ILLINOIS NATURAL HISTORY SURVEY
PRAIRIE RESEARCH INSTITUTE

Results from 2014 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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INHS Technical Report 2015 (06)
Prepared for Illinois Tollway Authority

Issue Date: 03/11/2015

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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 including prairie and old field habitats throughout the site and to document and interpret vegetation changes resulting from habitat management. Prior to 2014 monitoring, habitat management has included removal of invasive shrubs and trees, control of invasive species in terrestrial and wetland communities, localized seeding of native prairie and wetland species, mowing, and applications of prescribed fire. Objectives for 2014 monitoring were to collect and analyze data on species composition, diversity, and structural characteristics from permanent vegetation sample plots and to evaluate trends among vegetation types since the 2009 baseline sample. The 2014 sample data represent the forth complete year following removal of invasive shrubs and saplings (shrub removal was ongoing in a few plots during 2011). 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 2010-2013 sample data (Taft et al. 2010, Taft and Kron 2011, Taft and Kron 2012, Taft et al. 2013, Taft et al. 2014).

2014 Study Questions - This report focuses on results from vegetation monitoring in terrestrial plant communities during 2014 and compares trends among reference prairie, transect prairie, and old field habitats. There are four main questions:

1. What are the site-level comparative trends in species composition, total richness, and floristic quality and, for old field and prairie habitats (combining reference prairie and transect prairie habitats), what are the changes in species composition and abundance?
2. Based on 2014 sample data, are there significant between-subjects differences (vegetation types) with regard to ground layer and shrub/sapling parameters (e.g., composition, species richness, diversity, and cover - see Methods for full list and parameter definitions)?
3. Are there significant within-subjects differences (year) in these parameters since the 2009 baseline data for each vegetation type and when (what year) do the differences occur?
4. What are the between-subjects and within-subjects interactions (i.e., vegetation type x sample year) for selected vegetation parameters since 2009?

METHODS

Sample Design - As previously reported (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 northern-most transect which had four sample points. This array provided 49 sampling stations including 37 in non-wetland terrestrial vegetation and 12 in areas previously determined to be wetland habitat (Plocher et al. 1996). 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 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 plot, coincidentally, also was identified as an exceptional outlier in outlier analysis). This yields a total of 44 terrestrial vegetation sample plots examined in the current study.

Vegetation Sampling - Vegetation was sampled using 25-m^2 (5m x 5m) sampling plots with ground layer quadrats (1-m^2 [1 m x 1 m]) nested within. The baseline point for all sample plots is the southwest corner of the shrub/sapling plots, corresponding to the geographic coordinates associated with plot locations (Figure 2). Steel posts, 38.1 cm (15 inches) in length, were placed at the SW corner during 2010, replacing plastic posts established in 2009, to permanently mark each plot with fire-resistant markers. Plot sides were oriented along cardinal directions (the southern boundary runs W-E at 90°).

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^2 plots. Stems and clumps of stems from root crowns when joined above soil level were treated as 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. Each image was classified to accurately depict canopy cover by adjusting the contrast threshold display in comparison to continuous tone images (this procedure avoids tabulating clouds, for example, as canopy). 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^2 (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 include 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 2014 were from 18 June to 10 July and correspond to previous sample periods.

Data Preparation - 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. Cluster analysis was utilized to produce a hierarchical classification of sites from the 2009 baseline quantitative ground-layer sample data, based on the Sørensen similarity distance measure and flexible Beta linkage method (ß = -0.25). This procedure yielded 29 plots classified as old field/shrubland (now “old field”, following shrub removal) and 15 plots classified as prairie, including eight from the stratified array of plots and seven from the targeted reference prairie sampling effort (Taft et al. 2010). This classification is used as a framework for 2014 between-group comparisons and within-group comparisons across time intervals.

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 percent 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 were calculated following Whittaker (1975) and Taft et al. (2006):

Ground Layer Vegetation Diversity Measures

Native Species Density: Mean number of native species/quadrat (1 m^2)

Non-Native Species Density: Mean number of non-native species/quadrat (1 m^2)

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'n): $-\sum [p_i \ln(p_i)]$, 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 cover for each species in sample area

Percent Bare Ground: Estimate of bare ground for each quadrat

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

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

Mean Cn and **FQIn** are calculated using only native species.

Shrub-Sapling 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 (2002). Non-native species in the report will be indicated with an asterisk (*).

Statistical Analysis - Comparisons of vegetation parameters among old field, transect prairie, and reference prairie vegetation types were examined with means comparison tests. Assumptions for means comparison tests, including repeated measures, are multivariate normality, equality of variance of the within-subjects factor (sphericity), and homogeneity of variance for two or more groups (homoscedasticity or homogeneity of variance). Data found to be non-normally distributed were square-root transformed; however, untransformed values are presented in tables. Tests of equality of variance of the within-subjects factor time (year) were made with Mauchly's test. Tests for homoscedasticity were made with Levene's test. Statistical tests were performed with SPSS ver. 22 (IBM SPSS 2013).

Profile analysis (von Ende 1993) provides a framework for exploring patterns of change for the within-subjects factor (time [i.e., year]), between subjects factors (vegetation types), and the interaction. With profile analysis, the test of the within-subject factor examines the *flatness hypothesis* with the null expectation of no change over time. The between-subject factor is a test of the *levels hypothesis* with the null expectation of no difference among vegetation types. The test of interactions for each parameter, the major focus for profile analysis, is an examination of the *parallelism hypothesis*. The null expectation is a parallel response over time for vegetation types.

Question 1 – Site-level data on vegetation parameters are shown (e.g., total richness, dominant species, increasing and decreasing species). No statistical analysis.

Question 2 – Between-subject comparisons (vegetation types) for vegetation parameters (dependent variables) in 2014 were examined with one-way analysis of variance (1-way ANOVA). Homogeneity of variance, a required assumption for ANOVA, was examined with Levene's test statistic. With heteroscedasticity (when data lack homogeneity of variance),

Welch's test statistic (asymptotic F distribution) was used. The null expectation is no difference between subjects (vegetation types).

Question 3 - Within-subject differences (year) for each vegetation parameter (dependent variable) and vegetation type (independent variable) from 2009 to 2014 (test of flatness hypothesis) were examined with one-way repeated measures analysis of variance (1-way RM ANOVA). Where sphericity is lacking (significant Mauchly's test), the Greenhouse-Geisser adjustment to the degrees of freedom was applied. The null expectation is no within-subject differences (no change over time).

Question 4 - Between subjects differences (vegetation types, combining years), within subjects differences (year, combining vegetation type), and interactions (year x vegetation type [test of parallelism]) were examined with mixed model RM ANOVA using a 3 x 6 design (3 vegetation types and 6 years). With heteroscedasticity of variance across groups (significant Levene's test), the multivariate Pillai's Trace statistic was applied. The null expectation is no differences in the interaction profiles between years and vegetation types.

RESULTS AND DISCUSSION

Ground-Layer

Site Summary (all vegetation types combined)

Species Richness

About 241 taxa of vascular plants were recorded in 2014 from the combined ground-layer samples (44 plots, 132 quadrats) including 182 native species (about 75.5%), 48 non-native species, and 11 undetermined vegetative plants (Appendix 1). Combining results from general surveys and the 2009-2014 monitoring efforts, 449 vascular plant species have been recorded from the North Chicago Wetland Mitigation Site including two state threatened (*Amelanchier interior* and *Veronica scutellata*) and one state endangered (*Elymus trachycaulus*) species (Appendix 2). Recent changes in the Illinois list of threatened and endangered species list resulted in a delisting of *Oenothera perennis* (formerly State threatened) and a change in status for *Elymus trachycaulus* from state threatened to state endangered.

Throughout the study area there was an average species density per quadrat (1-m^2) of

17.5 native and 5.8 non-native species. Total plot richness averaged 31.1 native and 9.6 non-native species. Average percent ground cover was 176.4% and bare ground averaged 11.2%.

Dominant Species

The top-10 dominant species in descending rank order, accounting for 32.2% of the total importance, were *Sorghastrum nutans*, *Fragaria virginiana*, *Rhamnus cathartica**, *Andropogon gerardii*, *Solidago canadensis*, *Ratibida pinnata*, *Poa pratensis**, *Poa compressa**, *Cirsium arvense**, and *Schizachyrium scoparium.* This list suggests some ongoing changes among dominants. Although 8 of 10 are similar to 2013, the rank order has changed and the native warm-season grass *Sorghastrum nutans* now ranks first as the overall most dominant species. With the addition of *Schizachyrium scoparium* among the top-ranking species, three warm-season prairie grasses now rank in the top 10. *Rhamnus cathartica** has fallen to the third most important species and ranks as the most frequent species occurring in 71% of sample quadrats. *Lolium multiflorum**, an annual species planted at the site as a cover crop, was the top-ranking species in 2012 (Taft et al. 2013) but has continued to decline from 68% plot frequency in 2012, to 37% in 2013 and 31% in 2014. *Cirsium arvense** remains 9th in rank-order of abundance in 2014 occurring in 52% of the plots with about 4.7% total cover, similar to 2013 totals. This adventive thistle is classified as a noxious species in Illinois (Illinois Department of Agriculture 2003).

Overall Trends in Species Richness, Diversity, and Percent Cover

Total species richness in sample quadrats has increased since the baseline sample (Figure 3) from 215 in 2009 (79.5% native) to 248 in 2011-2012 and 241 in 2014 (75.5% native). Average native species density initially declined from 17.3 ± 1.2 SE to 15.5 ± 1.4 SE in 2011; since that time it has increased to 17.5 ± 1.13 SE but the overall differences are not significant (RM-ANOVA $F = 2.44$, df = 2.48, 106.4, $P = 0.08$). Mean plot species richness initially declined from 29.4 ±1.8 SE species per plot (combing species from three nested quadrat samples in each plot) to 25.3 ± 2.2 SE in 2011 but since has increased to 31.1 ± 1.7 SE in 2014. Native species richness in 2014, as in previous years, is highly correlated to native species density (Pearson Correlation Coefficient r = 0.97.4). Non-native species density increased since the baseline sample from 4.7 ± 0.34 SE to 5.8 ± 0.25 and the trend is significant (RM-

ANOVA F = 4.5, df = 3.3, 142.4, $P = 0.004$). The mean declined slightly in 2014 compared to 2013 but generally has increased since the baseline sample. Overall, the Shannon-Wiener index of diversity was similar to 2013 and the overall trend is not significant (RM-ANOVA F = 2.51, df = 2.7, 116.7, $P = 0.068$). Total percent ground cover has increased from the baseline total of 131% ± 12.8 SE to 176% ± 6.5 SE in 2014 and the difference is significant (RM-ANOVA F = 12.96, df = 2.6, 112.5, $P < 0.0001$). Percent bare ground has declined from the maximum of 34% ± 3.92 SE in 2010 to 11.2% ± 1.23 SE in 2014 and the difference is significant (RM-ANOVA F = 16.3, df = 2. 26, 97.2, $P < 0.0001$).

Trends with Floristic Quality Assessment

The overall Mean Coefficient of Conservatism (Mean C) for the site based on total 2014 plot sample data was 3.2 and Mean Cn was 3.96. The overall Floristic Quality Index (FQI) was 44.6 and native floristic quality (FQIn) was 55.2. Average plot Mean C initially declined from 2.33 ± 0.1 SE (2009); however, since reaching a minimum of 1.89 ± 0.13 SE in 2011 Mean C has increased. Overall Mean C in 2014 was 2.23 ± 0.12 SE and the differences over time are significant (RM-ANOVA F = 12.2, df = 3.2, 136.9, $P < 0.0001$). Similar to Mean C, average plot FQI initially declined but since 2011 has increased. Overall FQI in 2014 was 9.7 ± 0.76 SE and the differences over time are significant (RM-ANOVA F = 8.4, df = 2.6, 112.9, $P < 0.0001$).

2014 Habitat Characteristics

Dominant Species

OLD FIELD HABITAT. The top ten most abundant species from the old field habitat, accounting for 36.1% of the total importance value (IV 200), were *Solidago canadensis*, *Fragaria virginiana, Sorghastrum nutans, Ratibida pinnata, Cirsium arvense*, Rhamnus cathartica*, Andropogon gerardii, Dactylis glomerata*, Helianthus grosseserratus, and Poa compressa*.* Eight of these species (underlined) also were among the ten dominants in 2013. The establishment of two native warm-season prairie grasses, *A. gerardii* and *S. nutans*, into the top-ranking species observed in 2013 was strengthened as both species increased in percent frequency and cover (*S. nutans* from 47% frequency and 5% cover to 52% frequency and 8.9% cover; *A. gerardii* increased from 40% frequency and 5.9% cover to 47% frequency and 7.9%

cover).

PRAIRIE HABITAT (combining transect and reference prairie plots). The top ten ranking species from the prairie habitat accounted for 32.4% of the total importance and included: *Sorghastrum nutans, Andropogon gerardii, Rhamnus cathartica*, Schizachyrium scoparium, Poa pratensis*, Fragaria virginiana, Parthenium integrifolium, Ratibida pinnata, Poa compressa*, and Solidago juncea.* Only *P. compressa** is new to this top-ranking group compared to 2013. Three warm-season prairie grasses now rank among the top-four ranking species. *Rhamnus cathartica**, formerly the most dominant species, now ranks third in the ground layer in prairie habitat. It has the same frequency as in 2013 (84.4%) but percent cover declined 40.5%, possibly due to fire management.

Changes in Species Composition and Abundance

Thirty-six species recorded in the 2009 baseline sample were absent during the 2014 sample while 62 species recorded in 2014 were not recorded in 2009. About 65 other species were recorded sometime during the 2010 to 2013 period but were absent in the baseline and 2014 samples. Much of this fluctuation in the species pool is among low frequency taxa. Species increasing and decreasing greatest in frequency and percent cover since the 2009 baseline differ between the old field and prairie habitats (Tables 1a and 1b). In general, there has been a greater net increase in frequency and percent cover among species in old field habitat compared with prairie habitat.

OLD FIELD HABITAT. Twenty-one species increased in frequency greater than 15% since the 2009 baseline sample (Table 1a). The greatest increase was 65.6% by *Cirsium arvense**. Other species with prominent increase in frequency (> 40%) include *Sorghastrum nutans, Ratibida pinnata, Andropogon gerardii, Lolium multiflorum*,* and *Bidens frondosa*. Twenty-nine species increased in percent cover greater than 1%, most notably *Solidago canadensis, Dactylis glomerata*, Sorghastrum nutans, Fragaria virginiana, Andropogon gerardii* and *Cirsium arvense*.*

Nine species have decreased in frequency by more than 15% (Table 1a). The greatest decreasing species (≥ 30%) were *Cornus racemosa, Vitis riparia, Aster drummondii,* and

*Rhamnus cathartica**. Five species have declined in cover more than 1%, most notably *Rhamnus cathartica**, *Cornus racemosa,* and *Allium canadense* (Table 1a). Prescribed burning may account for the changes among woody plants.

Invasive species identified previously that can be management concerns still remain in old field habitat, most notably *Cirsium arvense**. Originally scarce in the baseline sample (3.5% frequency), this adventive species increased in frequency to 68% and 67% in old field plots during 2013 and 2014, respectively; percent cover declined slightly in 2014 from 8% to 7% (Figures 4a, 4b). *Cirsium vulgare**, another invasive adventive thistle, also listed as a noxious plant in Illinois, was absent in the baseline sample but increased dramatically in old field plots in 2010 but has declined since to 3.4% frequency in 2014 when it had 0.2% cover. *Dactylis glomerata** evidently was introduced either as a cover crop or unintentionally from seed in straw layered throughout most of the study area after shrub clearance. It occurred in 25% of the 87 old field sample plots in 2014 and had 9.5% cover. The annual grass *Lolium multiflorum** was planted as a cover crop in 2010-2011 and became widely established; it has declined since 2011 to 42.5% frequency and 1.6% cover in old field plots during 2014. *Rhamnus cathartica** remains among the most dominant species in the ground layer in old field habitat, though it has declined from the first to sixth ranking species. There has been a 30% decline in frequency and 25.6% decline in cover since the 2009 baseline sample.

PRAIRIE HABITAT. Ten species increased in frequency by more than 15%. Major increasers (> 20%) were *Sorghastrum nutans, Schizachyrium scoparium, Poa pratensis**, *Zizia aurea, Andropogon gerardii,* and *Cirsium arvense** (Table 1b). Seventeen species have increased in cover more than 1%; the largest increasers (>3%) were *Poa compressa**, *Spartina pectinata*, *Poa pratensis**, *Melilotus albus*/*officinalis**, and *Sorghastrum nutans*.

Twelve species declined in frequency > 15%. Species declining greatest (> 20%) were *Cerastium vulgatum**, *Solidago juncea, Dichanthelium acuminatum* var. *implicatum, Hieracium caespitosum**, *Vitis riparia,* and *Cornus racemosa* (Table 1b). Nineteen species declined in cover more than 1%, most notably (> 3% cover) *Rhamnus cathartica**, *Solidago juncea, Cornus racemosa, Carex pellita, Agrostis alba, Antennaria neglecta, Agrostis alba* var. *palustris,* and *Schizachyrium scoparium*.

Problem invasive species generally are less common in prairie habitats compared to old

field (Figures 4a, 4b). Nevertheless, frequency of *Cirsium arvense** continued a trend of increasing frequency in transect prairie plots reaching 33% in 2014 although percent cover declined from 1% to 0.27%. The increase in frequency likely is attributable to seedling establishment (60% of occurrences had less than 5% cover in quadrats) which may lead to future increases in percent cover. Percent frequency and cover remained 9.5% and 0.05%, respectively, in reference prairie plots. *Cirsium vulgare** was absent in transect prairie plots in 2014. *Dactylis glomerata* increased from 4% in 2013 to 8% frequency in 2014; however, percent cover remained low (0.15%) in contrast to old field plots (Figure 3b). Similar to old field plots, *Lolium multiflorum* in transect prairie plots has steadily declined in frequency and occurred in 16.7% of plots in 2014 with only 0.08% cover. As in 2013, during 2014 there were no recorded occurrences of *C. vulgare**, *Dactylis glomerata**, or *Lolium multiflorum** in reference prairie plots (Figure 3a, 3b). *Rhamnus cathartica* declined 7.6% in frequency since the 2009 baseline from 92% to 84.4% and percent cover declined 14.4% from 23% in 2009 to 8.8% in 2014. As a proportion of the original amount, this is a 62% reduction in cover and possibly is attributable to fire management.

Species Diversity, Structure, and Floristic Quality

There were significant between-group differences ($P < 0.05$) among reference prairie, transect prairie, and old field habitats for native species density, native and non-native species richness, and the Shannon-Wiener index of diversity (Table 2). Post hoc pairwise test results indicate the main differences were due to higher values in reference prairie habitat for native species density and native species richness and lower values in reference prairie for non-native species richness. Species density in reference prairie was about 38% greater than transect prairie and 46% greater than in old field habitats. Although reference prairie had greater percent cover compared to transect prairie and old field plots, the differences were not statistically significant. Percent bare ground was lower in reference prairie compared to transect prairie and old field habitats; however, the differences were only marginally significant ($P = 0.058$). FQA values (Mean C, Mean Cn, FQI, and FQIn) were significantly greater in reference prairie compared to transect prairie and old field habitats; however, transect prairie and old field habitats were not different (Table 2).

Time Series Differences for Vegetation Types (2009-2014)

Mean values (± 1 SE) for all parameters from 2009 to 2014 for each vegetation type (reference prairie, transect prairie, combined prairie plots, old field) and overall are shown in Table 3. The results for test of time differences (repeated measures analysis of variance within subjects tests [years – flatness hypothesis]) for each vegetation type (reference prairie, transect prairie, and old field) and parameter indicate significant within-subject differences for several metrics and vegetation types (Table 4), although the number of non-significant trends is increasing compared to past years as some parameters return to approximately baseline levels. Pairwise between-year comparisons indicate the greatest differences often occur between the baseline year (2009) or 2010 and remaining years; in some cases, trends are non-linear and some parameters return to baseline levels by year 2014 (Table 4). In general, habitat types demonstrate somewhat individualistic trajectories since the baseline sample with some evidence of convergence with parameters of percent cover and bare ground; for parameters of native species density, diversity, and floristic integrity (Mean C and FQI) transect prairie and old field vegetation types show trends towards convergence (Figure 5). See the following section Between-Subjects & Within-Subjects Differences and Interactions for further accounts of the test of the parallelism hypothesis (i.e., interaction between vegetation type and time [year]).

REFERENCE PRAIRIE. Native species density and richness reached their maximum values in 2011 following shrub removal, declined during 2012-2013 (drought years), and returned to near or slightly above baseline levels, respectively, during 2014 (Table 3, Figure 5). The trends for native species density over time indicate significant differences; however, trends for species richness are only marginally significant (Table 4). Fire increases species diversity in Illinois prairies (Bowles and Jones 2013) and fire management has occurred in non-wetland habitats during dormant and early spring periods from 2012-2014. However, the burns appear to have been somewhat patchy in the area of the reference prairie (wooden stakes placed in the vicinity of plots by restoration crews lack fire scares, but some plastic ribbon marking metal plot stakes were partially burned).

