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Results from 2012 Vegetation Monitoring in Prairie and Old Field Habitats Following Shrub Removal at the North Chicago Wetland Mitigation Site, Lake County, Illinois

by

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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 2012 monitoring, habitat management has included removal of invasive shrubs and trees, localized seeding of native prairie and wetland species, mowing, and limited applications of prescribed fire in a wetland. Future management includes proposed applications of prescribed fire in terrestrial communities and control of invasive species in terrestrial and wetland habitats. Objectives for 2012 monitoring were to collect and analyze data on species composition, diversity, and structural characteristics from permanent vegetation sample plots and to evaluate trends since the 2009 baseline sample among recognized vegetation types. Removal of invasive shrubs, saplings, and small trees was completed throughout the approximately 160-acre site prior to the 2011 sample period; the 2012 sample data represent the second complete year following this treatment. Previous work at this site includes extensive botanical surveys (e.g., Taft 1996 and 2006), wetland mapping that identified 29 wetland acres (Olson et al. 1991; Plocher et al. 1996, Plocher and Ketzner 2006a, and Plocher and Ketzner 2006b), and monitoring results from the 2009 baseline and 2010 and 2011 sample data (Taft et al. 2010, Taft and Kron 2011, Taft and Kron 2012).

<u>2012 Study Questions</u> - This report focuses on results from vegetation monitoring in terrestrial plant communities during 2012 and compares trends among reference prairie, transect prairie, and old field habitats. There are four main questions:

1. What are the site 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 2012 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-subject differences (year) in these parameters since the 2009

baseline data for each vegetation type and when (what year) do the difference 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 reported previously (Taft et al. 2010), a stratified vegetation sampling design was utilized with 10 parallel transects running west to east, each separated by intervals of 500-ft (152 m). Five sample points were established on each transect separated by 250 ft (76 m) with the exception of transect furthest to the north which had four sample points. This array provided 49 sampling stations including 37 in non-wetland terrestrial vegetation and 12 in areas previously determined (Plocher et al. 1996) to be wetland habitat. 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, 15 inches in length, were placed at the SW corner during 2010, replacing plastic posts established in 2009 (intended to avoid damage to shrub-removal equipment), to permanently mark each plot with fire-resistant markers. Plot sides were oriented along cardinal directions (the southern boundary runs W-E at 90°). Similar to 2011, mowing activities that occurred prior to 2012 vegetation sampling resulted in damage and loss of a few plot markers. An attempt was made to replace missing markers in the original locations.

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 2012 were from 26 June to 11 July, corresponding 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. With the baseline data, cluster analysis was utilized to produce a hierarchical classification of sites from the quantitative ground-layer sample data, based on the Sørensen similarity distance measure and flexible Beta linkage method (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 was used as a framework for 2012 comparisons.

Ground layer vegetation parameters were calculated at both quadrat and plot spatial scales. Quadrat means include the average among the 3 quadrats in each plot and the plot sum combines data from all 3 quadrats. Vegetation parameters include native and non-native species richness (termed species density at the quadrat scale), Shannon-Wiener Index of diversity (H' [native species only]), Simpson's Index of Dominance (including all species), percent cover and 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, following Whittaker (1975) and Taft et al. (2006), were calculated as follows:

Ground Layer Vegetation Diversity Measures

Native Species Density: Mean number of native species/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'): $-\sum [p_i \ln(p_i)]$, 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, and

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

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

Shrub Layer

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

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

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

Botanical nomenclature follows Mohlenbrock (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. Data found to be non-normally distributed were either log10 or square-root transformed; however, untransformed values are presented in tables. Statistical tests were performed with SPSS (IBM SPSS 2012).

Question 2 – Between-subject comparisons (vegetation types) for vegetation parameters (dependent variables) in 2012 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 2012 were examined with one-way repeated measures analysis of variance (1-way RM ANOVA). Two assumptions for RM ANOVA are: 1) homogeneity of variance (i.e., covariance of dependent variable are equal across groups), and 2) sphericity (within subjects [i.e, year] variances are equal). With heteroscedasticity of variance across group, the multivariate Pillai's Trace statistic was applied. When sphericity is lacking (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) were examined with mixed model RM ANOVA using a 3 x 4 design (3 vegetation types and 4 years). The null expectation is no differences in the interaction between years and vegetation types.

RESULTS AND DISCUSSION

Ground-Layer

Site Summary (all vegetation types combined)

Species Richness

About 248 taxa of vascular plants (the same as in 2011) were recorded from the combined ground-layer samples (44 plots, 132 quadrats) including 184 native species (about 78%), 52 non-native species, and 12 undetermined sterile seedlings and graminoids (Appendix 1). There were 25 new species recorded in 2012 and about 64 species previously recorded in sample plots since 2009 that were not in 2012 samples. Combining results from general surveys and the 2009-2012 monitoring efforts, 431 vascular plant species have been recorded from the North Chicago Wetland Mitigation Site including three state threatened (*Elymus trachycaulus, Oenothera perennis,* and *Veronica scutellata*) and one state endangered (*Amelanchier sanguinea*) plant species (Appendix 2).

Throughout the study area there was an average species density per quadrat (1-m^2) of 15.72 native and 5.36 non-native species. Total plot richness averaged 28.66 native and 8.8 non-native species. Average percent ground cover was 149.8% and bare ground averaged 14%.

Dominant Species

The top-10 dominant species in descending rank order, accounting for 35.5% of the total importance, were *Lolium multiflorum*, Rhamnus cathartica*, Rudbeckia hirta, Agrostis alba, Dactylus glomerata*, Allium cernuum/canadense, Cirsium arvense*, Daucus carota*, Ratibida pinnata, Poa compressa**. Six these species (underlined) also were among top-ranking

dominants in 2011. *Lolium multiflorum** is an annual species planted at the site as a cover crop and has become established as the overall most dominant species with 68% plot frequency and 17.4% cover on the site and accounting for 6.5% of the total importance among species. Despite control effort, *Rhamnus cathartica* ranks second overall in the ground layer data with 95% plot frequency and nearly 13% cover and 5.4% of the total importance among species. *Cirsium arvense** is a noxious species in Illinois (Illinois Department of Agriculture 2003).

Overall Trends in Species Richness, Diversity, and Percent Cover

Native species richness is highly correlated to native species density (Pearson Correlation Coefficient r = 0.97). Although average native species density has declined from 17.3 to 15.7 since 2009, the differences are not significant (RM-ANOVA F = 1.89, df = 1.73, $P = 0.134$). Non-native species density has increased from 4.7 to 5.4 and the trend is significant (RM-ANOVA F = 4.53, df = 2.3, $P = 0.01$), although the mean is slightly lower in 2012 than in 2011 (5.97). The overall Shannon-Wiener diversity index has declined from 2.4 to 2.2; however, the trend so far is not significant (RM-ANOVA F = 1.94, df = 1.45, P = 0.155). Total percent ground cover has increased from 131% to 150% and the difference is significant (RM-ANOVA F = 6.6, df = 1.95, $P = 0.002$). Percent bare ground has declined from 26% to 14% and the difference is significant (RM-ANOVA F = 12.9, df = 1.6, $P < 0.0001$).

Floristic Quality Assessment

The Mean Coefficient of Conservatism (Mean C) for the overall site based on total sample data was 3.1 and Mean Cn was 4.02. FQI was 42.1and FQIn was 54.4. Average plot Mean C was 2.1 ± 0.12 SE and Mean Cn was 2.87 ± 0.12 SE. Mean Floristic Quality Index (FQI) was 8.8 ± 0.77 SE and the native FQI (FQIn) was 11.59 ± 0.84 SE.

<u>2012 Habitat Differences</u>

Species Composition and Abundance

Old Field Habitat. The top ten most abundant species from the old field habitat, accounting for 41.5% of the total importance value (IV 200), were <u>*Lolium multiflorum*</u>*, <u>*Rhamnus cathartica*</u>*, <u>*Rudbeckia hirta*</u>, *Cirsium arvense**, *Dactylus glomerata**, <u>*Allium cernuum*</u>, <u>*Agrostis alba*</u>,

Ratibida pinnata, Solidago canadensis, and *Dichanthelium villosissimum*. Five of these species (underlined) also were among the ten dominants in 2011. The annual grass *Lolium multiflorm**, planted as a cover crop in 2010-2011, was recorded in 86% of old field plots in 2012 suggesting it may have become established in the seed bank (Figure 3a). *Cirsium arvense** increased to 65% of the old field plots. *Dactylus glomerata** increased in frequency and particularly cover in old field (and transect prairie) plots in 2012 (Figure 3a, 3b). The sudden increase in *D. glomerata* and *C. arvense** followed the application of straw cover, possibly a source of seed contamination. However, *C. arvense** is particularly abundant bordering shrub stem burn piles (Figure 4a) and, as a species with wind-aided seed dispersal, could have become established to these barren zones from off-site sources. However, it is also common away from burn zones in areas with straw mulch (Figure 4b).

Prairie Habitat. The top ten ranking species from the prairie habitat (combining species from the transect and reference plots) accounted for 34% of the total importance and included: *Rhamnus cathartica**, *Agrostis alba*, *Andropogon gerardii*, *Rudbeckia hirta, Poa compressa**, *Lolium multiflorum**, *Daucus carota**, *Parthenium integrifolium*, *Silphium terebinthinaceum*, *and Leucanthemum vulgare**. The underlined species also ranked among the top-10 dominant species in 2011.

Despite completion of shrub removal, *Rhamnus cathartica** remains among the most dominant species as seedlings and small shrubs in both old field and prairie habitats in the ground layer. Although since 2009 it has declined 49% in cover in old field plots and 8% in prairie plots, it has declined only 7% in frequency in old field plots while increasing 6% in prairie plot frequency. Additional management (e.g., applications of prescribed fire) will be required to reverse its abundance and potential for re-establishment into the shrub stratum.

Increasing and Decreasing Species

Species increasing and decreasing greatest in frequency and percent cover since the 2009 baseline differ greatly between the old field and prairie habitats (Tables 1a and 1b). In general, there were greater increases for species in old field habitat and greater declines among species in prairie habitat.

Old Field Habitat. Twenty-six species increased in frequency by more than 15% compared to the baseline sample (Table 1a). Species increasing greatest in frequency (≥ 40%), including species absent in the baseline sample, were *Lolium multiflorum*, Cirsium arvense*, Ratibida pinnata, Sorghastrum nutans, Allium cernuum, Andropogon gerardii, Rudbeckia hirta,* and *Agrostis alba.* Four of these are prairie species, including two characteristic warm-season grasses. Twenty species increased in percent cover greater than 1%, compared to eight in 2011. Species increasing greatest in percent cover (> 5%) were *Lolium multiflorum** , *Dactylus glomerata*, Allium cernuum, Rudbeckia hirta, Cirsium arvense*,* and *Agrostis alba*.

Twenty-six species decreased in frequency by more than 15% (Table 1a). The greatest decreasing species (≥ 40%) were *Anemone virginiana, Cornus racemosa, Vitis riparia, Allium canadense, Aster drummondii, Hypericum perforatum*,* and *Crataegus* sp. (seedlings). Fifteen species declined in cover more than 1%; species decreasing greatest in percent cover (> 3%) were *Rhamnus cathartica*, Allium canadense, Cornus racemosa,* and *Lonicera* x *bella** (Table 1a).

Prairie Habitat (combining transect and reference prairie plots). Thirteen species increased in frequency by more than 15%. Major increasers (> 40%) were *Allium cernuum, Andropogon gerardii,* and *Carex pensylvanica* (Table 1b). Eleven species increased in cover more than 1%; the largest increasers (>3%) were *Lolium multiflorum*, Poa compressa*, Rudbeckia hirta, Leucanthemum vulgare*, Melolotus alba/officinalis*,* and *Spartina pectinata*. Forty-three species declined in frequency > 15%. Species declining greatest (> 40%) were *Crataegus* sp. (seedling), *Geum* sp. (rosettes), *Taraxicum officinale*, Cerastium vulgatum*, Lobelia spicata,* and *Vitis riparia* (Table 1b). Thirty species declined in cover more than 1%. The greatest declines (> 3% cover) were for *Solidago juncea, Cornus racemosa, Schizachyrium scoparium, Rhamnus cathartica*, Sorghatrum nutans, Carex pellita, Antennaria neglecta, Andropogon gerardii, and Agrostis alba* var.*palustris*. Three of these declining species, *Schizachyrium scoparium, Sorhastrum nutans,* and *Andropogon gerardii*, are characteristic warm-season prairie grasses. In contrast, *S. nutans* and *A. gerardii* increased in frequency in old field habitat, possibly from augmentation in seed mixes.