Trends for non-native species density and richness since the baseline measure have varied with increases and decreases (Table 3, Figure 5) and the overall trends are significant for non-native species density but only marginally significant for non-native richness (Table 4).

Percent cover has fluctuated greatly since the baseline measure and the overall trend is significant; however, percent bare ground has not changed (Table 4). Reduced cover during 2012 to nearly half the baseline level may have been a drought effect; however, percent cover actually increased for other vegetation types, perhaps recovering from past disturbances related to intensive shrub removal activities. Percent cover in reference prairie increased during 2013 and that increase was maintained in 2014 (Table 3, Figure 5), possibly indicating recovery from the 2012 drought. Diversity, dominance, and FQA metrics have not changed (Table 4).

TRANSECT PRAIRIE. Native species density and richness initially declined in transect prairie plots but since 2011 these parameters have increased but have yet to match baseline levels (Table 3, Figure 5). Nevertheless, the differences among years is significant and the null expectation of no change over time is rejected (Table 4). The prominent decline in native species density and richness during 2011 for transect prairie may be the result of disturbance related to mechanized shrub removal. This decline was not observed in reference prairie plots where shrub removal was performed manually, or in old field plots dominated by ruderal species with perhaps relatively greater adaptation to soil disturbances from mechanized shrub removal.

Mean non-native species density and richness have fluctuated since the baseline measure and after declining in 2012 have returned to levels similar to baseline in 2014 (Table 3, Figure 5). The overall difference among years for both non-native species density and richness is not statistically significant (Table 4). Percent cover initially declined but has increased since 2011and the trends are significant; percent bare ground increased to 31% in 2011, presumably a result of shrub-removal activities, but by 2014 returned to approximate baseline conditions; however, the trends for percent bare ground are not significant (Table 4). Dominance and diversity have fluctuated and the overall trend for diversity is significant. Floristic quality indices initially declined in Transect Prairie plots reaching minimum levels in 2011 but since have gradually increased and the differences are significant (Table 4); however floristic quality has yet to reach levels recorded in the 2009 baseline (Figure 5).

OLD FIELD PLOTS. Native species density has been constant while native species richness has fluctuated slightly, first declining and gradually increasing since 2011 to the maximum level in

2014 (Table 3, Figure 5) and the differences for native species richness are significant (Table 4). Non-native species density and richness initially increased but have remained relatively unchanged since 2011 (Table 3, Figure 5) and the trends are significant (Table 4). Native species diversity has increased slightly but the trends are not significant; in contrast, dominance sharply declined since 2011 (Table 3, Figure 5) and the overall difference is significant (Table 4). Percent cover and percent bare ground have fluctuated since 2009 with cover generally increasing and bare ground decreasing (Table 3, Figure 5) and the overall trends are significant (Table 4). Mean C and FQI fluctuated with an initial declines followed by recovery to approximate baseline levels (Table 3, Figure 5) and the differences are significant (Table 4).

Between-Subjects & Within-Subjects Differences and Interactions

The null parallelism hypothesis suggests that the interaction of the between-subjects factor and within-subjects factor does not differ and that slopes remain parallel over time. The null parallelism hypothesis can be rejected at the North Chicago Wetland Mitigation Site for most of the measured parameters. Interactions between vegetation type and year indicate significant differences for all vegetation parameters except Mean C, dominance, and diversity (Table 5). There are significant differences in between-subject (vegetation type) comparisons (i.e., examining dissimilarity in vegetation type by combining within-subject [year] differences) for all ground layer vegetative parameters (Table 5). Within-subjects differences (years, combining vegetation types and examining effect of year alone) are significant for most parameters and the exceptions, for non-native species density and native species richness, are marginally significant (Table 5). In general, reference prairie plots have the highest values through time for native species density, richness, percent cover, and floristic integrity (Figure 5). Transect prairie plots in the baseline sample year were intermediate between reference prairie and old field plots, declined in several parameters until 2011 converging with old field plots, and then for several parameters (e.g., native species density, richness, percent cover, bare ground, dominance, diversity, Mean C, and FQI) there has been a trend of recovery to approximate baseline levels (Figure 5).

A comparative study carried out at this site based on observed patterns of the baseline vegetation suggests that woody encroachment can lead to attrition of native species and plant functional groups in the ground-layer (Taft and Kron 2014). One measure of restoration

success at this site would be a prevention of further decline for parameters of conservation interest (e.g., species richness, diversity, and floristic quality). A more promising indication of restoration progress would be convergence with reference prairie for these parameters. Establishment of prairie seedlings can be hindered where woody encroachment is pronounced. Removal of the shrub layer reduces one limiting factor for propagule establishment; however, the response appears to have been forestalled in portions of the site by disturbances related to mechanical shrub removal. Nevertheless, there is evidence of gradual recovery since 2011. With one more year of data in the current monitoring program, it will be insightful to evaluate whether this progress continues.

Shrub/Sapling Stratum

Site Summary

Overall density of woody stems has greatly declined from 22,898/ha to 1,164/ha in 2014, a reduction of about 95%. (Table 6) Mean shrub density throughout the study area initially declined from an average of 58 stems/25-m^2 plot to less than 1 stem/plot in 2011; subsequently, overall shrub density has increased to 2.91 stems/plot in 2014 (Table 3). Mean percent canopy cover in 2014 was 13.1%, an increase from 8.8% in 2013 and mean leaf area index was 0.145, a slight increase from 0.1 in 2013. The overall test of time (within-subjects differences combing vegetation types) indicate significant differences (Friedman's test results, $P < 0.0001$) for shrub density, percent canopy cover, and leaf area index (Table 5).

Nine species were recorded in 2014 compared to 24 in the 2009 baseline sample and 33 taxa overall (some taxa were only present from 2010 to 2013). Dominant species in the combined old field and prairie plots were *Rhamnus cathartica*, Viburnum lentago,* and *Lonicera* x *bella** accounting for about 87% of the total stem counts. *Rhamnus cathartica** remains the dominant species with 42% of the IV and 53% of total stems.

2014 Habitat Differences

There was no difference in shrub density, canopy cover, or LAI among the vegetation types for 2014 (Table 2). Time series differences (from 2009 to 2014) were found with all vegetation types for shrub density, percent canopy cover, and LAI (Table 4). Primarily, differences were found between 2009 and 2010 and in some cases between 2010 and 2011 and

overall there has been a dramatic decline since the 2009 baseline sample for each vegetation type in stem density, percent canopy cover, and LAI (Figure 6). The vegetation type x year interactions were all significantly different (Table 5). The between-subjects differences (i.e., comparisons among vegetation types, averaging all years) were found for percent canopy cover and LAI; the between-subjects difference for stem density was marginally significant (Table 5). Within-subject differences (comparison among years, averaging vegetation types) were highly significant.

Stem density for *Rhamnus cathartica** has been reduced 95% from the baseline total, yet this invasive shrub remains the most dominant species in the shrub-sapling stratum even though it is limited to 13.6% of sample plots (Table 6). *Rhamnus cathartica** was recorded in 71% of all ground-layer sample quadrats, including 100% of reference prairie quadrats, 71% of transect prairie quadrats, and 64% of old field quadrats (Appendix 1). Similar frequencies were observed in the 2013 ground layer samples. Continued management with prescribed fire will be required to prevent re-establishment of *R. cathartica** into the shrub-sapling stratum.

Tree Stratum

Trees (woody stems $\geq$ 10 cm dbh) were recorded in 20 plots during 2014. In 2014, tree density was 34.3/ha and basal area was 4.51 m^2/ha. Seven species were recorded in the tree sample plots with *Crataegus coccinea* the dominant with about 33% of the IV for all species (Table 7). Other species present include *Ulmus americana* and *Prunus serotina* both with about 24% of the importance value. Most trees occur outside the 25-m^2 shrub-sapling plots and in many cases near the outer margins of the tree plots.

Threatened and Endangered Species

Previously, four state threatened species (*Elymus trachycaulus*, *Oenothera perennis*, *Veronica scutellata,* and *Amelanchier interior*) have been reported from the study site, with all but *V. scutellata* found in sample plots. However, during 2014 the Illinois Endangered Species Protection Board delisted *Oenothera perennis* after determining it was more common than previously believed (this study site is believed to support the state's largest population). Population size for *O. perennis* has fluctuated widely at this site over many years of observation; it was locally occasional during 2014, occurring just outside some sample quadrats.

Amelanchier interior formerly had three stems but in 2011 only a single small tree was found with two stems. In the baseline sample, 33 *Amelanchier* seedlings were recorded; however, none were recorded in 2014. A determination to species can be difficult with flowering and fruiting material of *Amelanchier* and typically is not possible with sterile seedlings; when present seedlings may represent one of three species: *A. interior*, *A. arborea*, and possibly *A. laevis*. *Elymus trachycaulus*, recently changed from state threatened to state endangered, remains locally occasional in the southern quarter of the site. It was recorded in 8 quadrats in 2014, double the count recorded in 2013. *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 two reference prairie sample quadrats (reference prairie plot 1). Previously, this sterile material was believed to be a species of either *Platanthera* or *Spiranthes*. A late summer site visit during 2014 determined this material to be *Spiranthes magnicamporum* (Great Plaines ladies' tresses) an orchid previously unrecorded for the site. *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; habitat is present in the North Chicago mitigation site that is similar to nearby populations.

SUMMARY AND CONCLUSIONS

Total species richness from vegetation sample plots remained somewhat steady in 2014 at 241 taxa. Species increasing in percent frequency and cover exceeded declining species in the old field vegetation type while decreasing species slightly exceeded increasing species in the prairie vegetation type. The warm-season prairie grass *Sorghastrum nutans* (Indian grass) emerged as the overall dominant species, replacing the adventive shrub *Rhamnus cathartica** which, while still among the most dominant species, moved to third rank following *Fragaria virginiana* (wild strawberry). Other non-native species that are abundant include the noxious thistle species *Cirsium arvense** and the cool-season grass *Dactylis glomerata**. The non-native cool season grasses *Poa pratensis** and *P. compressa** also have had notable increases throughout the study site.

Tests of the parallelism hypothesis, the null expectation being no difference in the interaction between vegetation type (between-subjects factor) and year (within-subjects factor),

indicate significant differences in the profiles for all three vegetation types for all parameters except Mean C (the average coefficient of conservatism). Between-subjects differences were found for all parameters indicating that the averages for vegetation types over time differ and the differences are statistically significant. Furthermore, within-subjects differences were found for all parameters except non-native species density and native species richness (both marginally significant [$P = 0.064$ and 0.056, respectively) indicating that significant time differences were found when combining vegetation types.

Reference prairie plots, although showing yearly fluctuation, continue to have the highest values for native species density and richness, percent ground cover, and FQA indices and in 2014 had the lowest non-native species richness. Declines observed in native species density and richness in 2012 to 2013 were reversed in 2014 with the highest levels recorded for native richness with an average of 45 species recorded in each sample plot (combined data from 3 quadrats [1-m^2]). Formerly, transect prairie plots had intermediate species richness, diversity, and floristic quality values between reference prairie and old field vegetation types. During 2010 and 2011, these parameters declined and transect prairie converged with the old field vegetation type, evidently a response to disturbances related to mechanized shrub removal. From 2012 to 2014, these transect prairie parameters began a gradually improved trajectory but remain below levels for reference prairie plots. Additional monitoring may determine whether this trend continues. Ongoing management with prescribed fire is needed to promote native species and to control invasive plants including woody species (Bowles and Jones 2013).

Among the most dynamic ground layer parameters have been percent ground cover and percent bare ground with each vegetation type showing increases and decreases, but not always parallel. There was a sharp decline in percent ground cover in reference prairie plots in 2012, possibly a result of the widespread drought conditions, but evidence of recovery in 2013 that was maintained in 2014. Percent ground cover declined for transect prairie vegetation type in 2012 but since has increased; in contrast, percent ground cover has increased relatively steadily in the old field vegetation type. Percent bare ground has declined greatly among old field plots, initially as a response of cover crop establishment and more recently with increases among prairie species (presumably from added seed) and *Solidago canadensis* (Canada goldenrod).

The shrub/sapling stratum control efforts greatly reduced the canopy and stem density of woody species throughout the study area. However, *Rhamnus cathartica** in particular

remains among the dominant species in the ground layer samples suggesting it has great potential to become re-established in the woody overstory leading to a further suppression of native grassland species diversity.

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Table 1a. Species from old field habitat that in 2014 increased and decreased in frequency (> 15%) 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 > 15% Frequency	Increase % Frequenc	SPP INCREASING BY > 1.0% COVER	Increase % Cover	SPP DECREASING BY > 15% Frequency	Decrease % Frequenc	SPP DECREASING BY > 1.0% COVER	Decreas e % Cover
*Cirsium arvense**	65.6	*Solidago canadensis*	9.7	*Cornus racemosa*	-52.7	*Rhamnus cathartica**	-25.6
Sorghastrum nutans	51.7	*Dactylis glomerata**	9.5	*Vitis riparia*	-48.7	*Cornus racemosa*	-4.5
Ratibida pinnata	47.9	*Sorghastrum nutans*	8.9	*Aster drummondii*	-34.8	*Allium canadense*	-3.8
Andropogon gerardii	46.1	*Fragaria virginiana*	8.1	*Rhamnus cathartica**	-30.4	*Circaea lutetiana*	-1.1
*Lolium multiflorum**	42.5	*Andropogon gerardii*	7.8	*Anemone virginiana*	-28.3	*Aster lateriflorus*	-1.0
Bidens frondosa	40.2	*Cirsium arvense**	7.0	*Lonicera × bella**	-20.1		
Ambrosia artemisiifolia	35.8	*Ratibida pinnata*	6.7	*Circaea lutetiana*	-20.0		
Schizachyrium scoparium	32.3	*Helianthus grosseserratus*	6.4	*Hypericum punctatum**	-20.0		
Helianthus grosseserratus	31.7	*Poa pratensis**	5.1	*Aster simplex*	-16.6		
Solidago canadensis	28.2	*Ambrosia artemisiifolia*	3.3				
Euthamia graminifolia	28.2	*Poa compressa**	3.2				
Oxalis stricta	26.9	*Dichanthelium praecocius*	3.1				
*Dactylis glomerata**	25.3	*Chenopodium sp*	2.7				
Dichanthelium praecocius	24.1	*Euthamia graminifolia*	2.5				
Lactuca canadensis	20.7	*Lactuca canadensis*	2.5				
Rudbeckia hirta	19.5	*Schizachyrium scoparium*	2.4				
Aster pilosus	18.7	*Daucus carota**	2.0				
Zizia aurea	16.5	*Solidago gigantea*	1.9				
Echinacea pallida	16.1	*Setaria glauca**	1.9				
*Poa compressa**	15.8	*Aster praealtus*	1.8				
*Melilotus albus/officinalis**	15.4	*Phalaris arundinacea**	1.8				
		*Melilotus albus/officinalis**	1.7				
		Potentilla simplex	1.6				
		*Lolium multiflorum**	1.6				
		Zizia aurea	1.5				
		Prunella vulgaris v. elongatc	1.3				
		Viola pratincola	1.2				
		Oxalis stricta/dillenii	1.0				
		Rubus pensilvanicus	1.0				

Table 1b. Species from prairie habitat that in 2014 increased and decreased in frequency (> 15%) and in % cover (> 1%), compared to baseline (2009) levels at the North Chicago Wetland Mitigation Site, Lake County, Illinois.

----------PRAIRIE INCREASERS----------			
SPP INCREASING BY > 15% Frequency	Increase % Freq.	SPP INCREASING BY > 1.0% COVER	Increase % Cover
Sorghastrum nutans	42.7	*Poa compressa**	5.1
Schizachyrium scoparium	28.2	*Spartina pectinata*	3.9
*Poa pratensis**	26.9	*Poa pratensis**	3.5
Zizia aurea	23.1	*Melilotus alba/officinalis**	3.4
Andropogon gerardii	22.9	*Sorghastrum nutans*	3.0
*Cirsium arvense**	22.2	*Leucanthemum vulgare**	2.8
Krigia biflora	17.8	*Dichanthelium praecocius*	2.6
*Achillea millefolium**	16.4	*Ratibida pinnata*	2.5
Ambrosia artemisiifolia	15.8	*Euthamia graminifolia*	2.3
*Hypericum perforatum**	15.6	*Fragaria virginiana*	2.2
		*Achillea millefolium**	2.2
		Parthenium integrifolium	2.1
		Vicia americana	2.0
		Ambrosia artemisiifolia	1.8
		Monarda fistulosa	1.6
		Aster praealtus	1.5
		*Lonicera × bella**	1.4

----------PRAIRIE DECREASERS----------			
SPP DECREASING BY > 15% Frequency	Decrease % Freq.	SPP DECREASING BY > 1.0% COVER	Decrease % Cover
*Cerastium vulgatum**	-35.8	*Rhamnus cathartica**	-14.3
Solidago juncea	-28.2	*Solidago juncea*	-13.3
Dichanthelium implicatum	-25.8	*Cornus racemosa*	-8.3
*Hieracium caespitosum**	-25.8	*Carex pellita*	-3.7
Vitis riparia	-22.2	*Agrostis alba*	-3.4
Cornus racemosa	-21.6	*Antennaria neglecta*	-3.3
Aster ericoides	-17.8	*Agrostis alba* var. *palustris*	-3.2
Aster simplex	-16.0	*Schizachyrium scoparium*	-3.0
*Hypericum punctatum**	-16.0	*Daucus carota**	-2.9
Prenanthes aspera/racemosa	-16.0	*Carex buxbaumii*	-2.5
Rosa carolina	-15.6	*Solidago gigantea*	-2.3
Crataegus sp. (seedling)	-15.3	*Zanthoxylum americanum*	-2.2
		Aster drummondii	-1.7
		*Hieracium caespitosum**	-1.6
		Silphium terebinthinaceum	-1.6
		Potentilla simplex	-1.5
		Rosa carolina	-1.5
		Solidago rigida	-1.1
		Carex hirsutella	-1.0

Table 2. One way analysis of variance results for test of between subjects differences (vegetation types) for vegetation parameters (dependent variables) based on 2014 sample data from the North Chicago Wetland Mitigation Site. Post-hoc test results examine individual paired comparisons to identify where differences among independent variables occur. Different letters indicate significant pairwise comparisons. Tukey post hoc test applied except to the Welch ANOVA tests where Dunnett T3 post hoc test was applied.

2012 SAMPLE DATA	Reference Prairie		Transect Prairie		Old Field		1-Way Analysis of Variance			Reference Prairie	Transect Prairie	Old Field
PARAMETERS	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**df 1, df2**	**F stat**	***Prob.***	Post-Hoc Test Results		
Grd-Layer Spp Diversity												
Native Spp. Density/Quadrat	27.95	1.65	17.29	1.83	15.08	1.20	2, 41	13.0	**<0.001**	*a*	*b*	*b*
Non-Native Sp Density/Quadrat	5.33	0.48	6.99	0.47	5.61	0.32	2, 41	2.75	0.076	-	-	-
Native Richness/Plot	45.14	2.31	30.88	2.36	27.76	1.92	2, 15.8	16.99*	**<0.001**	*a*	*b*	*b*
Non-Native Richness/Plot	7.57	0.57	11.13	0.83	9.62	0.50	2, 41	3.77	**0.031**	*a*	*b*	*ab*
Shannon-Wiener Diversity (natives)	2.80	0.11	2.37	0.08	2.49	0.08	2, 41	2.26	0.118	-	-	-
Simpson's Dominance (all spp.)	0.09	0.02	0.16	0.05	0.11	0.01	2, 41	1.87	0.167	-	-	-
Vegetation Structure												
% Vegetation Cover	208.12	21.01	173.63	13.32	169.55	6.50	2, 41	2.41	0.103	-	-	-
% Bare Ground	4.81	1.37	14.25	3.74	11.85	1.42	2, 41	3.06	0.058	-	-	-
Florisitic Quality Assessment												
Mean C /quadrat (1-m^2)	3.54	0.14	2.06	0.09	1.96	0.11	2, 16.8	46.97*	**<0.001**	*a*	*b*	*b*
Mean Cn/quadrat	4.21	0.16	2.92	0.08	2.70	0.13	2, 16.5	31.05*	**<0.001**	*a*	*b*	*b*
FQI /quadrat	18.68	1.08	8.57	0.73	7.89	0.66	2, 41	32.10	**<0.001**	*a*	*b*	*b*
FQIn /quadrat	22.22	1.27	12.02	0.73	10.63	0.77	2, 41	26.74	**<0.001**	*a*	*b*	*b*
Shrub Stratum												
Shrub Density/ 25-m^2 plot	0.86	0.59	4.13	2.41	3.70	1.72	2	1.28**	0.528	-	-	-
% Canopy Cover	3.69	0.80	10.01	2.33	16.20	3.52	2	4.05**	0.132	-	-	-
Leaf Area Index (LAI)	0.02	0.01	0.08	0.02	0.19	0.07	2	3.84**	0.147	-	-	-

* Welch's test applied (asymptotically F distributed, used when equality of means test fails [Levene's test]).

** Kruskal-Wallis test (data do not meet normaility requirements of ANOVA)

Table 3. Summary variables for the North Chicago Wetland Mitigation Site from terrestrial (non-wetland) communities presenting data from the 2009 baseline samples to 2014. See Methods section for detailed description of metrics and parameters. COMBINED PRAIRIE combines data from transects and reference prairie samples. n = sample size (quadrat #); quadrats are 1-m^2. SE = standard error.

		TOTAL (n = 132)		OLD FIELD (n = 87)		COMBINED PRAIRIE (n = 45)		TRANSECT PRAIRIE (n = 24)		REFERENCE PRAIRIE (n = 21)	
	YEAR	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**
Species Diversity and Structure Parameters											
Native Species Density	2009	17.28	1.23	13.66	1.31	24.27	1.32	20.18	1.07	28.95	0.58
	2010	16.97	1.20	13.61	1.32	23.47	1.30	19.50	0.94	28.00	0.94
	2011	15.53	1.41	12.77	1.31	20.86	2.88	12.10	2.48	30.86	1.43
	2012	15.72	1.14	13.92	1.35	19.20	1.83	13.46	1.46	25.76	0.67
	2013	15.70	1.05	13.26	1.17	20.40	1.52	16.79	1.74	24.52	1.46
	2014	17.53	1.13	15.08	1.20	22.27	1.86	17.29	1.83	27.95	1.65
Non-Native Spp.	2009	4.75	0.34	3.93	0.34	6.33	0.55	6.88	0.80	5.71	0.74
	2010	5.42	0.37	4.67	0.44	6.89	0.51	8.21	0.45	5.38	0.58
	2011	5.97	0.32	5.56	0.32	6.76	0.69	7.33	1.05	6.10	0.86
	2012	5.36	0.25	5.40	0.33	5.29	0.37	5.96	0.48	4.52	0.44
	2013	5.89	0.27	5.78	0.33	6.11	0.47	7.13	0.48	6.11	0.47
	2014	5.82	0.25	5.61	0.32	6.22	0.39	7.00	0.47	6.22	0.39
Native Richness	2009	29.39	1.82	24.69	2.13	38.47	1.79	33.25	1.47	44.43	1.45
	2010	27.18	1.79	22.59	1.94	36.07	2.40	28.63	1.46	44.57	1.80
	2011	25.32	2.18	21.00	2.18	33.67	4.13	20.88	3.50	48.29	1.46
	2012	28.66	1.85	26.21	2.38	33.40	2.56	26.13	2.60	41.71	1.44
	2013	28.48	1.65	24.97	1.95	35.27	2.18	30.50	2.39	40.71	2.61
	2014	31.09	1.67	27.76	1.92	37.53	2.49	30.88	2.36	45.14	2.31
Non-Native Richness	2009	6.86	0.54	5.72	0.58	9.07	0.88	10.88	0.90	7.00	1.21
	2010	8.11	0.51	7.17	0.60	9.93	0.78	12.00	0.42	7.57	1.02
	2011	10.25	0.50	10.17	0.53	10.40	1.10	12.13	1.61	8.43	1.17
	2012	8.84	0.45	9.17	0.58	8.20	0.68	9.63	0.98	6.57	0.48
	2013	9.39	0.42	9.48	0.49	9.20	0.82	11.13	0.93	7.00	0.82
	2014	9.57	0.40	9.62	0.50	9.47	0.69	11.13	0.83	7.57	0.57
C dom 45 (allspp)	2009	0.21	0.03	0.27	0.03	0.10	0.01	0.11	0.02	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	0.07	0.09	0.01
	2012	0.18	0.02	0.20	0.03	0.13	0.01	0.15	0.02	0.11	0.01
	2013	0.11	0.01	0.12	0.02	0.08	0.01	0.08	0.01	0.09	0.01
	2014	0.12	0.01	0.11	0.01	0.13	0.03	0.16	0.05	0.09	0.02
Hn 45	2009	2.43	0.09	2.30	0.12	2.66	0.06	2.56	0.09	2.78	0.06

		TOTAL (n = 132)		OLD FIELD (n = 87)		COMBINED PRAIRIE (n = 45)		TRANSECT PRAIRIE (n = 24)		REFERENCE PRAIRIE (n = 21)	
	YEAR	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**
	2010	2.46	0.08	2.33	0.12	2.72	0.05	2.71	0.06	2.73	0.09
	2011	2.36	0.10	2.35	0.12	2.37	0.17	1.97	0.22	2.83	0.08
	2012	2.22	0.08	2.10	0.11	2.46	0.09	2.25	0.12	2.69	0.07
	2013	2.52	0.07	2.40	0.09	2.74	0.08	2.69	0.11	2.80	0.11
	2014	2.52	0.06	2.49	0.08	2.57	0.09	2.37	0.08	2.80	0.11
% Cover	2009	131.26	12.84	85.76	6.85	219.22	21.59	154.96	20.87	292.67	7.96
	2010	105.52	11.32	68.18	7.69	177.70	19.00	126.48	18.19	236.24	17.09
	2011	130.09	9.97	110.23	7.30	168.50	23.00	95.29	10.96	252.17	17.26
	2012	149.81	6.35	150.37	8.68	148.72	8.47	129.69	7.79	150.37	8.68
	2013	148.26	6.17	140.47	6.30	163.33	12.84	128.08	13.89	203.62	7.73
	2014	176.43	6.52	169.55	7.33	189.72	12.52	173.63	13.32	208.12	21.01
% BG	2009	25.91	2.90	34.34	3.30	9.60	2.20	13.39	3.56	5.26	1.21
	2010	34.07	3.92	44.93	4.34	13.07	4.21	20.15	6.83	4.98	2.41
	2011	18.98	2.58	19.50	3.12	17.99	4.70	30.92	5.59	3.21	0.68
	2012	14.03	2.16	14.30	3.11	13.51	2.15	19.63	1.57	6.52	2.13
	2013	13.76	1.44	14.34	1.28	12.64	3.48	21.10	4.81	2.98	0.75
	2014	11.17	1.23	11.85	1.42	9.84	2.38	14.25	3.74	4.81	1.37
Floristic Quality Assessment Metrics											
Native Mean C	2009	3.01	0.10	2.74	0.10	3.53	0.18	2.95	0.07	4.18	0.16
	2010	2.94	0.12	2.66	0.13	3.49	0.20	2.86	0.08	4.21	0.14
	2011	2.71	0.14	2.51	0.12	3.08	0.31	2.23	0.35	4.05	0.14
	2012	2.87	0.12	2.62	0.12	3.37	0.22	2.72	0.15	4.12	0.19
	2013	2.99	0.12	2.73	0.13	3.49	0.19	2.88	0.09	4.18	0.16
	2014	2.98	0.12	2.70	0.13	3.52	0.19	2.92	0.08	4.21	0.16
Mean C	2009	2.33	0.11	2.09	0.11	2.82	0.18	2.22	0.09	3.50	0.12
	2010	2.25	0.12	2.00	0.12	2.72	0.21	2.02	0.09	3.52	0.10
	2011	1.89	0.13	1.67	0.11	2.32	0.30	1.38	0.23	3.39	0.09
	2012	2.11	0.13	1.83	0.12	2.64	0.24	1.88	0.16	3.50	0.15
	2013	2.16	0.12	1.88	0.12	2.70	0.21	2.01	0.10	3.48	0.14
	2014	2.23	0.12	1.96	0.11	2.75	0.21	2.06	0.09	3.54	0.14
Native FQI	2009	12.61	0.85	10.06	0.73	17.53	1.35	13.16	0.47	22.52	1.03
	2010	12.26	0.83	9.77	0.71	17.06	1.33	12.61	0.61	22.14	0.48
	2011	10.92	0.95	8.90	0.74	14.82	2.10	8.14	1.42	22.46	1.04
	2012	11.59	0.84	9.79	0.78	15.08	1.62	9.99	0.93	20.89	1.18
	2013	12.02	0.79	10.00	0.75	15.91	1.36	11.79	0.87	20.63	1.11
	2014	12.72	0.84	10.63	0.77	16.78	1.52	12.02	0.73	22.22	1.27
FQI	2009	9.98	0.75	7.86	0.65	14.07	1.27	9.89	0.51	18.84	0.74
	2010	9.51	0.74	7.49	0.62	13.41	1.33	8.92	0.61	18.55	0.34

		TOTAL (n = 132)		OLD FIELD (n = 87)		COMBINED PRAIRIE (n = 45)		TRANSECT PRAIRIE (n = 24)		REFERENCE PRAIRIE (n = 21)	
	YEAR	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**
	2011	8.05	0.86	6.23	0.65	11.56	1.91	5.24	1.06	18.79	0.66
	2012	8.81	0.77	7.12	0.68	12.06	1.56	7.05	0.86	17.78	0.95
	2013	8.93	0.73	7.11	0.65	12.46	1.33	8.32	0.82	17.19	0.95
	2014	9.73	0.76	7.89	0.66	13.29	1.48	8.57	0.73	18.68	1.08
Shrub Density and Percent Cover Parameters											
Shrub Density	2009	58.48	5.05	55.55	6.03	64.13	9.25	90.00	8.18	34.57	8.09
	2010	14.50	3.64	11.62	3.51	20.07	8.25	1.38	0.63	41.43	14.04
	2011	0.84	0.26	0.69	0.30	1.13	0.49	1.00	0.87	1.29	0.42
	2012	2.70	0.80	2.72	1.08	2.67	1.16	1.50	1.24	2.72	1.08
	2013	2.84	0.88	2.79	1.19	2.93	1.21	0.88	0.64	5.29	2.24
	2014	2.91	1.22	3.07	1.72	2.60	1.34	4.13	2.41	0.86	0.59
% Canopy Cover	2009	67.63	3.08	76.03	1.78	51.38	6.67	69.05	6.40	31.19	6.38
	2010	33.04	3.79	38.41	4.97	22.66	4.76	12.09	2.90	34.74	7.50
	2011	15.95	2.71	15.59	3.44	16.64	4.52	17.28	7.20	15.91	5.72
	2012	12.09	2.25	15.63	3.19	5.25	1.10	7.60	1.62	15.63	3.19
	2013	8.76	2.01	10.76	2.91	4.91	1.41	7.94	2.10	1.45	0.62
	2014	13.09	2.45	16.20	3.52	7.07	1.51	10.01	2.33	3.69	0.80
Leaf Area Index (LAI)	2009	1.24	0.09	1.46	0.07	0.81	0.17	1.24	0.20	0.31	0.09
	2010	0.49	0.09	0.63	0.13	0.24	0.07	0.11	0.04	0.40	0.12
	2011	0.20	0.05	0.20	0.07	0.20	0.06	0.21	0.10	0.18	0.07
	2012	0.13	0.04	0.18	0.05	0.04	0.01	0.06	0.02	0.18	0.05
	2013	0.10	0.04	0.13	0.06	0.04	0.01	0.07	0.02	0.01	0.00
	2014	0.15	0.04	0.19	0.07	0.05	0.01	0.08	0.02	0.02	0.01

Table 4. One-way repeat measures analysis of variance results and pairwise comparisons examining within subject (year [2014]) differences for each vegetation type among ground layer and shrub/sapling parameters at the North Chicago Wetland Mitigation Site. Different letters in post-hoc comparisons indicate significant pairwise differences. Woody stratum data were non-normal and analyzed with Friedman's test.

		spher-	Within Subject (Year)			Pairwise Comparisons[1]					
PARAMETER	Veg. Type	icity	*F*	*df*	*P*	2009	2010	2011	2012	2013	2014
Ground Layer											
Native Spp. Density	Prairie	*	4.55	5, 30	**.003**	*a*	*abc*	*ab*	*c*	*c*	*ac*
	Trans Prairie	**	7.55	1.6, 11.2	**.011**	*a*	*a*	*b*	*b*	*a*	*a*
	Old Field	**	1.21	2.2, 60.9	.309	-	-	-	-	-	-
Non-Native Spp. Density	Prairie	*	3.60	5, 30	**.011**	*ac*	*ac*	*a*	*b*	*bc*	*ac*
	Trans Prairie	*	2.30	5, 35	.066	-	-	-	-	-	-
	Old Field	**	6.89	3.2, 88.9	**< 0.001**	*a*	*b*	*bc*	*bc*	*c*	*c*
Native Spp. Richness	Prairie	*	2.49	5, 30	.053	-	-	-	-	-	-
	Trans Prairie	**	5.86	1.4, 9.8	**.029**	*ae*	*bce*	*c*	*abd*	*e*	*e*
	Old Field	**	4.70	2.7, 74.6	**.006**	*abcd*	*ab*	*b*	*ac*	*ac*	*d*
Non-Native Spp. Richness	Prairie	*	2.44	5, 30	.057	-	-	-	-	-	-
	Trans Prairie	*	1.51	5, 35	.212	-	-	-	-	-	-
	Old Field	**	15.65	3.1, 85.8	**< 0.001**	*a*	*b*	*c*	*d*	*cd*	*cd*
Diversity	Prairie	*	0.51	5, 30	.765	-	-	-	-	-	-
	Trans Prairie	*	4.44	5, 35	**.003**	*ab*	*a*	*b*	*b*	*ac*	*bc*
	Old Field	**	1.75	2.7, 74.9	.169	-	-	-	-	-	-
Dominance	Prairie	*	1.15	5, 30	.355	-	-	-	-	-	-
	Trans Prairie	**	2.97	1.7, 12.1	.094	-	-	-	-	-	-
	Old Field	**	9.55	2.9, 82.5	**< 0.001**	*ac*	*bd*	*ab*	*cd*	*e*	*e*
% Ground Cover	Prairie	*	12.96	5, 30	**< 0.001**	*a*	*bd*	*b*	*c*	*b*	*cd*
	Trans Prairie	*	5.06	5, 35	**.001**	*ae*	*ab*	*bc*	*a*	*ad*	*e*
	Old Field	**	40.36	3.6, 102	**< 0.001**	*a*	*b*	*c*	*de*	*d*	e
% Bare Ground	Prairie	**	1.47	2.4, 14.6	.263	-	-	-	-	-	-
	Trans Prairie	**	2.62	2.1, 14.6	.105	-	-	-	-	-	-
	Old Field	**	24.53	2.5, 69.8	**< 0.001**	*a*	*b*	*c*	*d*	*cd*	*d*
Mean C	Prairie	*	0.59	5, 30	.705	-	-	-	-	-	-
	Trans Prairie	**	6.21	1.6, 11.5	**.018**	*a*	*a*	*b*	*a*	*a*	*a*
	Old Field	**	7.05	3.1, 87.4	**< 0.001**	*a*	*ac*	*b*	*c*	*cd*	*ad*
FQI	Prairie	*	1.40	5, 30	.249	-	-	-	-	-	-
	Trans Prairie	**	8.44	1.4, 10.1	**.010**	*a*	*a*	*b*	*c*	*a*	*a*
	Old Field	**	4.46	2.5, 70.8	**.009**	*ac*	*ac*	*b*	*a*	*a*	*c*
Shrub/Sapling Stratum			Chi-sq								
Shrub Density	Prairie	***	29.30	5.00	**< 0.0001**	*a*	*a*	*b*	*b*	*b*	*b*
	Trans Prairie	***	29.12	5.00	**< 0.0001**	*a*	*b*	*b*	*b*	*b*	*b*
	Old Field	***	90.32	5.00	**< 0.0001**	*a*	*b*	*c*	*bd*	*cd*	*cd*
% Canopy Cover	Prairie	***	28.55	5.00	**0.0001**	*ab*	*b*	*ac*	*cd*	*d*	*cd*
	Trans Prairie	***	18.93	5.00	**0.002**	*a*	*bc*	*bc*	*bc*	*b*	*c*
	Old Field	***	77.16	5.00	**< 0.0001**	*a*	*b*	*cd*	*c*	*d*	*c*
LAI	Prairie	***	24.82	5.00	**0.0001**	-	-	-	-	-	-
	Trans Prairie	***	16.47	5.00	**0.006**	*a*	*b*	*b*	*b*	*b*	*b*
	Old Field	***	72.58	5.00	**< 0.0001**	*a*	*b*	*bcd*	*cd*	*c*	*bcd*

* = sphericity assumed, ** = Greenhouse-Geisser adjustment when sphericity not found; *** non-normal, uncorrected with transformation (Chi-square and pairwise comparison results from Friedman's test)
1 = adjustment for multiple comparisons: Sidak.

Table 5. Mixed model repeat measures analysis of variance comparing trends among vegetation parameters (dependent variables) and vegetation type (independent variables) from the North Chicago Wetland Mitigation Site from 2009 to 2014. Design is 3 x 6 mixed model analysis (3 vegetation types, 6 years) for each dependent variable.

	Between Subjects (Vegetation Types)		Within Subject (Year)		Vegetation Type x Year	
PARAMETER	*F*	*P*	*F*	*P*	*F*	*P*
Ground Layer						
Native Spp. Density	20.49	**<0.0001**	4.01	**0.015***	3.88	**0.003***
Non-Native Spp. Density	6.30	**.004**	2.35	0.064*	3.19	**0.003***
Native Spp. Richness	15.26	**< 0.0001**	2.70	0.056*	3.18	**0.009***
Non-Native Spp. Richness	6.98	**.002**	4.27	**0.005***	3.43	**0.002***
Mean C	31.97	**< 0.0001**	9.03	**<0.0001***	1.65	0.134*
FQI	44.26	**< 0.0001**	7.57	**0.0003***	2.73	**0.022***
% Cover	46.69	**< 0.0001**	7.07	**<0.0001**	17.48	**< 0.0001**
% BG	14.40	**< 0.0001**	3.35	**0.014^**	3.77	**0.0004^**

*data lacking sphericity (variances not equal across within-subject variables; df adjusted with Greenhouse-Geisser adjustment.

^Pillai's Trace multivariate test (covariance matrices are not equal across groups)

	Between Subjects (Vegetation Types)[1]		Within Subject (Year)[2]		Vegetation Type x Year[3]	
	K-W test	*P*	Chi-square	*P*	*F*^	*P*^
Ground Layer						
Dominance	22.47	**<0.0001**	50.55	**<0.0001**	1.68	.102
Diversity	28.61	**<0.0001**	11.52	**0.042**	0.85	.582
Shrub/Sapling Stratum						
Stem Density	5.95	0.051	134.45	**< 0.0001**	2.61	**.009**
% Canopy Cover	7.15	**0.028**	115.34	**<0.0001**	4.36	**< 0.0001**
LAI	8.74	**0.013**	103.86	**<0.0001**	3.35	**0.001**

[1] Kruskal-Wallis test (non-parametric 1-way anova)

[2] Friedman test (non-parametric alternative to the 1-way rm-anova)

[3] assumptions of normality for rm-anova not met; this statistic may be unreliable (no non-parametric statistic for mixed model interactions)

^Pillai's Trace multivariate test (covariance matrices are not equal across groups)

Table 6. Summary from 2014 sample data in shrub/sapling plots (25-m^2) with comparison to 2009 baseline data at the North Chicago Wetland Mitigation site, Lake County, Illinois. * indicates non-native species. Species with 0 values were present between 2010 and 2013.