Species Diversity, Structure, and Floristic Quality

Analysis of variance test results indicate there were significant differences ($P < 0.05$) among reference prairie, transect prairie, and old field habitats for native species density, native species richness, the Shannon-Wiener index of diversity, and Simpson's index of dominance (Table 2). Post hoc pairwise test results indicate the main differences were due to higher values for reference prairie plots (species density and species richness) or differences between reference prairie and old field plots (diversity). During 2012, plots on the stratified transects (transect prairie and old field plots) had similar values. Species density was nearly twice as great and species richness was about 60% greater in reference prairie plots compared to transect prairie and old field plots. There were no differences in non-native species density or richness between the groups, although reference prairie plots had lower numbers compared to transect prairie and old field plots. Percent cover was similar between the three vegetation types; however, percent bare ground was significantly lower in reference prairie compared to transect prairie plots. FQA values (Mean C, Mean Cn, FQI, and FQIn) were significantly greater in reference prairie plots compared to transect prairie and old field plots (Table 2).

Time Series Differences (2009-2012)

Mean values (± 1 SE) for all parameters from 2009 to 2012 for each vegetation type (reference prairie, transect prairie, combined prairie plots, old field) and overall are shown in Table 3. The test of time differences results (repeated measures analysis of variance within subjects tests [years]) for each parameter and vegetation type (reference prairie, transect prairie, and old field) indicate significant within-subject differences for most parameters and vegetation types (Table 4). However, pairwise between-year comparisons indicate differences among tests when changes were greatest (Table 4). In general, transect prairie and old field vegetation types converged between 2010 and 2011 sample periods and have followed similar trajectories while reference prairie plots have maintained the highest measures of species richness, percent cover, and floristic integrity (Figure 5).

Reference Prairie. Native species density and richness declined in 2012 (Figure 5) and the overall trend now indicates a significant within-subject (year) difference (Table 4). Non-native

species density and richness also decreased in 2012 and the overall trend is significant. Percent cover declined greatly in 2012 and the overall trend is significant; however, percent bare ground has not changed. Reduced cover may be a drought effect; however, percent cover actually increased in the other vegetation types, perhaps recovering from past disturbances related to intensive shrub removal activities. Diversity and dominance and FQA metrics were unchanged.

Transect Prairie. Native species density and richness declined in transect prairie plots from 2009 to 2011 but increased slightly in 2012 (Figure 5); nevertheless, the differences among years is significant and the null expectation of no change over time is rejected (Table 4). Mean non-native species density and richness initially increased but have declined since 2010 and 2011, respectively; the overall difference among years for non-native species density is significant. Diversity and percent cover declined sharply from 2009 to 2011 but increased slightly in 2012 and the trends are a significant departure from the null expectation of an even trend. Dominance and percent bare ground initially increased but declined slightly in 2012 and the overall trends are significant. Floristic quality indices have declined in Transect Prairie plots but show a slight improvement in 2012; the differences are significant (Table 4).

Old Field Plots. Native species density has been constant; however, non-native species have increased (Figure 5) and the trend is significant (Table 4). Native richness first declined but increased slightly in 2012; in contrast, non-native richness increased over 50% at first but declined slightly in 2012 and the time-series differences are significant. Diversity and dominance have both declined slightly but the difference is not significant. Percent cover increased over 50% and percent bare ground declined about 50% and the differences over time are significant. Mean C and FQI have declined gradually and the differences are significant.

Year x Vegetation Type Interactions

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) are significant for all parameters except native richness, percent bare ground, dominance, and diversity

(combining vegetation types and examining effect of year alone). Vegetation type and year interactions are significantly different for all parameters except Mean C, FQI, dominance, and diversity (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 but have declined in many parameters converging with old field plots in native species density, dominance, diversity, Mean C, and FQI (Figure 5).

Shrub/Sapling Stratum

Site Summary

Mean shrub density throughout the study area increased from 0.84 to 2.7 stems per plot (25-m^2) and the difference is significant (paired t-test: t = -2.84, df 43, P = 0.007). The difference from the baseline still represents a major decline of 55.8 stems per plot (Table 6) and the difference in stem density from 2012 to the 2009 baseline is highly significant (paired t-test: t stat = 10.8, 43 df, $P < 0.00001$). Overall estimated stem density was 1,082/ha (437.8/acre), compared to the 2009 baseline shrub/sapling stem density of 22,898/ha (9,266.7/acre). Mean percent canopy cover in 2012 was 12.1% (visible sky 87.9%), a decline from 15.9% in 2011. Mean leaf area index was 0.13, a decline from 0.2 in 2011.

Fifteen species were recorded in the sampling compared to 10 in 2011 and 24 in the baseline sample. Dominant species in the combined old field and prairie plots, in descending rank order, were *Rhamnus cathartica*, Viburnum lentago, Cornus racemosa, Lonicera* x *bella** and *Cornus sericea* accounting for about 73% of the total importance value (IV200). *Rhamnus cathartica** is still the dominant species with 27% of the IV and 33% of the total stems, although its dominance has declined from the baseline level of 37% of the IV. Species with the greatest total density were *R. cathartica** and *V. lentago* with 57% of the total.

Vegetation Types

There was no difference in shrub density among the vegetation types for 2012; however, there were significant differences between reference prairie, transect prairie, and old field plots in percent canopy cover and LAI (Table 2). The differences for canopy cover were greatest

between the reference prairie plots and the other vegetation types. LAI differences were greatest between reference prairie and old field plots. Time series differences 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. As a result of intensive management focusing on shrub and sapling removal, there has been a dramatic decline for each vegetation type in stem density, percent canopy cover, and LAI since the 2009 baseline sample (Figure 6). Between subjects differences (i.e., comparisons among vegetation types, averaging all years) were found for percent canopy cover and LAI but not stem density (Table 5). Within subject differences (comparison among years, averaging vegetation types) were highly significant. Finally, the vegetation type x year interactions were all significantly different (Table 5).

The shrub removal treatment was very thorough. However, *Rhamnus cathartica** seedlings and small saplings were recorded in 42 of 44 (95%) sample plots and overall were present in 83% of ground-layer quadrats, 95% of reference prairie quadrats, 83% of transect prairie quadrats, and 79% of old field quadrats. Continued management, such as with prescribed fire, will be required to prevent re-establishment of *R. cathartica** into the shrub stratum. There is a strong inverse relationship between shrub/sapling canopy cover and LAI and ground layer species and functional group diversity and abundance (Taft and Kron, in preparation).

Tree Stratum

Seven of 44 plots included trees (woody stems > 10 cm dbh). Tree density has declined from the baseline of approximately 22.7 stems/ha and basal area of 1.1 m^2/ha to 14.8 stems/ha and 0.46 m^2/ha. Four species were recorded in the tree sample plots and *Crataegus pruinosa/coccinea* (combined due to sterile condition of most individuals) was the dominant with about 48% of the IV for all species (Table 7). Other species present include *Quercus macrocarpa* (19% of the IV), *Ulmus americana* (17% of IV), and *Prunus serotina* (16% of IV).

Threatened and Endangered Species

Three state threatened species (*Elymus trachycaulus*, *Oenothera perennis*, and *Veronica scutellata*) and one state endangered species (*Amelanchier sanguinea*) species have been reported

from the North Chicago Wetland Mitigation Site, with all but *V. scutellata* found in sample plots (Taft and Kron 2011). Only *E. trachycaulus* and *Amelanchier sanguinea* were found in sample plots during 2012. *Oenothera perennis*, an annual species formerly abundant locally in the northern half and locally scarce in the southern half of the study area, was absent in 2011 and 2012, presumably due to suppression by straw that was dispersed extensively over much of the site and competition from the prolific establishment of *Lolium multiflorum**. *Amelanchier sanguinea* formerly had three stems but in 2011 only a single tree was found with two stems now exposed above the soil level (counted as a single shrub; whereas, previously it may have been counted as two stems). In the baseline sample, 33 *Amelanchier* seedlings were recorded; however, only 2 were recorded in 2012. A determination to species can be difficult with flowering and fruiting material of *Amelanchier* and not possible in the field with sterile seedlings; seedlings may have represented two or three species: *A. sanguinea*, *A. arborea*, and possibly *A. laevis*. *Elymus trachycaulus* was recorded in 4 quadrats in 2012, down from 6 in 2011, including 3 in reference prairie plots and 1 in an old field plot and remains occasional in the southern half of the study area. *Veronica scutellata* is a marsh species, has always been scarce at this site, and has not been recorded in vegetation sample plots.

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

SUMMARY AND CONCLUSIONS

Total species richness was unchanged from 2011. However, species declining in total occurrences outnumbered increasing species in prairie habitats. The non-native cool-season annual grass *Lolium multiflorum**, planted as a cover crop, remains the overall dominant species followed by *Rhamnus cathartica**, the non-native shrub that dominated the shrub layer prior to woody control efforts. It is still the dominant shrub species throughout the site and occurs as a seedling and small sapling in 95% of the sample plots. Two other non-native invasive species, the noxious *Cirsium arvense** (Canada thistle) and *Dactylis glomerata** (orchard grass), have emerged as among the dominant species, particularly in old field plots.

Reference prairie plots continue to have the highest values for native species density and richness, percent ground cover, and FQA indices and in 2012 had the lower values for non-native species density and richness. Time series changes have been significantly different from the null expectation of no change, but have varied for each parameter and vegetation type and few clear trends can be identified. Formerly, transect prairie plots had intermediate diversity and floristic quality values and indices; however, during the past two years most parameters have merged with old field plots. 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 concordant. There was a sharp decline in percent ground cover in reference prairie plots in 2012, possibly a result of the widespread drought conditions. Percent bare ground has declined greatly among old field plots, largely a result of the persistence of the cover crop. Continued monitoring will determine whether transect prairie and old field plots begin to converge on reference prairie plots in parameters of conservation concern such as native species richness and diversity as well as floristic quality indices.

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 2012 increased and decreased in frequency (> 5 quadrats) and in % cover (> 1%), compared to baseline (2009) levels at the North Chicago Wetland Mitigation Site, Lake County, Illinois.