	2014 Shrub/Sapling Data			Change in Stem Density from 2009	
Species	% Frequency	Total Density	IV 200	Total Change	% Change
Acer negundo	0.0	0.0	0.0	0	0.0
Amelanchier arborea	0.0	0.0	0.0	0	0.0
Amelanchier interior	2.3	2.0	6.8	-1	-33.3
Cornus obliqua	0.0	0.0	0.0	-5	-100.0
Cornus racemosa	6.8	6.0	20.5	-730	-99.2
Cornus stolonifera	0.0	0.0	0.0	-20	-100.0
Crataegus calpodendron	0.0	0.0	0.0	-6	-100.0
Crataegus mollis	0.0	0.0	0.0	-1	-100.0
Crataegus coccinea	0.0	0.0	0.0	-32	-100.0
Crataegus punctata	0.0	0.0	0.0	-2	-100.0
Crataegus sp.	0.0	0.0	0.0	-5	-100.0
*Elaeagnus umbellata**	0.0	0.0	0.0	0	0.0
Fraxinus lanceolata	2.3	1.0	6.0	0	0.0
*Lonicera × bella**	4.5	13.0	20.7	-151	-92.1
Malus ioensis	0.0	0.0	0.0	-4	-100.0
*Malus pumila**	0.0	0.0	0.0	-1	-100.0
Parthenocissus quinquefolia	2.3	1.0	6.0	1	0.0
Populus deltoides	0.0	0.0	0.0	0	0.0
Populus tremuloides	0.0	0.0	0.0	-13	-100.0
Prunus americana	0.0	0.0	0.0	-1	-100.0
Prunus serotina	0.0	0.0	0.0	0	0.0
Prunus virginiana	0.0	0.0	0.0	-9	-100.0
Quercus macrocarpa	0.0	0.0	0.0	0	0.0
*Rhamnus cathartica**	13.6	68.0	84.7	-1291	-95.0
*Rhamnus frangula**	0.0	0.0	0.0	-25	-100.0
Rhus glabra	0.0	0.0	0.0	-2	-100.0
*Rosa multiflora**	2.3	3.0	7.6	3	0.0
Ulmus americana	0.0	0.0	0.0	0	0.0
Viburnum lentago	6.8	30.0	39.2	-107	-78.1
*Viburnum opulus**	0.0	0.0	0.0	-3	-100.0
Viburnum recognitum	2.3	4.0	8.4	3	300.0
Vitis riparia	0.0	0.0	0.0	-7	-100.0
Zanthoxylum americanum	0.0	0.0	0.0	-39	-100.0
TOTALS	N = 9	128.0	200.0	-2,448.0	-95.0
Avg. Density/plot		2.9		-54.3	
Density/ha		1,163.5		-21,734.3	

Table 7. Summary of tree plot sample data from the 2009 baseline to 2014 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			2012			2013			2014			Change in Stem Density from 2009*	
	Basal Area (m^2/ha)	Density/ ha	IV200	Basal Area (m^2/ha)	Density/ ha	IV200	Basal Area (m^2/ha)	Density/ ha	IV200	Basal Area (m^2/ha)	Density/ ha	IV200	Basal Area (m^2/ha)	Density/ ha	IV200	Basal Area (m^2/ha)	Density/ ha	IV200	Total Decline/Increase	% Change
Acer negundo	0.07	3.41	21.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-3.41	-100.00
Amelanchier arborea	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.88	5.18	0.06	0.88	3.80	0.88	100.00
Crataegus coccinea	0.05	4.55	24.27	0.10	10.23	45.25	0.17	14.77	108.71	0.12	10.23	95.65	0.74	10.56	65.89	0.98	14.96	65.42	10.41	69.62
Malus cf. *baccata**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.88	11.72	0.88	100.00
Populus deltoides	0.68	4.55	81.66	0.73	4.55	70.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-4.55	-100.00
Prunus americana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.88	4.97	0.05	0.88	3.65	0.88	100.00
Prunus serotina	0.06	1.14	10.40	0.16	6.82	37.19	0.08	2.27	26.31	0.08	2.27	31.87	1.31	7.04	67.43	1.10	7.92	47.41	6.78	85.65
Quercus macrocarpa	0.15	2.27	23.84	0.15	1.14	15.49	0.16	1.14	36.27	0.15	1.14	38.99	0.66	1.76	26.51	0.68	1.76	20.11	-0.51	-29.13
*Rhamnus cathartica**	0.09	6.82	38.22	0.09	3.41	19.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-6.82	-100.00
Ulmus americana	0.00	0.00	0.00	0.11	1.14	12.36	0.12	1.14	28.70	0.12	1.14	33.48	0.66	2.64	30.02	1.23	7.04	47.89	7.04	100.00
	1.11	22.73	200.00	1.35	27.27	200.00	0.52	19.32	200.00	0.46	14.77	200.00	3.47	23.76	200.00	4.51	34.32	200.00	11.59	

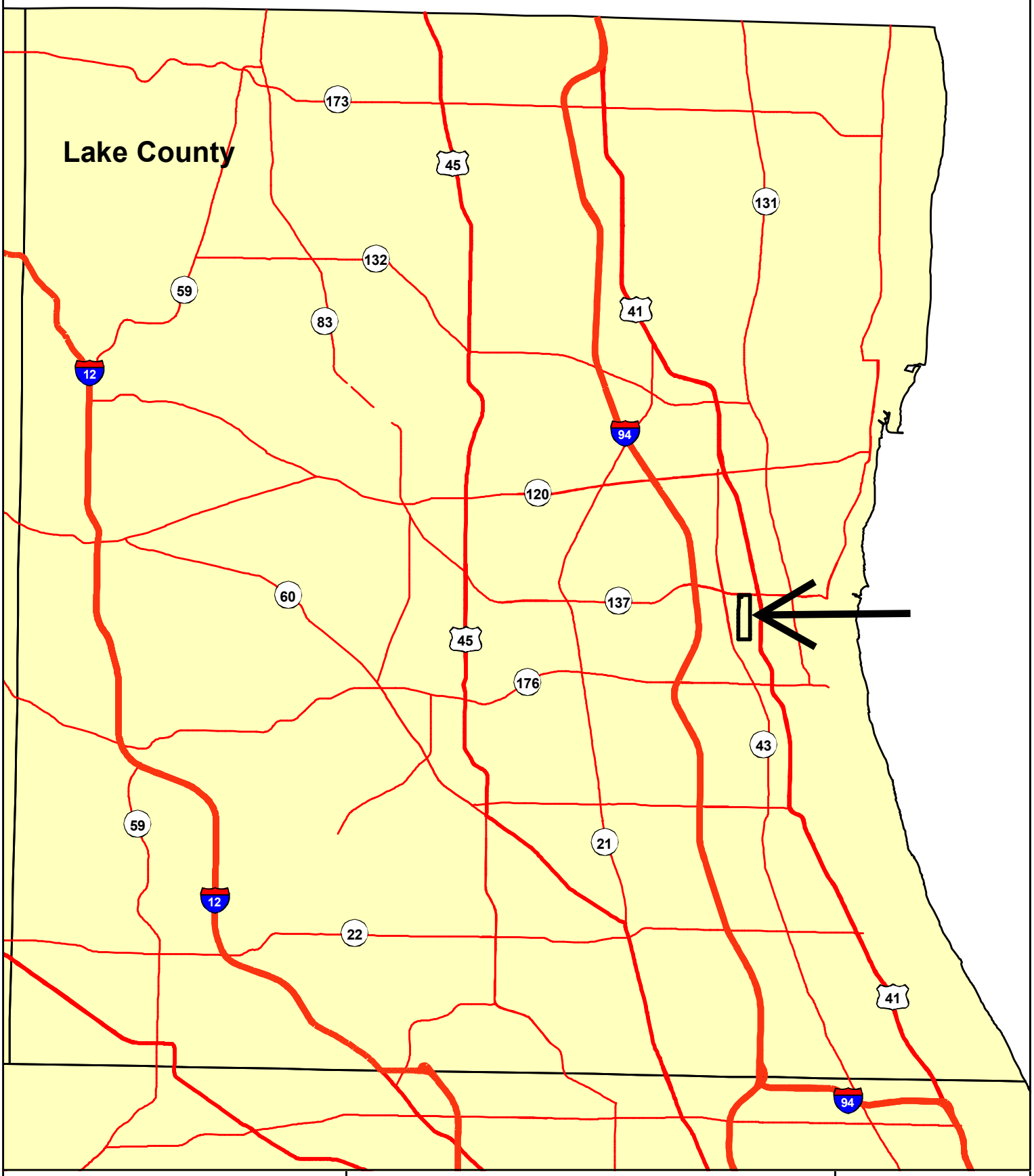

Figure 1. Location of the North Chicago Wetland Mitigation Site in Lake County, Illinois.

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.

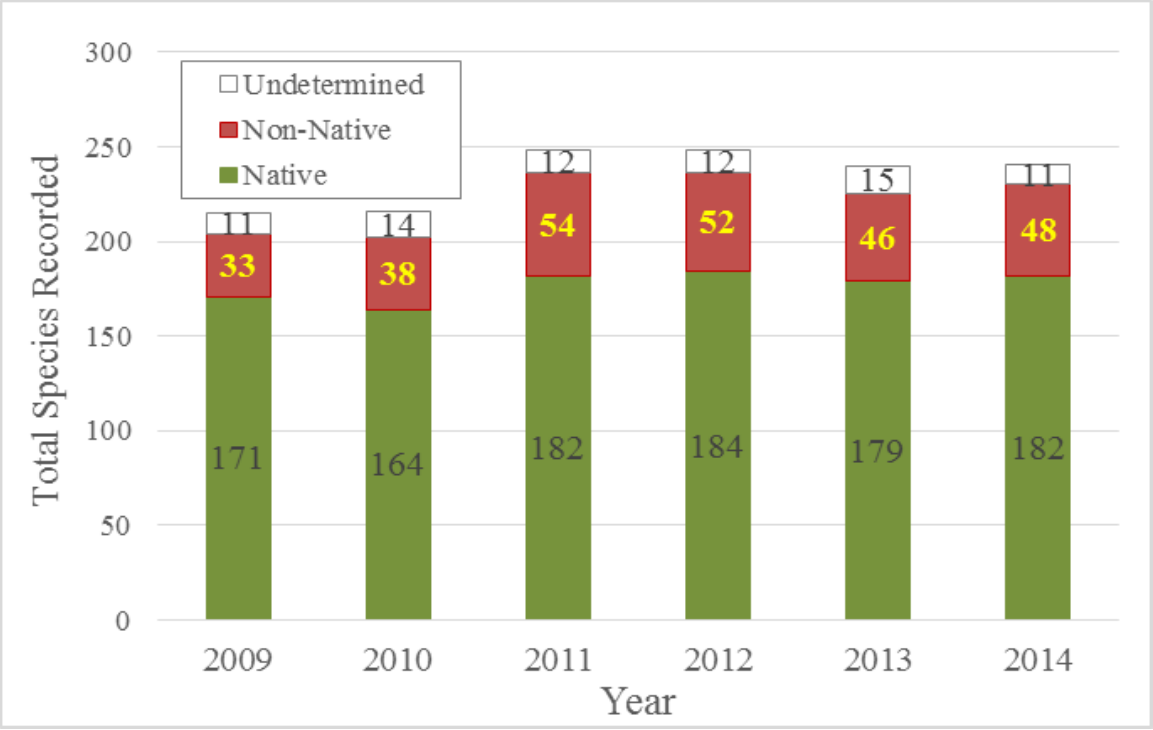

Figure 3. Total species richness recorded in sample plots at the North Chicago Wetland Mitigation Site including native, non-native, and undetermined species. Undetermined species generally are seedlings or sterile sedges (*Carex* sp.).

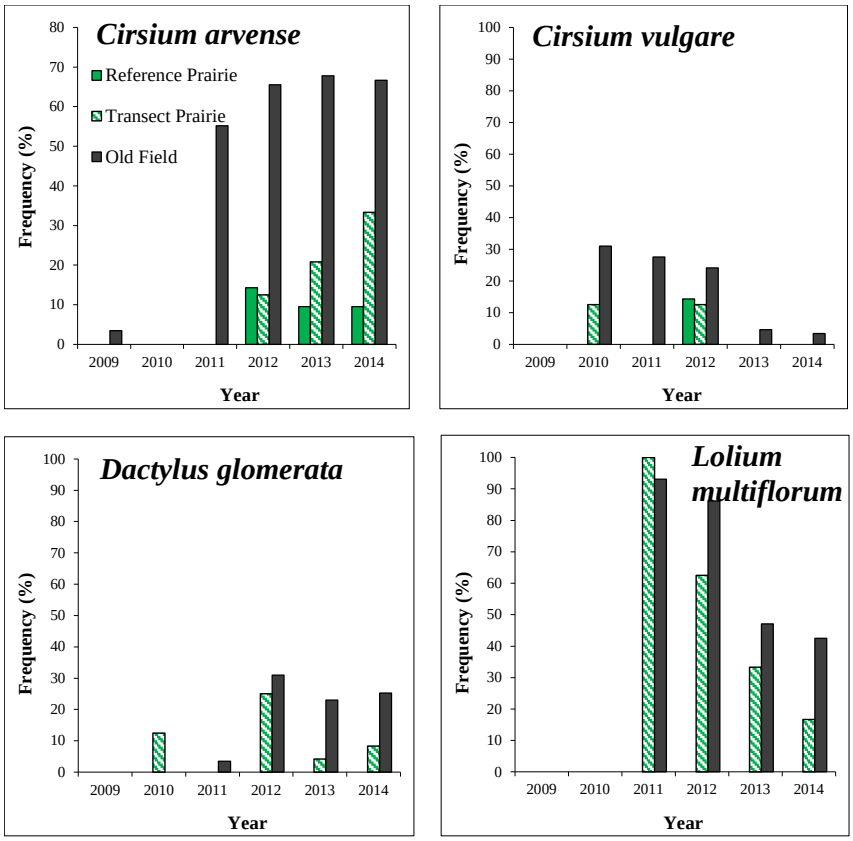

Figure 4a. Frequency trends for selected invasive species by vegetation types at the North Chicago Wetland Mitigation site, Lake County, Illinois.

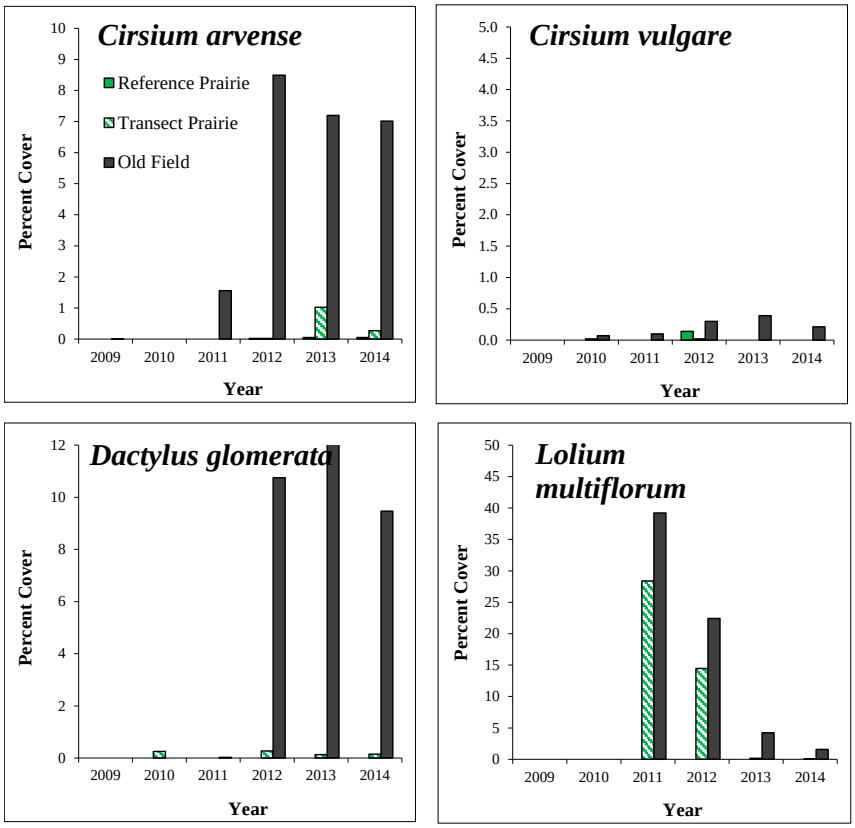

Figure 4b. Percent cover trends by vegetation type for selected invasive species at the North Chicago Wetland Mitigation site in Lake County, Illinois.

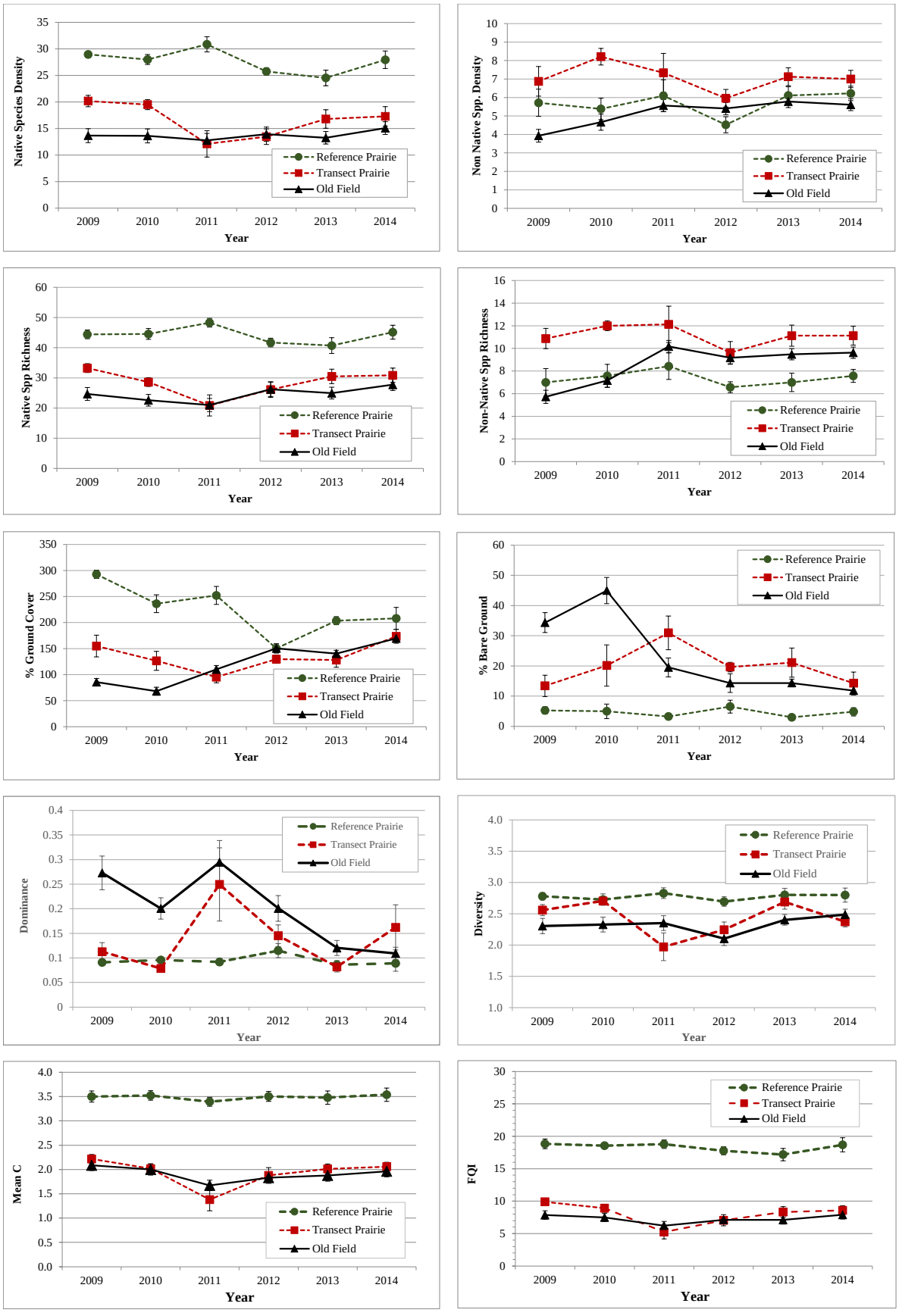

Figure 5. Trends for vegetation types from 2009 to 2014 for ground layer parameters. Test of time differences (within subject effect [flatness hypothesis]) for each vegetation type (flatness hypothesis) were made with repeated measures analysis of variance (see Table 4). The between subject x within subject interaction (vegetation type x year [parallelism hypothesis]) was tested with a mixed repeated measures analysis of variance design (see Table 5).

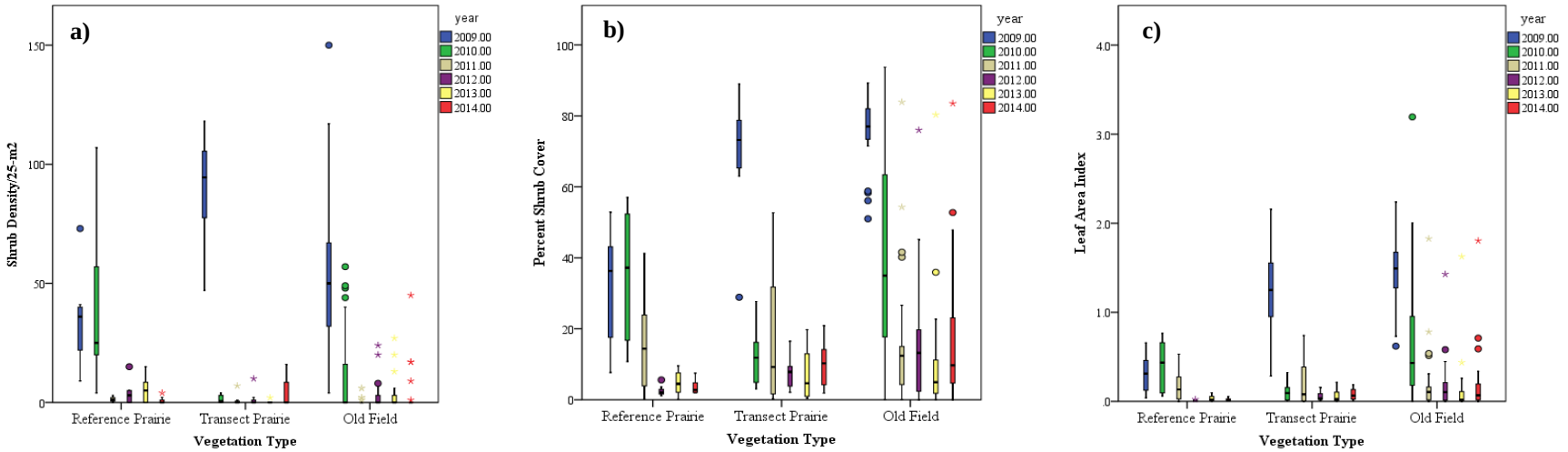

Figure 6. Box plots illustrating trends among vegetation types from 2009 to 2014 for a) shrub density, b) percent canopy cover, and c) leaf area index (LAI) across monitoring years.

Appendix 1. Summary list of species recorded at the North Chicago Wetland Site, Lake County, IL showing 2014 data. n = quadrat number; CC = coefficient of conservatism (* = non-native species); WC = wetness coefficient; A = annual, B = biennial, P = perennial. IV200 is sum of relative frequency and relative cover.