----------OLD FIELD INCREASERS----------				----------OLD FIELD DECREASERS----------			
SPP INCREASING BY > 15% Frequency	Increase % Frequency	SPP INCREASING BY > 1.0% COVER	Increase % Cover	SPP DECREASING BY > 15% Frequency	Decrease % Frequency	SPP DECREASING BY > 1.0% COVER	Decrease % Cover
*Lolium multiflorum**	86.21	*Lolium multiflorum**	22.43	*Anemone virginiana*	-51.72	*Rhamnus cathartica**	-48.96
*Cirsium arvense**	62.07	*Dactylus glomerata**	13.68	*Cornus racemosa*	-51.72	*Allium canadense*	-10.23
Ratibida pinnata	58.62	*Allium cernuum*	8.69	*Vitis riparia*	-51.72	*Cornus racemosa*	-8.66
Sorghastrum nutans	48.28	*Rudbeckia hirta*	8.60	*Allium canadense*	-48.28	*Lonicera × bella**	-3.83
Allium cernuum	44.83	*Cirsium arvense**	8.48	*Aster drummondii*	-44.83	*Aster drummondii*	-2.62
Andropogon gerardii	44.83	*Agrostis alba*	5.59	*Hypericum perforatum**	-44.83	*Circaea lutetiana*	-2.24
Rudbeckia hirta	41.38	*Daucus carota**	2.98	*Crataegus sp. (seedling)*	-41.38	*Aster lateriflorus*	-2.05
Agrostis alba	41.38	*Dichanthelium villosissimum*	2.53	*Geum sp (rosette)*	-34.48	*Parthenocissus quinquefolia*	-1.76
Bidens frondosa	37.93	*Solidago canadensis*	2.21	*Circaea lutetiana*	-31.03	*Rhamnus frangula**	-1.75
Zizia aurea	34.48	*Ratibida pinnata*	1.75	*Viola pratincola*	-31.03	*Viburnum lentago*	-1.70
Erigeron strigosus	34.48	*Leucanthemum vulgare**	1.73	*Aster simplex*	-27.59	*Anemone virginiana*	-1.69
Helianthus grosseserratus	34.48	*Helianthus grosseserratus*	1.59	*Geum aleppicum*	-27.59	*Solidago juncea*	-1.37
Ambrosia artemisiifolia	31.03	*Lythrum alatum*	1.38	*Rosa carolina*	-27.59	*Vitis riparia*	-1.16
*Dactylus glomerata**	31.03	*Andropogon gerardii*	1.28	*Rubus pensilvanicus*	-27.59	*Viola pratincola*	-1.04
Lactuca canadensis	27.59	*Phalaris arundinacea**	1.21	*Carex umbellata*	-24.14	*Equisetum arvense*	-1.04
*Cirsium vulgare**	24.14	*Poa pratensis**	1.18	*Sanicula canadensis*	-24.14		
Schizachyrium scoparium	24.14	*Melilotus alba/officianale**	1.14	*Amelanchier sanguinea/arborea*	-24.14		
Euthamia graminifolia	20.69	*Oxalis stricta*	1.08	*Erigeron philadelphicus*	-20.69		
*Medicago lupulina**	20.69	*Bidens frondosa*	1.06	*Fragaria virginiana*	-20.69		
Oxalis stricta	20.69	*Phleum pratense**	1.05	*Lonicera × bella**	-20.69		
Sphenopholis intermedia	20.69			*Solidago missouriensis*	-20.69		
Verbena hastata	20.69			*Viburnum opulus**	-20.69		
Dichanthelium villosissimum	20.69			*Crataegus crus-galli*	-17.24		
Aster pilosus	17.24			*Parthenocissus quinquefolia*	-17.24		
Lythrum alatum	17.24			*Rhamnus frangula*	-17.24		
Plantago rugelii	17.24			*Rosa multiflora*	-17.24		

Table 1b. Species from prairie habitat that in 2012 increased and decreased in frequency (> 5 quadrats) and in % cover (> 1%), compared to baseline (2009) levels at the North Chicago Wetland Mitigation Site, Lake County, Illinois.

----------PRAIRIE INCREASERS----------			
SPP INCREASING BY > 15% Frequency	Increase % Freq.	SPP INCREASING BY > 1.0% COVER	Increase % Cover
Allium cernuum	46.67	*Lolium multiflorum**	7.71
Andropogon gerardii	42.50	*Poa compressa**	5.30
Carex pensylvanica	40.00	*Rudbeckia hirta*	3.83
Zizia aurea	34.17	*Leucanthemum vulgare**	3.50
Dichanthelium leibergii	33.33	*Melilotus alba/officinalis**	3.49
*Lolium multiflorum**	33.33	*Spartina pectinata*	3.32
Crataegus coccinea/pruinosa	28.75	*Erigeron strigosus*	2.97
Liatris pycnostachya	27.08	*Agrostis alba*	2.66
Plantago rugelii	20.42	*Allium cernuum*	2.12
Scirpus pendulus	20.42	*Typha angustifolia**	1.39
Liatris sp. (seedling)	20.00	*Lonicera × bella**	1.28
Carex granularis	17.92		
Sorghastrum nutans	15.83		

----------PRAIRIE DECREASERS----------			
SPP DECREASING BY > 15% Frequency	Decrease % Freq.	SPP DECREASING BY > 1.0% COVER	Decrease % Cover
Crataegus sp. (seedling)	-56.25	*Solidago juncea*	-14.92
Geum sp. (rosette)	-55.83	*Cornus racemosa*	-10.22
*Taraxicum officinale**	-48.75	*Schizachyrium scoparium*	-8.74
*Cerastium vulgatum**	-42.08	*Rhamnus cathartica**	-8.09
Lobelia spicata	-42.08	*Sorghastrum nutans*	-5.56
Vitis riparia	-41.25	*Carex pellita*	-5.19
Aster simplex	-37.50	*Antennaria neglecta*	-4.07
Geum aleppicum	-36.67	*Andropogon gerardii*	-3.53
Monarda fistulosa	-33.75	*Agrostis alba* v. *palustris*	-3.28
Gentiana alba	-31.25	*Fragaria virginiana*	-2.99
Liatris cf. *spicata*	-30.00	*Carex buxbaumii*	-2.63
*Hieracium caespitosum**	-29.17	*Zanthoxylum americanum*	-2.38
Solidago nemoralis	-27.92	*Solidago gigantea*	-2.38
Juncus interior	-25.00	*Rosa carolina*	-2.28
Krigia biflora	-25.00	*Hieracium caespitosum**	-2.09
Solidago missouriensis	-24.58	*Zizia aurea*	-1.88
Antennaria neglecta	-22.50	*Aster drummondii*	-1.78
Rosa carolina	-22.50	*Helianthus grosseserratus*	-1.71
Dichanthelium villosissimum	-21.67	*Ratibida pinnata*	-1.69
Solidago canadensis	-21.67	*Solidago canadensis*	-1.68
Anemone virginiana	-21.25	*Silphium terebinthinaceum*	-1.58
Prunella vulgaris v. *elongata*	-21.25	*Potentilla simplex*	-1.38
Acer saccharinum	-18.75	*Carex granularis*	-1.34
Agrimonia gryposepala	-18.75	*Poa pratensis**	-1.21
Glyceria striata	-18.75	*Rubus pensilvanicus*	-1.10
Hypoxis hirsuta	-18.75	*Zizia aptera*	-1.06
Juniperus virginiana	-18.75	*Solidago missouriensis*	-1.06
Liatris aspera	-18.75	*Solidago nemoralis*	-1.03
Ulmus americana	-18.75	*Liatris* cf. *spicata*	-1.03
Carex hirsutella	-18.33	*Parthenium integrifolium*	-1.00
Gentiana andrewsii	-18.33		
Gentianella quinquefolia	-18.33		
Aster novae-angliae	-17.92		
Dichanthelium acuminatum	-17.92		
*Hypericum perforatum**	-17.92		
Helianthus grosseserratus	-17.08		
Helianthus rigidus	-17.08		
Sisyrinchium albidum	-17.08		
Viburnum lentago	-17.08		
Zizia aptera	-17.08		
*Lonicera × bella**	-16.25		
Rubus pensilvanicus	-15.42		
Viola pratincola	-15.00		

Table 2. One way analysis of variance results for test of between subjects differences (vegetation types) for vegetation parameters (dependent variables) based on 2012 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	25.76	0.67	13.46	1.07	13.92	1.35	2, 18.3	48.96*	**<0.0001**	*a*	*b*	*b*
Non-Native Sp Density/Quadrat	4.52	0.44	5.96	0.35	5.40	0.33	2, 41	1.48	0.239	-	-	-
Native Richness/Plot	41.71	1.44	26.13	1.90	26.21	2.38	2, 18,5	22.58*	**<0.0001**	*a*	*b*	*b*
Non-Native Richness/Plot	6.57	0.48	9.63	0.72	9.17	0.58	2, 41	2.71	0.078	-	-	-
Shannon-Wiener Diversity (natives)	2.69	0.07	2.25	0.09	2.10	0.11	2, 18.2	11.43*	**0.001**	*a*	*ab*	*b*
Simpson's Dominance (all spp.)	0.11	0.01	0.15	0.02	0.20	0.03	2, 19.8	4.08	**0.033**	-	-	-
Vegetation Structure												
% Vegetation Cover	170.48	11.40	129.69	7.79	150.37	8.68	2, 41	1.83	0.174	-	-	-
% Bare Ground	6.53	2.13	19.63	1.15	14.30	3.11	2, 41	5.26	**0.009**	*a*	*b*	*ab*
Florisitic Quality Assessment												
Mean C /quadrat (1-m^2)	3.50	0.15	1.88	0.12	1.83	0.12	2, 41	24.51	**<0.0001**	*a*	*b*	*b*
Mean Cn/quadrat	4.12	0.19	2.72	0.11	2.62	0.12	2, 41	17.63	**<0.0001**	*a*	*b*	*b*
FQI /quadrat	17.78	0.95	7.05	0.63	7.12	0.68	2, 41	30.21	**<0.0001**	*a*	*b*	*b*
FQIn /quadrat	20.89	1.18	9.99	0.68	9.79	0.78	2, 41	24.41	**<0.0001**	*a*	*b*	*b*
Shrub Stratum												
Shrub Density/ 25-m^2 plot	4.00	2.02	1.50	1.24	2.72	1.08	2, 41	0.40	0.674	-	-	-
% Canopy Cover	2.56	0.59	7.60	1.62	15.63	3.19	2, 17.9	11.29*	**0.001**	*a*	*b*	*b*
Leaf Area Index	0.01	0.01	0.06	0.02	0.18	0.05	2, 15.2	7.71*	**0.005**	*a*	*ab*	*b*

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

Table 3. Summary variables for the North Chicago Wetland Mitigation Site from terrestrial (non-wetland) communities presenting data from the 2009 baseline samples to 2012. See Methods section for detailed description of metrics and parameters. PRAIRIE combines data from transects and reference prairie samples. n = sample size (quadrat #); quadrats are 1-m^2. SE = standard error.

		REFERENCE PRAIRIE (n = 21)		TRANSECT PRAIRIE (n = 24)		PRAIRIE (n = 45)		OLD FIELD (n = 87)		TOTAL (n = 132)	
PARAMETERS	YEAR	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Spp. Diversity & Structure											
Native Species Density	2009	28.95	0.58	20.18	0.78	24.27	1.32	13.66	1.31	17.28	1.23
	2010	28.00	0.94	19.50	0.69	23.47	1.30	13.61	1.32	16.97	1.20
	2011	30.86	1.43	12.10	1.81	20.86	2.88	12.77	1.31	15.53	1.41
	2012	25.76	0.67	13.46	1.07	19.20	1.83	13.92	1.35	15.72	1.14
Non-Native Spp. Density	2009	5.71	0.74	6.88	0.59	6.33	0.55	3.93	0.34	4.75	0.34
	2010	5.38	0.58	8.21	0.33	6.89	0.51	4.67	0.44	5.42	0.37
	2011	6.10	0.86	7.33	0.77	6.76	0.69	5.56	0.32	5.97	0.32
	2012	4.52	0.44	5.96	0.35	5.29	0.37	5.40	0.33	5.36	0.25
Native Richness	2009	44.43	1.45	33.25	1.08	38.47	1.79	24.69	2.13	29.39	1.82
	2010	44.57	1.80	28.63	1.07	36.07	2.40	22.59	1.94	27.18	1.79
	2011	48.29	1.46	20.88	2.55	33.67	4.13	21.00	2.18	25.32	2.18
	2012	41.71	1.44	26.13	1.90	33.40	2.56	26.21	2.38	28.66	1.85
Non-Native Richness	2009	7.00	1.21	10.88	0.65	9.07	0.88	5.72	0.58	6.86	0.54
	2010	7.57	1.02	12.00	0.31	9.93	0.78	7.17	0.60	8.11	0.51
	2011	8.43	1.17	12.13	1.17	10.40	1.10	10.17	0.53	10.25	0.50
	2012	6.57	0.48	9.63	0.72	8.20	0.68	9.17	0.58	8.84	0.45
C dom 45 (allspp)	2009	0.09	0.00	0.11	0.01	0.10	0.01	0.27	0.03	0.21	0.03
	2010	0.10	0.00	0.08	0.00	0.09	0.00	0.20	0.02	0.16	0.02
	2011	0.09	0.01	0.25	0.05	0.18	0.04	0.29	0.04	0.25	0.03
	2012	0.11	0.01	0.15	0.02	0.13	0.01	0.20	0.03	0.18	0.02
Hn 45	2009	2.78	0.06	2.56	0.07	2.66	0.06	2.30	0.12	2.43	0.09
	2010	2.73	0.09	2.71	0.04	2.72	0.05	2.33	0.12	2.46	0.08
	2011	2.83	0.08	1.97	0.16	2.37	0.17	2.35	0.12	2.36	0.10
	2012	2.69	0.07	2.25	0.09	2.46	0.09	2.10	0.11	2.22	0.08
% Cover	2009	292.67	7.96	154.96	15.24	219.22	21.59	85.76	6.85	131.26	12.84
	2010	236.24	17.09	126.48	13.29	177.70	19.00	68.18	7.69	105.52	11.32
	2011	252.17	17.26	95.29	8.00	168.50	23.00	110.23	7.30	130.09	9.97
	2012	170.48	11.40	129.69	7.79	148.72	8.47	150.37	8.68	149.81	6.35
% BG	2009	5.26	1.21	13.39	2.60	9.60	2.20	34.34	3.30	25.91	2.90
	2010	4.98	2.41	20.15	4.99	13.07	4.21	44.93	4.34	34.07	3.92
	2011	3.21	0.68	30.92	4.08	17.99	4.70	19.50	3.12	18.98	2.58
	2012	6.53	2.13	19.63	1.57	13.51	2.15	14.30	3.11	14.03	2.16
Floristic Quality Assessment											
Native Mean C	2009	4.18	0.16	2.95	0.05	3.53	0.18	2.74	0.10	3.01	0.10
	2010	4.21	0.14	2.86	0.06	3.49	0.20	2.66	0.13	2.94	0.12
	2011	4.05	0.14	2.23	0.25	3.08	0.31	2.51	0.12	2.71	0.14
	2012	4.12	0.19	2.72	0.11	3.37	**0.22**	2.62	0.12	2.87	**0.12**