SCIENTIFIC NAME	OVERALL			OLD FIELD			PRAIRIE			ECOLOGY AND STRUCTURE				COMMON NAME
	% Freq. (n = 132)	% Cover	IV 200	% Freq. (n = 87)	% Cover	IV 200	% Freq. (n = 45)	% Cover	IV 200	CC	WC	Wet-ness	Physiog-nomy	
Sorghastrum nutans	56.82	9.765	7.94	51.72	8.891	7.71	66.67	11.456	8.36	4	2	FACU+	P-Grass C4	Indian grass
Fragaria virginiana	63.64	8.572	7.55	56.32	9.920	8.53	77.78	5.967	5.85	2	1	FAC-	P-Forb	wild strawberry
Rhamnus cathartica	71.21	7.670	7.36	64.37	7.069	7.23	84.44	8.833	7.59	*	3	FACU	Shrub	common buckthorn
Andropogon gerardii	47.73	9.133	7.20	47.13	7.851	6.87	48.89	11.611	7.82	5	1	FAC-	P-Grass C4	big bluestem
Solidago canadensis	56.82	8.333	7.13	59.77	10.437	9.00	51.11	4.267	4.03	1	3	FACU	P-Forb	Canada goldenrod
Ratibida pinnata	68.18	6.667	6.66	68.97	7.190	7.52	66.67	5.656	5.30	4	5	UPL	P-Forb	yellow coneflower
Poa pratensis	46.21	6.773	5.79	34.48	6.144	5.27	68.89	7.989	6.61	*	1	FAC-	P-Grass C3	Kentucky blue grass
Poa compressa	50.76	5.383	5.20	50.58	5.000	5.36	51.11	6.122	5.00	*	2	FACU+	P-Grass C3	Canadian blue grass
Cirsium arvense	51.52	4.678	4.83	66.67	7.011	7.31	22.22	0.167	0.86	*	3	FACU	P-Forb	field thistle
Schizachyrium scoparium	43.18	4.996	4.66	33.33	2.448	3.03	62.22	9.922	7.39	5	4	FACU-	P-Grass C4	little bluestem
Helianthus grosseserratus	35.61	5.511	4.63	39.08	6.684	5.80	28.89	3.244	2.72	2	-2	FACW-	P-Forb	sawtooth sunflower
Dactylis glomerata	18.18	6.265	4.32	25.29	9.466	6.79	4.44	0.078	0.20	*	3	FACU	P-Grass C3	orchard grass
Dichanthelium praecocius	50.00	3.330	4.00	48.28	3.431	4.32	53.33	3.133	3.51	5	5	UPL	P-Grass C3	early white-haired panic grass
Daucus carota	40.15	2.295	3.00	31.03	2.374	2.88	57.78	2.144	3.14	*	4	FACU-	B-Forb	Queen Anne's lace
Cornus racemosa	37.88	2.462	3.00	24.14	1.667	2.13	64.44	4.000	4.35	2	-2	FACW-	Shrub	gray dogwood
Solidago juncea	32.58	2.799	2.97	19.54	1.402	1.76	57.78	5.500	4.91	4	5	UPL	P-Forb	early goldenrod
Euthamia graminifolia	34.09	2.674	2.96	34.48	2.632	3.19	33.33	2.756	2.61	3	-2	FACW-	P-Forb	grass-leaved goldenrod
Potentilla simplex	34.85	2.545	2.92	36.78	3.443	3.78	31.11	0.811	1.51	3	4	FACU-	P-Forb	common cinquefoil
Ambrosia artemisiifolia	31.06	2.761	2.88	37.93	3.264	3.73	17.78	1.789	1.56	0	3	FACU	A-Forb	common ragweed
Viola pratincola	40.91	1.436	2.54	33.33	1.833	2.67	55.56	0.667	2.28	1	0	FAC	P-Forb	common blue violet
Rudbeckia hirta	49.24	0.659	2.46	43.68	0.586	2.43	60.00	0.800	2.51	2	3	FACU	P-Forb	black-eyed Susan
Melilotus albus/officinalis	23.49	2.519	2.42	20.69	1.747	2.02	28.89	4.011	3.12	*	3	FACU	B-Forb N2	sweet clover
Carex granularis	38.64	1.379	2.42	29.89	1.190	2.13	55.56	1.744	2.85	2	-4	FACW+	P-Sedge	pale sedge
Leucanthemum vulgare	33.33	1.674	2.36	18.39	0.799	1.35	62.22	3.367	3.94	*	5	UPL	P-Forb	ox-eye daisy
Lonicera x *bella*	22.73	2.439	2.34	24.14	2.471	2.61	20.00	2.378	1.95	*	3	FACU	Shrub	showy fly honeysuckle
Oxalis fontana	45.46	0.716	2.33	57.47	1.029	3.34	22.22	0.111	0.83	0	3	FACU	P-Forb	tall wood sorrel
Monarda fistulosa	29.55	1.720	2.23	16.09	1.121	1.43	55.56	2.878	3.45	4	3	FACU	P-Forb	wild bergamot
Parthenium integrifolium	12.12	2.981	2.20	0.00	0.000	0.00	35.56	8.744	5.85	8	5	UPL	P-Forb	wild quinine
Prunella vulgaris var. *elongata*	32.58	1.424	2.19	29.89	1.672	2.41	37.78	0.944	1.81	1	0	FAC	P-Forb	self-heal
Rubus pensilvanicus	23.49	2.015	2.14	14.94	1.644	1.68	40.00	2.733	2.83	2	1	FAC-	Shrub	Yankee blackberry
Achillea millefolium	28.03	1.667	2.13	9.20	0.557	0.77	64.44	3.811	4.25	*	3	FACU	P-Forb	common milfoil
Aster praealtus	16.67	2.314	2.02	12.64	1.983	1.77	24.44	2.956	2.41	4	-5	OBL	P-Forb	willow aster
Aster drummondii	27.27	1.443	1.97	24.14	2.017	2.34	33.33	0.333	1.34	3	3	FACU	P-Forb	Drummond's aster
Lolium multiflorum	31.06	1.049	1.91	42.53	1.569	2.95	8.89	0.044	0.33	*	5	UPL	A-Grass	Italian rye grass
Zizia aurea	24.24	1.504	1.88	20.69	1.500	1.87	31.11	1.511	1.88	6	-1	FAC+	P-Forb	golden Alexanders
Bidens frondosa	29.55	0.644	1.62	40.23	0.954	2.48	8.89	0.044	0.33	1	-3	FACW	A-Forb	common beggar's ticks
Allium cernuum	18.18	1.424	1.58	10.35	0.420	0.74	33.33	3.367	2.93	7	5	UPL	P-Forb	nodding wild onion
Allium canadense	21.97	1.106	1.56	27.59	1.563	2.24	11.11	0.222	0.50	2	3	FACU	P-Forb	wild garlic
Lactuca canadensis	14.39	1.636	1.54	20.69	2.477	2.45	2.22	0.011	0.08	1	2	FACU+	B-Forb	wild lettuce
Anemone virginiana	25.00	0.833	1.53	13.79	0.546	0.98	46.67	1.389	2.36	4	5	UPL	P-Forb	tall anemone

SCIENTIFIC NAME	OVERALL			OLD FIELD			PRAIRIE			ECOLOGY AND STRUCTURE				COMMON NAME
	% Freq. (n = 132)	% Cover	IV 200	% Freq. (n = 87)	% Cover	IV 200	% Freq. (n = 45)	% Cover	IV 200	CC	WC	Wet-ness	Physiog-nomy	
Silphium terebinthinaceum	9.09	1.936	1.48	0.00	0.000	0.00	26.67	5.678	3.92	4	1	FAC-	P-Forb	prairie dock
Aster ericoides	18.18	1.197	1.45	5.75	0.282	0.44	42.22	2.967	3.03	4	4	FACU-	P-Forb	heath aster
Taraxacum officinale	28.79	0.390	1.44	33.33	0.511	1.89	20.00	0.156	0.78	*	3	FACU	P-Forb	common dandelion
Spartina pectinata	6.06	2.049	1.42	3.45	0.379	0.39	11.11	5.278	3.17	4	-4	FACW+	P-Grass C4	prairie cord grass
Carex pellita	15.15	1.337	1.40	11.49	0.534	0.86	22.22	2.889	2.30	4	-5	OBL	P-Sedge	wooly sedge
Phalaris arundinacea	9.85	1.515	1.28	11.49	1.828	1.63	6.67	0.911	0.71	*	-4	FACW+	P-Grass C3	reed canary grass
Solidago gigantea	8.33	1.561	1.24	12.64	2.368	2.00	0.00	0.000	0.00	3	-3	FACW	P-Forb	late goldenrod
Solidago nemoralis	18.18	0.814	1.23	9.20	0.494	0.73	35.56	1.433	1.99	3	5	UPL	P-Forb	old field goldenrod
Chenopodium sp.	4.55	1.773	1.20	6.90	2.690	1.92	0.00	0.000	0.00	*				goosefoot
Aster lateriflorus	22.73	0.318	1.14	25.29	0.437	1.46	17.78	0.089	0.67	2	-2	FACW-	P-Forb	side-flowering aster
Lobelia spicata	22.73	0.303	1.13	21.84	0.282	1.21	24.44	0.344	1.03	4	0	FAC	P-Forb	pale spiked lobelia
Erigeron annuus	19.70	0.523	1.13	17.24	0.282	0.99	24.44	0.989	1.37	1	1	FAC-	B-Forb	annual fleabane
Frangula alnus	20.46	0.439	1.11	18.39	0.351	1.08	24.44	0.611	1.17	*	-1	FAC+	Shrub	glossy buckthorn
Viburnum lentago	15.15	0.777	1.08	14.94	1.052	1.33	15.56	0.244	0.67	4	-1	FAC+	Shrub	nannyberry
Agrostis gigantea	18.18	0.462	1.03	11.49	0.282	0.71	31.11	0.811	1.51	0	-3	FACW	P-Grass C3	red top
Pycnanthemum virginianum	10.61	0.970	1.00	8.05	0.764	0.83	15.56	1.367	1.26	5	-4	FACW+	P-Forb	common mountain mint
Oligoneuron rigidum	14.39	0.629	0.97	4.60	0.109	0.28	33.33	1.633	2.02	4	4	FACU-	P-Forb	rigid goldenrod
Helianthus subrhomboideus	10.61	0.845	0.93	1.15	0.034	0.08	28.89	2.411	2.28	6	5	UPL	P-Forb	prairie sunflower
Carex blanda	12.88	0.659	0.92	10.35	0.839	0.99	17.78	0.311	0.78	2	0	FAC	P-Sedge	common wood sedge
Vicia americana	10.61	0.826	0.92	1.15	0.034	0.08	28.89	2.356	2.25	6	5	UPL	P-Forb	American vetch
Aster pilosus	18.18	0.223	0.90	21.84	0.282	1.21	11.11	0.111	0.45	0	4	FACU-	P-Forb	hairy aster
Medicago lupulina	12.88	0.527	0.84	9.20	0.523	0.75	20.00	0.533	0.98	*	1	FAC-	A-Forb N2	black medic
Rosa carolina	13.64	0.458	0.84	8.05	0.213	0.51	24.44	0.933	1.34	4	4	FACU-	Shrub	pasture rose
Setaria glauca	3.03	1.235	0.83	4.60	1.874	1.32	0.00	0.000	0.00	*	0	FAC	A-Grass	pigeon grass
Carex stricta	3.03	1.163	0.79	4.60	1.764	1.26	0.00	0.000	0.00	5	-5	OBL	P-Sedge	common tussock sedge
Antennaria neglecta	14.39	0.277	0.77	4.60	0.052	0.25	33.33	0.711	1.53	4	5	UPL	P-Forb	cat's foot
Hieracium caespitosum	12.88	0.307	0.72	8.05	0.184	0.49	22.22	0.544	1.06	*	5	UPL	P-Forb	field hawkweed
Solidago missouriensis	9.85	0.511	0.71	1.15	0.172	0.16	26.67	1.167	1.54	4	5	UPL	P-Forb	Missouri goldenrod
Gentiana alba	9.09	0.561	0.70	8.05	0.460	0.65	11.11	0.756	0.79	9	3	FACU	P-Forb	pale gentian
Sanicula canadensis	12.88	0.250	0.69	12.64	0.316	0.79	13.33	0.122	0.53	4	2	FACU+	B-Forb	Canadian black snakeroot
Aster oolentangiensis	9.85	0.458	0.68	0.00	0.000	0.00	28.89	1.344	1.71	7	5	UPL	P-Forb	sky-blue aster
Echinacea pallida	12.88	0.197	0.66	16.09	0.282	0.93	6.67	0.033	0.25	7	5	UPL	P-Forb	pale purple coneflower
Hypericum perforatum	13.64	0.125	0.65	12.64	0.121	0.67	15.56	0.133	0.61	*	5	UPL	P-Forb	common St. John's-wort
Vitis riparia	12.12	0.231	0.64	9.20	0.161	0.53	17.78	0.367	0.81	2	-2	FACW-	W-Vine	riverbank grape
Viola pedatifida	12.88	0.159	0.64	6.90	0.092	0.38	24.44	0.289	1.00	9	4	FACU-	P-Forb	prairie violet
Erigeron strigosus	12.12	0.208	0.63	9.20	0.103	0.50	17.78	0.411	0.84	2	1	FAC-	P-Forb	daisy fleabane
Viola sororia	9.09	0.432	0.63	10.35	0.443	0.75	6.67	0.411	0.45	3	1	FAC-	P-Forb	woolly blue violet
Carex pensylvanica	9.85	0.345	0.61	9.20	0.466	0.71	11.11	0.111	0.45	5	5	UPL	P-Sedge	Pennsylvania oak sedge
Dipsacus laciniatus	5.30	0.655	0.60	8.05	0.994	0.97	0.00	0.000	0.00	*	5	UPL	B-Forb	cut-leaved teasel
Equisetum arvense	9.85	0.254	0.56	9.20	0.270	0.60	11.11	0.222	0.50	0	0	FAC	Fern	common horsetail
Juncus tenuis	10.61	0.129	0.52	5.75	0.086	0.33	20.00	0.211	0.81	0	0	FAC	P-Forb	path rush
Crataegus sp.	10.61	0.091	0.50	10.35	0.080	0.54	11.11	0.111	0.45				Tree	hawthorn
Plantago rugelii	6.82	0.330	0.48	9.20	0.494	0.73	2.22	0.011	0.08	0	0	FAC	A-Forb	red-stalked plantain

SCIENTIFIC NAME	OVERALL			OLD FIELD			PRAIRIE			ECOLOGY AND STRUCTURE				COMMON NAME
	% Freq. (n = 132)	% Cover	IV 200	% Freq. (n = 87)	% Cover	IV 200	% Freq. (n = 45)	% Cover	IV 200	CC	WC	Wet-ness	Physiog-nomy	
Tradescantia ohiensis	6.82	0.330	0.48	4.60	0.356	0.43	11.11	0.278	0.53	3	2	FACU+	P-Forb	common spiderwort
Geum aleppicum	7.58	0.261	0.47	8.05	0.155	0.48	6.67	0.467	0.48	6	-1	FAC+	P-Forb	yellow avens
Rhus glabra	4.55	0.481	0.47	3.45	0.379	0.39	6.67	0.678	0.59	1	5	UPL	Shrub	smooth sumac
Lythrum alatum	3.03	0.576	0.46	3.45	0.868	0.68	2.22	0.011	0.08	5	-5	OBL	P-Forb	winged loosestrife
Lythrum salicaria	7.58	0.223	0.45	6.90	0.259	0.48	8.89	0.156	0.39	*	-5	OBL	P-Forb	purple loosestrife
Eupatorium altissimum	6.06	0.326	0.44	5.75	0.253	0.42	6.67	0.467	0.48	2	3	FACU	P-Forb	tall boneset
Lespedeza capitata	5.30	0.322	0.41	1.15	0.034	0.08	13.33	0.878	0.93	4	3	FACU	P-Forb N2	round-headed bush clover
Sisyrinchium albidum	8.33	0.061	0.39	4.60	0.052	0.25	15.56	0.078	0.58	4	3	FACU	P-Forb	common blue-eyed grass
Toxicodendron radicans	3.03	0.424	0.37	4.60	0.644	0.60	0.00	0.000	0.00	1	3	FACU	W-Vine	poison ivy
Elymus trachycaulus	6.06	0.197	0.37	4.60	0.218	0.35	8.89	0.156	0.39	8	3	FACU	P-Grass C3	bearded wheat grass
Prunus americana	6.06	0.197	0.37	2.30	0.011	0.12	13.33	0.556	0.76	3	5	UPL	Tree	American plum
Prunus virginiana	6.82	0.110	0.35	3.45	0.046	0.19	13.33	0.233	0.59	3	1	FAC-	Shrub	common choke cherry
Trifolium pratense	6.82	0.110	0.35	6.90	0.092	0.38	6.67	0.144	0.31	*	2	FACU+	P-Forb N2	red clover
Parthenocissus quinquefolia	4.55	0.261	0.34	6.90	0.397	0.56	0.00	0.000	0.00	2	1	FAC-	W-Vine	Virginia creeper
Lithospermum canescens	6.06	0.144	0.34	0.00	0.000	0.00	17.78	0.422	0.84	6	5	UPL	P-Forb	hoary puccoon
Crataegus cf. *coccinea*	6.82	0.072	0.33	4.60	0.052	0.25	11.11	0.111	0.45	5	5	UPL	Tree	hawthorn
Lycopus americanus	6.82	0.072	0.33	9.20	0.103	0.50	2.22	0.011	0.08	3	-5	OBL	P-Forb	common water horehound
Krigia biflora	6.06	0.125	0.33	0.00	0.000	0.00	17.78	0.367	0.81	5	3	FACU	P-Forb	false dandelion
Typha angustifolia	3.03	0.345	0.32	3.45	0.351	0.37	2.22	0.333	0.25	*	-5	OBL	P-Forb	narrow-leaved cattail
Eryngium yuccifolium	5.30	0.155	0.31	8.05	0.236	0.52	0.00	0.000	0.00	7	-1	FAC+	P-Forb	rattlesnake master
Corylus americana	0.76	0.473	0.30	0.00	0.000	0.00	2.22	1.389	0.81	4	0	FAC	Shrub	American filbert
Cerastium fontanum	6.06	0.049	0.28	8.05	0.069	0.42	2.22	0.011	0.08	*	3	FACU	P-Forb	common mouse-ear chickweed
Comandra umbellata	5.30	0.102	0.28	1.15	0.034	0.08	13.33	0.233	0.59	6	3	FACU	P-Forb, Hemi	bastard toad-flax
Galium triflorum	5.30	0.102	0.28	4.60	0.109	0.28	6.67	0.089	0.28	4	2	FACU+	P-Forb	sweet-scented bedstraw
Liatris spicata	5.30	0.102	0.28	1.15	0.034	0.08	13.33	0.233	0.59	7	0	FAC	P-Forb	marsh blazing star
Erechtites hieracifolia	4.55	0.133	0.27	5.75	0.195	0.39	2.22	0.011	0.08	2	3	FACU	A-Forb	fireweed
Aster puniceus	4.55	0.117	0.26	5.75	0.144	0.36	2.22	0.067	0.11	7	-5	OBL	P-Forb	bristly aster
Thalictrum revolutum	3.79	0.167	0.26	1.15	0.006	0.06	8.89	0.478	0.56	5	0	FAC	P-Forb	waxy meadow rue
Juncus dudleyi	3.79	0.148	0.24	4.60	0.218	0.35	2.22	0.011	0.08	4	0	FAC	P-Forb	Dudley's rush
Zizia aptera	3.79	0.148	0.24	0.00	0.000	0.00	11.11	0.433	0.62	9	3	FACU	P-Forb	heart-leaved meadow parsnip
Prunus serotina	5.30	0.027	0.24	5.75	0.029	0.29	4.44	0.022	0.17	1	3	FACU	Tree	wild black cherry
Trifolium hybridum	2.27	0.250	0.24	3.45	0.379	0.39	0.00	0.000	0.00	*	1	FAC-	P-Forb N2	alsike clover
Liatris sp. (seedling)	4.55	0.080	0.24	1.15	0.006	0.06	11.11	0.222	0.50	6	1	FAC-	P-Forb	blazing star
Carex tenera	3.03	0.182	0.23	4.60	0.276	0.38	0.00	0.000	0.00	5	-1	FAC+	P-Sedge	narrow-leaved oval sedge
Convolvulus arvensis	1.52	0.288	0.23	2.30	0.437	0.37	0.00	0.000	0.00	*	5	UPL	P-Forb	field bindweed
Stachys sp.	1.52	0.288	0.23	2.30	0.437	0.37	0.00	0.000	0.00					hedge nettle
Phleum pratense	3.03	0.144	0.21	3.45	0.046	0.19	2.22	0.333	0.25	*	3	FACU	P-Grass C3	timothy
Silphium integrifolium	3.03	0.144	0.21	3.45	0.184	0.27	2.22	0.067	0.11	5	5	UPL	P-Forb	rosin weed
Fraxinus lanceolata	4.55	0.023	0.21	6.90	0.034	0.35	0.00	0.000	0.00	2	-3	FACW	Tree	green ash
Festuca pratensis	3.03	0.125	0.20	3.45	0.184	0.27	2.22	0.011	0.08	*	4	FACU-	P-Grass	meadow fescue
Arctium cf. *minus*	0.76	0.284	0.19	1.15	0.431	0.31	0.00	0.000	0.00	*	5	UPL	B-Forb	burdock
Elytrigia repens	0.76	0.284	0.19	1.15	0.431	0.31	0.00	0.000	0.00	*	3	FACU	P-Grass C3	quack grass
Eupatoriadelphus maculatus	0.76	0.284	0.19	1.15	0.431	0.31	0.00	0.000	0.00	5	-5	OBL	P-Forb	spotted Joe Pye weed