PARAMETERS	YEAR	REFERENCE PRAIRIE (n = 21) Mean	SE	TRANSECT PRAIRIE (n = 24) Mean	SE	PRAIRIE (n = 45) Mean	SE	OLD FIELD (n = 87) Mean	SE	TOTAL (n = 132) Mean	SE
Mean C	2009	3.50	0.12	2.22	0.07	2.82	0.18	2.09	0.11	2.33	0.11
	2010	3.52	0.10	2.02	0.07	2.72	0.21	2.00	0.12	2.25	0.12
	2011	3.39	0.09	1.38	0.17	2.32	0.30	1.67	0.11	1.89	0.13
	2012	3.50	0.15	1.88	0.12	2.64	0.24	1.83	0.12	2.11	0.13
Native FQI	2009	22.52	1.03	13.16	0.34	17.53	1.35	10.06	0.73	12.61	0.85
	2010	22.14	0.48	12.61	0.45	17.06	1.33	9.77	0.71	12.26	0.83
	2011	22.46	1.04	8.14	1.04	14.82	2.10	8.90	0.74	10.92	0.95
	2012	20.89	1.18	9.99	0.68	15.08	1.62	9.79	0.78	11.59	0.84
FQI	2009	18.84	0.74	9.89	0.38	14.07	1.27	7.86	0.65	9.98	0.75
	2010	18.55	0.34	8.92	0.45	13.41	1.33	7.49	0.62	9.51	0.74
	2011	18.79	0.66	5.24	0.77	11.56	1.91	6.23	0.65	8.05	0.86
	2012	17.78	0.95	7.05	0.63	12.06	1.56	7.12	0.68	8.81	0.77
Shrub/Sapling Stratum											
Shrub Density	2009	34.57	8.09	90.00	5.97	64.13	9.25	55.55	6.03	58.48	5.05
	2010	41.43	14.04	1.38	0.46	20.07	8.25	11.62	3.51	14.50	3.64
	2011	1.29	0.42	1.00	0.63	1.13	0.49	0.69	0.30	0.84	0.26
	2012	4.00	2.02	1.50	1.24	2.67	1.16	2.72	1.08	2.70	0.80
% Visible Sky	2009	68.81	0.06	30.95	0.05	48.62	0.07	23.97	0.02	32.38	0.03
	2010	65.26	0.08	87.91	0.02	77.34	0.05	61.59	0.05	66.96	0.04
	2011	84.09	0.06	82.73	0.05	83.36	0.05	84.41	0.03	84.05	0.03
	2012	84.37	0.03	92.40	0.01	94.75	0.01	84.37	0.03	87.91	0.02
% Canopy Cover	2009	31.19	6.38	69.05	4.67	51.38	6.67	76.03	1.78	67.63	3.08
	2010	34.74	7.50	12.09	2.12	22.66	4.76	38.41	4.97	33.04	3.79
	2011	15.91	5.72	17.28	5.26	16.64	4.52	15.59	3.44	15.95	2.71
	2012	2.56	0.59	7.60	1.62	5.25	1.10	15.63	3.19	12.09	2.25
Leaf Area Index (LAI)	2009	0.31	0.09	1.24	0.14	0.81	0.17	1.46	0.07	1.24	0.09
	2010	0.40	0.12	0.11	0.03	0.24	0.07	0.63	0.13	0.49	0.09
	2011	0.18	0.07	0.21	0.07	0.20	0.06	0.20	0.07	0.20	0.05
	2012	0.01	0.01	0.06	0.01	0.04	0.01	0.18	0.05	0.13	0.04

Table 4. One-way repeat measures analysis of variance results and pariwise comparisons examining within subject (year) differences among ground layer and shrub/sapling parameters at the North Chicago Wetland Mitigation Site. Different letters in post-hoc comparisons indicate significant pairwise differences.

PARAMETER	Veg. Type	spher-icity	Within Subject (Year) *F*	*P*	*df*	Pairwise Comparisons[1] 2009	2010	2011	2012
Ground Layer									
Native Spp. Density	Prairie	*	4.45	**.017**	3.00	*a*	*ab*	*ab*	*b*
	Trans Prairie	**	9.11	**.012**	1.24	*a*	*a*	*ab*	*b*
	Old Field	**	0.42	.615	1.60	-	-	-	-
Non-Native Spp. Density	Prairie	*	4.10	**.022**	3.00	*a*	*a*	*a*	*a*
	Trans Prairie	*	3.54	**.032**	3.00	*ab*	*a*	*ab*	*b*
	Old Field	**	6.52	**.003**	2.07	*a*	*ab*	*b*	*b*
Native Spp. Richness	Prairie	*	3.37	**.041**	3.00	-	-	-	-
	Trans Prairie	**	5.71	**.042**	1.11	*a*	*b*	*ab*	*ab*
	Old Field	**	3.64	**.041**	1.70	*ab*	*ab*	*b*	*ac*
Non-Native Spp. Richness	Prairie	*	3.22	**.047**	3.00	*a*	*ab*	*b*	*ac*
	Trans Prairie	*	2.30	.107	3.00	-	-	-	-
	Old Field	**	18.08	**< 0.0001**	1.91	*a*	*b*	*c*	*d*
Diversity	Prairie	*	1.10	.376	3.00	-	-	-	-
	Trans Prairie	*	4.82	**.010**	3.00	-	-	-	-
	Old Field	**	1.25	.293	1.78	-	-	-	-
Dominance	Prairie	**	1.39	.288	1.80	-	-	-	-
	Trans Prairie	**	4.47	.057	1.28	-	-	-	-
	Old Field	**	2.88	.060	2.14	-	-	-	-
% Ground Cover	Prairie	*	22.60	**< 0.0001**	3.00	*a*	*ab*	*a*	*b*
	Trans Prairie	*	3.42	**.036**	3.00	-	-	-	-
	Old Field	**	30.00	**< 0.0001**	2.27	*a*	*a*	*b*	*c*
% Bare Ground (log10)	Prairie	*	1.39	.278	3.00	-	-	-	-
	Trans Prairie	*	3.40	**.037**	3.00	-	-	-	-
	Old Field	**	27.05	**< 0.0001**	1.90	*a*	*b*	*c*	*c*
Mean C	Prairie	*	0.89	.464	3.00	-	-	-	-
	Trans Prairie	*	6.02	**.004**	3.00	-	-	-	-
	Old Field	**	9.34	**< 0.0001**	2.26	*a*	*a*	*b*	*ab*
FQI (sqrt)	Prairie	*	1.08	.383	3.00	-	-	-	-
	Trans Prairie	**	6.03	**.034**	1.17	-	-	-	-
	Old Field	**	3.83	**.035**	1.70	a	*ab*	*b*	*ab*
Shrub/Sapling Stratum									
Shrub Density	Prairie	**	8.43	**.018**	1.25	*a*	*ab*	*b*	*b*
	Trans Prairie	**	123.20	**< 0.0001**	1.02	*a*	*b*	*b*	*b*
	Old Field	**	51.95	**< 0.0001**	1.53	*a*	*b*	*c*	*bc*
% Canopy Cover	Prairie	*	11.69	**0.0002**	3.00	*a*	*a*	*ab*	*b*
	Trans Prairie	*	27.00	**< 0.0001**	3.00	*a*	*b*	*b*	*b*
	Old Field	**	72.88	**< 0.0001**	2.28	*a*	*b*	*c*	*c*
LAI	Prairie	*	6.58	**0.0034**	3.00	-	-	-	-
	Trans Prairie	**	23.05	**0.0003**	1.44	*a*	*b*	*b*	*b*
	Old Field	**	51.92	**< 0.0001**	2.11	*a*	*b*	*c*	*c*

* = sphericity assumed, ** = Greenhouse-Geisser adjustment when sphericity not found

1 = adjustment for multiple comparisons: Sidak.

2 = data lack normal central tendency and could not be transformed.

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 2012. Design is 3 x 4 mixed model analysis (3 vegetation types, 4 years) for each depedent variable.

	Between Subjects (Vegetation Types)		Within Subject (Year)		Vegetation Type X Year	
PARAMETER	*F*	*P*	*F*	*P*	*F*	*P*
Ground Layer						
Native Spp. Density	22.83	<0.0001	4.37	0.021**	4.55	0.004**
Non-Native Spp. Density	6.98	.002	3.23	0.036**	3.59	0.006**
Native Spp. Richness	16.78	< 0.0001	2.31	0.115**	3.68	0.012**
Non-Native Spp. Richness	6.97	.002	5.66	0.004**	3.98	0.004**
Mean C	33.94	< 0.0001	11.02	<0.0001**	1.88	0.111**
FQI	27.19	< 0.0001	4.90	.006*	1.74	0.122*
% Cover	64.21	< 0.0001	5.60	.001	18.91	< 0.0001
% BG	22.20	< 0.0001	0.47	0.703*	5.35	0.0001*
Dominance	7.54	.002	2.00	0.129*	1.43	0.097*
Diversity	5.61	.007	2.22	0.101*	1.02	0.418*
Shrub/Sapling Stratum						
Stem Density	1.18	.317	44.08	< 0.0001*	9.23	< 0.0001*
% Canopy Cover	7.84	.001	100.74	<0.0001*	6.41	< 0.0001*
LAI	9.71	0.0004	49.77	<0.0001*	5.23	0.0001*

*data lacking homogeneity of variance for dependent variables across groups; *P* value based on Pillai's Trace multivariate test statistic.

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

Table 6. Summary from 2012 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.

	2012 Shrub/Sapling Data (Overall)			Change in Stem Density from 2009 Baseline	
Species	**% Freq-uency**	**Total Density**	**IV 200**	**Total Change**	**% Change**
Amelanchier sanguinea	2.27	2	4.71	-1	-33.33
Cornus obliqua	2.27	7	8.91	2	40.00
Cornus racemosa	6.82	7	14.97	-729	-99.05
Cornus sericea	2.27	10	11.43	-10	-50.00
Crataegus calpodendron	0.00	0	0.00	-6	-100.00
Crataegus mollis	0.00	0	0.00	-1	-100.00
Crataegus pruinosa/coccinea	4.55	3	8.58	-29	-90.63
Crataegus punctata	0.00	0	0.00	-2	-100.00
Crataegus sp. (undetermined)	0.00	0	0.00	-5	-100.00
*Elaeagnus umbellata**	2.27	1	3.87	1	100.00
Fraxinus lanceolata	0.00	0	0.00	-1	-100.00
Juniperus virginiana	0.00	0	0.00	0	0.00
*Lonicera × bella**	4.55	9	13.62	-155	-94.51
Malus ioensis	0.00	0	0.00	-4	-100.00
*Malus pumila**	0.00	0	0.00	-1	-100.00
Populus tremuloides	0.00	0	0.00	-13	-100.00
Prunus americana	2.27	1	3.87	0	0.00
Prunus serotina	2.27	1	3.87	-8	-88.89
*Rhamnus cathartica**	15.91	39	53.99	-1,320	-97.13
*Rhamnus frangula**	2.27	4	6.39	-21	-84.00
Rhus glabra	2.27	1	3.87	-1	-50.00
Viburnum lentago	20.45	29	51.64	-108	-78.83
*Viburnum opulus**	0.00	0	0.00	-3	-100.00
Viburnum recognitum	2.27	3	5.55	2	200.00
Vitis riparia	2.27	2	4.71	-5	-71.43
Zanthoxylum americanum	0.00	0	0.00	-39	-100.00
TOTALS		119	200.00	-2,457	
Avg. Density/plot		2.7		-55.8	
Density/ha		1,081.8		-22,336.4	

Table 7. Summary of tree plot sample data from the 2009 baseline to 2012 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			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**	**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	-3.4	-100.0
Crataegus pruinosa/ 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	5.7	125.0
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	-4.5	-100.0
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	1.1	100.0
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	-1.1	-50.0
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	-6.8	-100.0
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	1.1	100.0
	1.11	22.73	200.00	1.35	27.27	200.00	0.52	19.32	200.00	0.46	14.77	200.00	-8.0	

Appendix 1. Summary list of species recorded at the North Chicago Wetland Site, Lake Coumty, IL showing 2012 data. Zero values are species recorded since the 2009 baseline sample but absent in 2012. 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.

	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	
Acalypha rhomboidea	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0	3	FACU	A-Forb	Three-seeded Mercury
Acer ginnala	1.52	0.008	0.08	2.30	0.011	0.13	0.00	0.000	0.00	*	5	UPL	Tree	Amur Maple
Acer negundo	1.52	0.008	0.08	2.30	0.011	0.13	0.00	0.000	0.00	1	-2	FACW-	Tree	Boxelder
Acer saccharinum	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	1	-3	FACW	Tree	Silver Maple
Achillea millefolium	25.00	1.220	2.00	9.20	0.557	0.85	55.56	2.500	3.95	*	3	FACU	P-Forb	Common Milfoil
Agrimonia gryposepala	2.27	0.030	0.13	3.45	0.046	0.21	0.00	0.000	0.00	3	2	FACU+	P-Forb	Tall Agrimony
Agrostis alba	51.52	6.508	6.79	48.28	6.201	6.62	57.78	7.100	7.13	0	-3	FACW	P-Grass C3	Red Top
Agrostis alba var. *palustris*	1.52	0.027	0.09	0.00	0.000	0.00	4.44	0.078	0.23	8	-3	FACW	P-Grass C3	Creeping Bent Grass
Agrostis hyemalis	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	2	1	FAC-	P-Grass C3	Hair Grass
Alliaria petiolata	1.52	0.227	0.22	2.30	0.345	0.35	0.00	0.000	0.00	*	0	FAC	B-Forb	Garlic Mustard
Allium canadense	3.79	0.318	0.39	2.30	0.466	0.43	6.67	0.033	0.29	2	3	FACU	P-Forb	Wild Garlic
Allium cernuum	36.36	5.655	5.50	32.18	7.483	6.64	44.44	2.122	3.24	7	5	FACU	P-Forb	Nodding Onion
Amaranthus sp.	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00				A-Forb	Amaranth
Ambrosia artemisiifolia	12.88	0.140	0.70	17.24	0.172	1.01	4.44	0.078	0.23	0	3	FACU	A-Forb	Common Ragweed
Amelanchier arborea/sanguinea	1.52	0.008	0.08	0.00	0.000	0.00	4.44	0.022	0.20				Tree/Shrub	Serviceberry
Andropogon gerardii	30.30	3.489	3.77	26.44	1.345	2.26	37.78	7.633	6.68	5	1	FAC-	P-Grass C4	Big Bluestem
Anemone cylindrica	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	8	5	UPL	P-Forb	Candle Anemone
Anemone virginiana	18.18	0.186	0.99	10.34	0.109	0.61	33.33	0.333	1.59	4	5	UPL	P-Forb	Tall Anemone
Antennaria neglecta	7.58	0.057	0.40	1.15	0.006	0.06	20.00	0.156	0.92	4	5	UPL	P-Forb	Cat's Foot
Apocynum androsaemifolium	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	6	5	UPL	P-Forb	Spreading Dogbane
Apocynum cannabinum	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	2	0	FAC	P-Forb	Dogbane
Apocynum sibiricum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	2	-1	FAC+	P-Forb	Indian Hemp
Aquilegia canadensis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	1	FAC-	P-Forb	Columbine
Arctium minus	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	*	5	UPL	B-Forb	Burdock
Arisaema triphyllum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	-2	FACW-	P-Forb	Indian Turnip
Asclepias incarnata	2.27	0.159	0.21	3.45	0.241	0.34	0.00	0.000	0.00	4	-5	OBL	P-Forb	Swamp Milkweed
Asclepias purpurascens	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	7	3	FACU	P-Forb	Purple Milkweed
Asclepias tuberosa	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	5	5	UPL	P-Forb	Butterflyweed
Aster azureus	8.33	0.212	0.54	0.00	0.000	0.00	24.44	0.622	1.42	7	5	UPL	P-Forb	Sky-blue Aster
Aster cordifolius	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	6	5	UPL	P-Forb	Heart-leaved Aster
Aster drummondii	22.73	0.561	1.45	19.54	0.690	1.47	28.89	0.311	1.39	3	3	FACU	P-Forb	Drummond's Aster
Aster ericoides	18.18	0.538	1.22	5.75	0.086	0.35	42.22	1.411	2.67	4	4	FACU-	P-Forb	Heath Aster
Aster lateriflorus	21.21	0.587	1.40	25.29	0.799	1.84	13.33	0.178	0.66	2	-2	FACW-	P-Forb	Side-flowering Aster
Aster novae-angliae	4.55	0.152	0.32	4.60	0.052	0.27	4.44	0.344	0.41	4	-3	FACW	P-Forb	New England Aster
Aster ontarionis	1.52	0.045	0.10	2.30	0.069	0.16	0.00	0.000	0.00	4	0	FAC	P-Forb	Ontario Aster
Aster pilosus	11.36	0.280	0.73	12.64	0.345	0.88	8.89	0.156	0.47	0	4	FACU-	P-Forb	Hairy Aster
Aster praealtus	15.15	0.667	1.16	12.64	0.483	0.98	20.00	1.022	1.50	4	-5	OBL	P-Forb	Willow Aster
Aster puniceus	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	7	-5	OBL	P-Forb	Bristly Aster

	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 sagittifolius	3.79	0.057	0.22	5.75	0.086	0.35	0.00	0.000	0.00	4	5	UPL	P-Forb	Arrow-leaved Aster
Aster simplex	3.79	0.057	0.22	5.75	0.086	0.35	0.00	0.000	0.00	3	-5	OBL	P-Forb	Panicled Aster
Atriplex patula	1.52	0.008	0.08	2.30	0.011	0.13	0.00	0.000	0.00	*	2	FACU+	A-Forb	Fat-Hen Saltbrush
Avena sativa	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	A-Grass C3	Oats
Barbarea vulgaris	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	*	0	FAC	B-Forb	Winter Cress
Bidens frondosa	16.67	0.701	1.26	24.14	1.057	1.95	2.22	0.011	0.10	1	-3	FACW	A-Forb	Common Beggar's Ticks
Botrychium dissectum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	0	FAC	Fern	Bronze Fern
Bromus commutatus /japonicus	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	*	5	UPL	A-Grass C3	Hairy Brome
Bromus inermis	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	*	5	UPL	P-Grass C3	Hungarian Brome
Bromus kalmii	4.55	0.189	0.34	0.00	0.000	0.00	13.33	0.556	0.92	10	0	FAC	P-Grass C3	Prairie Brome
Cacalia tuberosa	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	10	0	FAC	P-Forb	Prairie Indian Plantain
Calamagrostis canadensis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	3	-5	OBL	P-Grass C3	Blue Joint Grass
Calystegia sepium	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	1	0	FAC	P-Forb	American Bindweed
Carduus nutans	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	B-Forb	Musk Bristle Thistle
Carex (1) vegetative	2.27	0.049	0.14	2.30	0.069	0.16	2.22	0.011	0.10				P-Sedge	Sedge
Carex (2) vegetative	2.27	0.140	0.20	0.00	0.000	0.00	6.67	0.411	0.55				P-Sedge	Sedge
Carex (3) vegetative	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10				P-Sedge	Sedge
Carex (4) vegetative	0.76	0.114	0.11	1.15	0.172	0.17	0.00	0.000	0.00				P-Sedge	Sedge
Carex blanda	10.61	0.186	0.63	10.34	0.224	0.68	11.11	0.111	0.53	2	0	FAC	P-Sedge	Common Wood Sedge
Carex brevior	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	0	FAC	P-Sedge	Plains Oval Sedge
Carex cristatella	2.27	0.250	0.27	3.45	0.379	0.43	0.00	0.000	0.00	3	-4	FACW+	P-Sedge	Crested Oval Sedge
Carex granularis	37.88	0.973	2.45	29.89	1.080	2.27	53.33	0.767	2.69	2	-4	FACW+	P-Sedge	Pale Sedge
Carex grisea	1.52	0.136	0.16	2.30	0.207	0.26	0.00	0.000	0.00	3	5	UPL	P-Sedge	Wood Grey Sedge
Carex hirsutella	0.76	0.023	0.05	0.00	0.000	0.00	2.22	0.067	0.14	5	4	FACU-	P-Sedge	Hairy Green Sedge
Carex laxiflora	0.76	0.114	0.11	1.15	0.172	0.17	0.00	0.000	0.00	10	0	FAC	P-Sedge	Beech Wood Sedge
Carex pellita	9.85	0.663	0.91	8.05	0.155	0.52	13.33	1.644	1.65	4	-5	OBL	P-Sedge	Wooly Sedge
Carex pensylvanica	9.09	0.102	0.50	5.75	0.086	0.35	15.56	0.133	0.72	5	5	UPL	P-Sedge	Oak Sedge
Carex cf. *radiata* (vegetative)	0.76	0.114	0.11	1.15	0.172	0.17	0.00	0.000	0.00	5	5	UPL	P-Sedge	Sedge
Carex stricta	1.52	1.477	1.06	2.30	2.241	1.61	0.00	0.000	0.00	5	-5	OBL	P-Sedge	Common Tussock Sedge
Carex tenera	3.03	0.163	0.25	3.45	0.241	0.34	2.22	0.011	0.10	5	-1	FAC+	P-Sedge	Narrow-leaved Oval Sedge
Carex umbellata	2.27	0.030	0.13	3.45	0.046	0.21	0.00	0.000	0.00	6	5	UPL	P-Sedge	Early Oak Sedge
Castilleja coccinea	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	8	0	FAC	A-Forb	Indian Paintbrush
Centaurium pulchellum	2.27	0.030	0.13	3.45	0.046	0.21	0.00	0.000	0.00	*	4	FACU-	A-Forb	Showy Centaury
Cephalanthus occidentalis	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	4	-5	OBL	Shrub	Buttonbush
Cerastium vulgatum	9.85	0.049	0.50	6.90	0.034	0.38	15.56	0.078	0.69	*	3	FACU	P-Forb	Common Mouse-ear Chickweed
Chenopodium album	2.27	0.159	0.21	3.45	0.241	0.34	0.00	0.000	0.00	*	1	FAC-	A-Forb	Lamb's Quarters
Cicuta maculata	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	-5	OBL	B-Forb	Water Hemlock
Circaea lutetiana	1.52	0.008	0.08	2.30	0.011	0.13	0.00	0.000	0.00	2	3	FACU	P-Forb	Enchanter's Nightshade
Cirsium arvense	36.36	5.602	5.46	52.87	8.489	8.38	4.44	0.022	0.20	*	3	FACU	P-Forb	Field Thistle
Cirsium discolor	0.76	0.023	0.05	0.00	0.000	0.00	2.22	0.067	0.14	3	5	UPL	B-Forb	Pasture Thistle
Cirsium vulgare	8.33	0.227	0.55	10.34	0.305	0.74	4.44	0.078	0.23	*	4	FACU-	B-Forb	Bull Thistle
Comandra umbellata	5.30	0.064	0.29	0.00	0.000	0.00	15.56	0.189	0.76	6	3	FACU	P-Forb, Hemi	Bastard Toad-flax