SCIENTIFIC NAME	OVERALL			OLD FIELD			PRAIRIE			ECOLOGY AND STRUCTURE				COMMON NAME
	% Freq. (n = 132)	% Cover	IV 200	% Freq. (n = 87)	% Cover	IV 200	% Freq. (n = 45)	% Cover	IV 200	CC	WC	Wet-ness	Physiog-nomy	
Helianthus strumosus	0.76	0.284	0.19	1.15	0.431	0.31	0.00	0.000	0.00	3	5	UPL	P-Forb	pale-leaved sunflower
Senecio pauperculus	3.79	0.057	0.19	5.75	0.086	0.33	0.00	0.000	0.00	3	-1	FAC+	P-Forb	balsam ragwort
Rubus flagellaris	2.27	0.159	0.19	1.15	0.034	0.08	4.44	0.400	0.37	2	4	FACU-	Shrub	common dewberry
Scirpus pendulus	2.27	0.159	0.19	1.15	0.034	0.08	4.44	0.400	0.37	3	-5	OBL	P-Sedge	red bulrush
Asclepias incarnata	3.79	0.038	0.18	4.60	0.023	0.23	2.22	0.067	0.11	4	-5	OBL	P-Forb	swamp milkweed
Bromus kalmii	3.79	0.038	0.18	0.00	0.000	0.00	11.11	0.111	0.45	10	0	FAC	P-Grass	prairie brome
Hypoxis hirsuta	3.79	0.038	0.18	2.30	0.040	0.13	6.67	0.033	0.25	6	0	FAC	P-Forb	yellow star grass
Smilax ecirrhata	3.79	0.038	0.18	4.60	0.052	0.25	2.22	0.011	0.08	5	5	UPL	P-Forb	upright carrion flower
Trifolium repens	3.79	0.038	0.18	4.60	0.052	0.25	2.22	0.011	0.08	*	2	FACU+	P-Forb N2	white clover
Verbena hastata	3.79	0.038	0.18	3.45	0.046	0.19	4.44	0.022	0.17	3	-4	FACW+	P-Forb	blue vervain
Cirsium vulgare	2.27	0.140	0.18	3.45	0.213	0.29	0.00	0.000	0.00	*	4	FACU-	B-Forb	bull thistle
Poaceae - unknown grass	2.27	0.140	0.18	0.00	0.000	0.00	6.67	0.411	0.45					grass-leaved goldenrod
Agrimonia gryposepala	3.03	0.072	0.17	3.45	0.075	0.21	2.22	0.067	0.11	3	2	FACU+	P-Forb	tall agrimony
Euphorbia esula	2.27	0.121	0.17	0.00	0.000	0.00	6.67	0.356	0.42	*	5	UPL	P-Forb	leafy spurge
Senecio aureus	3.03	0.053	0.16	4.60	0.080	0.27	0.00	0.000	0.00	4	-3	FACW	P-Forb	golden ragwort
Poa palustris	3.03	0.034	0.15	3.45	0.017	0.17	2.22	0.067	0.11	7	-4	FACW+	P-Grass	fowl blue grass
Carex cf. *cristatella*	1.52	0.136	0.14	2.30	0.207	0.23	0.00	0.000	0.00	3	-4	FACW+	P-Sedge	crested oval sedge
Crataegus crus-galli	3.03	0.015	0.14	2.30	0.011	0.12	4.44	0.022	0.17	2	0	FAC	Tree	cock-spur hawthorn
Geum sp. (rosette)	3.03	0.015	0.14	2.30	0.011	0.12	4.44	0.022	0.17	2	0	FAC	P-Forb	avens
Scutellaria leonardii	3.03	0.015	0.14	2.30	0.011	0.12	4.44	0.022	0.17	5	3	FACU	P-Forb	small skullcap
Aster novae-angliae	2.27	0.068	0.14	1.15	0.034	0.08	4.44	0.133	0.23	4	-3	FACW	P-Forb	New England aster
Muhlenbergia sp.	1.52	0.117	0.13	2.30	0.178	0.22	0.00	0.000	0.00					satin grass
Viburnum recognitum	1.52	0.117	0.13	0.00	0.000	0.00	4.44	0.344	0.34	6	-2	FACW-	Shrub	smooth arrowwood
Bromus commutatus	2.27	0.049	0.12	3.45	0.075	0.21	0.00	0.000	0.00	*	5	UPL	A-Grass	hairy brome
Calystegia sepium	2.27	0.049	0.12	3.45	0.075	0.21	0.00	0.000	0.00	1	0	FAC	P-Forb	American bindweed
Lotus corniculatus	2.27	0.049	0.12	3.45	0.075	0.21	0.00	0.000	0.00	*	1	FAC-	P-Forb	birdsfoot trefoil
Pycnanthemum tenuifolium	2.27	0.049	0.12	3.45	0.075	0.21	0.00	0.000	0.00	4	0	FAC	P-Forb	slender mountain mint
Alliaria petiolata	2.27	0.030	0.11	3.45	0.046	0.19	0.00	0.000	0.00	*	0	FAC	B-Forb	garlic mustard
Ambrosia trifida	2.27	0.030	0.11	3.45	0.046	0.19	0.00	0.000	0.00	0	-1	FAC+	A-Forb	giant ragweed
Carex cf. *normalis*	2.27	0.030	0.11	2.30	0.011	0.12	2.22	0.067	0.11	4	-3	FACW	P-Sedge	spreading oval sedge
Carex sp. sterile	2.27	0.030	0.11	2.30	0.011	0.12	2.22	0.067	0.11				P-Sedge	sedge
Oxypolis rigidior	2.27	0.030	0.11	3.45	0.046	0.19	0.00	0.000	0.00	7	-5	OBL	P-Forb	cowbane
Polygonatum commutatum	2.27	0.030	0.11	3.45	0.046	0.19	0.00	0.000	0.00	4	3	FACU	P-Forb	great Solomon seal
Galium obtusum	2.27	0.011	0.10	1.15	0.006	0.06	4.44	0.022	0.17	5	-4	FACW+	P-Forb	wild madder
Asclepias tuberosa ssp. *interior*	0.76	0.114	0.10	0.00	0.000	0.00	2.22	0.333	0.25	5	5	UPL	P-Forb	butterflyweed
Bromus inermis	0.76	0.114	0.10	1.15	0.172	0.16	0.00	0.000	0.00	*	5	UPL	P-Grass	Hungarian brome
Calamagrostis canadensis	0.76	0.114	0.10	1.15	0.172	0.16	0.00	0.000	0.00	3	-5	OBL	P-Grass C3	blue joint grass
Ranunculus recurvatus	0.76	0.114	0.10	1.15	0.172	0.16	0.00	0.000	0.00	5	-3	FACW	A-Forb	hooked buttercup
Rosa multiflora	0.76	0.114	0.10	1.15	0.172	0.16	0.00	0.000	0.00	*	3	FACU	Shrub	Japanese rose
Rubus idaeus	0.76	0.114	0.10	1.15	0.172	0.16	0.00	0.000	0.00	*	2	FACU+	Shrub	cultivated raspberry
Arnoglossum plantaginea	1.52	0.045	0.09	0.00	0.000	0.00	4.44	0.133	0.23	10	0	FAC	P-Forb	prairie Indian plantain
Aster sagittifolius	1.52	0.045	0.09	2.30	0.069	0.15	0.00	0.000	0.00	4	5	UPL	P-Forb	arrow-leaved aster
Hieracium canadense	1.52	0.045	0.09	1.15	0.034	0.08	2.22	0.067	0.11	5	5	UPL	P-Forb	Canada hawkweed

SCIENTIFIC NAME	OVERALL			OLD FIELD			PRAIRIE			ECOLOGY AND STRUCTURE				COMMON NAME
	% Freq. (n = 132)	% Cover	IV 200	% Freq. (n = 87)	% Cover	IV 200	% Freq. (n = 45)	% Cover	IV 200	CC	WC	Wet-ness	Physiog-nomy	
Liatris pycnostachya	1.52	0.045	0.09	0.00	0.000	0.00	4.44	0.133	0.23	6	1	FAC-	P-Forb	prairie blazine star
Anemone cylindrica	1.52	0.027	0.08	2.30	0.040	0.13	0.00	0.000	0.00	8	5	UPL	P-Forb	candle anemone
Carex cf. *brevior*	1.52	0.027	0.08	1.15	0.034	0.08	2.22	0.011	0.08	4	0	FAC	P-Sedge	plains oval sedge
Carex hirsutella	1.52	0.027	0.08	2.30	0.040	0.13	0.00	0.000	0.00	5	4	FACU-	P-Sedge	hairy green sedge
Carex umbellata	1.52	0.027	0.08	0.00	0.000	0.00	4.44	0.078	0.20	6	5	UPL	P-Sedge	early oak sedge
Carex vulpinoidea	1.52	0.027	0.08	0.00	0.000	0.00	4.44	0.078	0.20	3	-5	OBL	P-Sedge	brown fox sedge
Crataegus cf. *pruinosa*	1.52	0.027	0.08	2.30	0.040	0.13	0.00	0.000	0.00	3	5	UPL	Tree	frosted hawthorn
Gentiana andrewsii	1.52	0.027	0.08	0.00	0.000	0.00	4.44	0.078	0.20	7	-3	FACW	P-Forb	closed gentian
Glyceria striata	1.52	0.027	0.08	2.30	0.040	0.13	0.00	0.000	0.00	4	-5	OBL	P-Grass C3	fowl manna grass
Penstemon digitalis	1.52	0.027	0.08	0.00	0.000	0.00	4.44	0.078	0.20	4	1	FAC-	P-Forb	foxglove beard tongue
Potentilla arguta	1.52	0.027	0.08	0.00	0.000	0.00	4.44	0.078	0.20	10	4	FACU-	P-Forb	prairie cinquefoil
Aster lanceolatus	1.52	0.008	0.07	2.30	0.011	0.12	0.00	0.000	0.00	3	-5	OBL	P-Forb	panicled aster
Celtis occidentalis	1.52	0.008	0.07	2.30	0.011	0.12	0.00	0.000	0.00	3	1	FAC-	Tree	hackberry
Erigeron philadelphicus	1.52	0.008	0.07	2.30	0.011	0.12	0.00	0.000	0.00	3	-3	FACW	P-Forb	marsh fleabane
Eupatorium perfoliatum	1.52	0.008	0.07	0.00	0.000	0.00	4.44	0.022	0.17	4	-4	FACW+	P-Forb	common boneset
Gentianella quinquefolia	1.52	0.008	0.07	0.00	0.000	0.00	4.44	0.022	0.17	7	0	FAC	A-Forb	stiff gentian
Juncus interior	1.52	0.008	0.07	2.30	0.011	0.12	0.00	0.000	0.00	3	-1	FAC+	P-Forb	inland rush
Lilium michiganense	1.52	0.008	0.07	2.30	0.011	0.12	0.00	0.000	0.00	6	-1	FAC+	P-Forb	Michigan lily
Phlox glaberrima ssp. *interior*	1.52	0.008	0.07	2.30	0.011	0.12	0.00	0.000	0.00	6	-3	FACW	P-Forb	smooth phlox
Polygala verticillata	1.52	0.008	0.07	0.00	0.000	0.00	4.44	0.022	0.17	5	5	UPL	A-Forb	whorled milkwort
Rumex crispus	1.52	0.008	0.07	1.15	0.006	0.06	2.22	0.011	0.08	*	-1	FAC+	P-Forb	curly dock
Spiraea alba	1.52	0.008	0.07	2.30	0.011	0.12	0.00	0.000	0.00	6	-4	FACW+	Shrub	meadowsweet
Spiranthes magnicamporum	1.52	0.008	0.07	0.00	0.000	0.00	4.44	0.022	0.17	9	-3	FACW	P-Forb	Great Plaines ladies' tresses
Apocynum androsaemifolium	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	6	5	UPL	P-Forb	spreading dogbane
Asclepias syriaca	0.76	0.023	0.05	0.00	0.000	0.00	2.22	0.067	0.11	0	5	UPL	P-Forb	common milkweed
Castilleja coccinea	0.76	0.023	0.05	0.00	0.000	0.00	2.22	0.067	0.11	8	0	FAC	A-Forb	Indian paintbrush
Geranium maculatum	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	4	3	FACU	P-Forb	wild geranium
Lactuca serriola	0.76	0.023	0.05	0.00	0.000	0.00	2.22	0.067	0.11	*	0	FAC	B-Forb	prickly lettuce
Mentha sp.	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00					mint
Oenothera biennis	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	1	3	FACU	B-Forb	common evening primrose
Panicum virgatum	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	4	-1	FAC+	P-Grass C4	prairie switch grass
Populus deltoides	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	2	-1	FAC+	Tree	eastern cottonwood
Potentilla recta	0.76	0.023	0.05	0.00	0.000	0.00	2.22	0.067	0.11	*	5	UPL	P-Forb	sulfur cinquefoil
Prenanthes aspera	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	8	5	UPL	P-Forb	rough white lettuce
Quercus macrocarpa	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	5	1	FAC-	Tree	burr oak
Rubus occidentalis/idaeus	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	2	3	FACU	Shrub	raspberry
Salix rigida	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	5	-4	FACW+	Shrub	heart-leaved willow
Solanum dulcamara	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	*	0	FAC	W-Vine	bittersweet nightshade
Veronicastrum virginicum	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	6	0	FAC	P-Forb	culver's root
Zanthoxylum americanum	0.76	0.023	0.05	0.00	0.000	0.00	2.22	0.067	0.11	4	5	UPL	Shrub	prickly ash
Acer negundo	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	1	-2	FACW-	Tree	box elder
Agrostis stolonifera var. *palustris*	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	8	-3	FACW	P-Grass C3	creeping bent grass
Apocynum cannabinum	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	2	0	FAC	P-Forb	dogbane

SCIENTIFIC NAME	OVERALL			OLD FIELD			PRAIRIE			ECOLOGY AND STRUCTURE				COMMON NAME
	% Freq. (n = 132)	% Cover	IV 200	% Freq. (n = 87)	% Cover	IV 200	% Freq. (n = 45)	% Cover	IV 200	CC	WC	Wet-ness	Physiog-nomy	
Aster ontarionis	0.76	0.004	0.03	0.00	0.000	0.00	2.22	0.011	0.08	4	0	FAC	P-Forb	Ontario aster
Baptisia bracteata	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	9	5	UPL	P-Forb	cream wild indigo
Barbarea vulgaris	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	*	0	FAC	B-Forb	winter cress
Botrychium virginianum	0.76	0.004	0.03	0.00	0.000	0.00	2.22	0.011	0.08	4	3	FACU	Fern	rattlesnake fern
Carex stipata	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	2	-5	OBL	P-Sedge	common fox sedge
Cirsium discolor	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	3	5	UPL	B-Forb	pasture thistle
Cuscuta sp.	0.76	0.004	0.03	0.00	0.000	0.00	2.22	0.011	0.08		-3	FACW	A-Forb	dodder
Danthonia spicata	0.76	0.004	0.03	0.00	0.000	0.00	2.22	0.011	0.08	3	5	UPL	P-Grass C3	poverty oat grass
Dichanthelium acuminatum var. *implicatum*	0.76	0.004	0.03	0.00	0.000	0.00	2.22	0.011	0.08	2	0	FAC	P-Grass C3	panic grass
Dicot seedling	0.76	0.004	0.03	0.00	0.000	0.00	2.22	0.011	0.08					dicot seedling
Eupatorium serotinum	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	1	-1	FAC+	P-Forb	late boneset
Juniperus virginiana	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	1	3	FACU	Tree	eastern red cedar
Liparis liliifolia	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	4	4	FACU-	P-Forb	purple twayblade
Lycopus uniflorus	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	7	-5	OBL	P-Forb	nothern bugle weed
Lysimachia sp.	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00					loosestrife
Morus alba	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	*	0	FAC	Tree	white mulberry
Oxalis sp.	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00					wood sorrel
Persicaria vulgaris	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	*	-3	FACW	A-Forb	lady's thumb
Phragmites australis	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	1	-4	FACW+	P-Grass	common reed
Physalis heterophylla	0.76	0.004	0.03	0.00	0.000	0.00	2.22	0.011	0.08	2	5	UPL	P-Forb	clammy ground cherry
Physalis subglabrata	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	0	5	UPL	P-Forb	smooth ground cherry
Populus tremuloides	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	3	0	FAC	Tree	quaking aspen
Quercus palustris	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	4	-3	FACW	Tree	pin oak
Senecio vulgaris	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	*	5	UPL	A-Forb	common groundsel
Smilacina stellata	0.76	0.004	0.03	0.00	0.000	0.00	2.22	0.011	0.08	5	1	FAC-	P-Forb	starry false Solomon seal
Solanum ptychanthum	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	0	4	FACU-	A-Forb	black nightshade
Sporobolus compositus	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	3	5	UPL	P-GRASS	rough dropseed
Ulmus sp.	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00				Tree	elm
Viburnum opulus	0.76	0.004	0.03	1.15	0.006	0.06	0.00	0.000	0.00	*	0	FAC	Shrub	European high-bush cranberry
SUMMARY	241		200.00	205		200.00	158		200.00					

Appendix 2. Complete list of species recorded from the North Chicago Wetland Mitigation site since intensive botanical surveys began in 1996 including data from vegetation monitoring plots (2009-2014) and wetland habitats. CC = coefficient of conservatism (* = non-native species), CW = coefficient of wetness, A = annual, B = biennial, P = perennial. Botanical nomenclature follows Mohlenbrock (2002).

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
Acalypha rhomboidea	Three-seeded Mercury	Euphorbiaceae	0	3	FACU	A-FORB
Acer ginnala	Amur Maple	Aceraceae	*	5	UPL	TREE
Acer negundo	Boxelder	Aceraceae	1	-2	FACW-	TREE
Acer saccharinum	Silver Maple	Aceraceae	1	-3	FACW	TREE
Achillea millefolium	Yarrow	Asteraceae	*	3	FACU	P-FORB
Ageratina altissima	White Snakeroot	Asteraceae	2	3	FACU	P-FORB
Agrimonia gryposepala	Tall Agrimony	Rosaceae	3	2	FACU+	P-FORB
Agrimonia parviflora	Swamp Agrimony	Rosaceae	5	-1	FAC+	P-FORB
Agrostis gigantea	Red Top	Poaceae	0	-3	FACW	P-GRASS
Agrostis hyemalis	Hair Grass	Poaceae	2	1	FAC-	P-GRASS
Agrostis stolonifera var. *palustris*	Creeping Bent Grass	Poaceae	8	-3	FACW	P-GRASS
Alisma subcordatum	Common Water Plantain	Alismataceae	2	-5	OBL	P-FORB
Alliaria petiolata	Garlic Mustard	Brassicaceae	*	0	FAC	B-FORB
Allium canadense	Wild Garlic	Liliaceae	2	3	FACU	P-FORB
Allium cernuum	Nodding Wild Onion	Liliaceae	7	5	UPL	P-FORB
Alnus glutinosa	Black Alder	Betulaceae	*	-2	FACW-	TREE
Amaranthus sp.	Amaranth	Amaranthaceae	~	~	~	FORB
Ambrosia artemisiifolia	Common Ragweed	Asteraceae	0	3	FACU	A-FORB
Ambrosia trifida	Giant Ragweed	Asteraceae	0	-1	FAC+	A-FORB
Amelanchier arborea	Shadbush	Rosaceae	7	3	FACU	TREE
Amelanchier sanguinea	Round-leaved Serviceberry	Rosaceae	10	5	UPL	SHRUB
Andropogon gerardii	Big Bluestem	Poaceae	5	1	FAC-	P-GRASS
Anemone cylindrica	Thimbleweed	Ranunculaceae	8	5	UPL	P-FORB
Anemone virginiana	Tall Anemone	Ranunculaceae	4	5	UPL	P-FORB
Antennaria neglecta	Cat's Foot	Asteraceae	4	5	UPL	P-FORB
Apocynum androsaemifolium	Spreading Dogbane	Apocynaceae	6	5	UPL	P-FORB
Apocynum cannabinum	Dogbane	Apocynaceae	2	0	FAC	P-FORB
Apocynum sibiricum	Indian Hemp	Apocynaceae	2	-1	FAC+	P-FORB
Aquilegia canadensis	Columbine	Ranunculaceae	5	1	FAC-	P-FORB
Arctium minus	Common Burdock	Asteraceae	*	5	UPL	B-FORB
Arisaema triphyllum	Jack-in-the-pulpit	Araceae	4	-2	FACW-	P-FORB
Arnoglossum plantaginea	Prairie Indian Plantain	Asteraceae	10	0	FAC	P-FORB
Asclepias incarnata	Swamp Milkweed	Asclepiadaceae	4	-5	OBL	P-FORB
Asclepias purpurascens	Purple Milkweed	Asclepiadaceae	7	3	FACU	P-FORB
Asclepias sullivantii	Prairie Milkweed	Asclepiadaceae	7	5	UPL	P-FORB
Asclepias syriaca	Common Milkweed	Asclepiadaceae	0	5	UPL	P-FORB
Asclepias tuberosa ssp. *interior*	Butterflyweed	Asclepiadaceae	5	5	UPL	P-FORB
Asclepias verticillata	Whorled Milkweed	Asclepiadaceae	1	5	UPL	P-FORB
Aster cordifolius	Heart-leaved Aster	Asteraceae	6	5	UPL	P-FORB
Aster drummondii	Drummond's Aster	Asteraceae	3	3	FACU	P-FORB
Aster ericoides	Heath Aster	Asteraceae	4	4	FACU-	P-FORB
Aster firmus	Shining Aster	Asteraceae	5	-5	OBL	P-FORB
Aster lanceolatus	Panicled Aster	Asteraceae	3	-3	FACW	P-FORB
Aster lateriflorus	Side-flowering Aster	Asteraceae	2	-2	FACW-	P-FORB
Aster novae-angliae	New England Aster	Asteraceae	4	-3	FACW	P-FORB
Aster ontarionis	Ontario Aster	Asteraceae	4	0	FAC	P-FORB
Aster oolentangiensis	Sky-blue Aster	Asteraceae	7	5	UPL	P-FORB
Aster pilosus	Hairy Aster	Asteraceae	0	3	FACU+	P-FORB
Aster praealtus	Willow Aster	Asteraceae	4	-5	OBL	P-FORB
Aster puniceus	Swamp Aster	Asteraceae	7	-5	OBL	P-FORB
Aster sagittifolius	Arrow-leaved Aster	Asteraceae	4	5	UPL	P-FORB
Atriplex patula	Spear Scale	Chenopodiaceae	*	2	FACU+	A-FORB
Avena sativa	Oats	Poaceae	*	5	UPL	A-GRASS
Baptisia alba	White Wild Indigo	Fabaceae	6	3	FACU	P-FORB