	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	
Conyza canadensis	3.79	0.299	0.38	4.60	0.448	0.54	2.22	0.011	0.10	0	1	FAC-	A-Forb	Horseweed
Cornus alternifolia	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	7	5	UPL	Tree	Alternate-leaved Dogwood
Cornus obliqua	0.76	0.114	0.11	1.15	0.172	0.17	0.00	0.000	0.00	4	-5	OBL	Shrub	Pale Dogwood
Cornus racemosa	35.61	2.295	3.22	22.99	2.287	2.71	60.00	2.311	4.00	2	-2	FACW-	Shrub	Gray Dogwood
Cornus sericea	0.76	0.023	0.05	0.00	0.000	0.00	2.22	0.067	0.14	4	-3	FACW	Shrub	Red Osier Dogwood
Corylus americana	0.76	0.473	0.35	0.00	0.000	0.00	2.22	1.389	1.02	4	0	FAC	Shrub	American Filbert
Crataegus cf. *coccinea*	12.12	0.098	0.64	6.90	0.063	0.40	22.22	0.167	1.02	5	5	UPL	Tree	Scarlet Hawthorn
Crataegus cf. *pruinosa*	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	3	5	UPL	Tree	Frosted Hawthorn
Crataegus crus-galli	1.52	0.008	0.08	0.00	0.000	0.00	4.44	0.022	0.20	2	0	FAC	Tree	Cock-spur Hawthorn
Crataegus mollis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	2	-2	FACW-	Tree	Downy Hawthorn
Crataegus sp. (seedlings)	2.27	0.011	0.12	3.45	0.017	0.19	0.00	0.000	0.00				Tree	Hawthorn
Cratageus sp. (tri-lobed leaves)	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10				Tree	Hawthorn
Cuscuta sp.	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00		-3	FACW	A-Forb	Dodder
Dactylus glomerata	17.42	7.133	5.59	22.99	10.747	8.34	6.67	0.144	0.37	*	3	FACU	P-Grass C3	Orchard Grass
Danthonia spicata	2.27	0.481	0.43	2.30	0.724	0.60	2.22	0.011	0.10	3	5	UPL	P-Grass C3	Poverty Oat Grass
Daucus carota	32.58	4.371	4.46	27.59	3.448	3.72	42.22	6.156	5.86	*	4	FACU-	B-Forb	Queen Anne's Lace
Dianthus armeria	1.52	0.008	0.08	0.00	0.000	0.00	4.44	0.022	0.20	*	5	UPL	A-Forb	Deptford Pink
Dichanthelium acuminatum	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	0	0	FAC	P-Grass C3	Panic Grass
Dichanthelium implicatum	6.82	0.053	0.36	6.90	0.063	0.40	6.67	0.033	0.29	2	0	FAC	P-Grass C3	Old Field Panic Grass
Dichanthelium leibergii	3.79	0.019	0.19	0.00	0.000	0.00	11.11	0.056	0.49	7	2	FACU+	P-Grass C3	Leiberg's Panic Grass
Dichanthelium oligosanthes	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	3	3	FACU	P-Grass C3	Scribner's Panic Grass
Dichanthelium villosissimum	43.18	2.485	3.71	44.83	3.184	4.44	40.00	1.133	2.40	5	5	UPL	P-Grass C3	White-haired Panic Grass
Dicot 1 (seedlings)	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00					
Digitaria ischaemum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	3	FACU	A-Grass	Smooth Crab Grass
Dipsacus laciniatus	2.27	0.591	0.50	3.45	0.897	0.77	0.00	0.000	0.00	*	5	UPL	B-Forb	Cut-leaved Teasel
Echinacea pallida	4.55	0.023	0.23	6.90	0.034	0.38	0.00	0.000	0.00	7	5	UPL	P-Forb	Pale Purple Coneflower
Eleocharis erythropodia	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	3	-5	OBL	P-Sedge	Red-rooted Spike Rush
Eleusine indica	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	3	FACU	A-Grass C4	Goosegrass
Elymus trachycaulus	3.03	0.034	0.17	1.15	0.034	0.08	6.67	0.033	0.29	8	3	FACU	P-Grass C3	Bearded Wheat Grass
Elymus virginiana	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	-2	FACW-	P-Grass C3	Virginia Wild Rye
Elytrigia repens	1.52	0.008	0.08	2.30	0.011	0.13	0.00	0.000	0.00	*	3	FACU	P-Grass C3	Quack Grass
Epilobium coloratum	3.03	0.034	0.17	4.60	0.052	0.27	0.00	0.000	0.00	3	-5	OBL	P-Forb	Cinnamon Willow Herb
Equisetum arvense	4.55	0.042	0.24	4.60	0.052	0.27	4.44	0.022	0.20	0	0	FAC	Fern	Common Horsetail
Eragrostis cf. *pectinata*	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0	0	FAC	A-Grass C4	Love Grass
Erechtites hieracifolia	3.03	0.053	0.18	4.60	0.080	0.29	0.00	0.000	0.00	2	3	FACU	A-Forb	Fireweed
Erigeron annuus	27.27	0.708	1.77	24.14	0.626	1.67	33.33	0.867	1.94	1	1	FAC-	B-Forb	Annual Fleabane
Erigeron philadelphicus	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	3	-3	FACW	P-Forb	Marsh Fleabane
Erigeron strigosus	28.03	2.045	2.69	20.69	1.109	1.81	42.22	3.856	4.32	2	1	FAC-	P-Forb	Daisy Fleabane
Eryngium yuccifolium	2.27	0.011	0.12	3.45	0.017	0.19	0.00	0.000	0.00	7	-1	FAC+	P-Forb	Rattlesnake Master
Eupatorium altissimum	1.52	0.027	0.09	1.15	0.006	0.06	2.22	0.067	0.14	2	3	FACU	P-Forb	Tall Boneset
Eupatorium maculatum	3.03	0.314	0.35	4.60	0.477	0.56	0.00	0.000	0.00	5	-5	OBL	P-Forb	Spotted Joe Pye Weed
Eupatorium perfoliatum	3.79	0.057	0.22	3.45	0.046	0.21	4.44	0.078	0.23	4	-4	FACW+	P-Forb	Common Boneset

	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	
Eupatorium rugosum	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	2	3	FACU	P-Forb	White Snakeroot
Eupatorium serotinum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	1	-1	FAC+	P-Forb	Late Boneset
Euphorbia corallata	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	3	5	UPL	P-Forb	Flowering Spurge
Euphorbia escula	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	*	5	UPL	P-Forb	Leafy Spurge
Euthamia graminifolia	14.39	0.462	0.99	13.79	0.546	1.08	15.56	0.300	0.84	3	-2	FACW-	P-Forb	Grass-leaved Goldenrod
Festuca pratensis	2.27	0.011	0.12	3.45	0.017	0.19	0.00	0.000	0.00	*	4	FACU-	P-Grass	Meadow Fescue
Festuca trachyphlla	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	*	5	UPL	P-Grass C3	Sheep Fescue
Fragaria virginiana	48.48	1.864	3.54	45.98	2.402	3.98	53.33	0.822	2.73	2	1	FAC-	P-Forb	Wild Strawberry
Fraxinus lanceolata	4.55	0.023	0.23	5.75	0.029	0.32	2.22	0.011	0.10	2	-3	FACW	Tree	Green Ash
Galium obtusum	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	5	-4	FACW+	P-Forb	Wild Madder
Galium triflorum	4.55	0.023	0.23	5.75	0.029	0.32	2.22	0.011	0.10	4	2	FACU+	P-Forb	Sweet-scented Bedstraw
Gaura biennis	2.27	0.011	0.12	2.30	0.011	0.13	2.22	0.011	0.10	2	4	FACU-	B-Forb	Biennial Gaura
Gentiana alba	6.06	0.197	0.42	4.60	0.080	0.29	8.89	0.422	0.65	9	3	FACU	P-Forb	Pale Gentian
Gentiana andrewsii	2.27	0.250	0.27	0.00	0.000	0.00	6.67	0.733	0.77	7	-3	FACW	P-Forb	Closed Gentian
Gentianopsis procera	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	10	-5	OBL	A-Forb	Fringed Gentian
Gentianella quinquefolia	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	7	0	FAC	A-Forb	Stiff Gentian
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
Geum aleppicum	5.30	0.027	0.27	5.75	0.029	0.32	4.44	0.022	0.20	6	-1	FAC+	P-Forb	Yellow Avens
Geum canadense	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	2	0	FAC	P-Forb	White Avens
Geum sp. (rosette)	5.30	0.027	0.27	6.90	0.034	0.38	2.22	0.011	0.10	2	0	FAC	P-Forb	Avens
Glyceria striata	5.30	0.284	0.44	8.05	0.431	0.70	0.00	0.000	0.00	4	-5	OBL	P-Grass C3	Fowl Manna Grass
Hackelia virginiana	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	1	1	FAC-	P-Forb	Stickseed
Helianthus grosseserratus	19.70	1.640	2.03	22.99	2.092	2.58	13.33	0.767	1.06	2	-2	FACW-	P-Forb	Sawtooth Sunflower
Helianthus rigidus	8.33	0.614	0.80	0.00	0.000	0.00	24.44	1.800	2.21	6	5	UPL	P-Forb	Prairie Sunflower
Helianthus strumosus	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	3	5	UPL	P-Forb	Pale-leaved Sunflower
Hieracium caespitosum	12.12	0.080	0.63	4.60	0.023	0.25	26.67	0.189	1.22	*	5	UPL	P-Forb	Field Hawkweed
Hieracium canadense	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	5	UPL	P-Forb	Canada Hawkweed
Hierochloe odorata	1.52	0.045	0.10	2.30	0.069	0.16	0.00	0.000	0.00	7	-3	FACW	P-Grass C3	Sweet Grass
Hypericum perforatum	3.79	0.019	0.19	3.45	0.017	0.19	4.44	0.022	0.20	*	5	UPL	P-Forb	Common St. John's Wort
Hypericum punctatum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	3	-1	FAC+	P-Forb	Spotted St. John's Wort
Hypoxis hirsuta	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	6	0	FAC	P-Forb	Yellow Star Grass
Impatiens capensis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	2	-3	FACW	A-Forb	Spotted Touch-Me-Not
Iris shrevei	0.76	0.114	0.11	1.15	0.172	0.17	0.00	0.000	0.00	5	-5	OBL	P-Forb	Wild Blue Iris
Juncus dudleyi	8.33	0.466	0.71	9.20	0.632	0.90	6.67	0.144	0.37	4	0	FAC	P-Forb	Dudley's Rush
Juncus interior	0.76	0.114	0.11	1.15	0.172	0.17	0.00	0.000	0.00	3	-1	FAC+	P-Forb	Inland Rush
Juncus tenuis	12.12	0.098	0.64	6.90	0.063	0.40	22.22	0.167	1.02	0	0	FAC	P-Forb	Path Rush
Juniperus virginiana	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	1	3	FACU	Tree	Eastern Red Cedar
Krigia biflora	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	3	FACU	P-Forb	False Dandelion
Lactuca canadensis	6.82	0.072	0.37	10.34	0.109	0.61	0.00	0.000	0.00	1	2	FACU+	B-Forb	Wild Lettuce
Lactuca serriola	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	*	0	FAC	B-Forb	Prickly Lettuce
Lactuca sp.	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00				B-Forb	Lettuce
Laythrus palustris	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	7	-5	OBL	P-Forb	Marsh Vetchling

	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	
Leersia oryzoides	1.52	0.027	0.09	2.30	0.040	0.15	0.00	0.000	0.00	3	-5	OBL	P-Grass	Rice Cut-Grass
Lespedeza capitata	3.79	0.186	0.30	0.00	0.000	0.00	11.11	0.544	0.82	4	3	FACU	P-Forb N2	Round-headed Bush Clover
Leucanthemum vulgare	35.61	2.746	3.52	25.29	2.046	2.67	55.56	4.100	5.03	*	5	UPL	P-Forb	Ox-eye Daisy
Liatris aspera	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	7	5	UPL	P-Forb	Rough Blazing Star
Liatris cf. *spicata*	3.03	0.034	0.17	0.00	0.000	0.00	8.89	0.100	0.43	7	0	FAC	P-Forb	Marsh Blazing Star
Liatris pycnostachya	5.30	0.303	0.45	0.00	0.000	0.00	15.56	0.889	1.23	6	1	FAC-	P-Forb	Prairie Blazine Star
Liatris sp. (seedling)	6.06	0.068	0.33	5.75	0.086	0.35	6.67	0.033	0.29	6	1	FAC-	P-Forb	Blazing Star
Lilium michiganense	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	6	-1	FAC+	P-Forb	Michigan Lily
Lithospermum canescens	6.82	0.053	0.36	0.00	0.000	0.00	20.00	0.156	0.92	6	5	UPL	P-Forb	Hoary Puccoon
Lobelia spicata	10.61	0.053	0.54	11.49	0.057	0.63	8.89	0.044	0.39	4	0	FAC	P-Forb	Pale Spiked Lobelia
Lolium multiflorum	47.73	17.409	13.88	60.92	22.425	18.07	22.22	7.711	6.09	*	5	UPL	A-Grass	Italian Rye Grass
Lolium perenne	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	*	3	FACU	P-Grass C3	Perennial Rye Grass
Lonicera X *bella*	25.76	1.955	2.53	28.74	1.764	2.66	20.00	2.322	2.38	*	3	FACU	Shrub	Showy Fly Honeysuckle
Lotus corniculatus	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	*	1	FAC-	P-Forb	Birdsfoot Trefoil
Lycopus americanus	6.06	0.197	0.42	9.20	0.299	0.67	0.00	0.000	0.00	3	-5	OBL	P-Forb	Common Water Horehound
Lycopus uniflorus	3.03	0.015	0.15	3.45	0.017	0.19	2.22	0.011	0.10	7	-5	OBL	P-Forb	Nothern Bugle Weed
Lysimachia quadriflora	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	8	-5	OBL	P-Forb	Narrow-leaved Loosestrife
Lythrum alatum	6.82	0.913	0.93	9.20	1.379	1.39	2.22	0.011	0.10	5	-5	OBL	P-Forb	Winged Loosestrife
Lythrum salicaria	5.30	0.193	0.38	5.75	0.115	0.37	4.44	0.344	0.41	*	-5	OBL	P-Forb	Purple Loosestrife
Malus pumila	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	*	5	UPL	Tree	Apple
Medicago lupulina	8.33	0.189	0.52	8.05	0.236	0.57	8.89	0.100	0.43	*	1	FAC-	A-Forb N2	Black Medick
Melilotus alba/officinalis	11.36	2.163	1.98	8.05	1.172	1.20	17.78	4.078	3.47	*	3	FACU	B-Forb N2	White Sweet Clover
Monarda fistulosa	21.21	0.553	1.38	10.34	0.672	0.98	42.22	0.322	1.94	4	3	FACU	P-Forb	Wild Bergamot
Morus alba	1.52	0.008	0.08	2.30	0.011	0.13	0.00	0.000	0.00	*	0	FAC	Tree	White Mulberry
Muhlenbergia sp.	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00				P-Grass C4	Muhly
Oenothera biennis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	1	3	FACU	B-Forb	Common Evening Primrose
Oenothera perennis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	8	0	FAC	P-Forb	Small Sundrops
Oenothera pilosella	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	6	1	FAC-	P-Forb	Prairie Sundrops
Osmorhiza claytonii	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	3	4	FACU-	P-Forb	Hairy Sweet Cicely
Oxalis stricta	36.36	1.004	2.39	51.72	1.506	3.68	6.67	0.033	0.29	0	3	FACU	P-Forb	Tall Wood Sorrel
Oxypolis rigidor	1.52	0.027	0.09	2.30	0.040	0.15	0.00	0.000	0.00	7	-5	OBL	P-Forb	Cowbane
Panicum capillare	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0	0	FAC	A-Grass	Old Witch Grass
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	Switch Grass
Parthenium integrifolium	12.12	2.027	1.93	0.00	0.000	0.00	35.56	5.944	5.45	8	5	UPL	P-Forb	Wild Quinine
Parthenocissus quinquefolia	5.30	0.231	0.41	6.90	0.316	0.57	2.22	0.067	0.14	2	1	FAC-	W-Vine	Virginia Creeper
Pedicularis canadensis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	7	2	FACU+	P-Forb	Wood Betany
Penstemon digitalis	1.52	0.008	0.08	0.00	0.000	0.00	4.44	0.022	0.20	4	1	FAC-	P-Forb	Foxglove Beard Tongue
Phalaris arundinacea	5.30	0.955	0.89	6.90	1.276	1.21	2.22	0.333	0.31	*	-4	FACW+	P-Grass C3	Reed Canary Grass
Phleum pratense	6.82	0.830	0.88	8.05	1.052	1.12	4.44	0.400	0.45	*	3	FACU	P-Grass C3	Timothy
Phlox glaberrima	3.03	0.015	0.15	1.15	0.006	0.06	6.67	0.033	0.29	6	-3	FACW	P-Forb	Smooth Phlox
Phlox pilosa	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	7	1	FAC-	P-Forb	Sand Prairie Phlox
Phryma leptostachya	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	5	UPL	P-Forb	Lopseed

	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	
Physalis sp.	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00					Ground Cherry
Physalis subglabrata	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0	5	UPL	P-Forb	Smooth Ground Cherry
Plantago rugelii	10.61	0.386	0.76	10.34	0.529	0.89	11.11	0.111	0.53	0	0	FAC	A-Forb	Red-stalked Plantain
Platanthera sp.	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10				P-Forb	Orchid (basal leaf)
Poa bulbosa	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	P-Grass C3	Bulbous Blue Grass
Poa compressa	41.67	3.602	4.38	36.78	2.190	3.36	51.11	6.333	6.35	*	2	FACU+	P-Grass C3	Canadian Blue Grass
Poa pratensis	31.82	2.780	3.37	24.14	2.517	2.92	46.67	3.289	4.12	*	1	FAC-	P-Grass C3	Kentucky Blue Grass
Poa trivialis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	-3	FACW	P-Grass	Meadow Grass
Poaceae seedling	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00					Grass
Polygala verticillata	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	5	UPL	A-Forb	Whorled Milkwort
Polygonatum commutatum	1.52	0.008	0.08	1.15	0.006	0.06	2.22	0.011	0.10	4	3	FACU	P-Forb	Great Solomon Seal
Polygonum arenastrum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	A-Forb	Sidewalk Knotweed
Polygonum caespitosum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	A-Forb	Creeping Smartweed
Polygonum hydropiperoides	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	-5	OBL	P-Forb	Creeping Smartweed
Populus deltoides	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	2	-1	FAC+	Tree	Cottonwood
Populus tremuloides	1.52	0.117	0.15	2.30	0.178	0.24	0.00	0.000	0.00	3	0	FAC	Tree	Quaking Aspen
Portulaca oleracea	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	1	FAC-	A-Forb	Purslane
Potentilla arguta	3.79	0.019	0.19	0.00	0.000	0.00	11.11	0.056	0.49	10	4	FACU-	P-Forb	Prairie Cinquefoil
Potentilla norvegica	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0	0	FAC	A-Forb	Rough Cinquefoil
Potentilla recta	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	P-Forb	Sulfur Cinquefoil
Potentilla simplex	34.09	1.905	2.89	33.33	2.345	3.28	35.56	1.056	2.16	3	4	FACU-	P-Forb	Common Cinquefoil
Prenanthes racemosa	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	8	-3	FACW	P-Forb	Glaucous White Lettuce
Prunella vulgaris var. *elongata*	37.88	1.121	2.55	42.53	1.374	3.11	28.89	0.633	1.61	1	0	FAC	P-Forb	Self-heal
Prunus americana	4.55	0.152	0.32	2.30	0.011	0.13	8.89	0.422	0.65	3	5	UPL	Tree	American Plum
Prunus serotina	11.36	0.095	0.60	13.79	0.098	0.78	6.67	0.089	0.33	1	3	FACU	Tree	Wild Black Cherry
Prunus virginiana	3.79	0.057	0.22	3.45	0.046	0.21	4.44	0.078	0.23	3	1	FAC-	Shrub	Common Choke Cherry
Pycnanthemum tenuifolia	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	0	FAC	P-Forb	Slender Mountain Mint
Pycnanthemum virginianum	12.12	0.883	1.16	9.20	0.816	1.02	17.78	1.011	1.41	5	-4	FACW+	P-Forb	Common Mountain Mint
Quercus macrocarpa	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	1	FAC-	Tree	Burr Oak
Quercus palustris	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	-3	FACW	Tree	Pin Oak
Quercus rubra	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	5	3	FACU	Tree	Red Oak
Quercus velutina	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	5	5	UPL	Tree	Black Oak
Ranunculus abortivus	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	1	-2	FACW-	A-Forb	Little-leaf Buttercup
Ranunculus recurvatus	0.76	0.114	0.11	1.15	0.172	0.17	0.00	0.000	0.00	5	-3	FACW	A-Forb	Hooked Buttercup
Ratibida pinnata	64.39	2.083	4.44	65.52	2.351	4.95	62.22	1.567	3.59	4	5	UPL	P-Forb	Yellow Coneflower
Rhamnus cathartica	82.58	12.042	11.95	79.31	10.500	11.09	88.89	15.022	13.73	*	3	FACU	Shrub	Common Buckthorn
Rhamnus frangula	20.45	0.530	1.32	18.39	0.489	1.28	24.44	0.611	1.41	*	-1	FAC+	Shrub	Glossy Buckthorn
Rhus glabra	1.52	0.008	0.08	2.30	0.011	0.13	0.00	0.000	0.00	1	5	UPL	Shrub	Smooth Sumac
Rhus hirta	1.52	0.008	0.08	2.30	0.011	0.13	0.00	0.000	0.00	2	5	UPL	Shrub	Staghorn Sumac
Rosa blanda	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	3	FACU	Shrub	Early Wild Rose
Rosa carolina	10.61	0.167	0.61	5.75	0.115	0.37	20.00	0.267	1.00	4	4	FACU-	Shrub	Pasture Rose
Rosa multiflora	1.52	0.136	0.16	2.30	0.207	0.26	0.00	0.000	0.00	*	3	FACU	Shrub	Japanese Rose