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
Baptisia bracteata	Cream Wild-indigo	Fabaceae	0	5	UPL	P-FORB
Barbarea vulgaris	Winter Cress	Brassicaceae	*	0	FAC	B-FORB
Bidens cernua	Nodding Bur Marigold	Asteraceae	2	-5	OBL	A-FORB
Bidens connata	Purple-stemmed Tickseed	Asteraceae	2	-5	OBL	A-FORB
Bidens frondosa	Common Beggar's Ticks	Asteraceae	1	-3	FACW	A-FORB
Boehmeria cylindrica	False Nettle	Urticaceae	3	-5	OBL	P-FORB
Bolboschoenus fluviatilis	River Bulrush	Cyperaceae	3	-5	OBL	P-SEDGE
Botrychium dissectum	Cut-leaved Grape Fern	Ophioglossaceae	6	0	FAC	FERN
Botrychium virginianum	Rattlesnake Fern	Ophioglossaceae	4	3	FACU	FERN
Brassica sp.	Brassica	Brassicaceae	*	5	UPL	A-FORB
Bromus commutatus	Brome	Poaceae	*	5	UPL	A-GRASS
Bromus inermis	Awnless Brome Grass	Poaceae	*	5	UPL	P-GRASS
Bromus japonicus	Japanese chess	Poaceae	*	3	FACU	A-GRASS
Bromus kalmii	Prairie Brome	Poaceae	10	0	FAC	P-GRASS
Calamagrostis canadensis	Bluejoint Grass	Poaceae	3	-5	OBL	P-GRASS
Caltha palustris	Marsh Marigold	Ranunculaceae	7	-5	OBL	P-FORB
Calystegia sepium	Hedge Bindweed	Convolvulaceae	1	0	FAC	P-FORB
Carduus nutans	Nodding Thistle	Asteraceae	*	5	UPL	B-FORB
Carex atherodes	Hairy-leaved Lake Sedge	Cyperaceae	6	-5	OBL	P-SEDGE
Carex blanda	Common Wood Sedge	Cyperaceae	2	0	FAC	P-SEDGE
Carex brachyglossa	Small Yellow Fox Sedge	Cyperaceae	3	-3	FACW	P-SEDGE
Carex brevior	Plains Oval Sedge	Cyperaceae	4	0	FAC	P-SEDGE
Carex buxbaumii	Buxbaum's Sedge	Cyperaceae	9	-5	OBL	P-SEDGE
Carex comosa	Bristly Sedge	Cyperaceae	6	-5	OBL	P-SEDGE
Carex cristatella	Crested Oval Sedge	Cyperaceae	3	-4	FACW+	P-SEDGE
Carex granularis	Pale Sedge	Cyperaceae	2	-4	FACW+	P-SEDGE
Carex grisea	Wood Gray Sedge	Cyperaceae	3	5	UPL	P-SEDGE
Carex haydenii	Long-scaled Tussock Sedge	Cyperaceae	7	-5	OBL	P-SEDGE
Carex hirsutella	Hairy Green Sedge	Cyperaceae	5	4	FACU-	P-SEDGE
Carex lacustris	Common Lake Sedge	Cyperaceae	6	-5	OBL	P-SEDGE
Carex lasiocarpa var. *americana*	Narrow-leaved Woolly Sedge	Cyperaceae	10	-5	OBL	P-SEDGE
Carex laxiflora	Beech Wood Sedge	Cyperaceae	10	0	FAC	P-SEDGE
Carex molesta	Field Oval Sedge	Cyperaceae	2	0	FAC	P-SEDGE
Carex normalis	Spreading Oval Sedge	Cyperaceae				
Carex pellita	Wooly Sedge	Cyperaceae	4	-5	OBL	P-SEDGE
Carex pensylvanica	Pennsylvania Oak Sedge	Cyperaceae	5	5	UPL	P-SEDGE
Carex radiata	Star Sedge	Cyperaceae	5	5	UPL	P-SEDGE
Carex sartwellii	Running Marsh Sedge	Cyperaceae	5	-5	OBL	P-SEDGE
Carex stipata	Common Fox Sedge	Cyperaceae	2	-5	OBL	P-SEDGE
Carex stricta	Common Tussock Sedge	Cyperaceae	5	-5	OBL	P-SEDGE
Carex tenera	Narrow-leaved Oval Sedge	Cyperaceae	5	-1	FAC+	P-SEDGE
Carex tetanica	Common Stiff Sedge	Cyperaceae	5	-3	FACW	P-SEDGE
Carex umbellata	Early Oak Sedge	Cyperaceae	6	5	UPL	P-SEDGE
Carex vulpinoidea	Brown Fox Sedge	Cyperaceae				
Castilleja coccinea	Indian Paintbrush	Scrophulariaceae	8	0	FAC	A-FORB
Celtis occidentalis	Hackberry	Ulmaceae	3	1	FAC	TREE
Centaurium pulchellum	Showy Centaury	Gentianaceae	*	4	FACU-	A-FORB
Cephalanthus occidentalis	Buttonbush	Rubiaceae	4	-5	OBL	SHRUB
Cerastium fontanum	Common Mouse-ear Chickweed	Caryophyllaceae	*	3	FACU	P-FORB
Ceratophyllum demersum	Coontail	Ceratophyllaceae	3	-5	OBL	P-FORB
Chenopodium album	Lamb's Quarters	Chenopodiaceae	*	1	FAC-	A-FORB
Cichorium intybus	Chickory	Asteraceae	*	5	UPL	P-FORB
Cicuta maculata	Water Hemlock	Apiaceae	4	-5	OBL	B-FORB
Cinna arundinacea	Common Wood Reed	Poaceae	5	-3	FACW	P-GRASS
Circaea lutetiana	Enchanter's Nightshade	Onagraceae	2	3	FACU	P-FORB
Cirsium arvense	Field Thistle	Asteraceae	*	3	FACU	P-FORB
Cirsium discolor	Pasture Thistle	Asteraceae	3	5	UPL	B-FORB
Cirsium vulgare	Bull Thistle	Asteraceae	*	4	FACU-	B-FORB

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
Comandra umbellata	Bastard Toad-flax	Santalaceae	6	3	FACU	P-FORB
Convolvulus arvensis	Field Bindweed	Convolvulaceae	*	5	UPL	P-FORB
Conyza canadensis	Horseweed	Asteraceae	0	1	FAC-	A-FORB
Coreopsis palmata	Prairie Coreopsis	Asteraceae	6	5	UPL	P-FORB
Cornus alternifolia	Alternate-leaved Dogwood	Cornaceae	7	5	UPL	TREE
Cornus obliqua	Pale Dogwood	Cornaceae	4	-4	FACW+	SHRUB
Cornus racemosa	Gray Dogwood	Cornaceae	2	-2	FACW-	SHRUB
Cornus sericea	Red Osier Dogwood	Cornaceae	4	-3	FACW	SHRUB
Corylus americana	Hazelnut	Corylaceae	4	4	FACU-	SHRUB
Crataegus calpodendron	Sugar Hawthorn	Rosaceae	5	5	UPL	TREE
Crataegus coccinea	scarlet hawthorn	Rosaceae	5	5	UPL	TREE
Crataegus coccinioides	False Scarlet Hawthorn	Rosaceae	5	5	UPL	TREE
Crataegus crus-galli	Cock-spur Hawthorn	Rosaceae	2	0	FAC	TREE
Crataegus flabellata	Hawthorn	Rosaceae	5	5	UPL	TREE
Crataegus mollis	Downy Hawthorn	Rosaceae	2	-2	FACW-	TREE
Crataegus pruinosa	Frosted Hawthorn	Rosaceae	3	5	UPL	TREE
Crataegus punctata	Dotted Hawthorn	Rosaceae	2	5	UPL	TREE
Crataegus succulenta	Fleshy Hawthorn	Rosaceae	5	5	UPL	TREE
Cuscuta sp.	Dodder	Cuscutaceae	~	-3	FACW	A-FORB
Dactylis glomerata	Orchard Grass	Poaceae	*	3	FACU	P-GRASS
Dalea purpurea	Purple Prairie Clover	Fabaceae	8	5	UPL	P-FORB
Danthonia spicata	Poverty Oat Grass	Poaceae	3	5	UPL	P-GRASS
Daucus carota	Queen Anne's Lace	Apiaceae	*	5	UPL	B-FORB
Desmodium canadense	Showy Tick Trefoil	Fabaceae	5	1	FAC-	P-FORB
Dianthus armeria	Deptford Pink	Caryophyllaceae	*	5	UPL	A-FORB
Dichanthelilum acuminatum	Panic Grass	Poaceae	2	0	FAC	P-GRASS
Dichanthelilum acuminatum var. *implicatum*	Panic Grass	Poaceae	2	0	FAC	P-GRASS
Dichanthelium leibergii	Leiberg's Panic Grass	Poaceae	7	2	FACU+	P-GRASS
Dichanthelium oligosanthes	Panic Grass	Poaceae	3	3	FACU	P-GRASS
Dichanthelium praecocius	Early White-haired Panic Grass	Poaceae	5	5	UPL	P-GRASS
Digitaria ischaemum	Smooth Crab Grass	Poaceae	*	3	FACU	A-GRASS
Dipsacus laciniatus	Cut-leaved Teasel	Dipsacaceae	*	5	UPL	B-FORB
Dodecatheon meadia	Shooting Star	Primulaceae	6	3	FACU	P-FORB
Echinacea pallida	Pale Purple Coneflower	Asteraceae	7	5	UPL	P-FORB
Echinochloa crus-galli	Barnyard Grass	Poaceae	*	-3	FACW	A-GRASS
Elaeagnus angustifolia	Russian Olive	Elaeagnaceae	*	4	FACU-	SHRUB
Elaeagnus umbellata	Autumn Olive	Elaeagnaceae	*	5	UPL	SHRUB
Eleocharis erythropoda	Red-rooted Spike Rush	Cyperaceae	3	-5	OBL	P-SEDGE
Eleusine indica	Crowfoot Grass	Poaceae	*	3	FACU	A-GRASS
Elymus trachycaulus	Bearded Wheat Grass	Poaceae	8	0	FAC	P-GRASS
Elymus virginicus	Virginia Wild Rye	Poaceae	4	-2	FACW-	P-GRASS
Elytrigia repens	Quack Grass	Poaceae	*	3	FACU	P-GRASS
Epilobium coloratum	Cinnamon Willow Herb	Onagraceae	3	-5	OBL	P-FORB
Epilobium leptophyllum	Fen Willow Herb	Onagraceae	9	-5	OBL	P-FORB
Equisetum arvense	Common Horsetail	Equisetaceae	0	0	FAC	FERN
Equisetum x ferrissii	Joliet Horsetail	Equisetaceae	2	-3	FACW	FERN
Eragrostis pectinacea	Small Love Grass	Poaceae	0	0	FAC	A-GRASS
Erechtites hieracifolia	Fireweed	Asteraceae	2	3	FACU	A-FORB
Erigeron annuus	Annual Fleabane	Asteraceae	1	1	FAC-	B-FORB
Erigeron philadelphicus	Marsh Fleabane	Asteraceae	3	-3	FACW	P-FORB
Erigeron strigosus	Daisy Fleabane	Asteraceae	2	1	FAC-	P-FORB
Eryngium yuccifolium	Rattlesnake Master	Apiaceae	7	-1	FAC+	P-FORB
Eupatoriadelphus maculatus	Spotted Joe Pye Weed	Asteraceae	5	-5	OBL	P-FORB
Eupatorium altissimum	Tall Boneset	Asteraceae	2	3	FACU	P-FORB
Eupatorium perfoliatum	Common Boneset	Asteraceae	4	-4	FACW+	P-FORB
Eupatorium serotinum	Late Boneset	Asteraceae	1	-1	FAC+	P-FORB
Euphorbia corollata	Flowering Spurge	Euphorbiaceae	0	5	UPL	P-FORB

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
Euphorbia esula	Leafy Spurge	Euphorbiaceae	*	5	UPL	P-FORB
Euthamia graminifolia	Grass-leaved Goldenrod	Asteraceae	3	-2	FACW-	P-FORB
Festuca pratensis	Meadow Fescue	Poaceae	*	4	FACU-	P-GRASS
Festuca trachyphylla	Sheep Fescue	Poaceae	*	5	UPL	P-GRASS
Fragaria virginiana	Wild Strawberry	Rosaceae	2	1	FAC-	P-FORB
Frangula alnus	Glossy Buckthorn	Rhamnaceae	*	-1	FAC+	SHRUB
Fraxinus lanceolata	Green Ash	Oleaceae	2	-3	FACW	TREE
Galium obtusum	Wild Madder	Rubiaceae	5	-4	FACW+	P-FORB
Galium tinctorium	Stiff Bedstraw	Rubiaceae	6	-5	OBL	P-FORB
Galium triflorum	Sweet-scented Bedstraw	Rubiaceae	4	2	FACU+	P-FORB
Gaura biennis	Biennial Gaura	Onagraceae	2	4	FACU-	B-FORB
Gentiana alba	Pale Gentian	Gentianaceae	9	3	FACU	P-FORB
Gentiana andrewsii	Closed Gentian	Gentianaceae	7	-3	FACW	P-FORB
Gentianella quinquefolia	Stiff Gentian	Gentianaceae	0	0	FAC	A-FORB
Geranium maculatum	Wild Geranium	Geraniaceae	4	3	FACU	P-FORB
Geum aleppicum	Yellow Avens	Rosaceae	6	-1	FAC+	P-FORB
Geum canadense	White Avens	Rosaceae	2	0	FAC	P-FORB
Geum laciniatum	Rough Avens	Rosaceae	2	-3	FACW	P-FORB
Glechoma hederacea	Ground Ivy	Lamiaceae	*	3	FACU	P-FORB
Glyceria septentrionalis	Floating Manna Grass	Poaceae	6	-5	OBL	P-GRASS
Glyceria striata	Fowl Manna Grass	Poaceae	4	-5	OBL	P-GRASS
Hackelia virginiana	Stickseed	Boraginaceae	1	1	FAC-	P-FORB
Helenium autumnale	Sneezeweed	Asteraceae	3	-4	FACW+	P-FORB
Helianthus grosseserratus	Sawtooth Sunflower	Asteraceae	2	-2	FACW-	P-FORB
Helianthus hirsutus	Bristly Sunflower	Asteraceae	5	5	UPL	P-FORB
Helianthus strumosus	Pale-leaved Sunflower	Asteraceae	3	5	UPL	P-FORB
Helianthus subrhomboideus	Prairie Sunflower	Asteraceae	6	5	UPL	P-FORB
Heuchera richardsonii	Richardson Alumroot	Saxifragaceae	7	1	FAC-	P-FORB
Hieracium aurantiacum	Orange Hawkweed	Asteraceae	*	5	UPL	P-FORB
Hieracium caespitosum	Field Hawkweed	Asteraceae	*	5	UPL	P-FORB
Hieracium canadense	Canada Hawkweed	Asteraceae	5	5	UPL	P-FORB
Hieracium scabrum	Rough Hawkweed	Asteraceae	5	5	UPL	P-FORB
Hierochloe odorata	Sweet Grass	Poaceae	7	-3	FACW	P-GRASS
Hypericum perforatum	Common St. John's-wort	Hypericaceae	*	5	UPL	P-FORB
Hypericum punctatum	Spotted St. John's-wort	Hypericaceae	3	-1	FAC+	P-FORB
Hypoxis hirsuta	Yellow Star Grass	Liliaceae	6	0	FAC	P-FORB
Impatiens capensis	Spotted Touch-me-not	Balsaminaceae	2	-3	FACW	A-FORB
Ipomoea pandurata	Wild Sweet Potato	Convolvulaceae	2	3	FACU	P-FORB
Iris shrevei	Southern Blue Flag	Iridaceae	5	-5	OBL	P-FORB
Juncus dudleyi	Dudley's Rush	Juncaceae	4	0	FAC	P-FORB
Juncus interior	Inland Rush	Juncaceae	3	-1	FAC+	P-FORB
Juncus nodosus	Joint Rush	Juncaceae	6	-5	OBL	P-FORB
Juncus tenuis	Path Rush	Juncaceae	0	0	FAC	P-FORB
Juncus torreyi	Torrey's Rush	Juncaceae	3	-3	FACW	P-FORB
Juniperus virginiana	Eastern Red Cedar	Cupressaceae	1	3	FACU	TREE
Koeleria macrantha	June Grass	Poaceae	7	5	UPL	P-GRASS
Krigia biflora	False Dandelion	Asteraceae	5	3	FACU	P-FORB
Lactuca canadensis	Wild Lettuce	Asteraceae	1	2	FACU+	B-FORB
Lactuca serriola	Prickly Lettuce	Asteraceae	*	0	FAC	B-FORB
Lathyrus palustris var. *myrtifolius*	Marsh Vetchling	Fabaceae	6	-5	OBL	P-FORB
Leersia oryzoides	Rice Cut Grass	Poaceae	3	-5	OBL	P-GRASS
Lemna minor	Small Duckweed	Lemnaceae	3	-5	OBL	A-FORB
Lemna trisulca	Forked Duckweed	Lemnaceae	8	-5	OBL	A-FORB
Lespedeza capitata	Round-headed Bush Clover	Fabaceae	4	3	FACU	P-FORB
Leucanthemum vulgare	Ox-eye Daisy	Asteraceae	*	5	UPL	P-FORB
Liatris aspera	Rough Blazing Star	Asteraceae	7	5	UPL	P-FORB
Liatris pycnostachya	Prairie Blazine Star	Asteraceae	6	1	FAC-	P-FORB

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
Liatris spicata	Marsh Blazing Star	Asteraceae	7	0	FAC	P-FORB
Lilium michiganense	Michigan Lily	Liliaceae	6	-1	FAC+	P-FORB
Liparis liliifolia	Purple Twayblade	Orchidaceae	4	4	FACU-	P-FORB
Lithospermum canescens	Hoary Puccoon	Boraginaceae	6	5	UPL	P-FORB
Lobelia siphilitica	Great Blue Lobelia	Campanulaceae	4	-4	FACW+	P-FORB
Lobelia spicata	Pale Spiked Lobelia	Campanulaceae	4	0	FAC	P-FORB
Lolium multiflorum	Italian Rye Grass	Poaceae	*	5	UPL	A-GRASS
Lolium perenne	Perennial Rye Grass	Poaceae	*	3	FACU	P-GRASS
Lonicera X *bella*	Showy Fly Honeysuckle	Caprifoliaceae	*	3	FACU	SHRUB
Lotus corniculatus	Birdsfoot Trefoil	Fabaceae	*	1	FAC-	P-FORB
Ludwigia palustris var. *americana*	Marsh Purslane	Onagraceae	4	-5	OBL	P-FORB
Ludwigia polycarpa	False Loosestrife	Onagraceae	5	-5	OBL	P-FORB
Luzula multiflora	Common Wood Rush	Juncaceae	5	3	FACU	P-FORB
Lycopus americanus	Common Water Horehound	Lamiaceae	3	-5	OBL	P-FORB
Lycopus uniflorus	Nothern Bugle Weed	Lamiaceae	7	-5	OBL	P-FORB
Lysimachia quadriflora	Narrow-leaved Loosestrife	Primulaceae	8	-5	OBL	P-FORB
Lysimachia thyrsiflora	Tufted Loosestrife	Primulaceae	7	-5	OBL	P-FORB
Lythrum alatum	Winged Loosestrife	Lythraceae	5	-5	OBL	P-FORB
Lythrum salicaria	Purple Loosestrife	Lythraceae	*	-5	OBL	P-FORB
Malus ioensis	Iowa Crab	Rosaceae	3	5	UPL	TREE
Malus pumila	Apple	Rosaceae	*	5	UPL	TREE
Medicago lupulina	Black Medic	Fabaceae	*	1	FAC-	A-FORB
Melilotus albus	White Sweet Clover	Fabaceae	*	3	FACU	B-FORB
Melilotus officinalis	Yellow Sweet Clover	Fabaceae	*	3	FACU	B-FORB
Mentha arvensis var. *villosa*	Wild Mint	Lamiaceae	4	-3	FACW	P-FORB
Mimulus ringens	Monkey Flower	Scrophulariaceae	5	-5	OBL	P-FORB
Monarda fistulosa	Wild Bergamot	Lamiaceae	4	3	FACU	P-FORB
Morus alba	White Mulberry	Moraceae	*	0	FAC	TREE
Muhlenbergia frondosa	Common Satin Grass	Poaceae	3	-3	FACW	P-GRASS
Muhlenbergia mexicana	Leafy Satin Grass	Poaceae	4	-3	FACW	P-GRASS
Myriophyllum heterophyllum	Various-leaved Water Milfoil	Haloragidaceae	10	-5	OBL	P-FORB
Oenothera biennis	Common Evening Primrose	Onagraceae	1	3	FACU	B-FORB
Oenothera perennis	Small Sundrops	Onagraceae	8	0	FAC	P-FORB
Oenothera pilosella	Prairie Sundrops	Onagraceae	6	1	FAC-	P-FORB
Oligoneuron riddellii	Riddell's Goldenrod	Asteraceae	7	-5	OBL	P-FORB
Oligoneuron rigidum	Rigid Goldenrod	Asteraceae	4	4	FACU-	P-FORB
Onoclea sensibilis	Sensitive Fern	Aspleniaceae	5	-3	FACW	FERN
Osmorhiza claytonii	Hairy Sweet Cicely	Apiaceae	3	4	FACU-	P-FORB
Oxalis fontana	Common Wood Sorrel	Oxalidaceae	0	3	FACU	P-FORB
Oxypolis rigidior	Cowbane	Apiaceae	7	-5	OBL	P-FORB
Panicum capillare	Old Witch Grass	Poaceae	0	0	FAC	A-GRASS
Panicum virgatum	Prairie Switch Grass	Poaceae	4	-1	FAC+	P-GRASS
Parthenium integrifolium	Wild Quinine	Asteraceae	8	5	UPL	P-FORB
Parthenocissus quinquefolia	Virginia Creeper	Vitaceae	2	1	FAC-	W-VINE
Pedicularis canadensis	Wood Betony	Scrophulariaceae	7	2	FACU+	P-FORB
Pedicularis lanceolata	Fen Betony	Scrophulariaceae	9	-4	FACW+	P-FORB
Penstemon calycosus	Smooth Beard Tongue	Scrophulariaceae	3	3	FACU	P-FORB
Penstemon digitalis	Foxglove Beard Tongue	Scrophulariaceae	4	1	FAC-	P-FORB
Penthorum sedoides	Ditch Stonecrop	Saxifragaceae	2	-5	OBL	P-FORB
Persicaria amphibium	Water Knotweed	Polygonaceae	3	-5	OBL	P-FORB
Persicaria cespitosa	Creeping Smartweed	Polygonaceae	*	5	UPL	A-FORB
Persicaria hydropiperoides	Mild Water Pepper	Polygonaceae	4	-5	OBL	P-FORB
Persicaria punctata	Smartweed	Polygonaceae	3	-5	OBL	A-FORB
Persicaria vulgaris	Lady's Thumb	Polygonaceae	*	-3	FACW	A-FORB
Phalaris arundinacea	Reed Canary Grass	Poaceae	*	-4	FACW+	P-GRASS
Phleum pratense	Timothy	Poaceae	*	3	FACU	P-GRASS
Phlox glaberrima ssp. *interior*	Smooth Phlox	Polemoniaceae	6	-3	FACW	P-FORB

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
Phlox pilosa	Prairie Phlox	Polemoniaceae	7	1	FAC-	P-FORB
Phragmites australis	Common Reed	Poaceae	*	-4	FACW+	P-GRASS
Phryma leptostachya	Lopseed	Phrymaceae	4	5	UPL	P-FORB
Physalis heterophylla	Clammy Ground Cherry	Solanaceae	2	5	UPL	P-FORB
Physalis pubescens	Hairy Ground Cherry	Solanaceae	3	5	UPL	A-FORB
Physalis subglabrata	Smooth Ground Cherry	Solanaceae	0	5	UPL	P-FORB
Plantago rugelii	Red-stalked Plantain	Plantaginaceae	0	0	FAC	A-FORB
Platanthera sp.	Orchid	Orchidaceae	native	~	~	P-FORB
Poa bulbosa	Bulbous Blue Grass	Poaceae	*	5	UPL	P-GRASS
Poa compressa	Canadian Blue Grass	Poaceae	*	2	FACU+	P-GRASS
Poa palustris	Fowl Blue Grass	Poaceae	7	-4	FACW	P-GRASS
Poa pratensis	Kentucky Blue Grass	Poaceae	*	1	FAC-	P-GRASS
Poa trivialis	Meadow Grass	Poaceae	*	-3	FACW	P-GRASS
Podophyllum peltatum	Mayapple	Berberidaceae	4	3	FACU	P-FORB
Polygala verticillata	Whorled Milkwort	Polygalaceae	9	5	UPL	A-FORB
Polygonatum commutatum	Great Solomon Seal	Liliaceae	4	3	FACU	P-FORB
Polygonum arenastrum	Prostrate Knotweed	Polygonaceae	*	5	UPL	A-FORB
Populus deltoides	Eastern Cottonwood	Salicaceae	2	-1	FAC+	TREE
Populus tremuloides	Quaking Aspen	Salicaceae	3	0	FAC	TREE
Portulaca oleracea	Purslane	Portulacaceae	*	1	FAC-	A-FORB
Potamogeton foliosus	Leafy Pondweed	Potamogetonaceae	5	-5	OBL	P-FORB
Potentilla arguta	Prairie Cinquefoil	Rosaceae	10	4	FACU-	P-FORB
Potentilla norvegica	Rough Cinquefoil	Rosaceae	0	0	FAC	A-FORB
Potentilla recta	Sulfur Cinquefoil	Rosaceae	*	5	UPL	P-FORB
Potentilla simplex	Common Cinquefoil	Rosaceae	3	4	FACU-	P-FORB
Prenanthes aspera	Rough White Lettuce	Asteraceae	8	5	UPL	P-FORB
Prenanthes racemosa	Glaucous White Lettuce	Asteraceae	8	-3	FACW	P-FORB
Proserpinaca palustris	Mermaid Weed	Haloragidaceae	5	-5	OBL	P-FORB
Prunella vulgaris var. *elongata*	Self-heal	Lamiaceae	1	0	FAC	P-FORB
Prunus americana	Wild Plum	Rosaceae	3	5	UPL	TREE
Prunus serotina	Wild Black Cherry	Rosaceae	1	3	FACU	TREE
Prunus virginiana	Common Chokecherry	Rosaceae	3	1	FAC-	SHRUB
Pycnanthemum pilosum	Hairy Mountain Mint	Lamiaceae	6	5	UPL	P-FORB
Pycnanthemum tenuifolium	Slender Mountain Mint	Lamiaceae	4	0	FAC	P-FORB
Pycnanthemum virginianum	Common Mountain Mint	Lamiaceae	5	-4	FACW+	P-FORB
Pyrus calleryana	Ornamental Pear	Rosaceae	*	5	UPL	TREE
Quercus macrocarpa	Bur Oak	Fagaceae	5	1	FAC-	TREE
Quercus palustris	Pin Oak	Fagaceae	4	-3	FACW	TREE
Quercus rubra	Northern Red Oak	Fagaceae	5	3	FACU	TREE
Quercus velutina	Black Oak	Fagaceae	5	5	UPL	TREE
Ranunculus abortivus	Little-leaf Buttercup	Ranunculaceae	1	-2	FACW-	A-FORB
Ranunculus flabellaris	Yellow Water Buttercup	Ranunculaceae	6	-5	OBL	P-FORB
Ranunculus longirostris	White Water Crowfoot	Ranunculaceae	6	-5	OBL	P-FORB
Ranunculus recurvatus	Hooked Buttercup	Ranunculaceae	5	-3	FACW	A-FORB
Ranunculus sceleratus	Cursed Crowfoot	Ranunculaceae	3	-5	OBL	A-FORB
Ratibida pinnata	Yellow Coneflower	Asteraceae	4	5	UPL	P-FORB
Rhamnus cathartica	Common Buckthorn	Rhamnaceae	*	3	FACU	SHRUB
Rhus copallina	Winged Sumac	Anacardiaceae	3	5	UPL	SHRUB
Rhus glabra	Smooth Sumac	Anacardiaceae	1	5	UPL	SHRUB
Rhus hirta	Staghorn Sumac	Anacardiaceae	2	5	UPL	SHRUB
Ribes americanum	Wild Black Current	Grossulariaceae	5	-3	FACW	SHRUB
Rorippa palustris var. *fernaldiana*	Marsh Yellow Cress	Brassicaceae	4	-5	OBL	A-FORB
Rosa blanda	Early Wild Rose	Rosaceae	4	3	FACU	SHRUB
Rosa carolina	Pasture Rose	Rosaceae	4	4	FACU-	SHRUB
Rosa multiflora	Multiflora Rose	Rosaceae	*	3	FACU	SHRUB
Rosa setigera	Prairie Rose	Rosaceae	5	2	FACU+	SHRUB
Rubus flagellaris	Common Dewberry	Rosaceae	2	4	FACU-	SHRUB

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Rubus idaeus	Cultivated Raspberry	Rosaceae	*	2	FACU	SHRUB
Rubus occidentalis	Black Raspberry	Rosaceae	2	5	UPL	SHRUB
Rubus pensilvanicus	Yankee Blackberry	Rosaceae	2	1	FAC-	SHRUB
Rubus strigosus	Red Raspberry	Rosaceae	6	-2	FACW-	P-FORB
Rudbeckia hirta	Black-eyed Susan	Asteraceae	2	3	FACU	P-FORB
Rudbeckia subtomentosa	Sweet Black-eyed Susan	Asteraceae	5	-3	FACW	P-FORB
Rumex altissimus	Pale Dock	Polygonaceae	2	-2	FACW-	P-FORB
Rumex crispus	Curly Dock	Polygonaceae	*	-1	FAC+	P-FORB
Rumex sp. (*vert./orbiculatus*)	Dock	Polygonaceae	native	~	~	P-FORB
Sagittaria latifolia	Common Arrowleaf	Alismataceae	4	-5	OBL	P-FORB
Salix alba	White Willow	Salicaceae	*	-3	FACW	TREE
Salix discolor	Pussy Willow	Salicaceae	4	-3	FACW	SHRUB
Salix fragilis	Crack Willow	Salicaceae	*	-1	FAC+	TREE
Salix interior	Sandbar Willow	Salicaceae	1	-5	OBL	SHRUB
Salix petiolaris	Meadow Willow	Salicaceae	6	-5	OBL	SHRUB
Salix rigida	Heart-leaved Willow	Salicaceae	5	-4	FACW+	SHRUB
Salix x rubens	Hybrid Crack Willow	Salicaceae	*	5	UPL	TREE
Sambucus canadensis	Common Elderberry	Caprifoliaceae	2	-2	FACW	SHRUB
Sanicula canadensis	Canadian Black Snakeroot	Apiaceae	4	2	FACU+	B-FORB
Schizachyrium scoparium	Little Bluestem	Poaceae	5	4	FACU-	P-GRASS
Schoenoplectus acutus	Hard-stemmed Bulrush	Cyperaceae	6	-5	OBL	P-SEDGE
Schoenoplectus tabernaemontani	Soft-stem Bulrush	Cyperaceae	4	-5	OBL	P-SEDGE
Scirpus atrovirens	Dark Green Rush	Cyperaceae	4	-5	OBL	P-SEDGE
Scirpus cyperinus	Wool Grass	Cyperaceae	5	-5	OBL	P-SEDGE
Scirpus pendulus	Red Bulrush	Cyperaceae	3	-5	OBL	P-SEDGE
Scutellaria galericulata	Marsh Skullcap	Lamiaceae	6	-5	OBL	P-FORB
Scutellaria lateriflora	Mad-dog Skullcap	Lamiaceae	4	-5	OBL	P-FORB
Scutellaria leonardii	Small Skullcap	Lamiaceae	5	3	FACU	P-FORB
Senecio aureus	Golden Ragwort	Asteraceae	4	-3	FACW	P-FORB
Senecio pauperculus	Balsam Ragwort	Asteraceae	3	-1	FAC+	P-FORB
Senecio vulgaris	Common Groundsel	Asteraceae	*	5	UPL	A-FORB
Setaria faberi	Giant Foxtail	Poaceae	*	2	FACU+	A-GRASS
Setaria glauca	Yellow Foxtail	Poaceae	*	0	FAC	A-GRASS
Silene pratensis	White Campion	Caryophyllaceae	*	5	UPL	A-FORB
Silphium integrifolium	Rosin Weed	Asteraceae	5	5	UPL	P-FORB
Silphium laciniatum	Compass Plant	Asteraceae	5	4	FACU-	P-FORB
Silphium terebinthinaceum	Prairie Dock	Asteraceae	4	1	FAC-	P-FORB
Sisymbrium officinale	Hedge Mustard	Brassicaceae	*	5	UPL	A-FORB
Sisyrinchium albidum	Common Blue-eyed Grass	Iridaceae	4	3	FACU	P-FORB
Sisyrinchium campestre	Prairie Blue-eyed Grass	Iridaceae	6	5	UPL	P-FORB
Sium suave	Water Parsnip	Apiaceae	5	-5	OBL	P-FORB
Smilacina stellata	Starry False Solomon Seal	Liliaceae	5	1	FAC-	P-FORB
Smilax ecirrhata	Upright Carrion Flower	Smilacaceae	5	5	UPL	P-FORB
Smilax lasioneuron	Common Carrion Flower	Smilacaceae	4	5	UPL	H-VINE
Solanum dulcamara	Bittersweet Nightshade	Solanaceae	*	0	FAC	W-VINE
Solanum ptychanthum	Black Nightshade	Solanaceae	0	4	FACU-	A-FORB
Solidago canadensis	Canada Goldenrod	Asteraceae	1	3	FACU	P-FORB
Solidago gigantea	Late Goldenrod	Asteraceae	3	-3	FACW	P-FORB
Solidago juncea	Early Goldenrod	Asteraceae	4	5	UPL	P-FORB
Solidago missouriensis	Missouri Goldenrod	Asteraceae	4	5	UPL	P-FORB
Solidago nemoralis	Old Field Goldenrod	Asteraceae	3	5	UPL	P-FORB
Sonchus arvensis	Field Sow Thistle	Asteraceae	*	1	FAC-	P-FORB
Sonchus asper	Prickly Sow Thistle	Asteraceae	*	0	FAC	A-FORB
Sonchus oleraceus	Common Sow Thistle	Asteraceae	*	3	FACU	A-FORB
Sorghastrum nutans	Indian Grass	Poaceae	4	2	FACU+	P-GRASS
Sparganium eurycarpum	Common Bur Reed	Sparganiaceae	5	-5	OBL	P-FORB
Spartina pectinata	Prairie Cord Grass	Poaceae	4	-4	FACW+	P-GRASS
Sphenopholis intermedia	Slender Wedge Grass	Poaceae	5	0	FAC	P-GRASS

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Spiraea alba	Meadowsweet	Rosaceae	6	-4	FACW+	SHRUB
Spiranthes cernua	Nodding Ladies' Tresses	Orchidaceae	4	-2	FACW-	P-FORB
Spiranthes magnicamporum	Great Plaines Ladies' Tresses	Orchidaceae	9	-3	FACW	P-FORB
Sporobolus compositus	Rough Dropseed	Poaceae	3	5	UPL	P-GRASS
Sporobolus heterolepis	Northern Drop Seed	Poaceae	9	4	FACU-	P-GRASS
Stachys hispida	Marsh Hedge Nettle	Lamiaceae	5	-5	OBL	P-FORB
Stachys pilosa var. *homotricha*	Woundwort	Lamiaceae	5	-5	OBL	P-FORB
Stellaria media	Common Chickweed	Caryophyllaceae	*	3	FACU	A-FORB
Taraxacum officinale	Common Dandelion	Asteraceae	*	3	FACU	P-FORB
Thalictrum dasycarpum	Purple Meadow Rue	Ranunculaceae	5	-2	FACW-	P-FORB
Thalictrum revolutum	Waxy Meadow Rue	Ranunculaceae	5	0	FAC	P-FORB
Thelypteris palustris	Marsh Fern	Thelypteridaceae	0	-4	FACW+	FERN
Toxicodendron radicans	Poison Ivy	Anacardiaceae	1	-1	FAC+	W-VINE
Tradescantia ohiensis	Common Spiderwort	Commelinaceae	3	2	FACU+	P-FORB
Tridens flavus	Common Purpletop	Poaceae	1	5	UPL	P-GRASS
Trifolium hybridum	Alsike Clover	Fabaceae	*	1	FAC-	P-FORB
Trifolium pratense	Red Clover	Fabaceae	*	2	FACU+	P-FORB
Trifolium repens	White Clover	Fabaceae	*	2	FACU+	P-FORB
Trillium recurvatum	Red Trillium	Liliaceae	5	4	FACU-	P-FORB
Triosteum aurantiacum	Early Horse Gentian	Caprifoliaceae	5	5	UPL	P-FORB
Triosteum perfoliatum	Late Horse Gentian	Caprifoliaceae	5	5	UPL	P-FORB
Triticum aestivum	Wheat	Poaceae	*	5	UPL	A-GRASS
Typha angustifolia	Narrow-leaved Cattail	Typhaceae	*	-5	OBL	P-FORB
Typha latifolia	Broad-leaved Cattail	Typhaceae	1	-5	OBL	P-FORB
Ulmus americana	American Elm	Ulmaceae	5	-2	FACW-	TREE
Ulmus rubra	Slippery Elm	Ulmaceae	3	0	FAC	TREE
Urtica gracilis	Stinging Nettle	Urticaceae	2	-1	FAC+	P-FORB
Utricularia gibba	Humped Bladderwort	Lentibulariaceae	7	-5	OBL	P-FORB
Utricularia macrorhiza	Common Bladderwort	Lentibulariaceae	6	-5	OBL	P-FORB
Valeriana officinalis	Garden Heliotrope	Valerianaceae	*	-4	FACW+	P-FORB
Verbascum thapsus	Woolly Mullein	Scrophulariaceae	*	5	UPL	B-FORB
Verbena hastata	Blue Vervain	Verbenaceae	3	-4	FACW+	P-FORB
Vernonia fasciculata	Common Ironweed	Asteraceae	5	-3	FACW	P-FORB
Veronica scutellata	Marsh Speedwell	Scrophulariaceae	9	-5	OBL	P-FORB
Veronica serpyllifolia	Thyme-leaved Speedwell	Scrophulariaceae	*	-3	FACW	P-FORB
Veronicastrum virginicum	Culver's Root	Scrophulariaceae	6	0	FAC	P-FORB
Viburnum lantana	Wayfaring Tree	Caprifoliaceae	*	5	UPL	SHRUB
Viburnum lentago	Nannyberry	Caprifoliaceae	4	-1	FAC+	SHRUB
Viburnum opulus	European High-bush Cranberry	Caprifoliaceae	*	5	UPL	SHRUB
Viburnum prunifolium	Black Haw	Caprifoliaceae	4	3	FACU	SHRUB
Viburnum recognitum	Smooth Arrowwood	Caprifoliaceae	6	-2	FACW-	SHRUB
Vicia americana	American Vetch	Fabaceae	6	0	NI	P-FORB
Viola affinis	Woodland Blue Violet	Violaceae	2	0	FAC	P-FORB
Viola missouriensis	Missouri Violet	Violaceae	4	-3	FACW	P-FORB
Viola pedatifida	Prairie Violet	Violaceae	9	4	FACU-	P-FORB
Viola pratincola	Common Blue Violet	Violaceae	1	0	FAC	P-FORB
Viola sororia	Woolly Blue Violet	Violaceae	3	1	FAC-	P-FORB
Vitis riparia	Riverbank Grape	Vitaceae	2	-2	FACW-	W-VINE
Zanthoxylum americanum	Prickly Ash	Rutaceae	4	5	UPL	SHRUB
Zizia aptera	Heart-leaved Meadow Parsnip	Apiaceae	9	3	FACU	P-FORB
Zizia aurea	Golden Alexanders	Apiaceae	6	-1	FAC+	P-FORB

Native Species # - 354
Non-Native Species # - 95
Total Species - 449