	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	
Rubus flagellaris	4.55	0.299	0.42	2.30	0.040	0.15	8.89	0.800	0.90	2	4	FACU-	Shrub	Common Dewberry
Rubus occidentalis/idaeus	2.27	0.311	0.32	3.45	0.471	0.49	0.00	0.000	0.00	2	3	FACU	Shrub	Black Raspberry
Rubus pensilvanicus	17.42	0.905	1.43	10.34	0.333	0.76	31.11	2.011	2.62	2	1	FAC-	Shrub	Yankee Blackberry
Rubus sp. (veg.)	2.27	0.049	0.14	2.30	0.040	0.15	2.22	0.067	0.14				Shrub	Blackberry
Rudbeckia hirta	75.00	7.705	8.70	71.26	9.172	9.79	82.22	4.867	6.63	2	3	FACU	P-Forb	Black-eyed Susan
Rudbeckia subtomentosa	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	-3	FACW	P-Forb	Sweet Black-Eyed Susan
Rumex cf. *altissimus*	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	2	-2	FACW-	P-Forb	Pale Dock
Rumex crispus	1.52	0.117	0.15	2.30	0.178	0.24	0.00	0.000	0.00	*	-1	FAC+	P-Forb	Curly Dock
Rumex sp. (*vert./orbiculatus*)	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	5	-5	OBL	P-Forb	Dock
Salix rigida	1.52	0.027	0.09	2.30	0.040	0.15	0.00	0.000	0.00	5	-4	FACW+	Shrub	Heart-leaved Willow
Sanicula canadensis	9.09	0.083	0.49	10.34	0.109	0.61	6.67	0.033	0.29	4	2	FACU+	B-Forb	Canadian Black Snakeroot
Schizachyrium scoparium	17.42	1.758	2.00	10.34	0.224	0.68	31.11	4.722	4.45	5	4	FACU-	P-Grass C4	Little Bluestem
Scirpus atrovirens	0.76	0.114	0.11	1.15	0.172	0.17	0.00	0.000	0.00	4	-5	OBL	P-Sedge	Green Bulrush
Scirpus cyperinus	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	-5	OBL	P-Sedge	Wool Grass
Scirpus pendulus	6.06	0.758	0.79	2.30	0.466	0.43	13.33	1.322	1.43	3	-5	OBL	P-Sedge	Red Bulrush
Scutellaria leonardii	2.27	0.011	0.12	1.15	0.006	0.06	4.44	0.022	0.20	5	3	FACU	P-Forb	Small Skullcap
Senecio aureus	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	-3	FACW	P-Forb	Golden Ragwort
Senecio paperculus	6.06	0.235	0.44	9.20	0.356	0.71	0.00	0.000	0.00	3	-1	FAC+	P-Forb	Balsam Ragwort
Senecio vulgaris	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	A-Forb	Common Groundsel
Setaria faberi	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	*	2	FACU+	A-Grass	Giant Foxtail
Setaria glauca	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	0	FAC	A-Grass	Yellow Foxtail
Silphium integrifolium	1.52	0.117	0.15	1.15	0.172	0.17	2.22	0.011	0.10	5	5	UPL	P-Forb	Rosin Weed
Silphium laciniatum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	4	FACU-	P-Forb	Compass Plant
Silphium terebinthinaceum	9.09	2.034	1.79	0.00	0.000	0.00	26.67	5.967	5.10	4	1	FAC-	P-Forb	Prairie Dock
Sisymbrium officinale	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	A-Forb	Hedge Mustard
Sisyrinchium albidum	6.06	0.049	0.32	3.45	0.017	0.19	11.11	0.111	0.53	4	3	FACU	P-Forb	Common Blue-eyed Grass
Sisyrinchium campestre	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	6	5	UPL	P-Forb	Prairie Blue-eyed Grass
Sisyrinchium sp. (sterile)	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00				P-Forb	Blue-Eyed Grass
Smilax ecirrhata	2.27	0.030	0.13	1.15	0.006	0.06	4.44	0.078	0.23	5	5	UPL	P-Forb	Upright Carrion Flower
Solanum dulcamara	2.27	0.011	0.12	3.45	0.017	0.19	0.00	0.000	0.00	*	0	FAC	W-Vine	Bittersweet Nightshade
Solanum ptycanthum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0	4	FACU-	A-Forb	Black Nightshade
Solidago canadensis	44.70	2.841	4.02	45.98	3.471	4.69	42.22	1.622	2.81	1	3	FACU	P-Forb	Canada Goldenrod
Solidago gigantea	7.58	0.515	0.70	11.49	0.782	1.11	0.00	0.000	0.00	3	-3	FACW	P-Forb	Late Goldenrod
Solidago juncea	28.03	1.947	2.63	16.09	1.167	1.61	51.11	3.456	4.41	4	5	UPL	P-Forb	Early Goldenrod
Solidago missouriensis	1.52	0.045	0.10	0.00	0.000	0.00	4.44	0.133	0.27	4	5	UPL	P-Forb	Missouri Goldenrod
Solidago nemoralis	13.64	0.420	0.93	6.90	0.287	0.55	26.67	0.678	1.54	3	5	UPL	P-Forb	Old Field Goldenrod
Solidago riddellii	1.52	0.045	0.10	1.15	0.034	0.08	2.22	0.067	0.14	7	-5	OBL	P-Forb	Riddell's Goldenrod
Solidago rigida	13.64	0.716	1.12	3.45	0.103	0.25	33.33	1.900	2.64	4	4	FACU-	P-Forb	Rigid Goldenrod
Sonchus oleracea/arvensis	3.79	0.057	0.22	5.75	0.086	0.35	0.00	0.000	0.00	*	3	FACU	A-Forb	Common Sow Thistle
Sorghastrum nutans	28.79	1.652	2.47	26.44	0.810	1.91	33.33	3.278	3.57	4	2	FACU+	P-Grass C4	Indian Grass
Spartina pectinata	6.06	1.686	1.41	3.45	0.075	0.23	11.11	4.800	3.68	4	-4	FACW+	P-Grass C4	Prairie Cord Grass
Sphenopholis intermedia	15.15	0.758	1.22	18.39	1.126	1.70	8.89	0.044	0.39	5	0	FAC	P-Grass C3	Prairie Wedge Grass

	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	
Spiraea alba	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	6	-4	FACW+	Shrub	Meadowsweet
Taraxacum officinale	19.70	0.155	1.04	25.29	0.155	1.41	8.89	0.156	0.47	*	3	FACU	P-Forb	Common Dandelion
Thalictrum dasycarpum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	-2	FACW-	P-Forb	Purple Meadow Rue
Thalictrum revolutum	3.79	0.038	0.20	0.00	0.000	0.00	11.11	0.111	0.53	5	0	FAC	P-Forb	Waxy Meadow Rue
Toxicodendron radicans	3.03	0.072	0.19	4.60	0.109	0.31	0.00	0.000	0.00	1	3	FACU	W-Vine	Poison Ivy
Tradescantia ohiensis	2.27	0.030	0.13	2.30	0.040	0.15	2.22	0.011	0.10	3	2	FACU+	P-Forb	Common Spiderwort
Tridens flavus	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	1	5	UPL	P-Grass	Common Purpletop
Trifolium hybridum	3.03	0.163	0.25	4.60	0.247	0.40	0.00	0.000	0.00	*	1	FAC-	P-Forb N2	Alsike Clover
Trifolium pratense	2.27	0.140	0.20	3.45	0.213	0.32	0.00	0.000	0.00	*	2	FACU+	P-Forb N2	Red Clover
Trifolium repens	2.27	0.011	0.12	3.45	0.017	0.19	0.00	0.000	0.00	*	2	FACU+	P-Forb N2	White Clover
Triticum aestivum	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	5	UPL	A-Grass	Wheat
Typha angustifolia	3.79	1.087	0.91	4.60	0.931	0.86	2.22	1.389	1.02	*	-5	OBL	P-Forb	Narrow-leaved Cattail
Ulmus americana	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	5	-2	FACW-	Tree	American Elm
Ulmus rubra	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	3	0	FAC	Tree	Slippery Elm
Verbascum thapsus	0.76	0.023	0.05	1.15	0.034	0.08	0.00	0.000	0.00	*	5	UPL	B-Forb	Woolly Mullein
Verbena hastata	6.82	0.383	0.58	10.34	0.580	0.92	0.00	0.000	0.00	3	-4	FACW+	P-Forb	Blue Vervain
Veronica serpyllifolia	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	*	-3	FACW	P-Forb	Thyme-leaved Speedwell
Veronicastrum virginicum	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	6	0	FAC	P-Forb	Culver's Root
Viburnum lentago	18.18	0.830	1.42	22.99	1.178	1.97	8.89	0.156	0.47	4	-1	FAC+	Shrub	Nannyberry
Viburnum opulus	0.76	0.004	0.04	1.15	0.006	0.06	0.00	0.000	0.00	*	0	FAC	Shrub	European High-bush Cranberry
Viburnum prunifolium	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	3	FACU	Shrub	Black Haw
Viburnum recognitum	1.52	0.008	0.08	0.00	0.000	0.00	4.44	0.022	0.20	6	-2	FACW-	Shrub	Smooth Arrowwood
Vicia americana	7.58	0.205	0.50	0.00	0.000	0.00	22.22	0.600	1.31	6	5	UPL	P-Forb	American Vetch
Viola missouriensis	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	4	-3	FACW	P-Forb	Missouri Violet
Viola peditifida	8.33	0.042	0.42	3.45	0.017	0.19	17.78	0.089	0.79	9	4	FACU-	P-Forb	Prairie Violet
Viola pratincola	21.21	0.125	1.09	14.94	0.103	0.84	33.33	0.167	1.47	1	0	FAC	P-Forb	Common Blue Violet
Viola sororia	8.33	0.170	0.51	10.34	0.247	0.70	4.44	0.022	0.20	3	1	FAC-	P-Forb	Woolly Blue Violet
Vitis riparia	19.70	0.557	1.31	18.39	0.454	1.25	22.22	0.756	1.42	2	-2	FACW-	W-Vine	Rivervbank Grape
Zanthoxylum americanum	0.76	0.004	0.04	0.00	0.000	0.00	2.22	0.011	0.10	4	5	UPL	Shrub	Prickly Ash
Zizia aptera	9.85	0.148	0.57	8.05	0.103	0.49	13.33	0.233	0.70	9	3	FACU	P-Forb	Heart-leaved Meadow Parsnip
Zizia aurea	21.97	0.443	1.34	20.69	0.385	1.33	24.44	0.556	1.37	6	-1	FAC+	P-Forb	Golden Alexanders
SUMMARY	248		200.00	205		200.00	153		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 (2009-2012) and wetland habitats. * = non-native taxa, CC = coefficient of conservatism, 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
*Bromus commutatus**	Brome	Poaceae	*			A-GRASS
*Bromus inermis**	Awnless Brome Grass	Poaceae	*	5	UPL	P-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 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
Castilleja coccinea	Indian Paintbrush	Scrophulariaceae	8	0	FAC	A-FORB
*Centaurium pulchellum**	Showy Centaury	Gentianaceae	*	4	FACU-	A-FORB
Cephalanthus occidentalis	Buttonbush	Rubiaceae	4	-5	OBL	SHRUB
*Cerastium fontanum**	Common Mouse-ear Chickwe	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
Comandra umbellata	Bastard Toad-flax	Santalaceae	6	3	FACU	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

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
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 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				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
Dichanthelium acuminatum	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 villosissimum	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
*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

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
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
Gentianopsis procera	Small Fringed Gentian	Gentianaceae	10	-5	OBL	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 pauciflorus	Prairie Sunflower	Asteraceae	6	5	UPL	P-FORB
Helianthus strumosus	Pale-leaved Sunflower	Asteraceae	3	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	Marsh Vetchling	Fabaceae	7	-5	OBL	P-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
Liatris spicata	Marsh Blazing Star	Asteraceae	7	0	FAC	P-FORB
Lilium michiganense	Michigan Lily	Liliaceae	6	-1	FAC+	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

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
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 alba**	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
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 stricta	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
*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
Phlox pilosa ssp. 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 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				P-FORB
*Poa bulbosa**	Bulbous Blue Grass	Poaceae	*	5	UPL	P-GRASS
*Poa compressa**	Canadian Blue Grass	Poaceae	*	2	FACU+	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

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
*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 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
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
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				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
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

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
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 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
Spiraea alba	Meadowsweet	Rosaceae	6	-4	FACW+	SHRUB
Spiranthes cernua	Nodding Ladies' Tresses	Orchidaceae	4	-2	FACW-	P-FORB
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

Scientific Name	Common Name	Family	CC	CW	Wetness	Physiognomy
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 Cranber	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 #	345
Non-Native Species #	84
Total Species	429

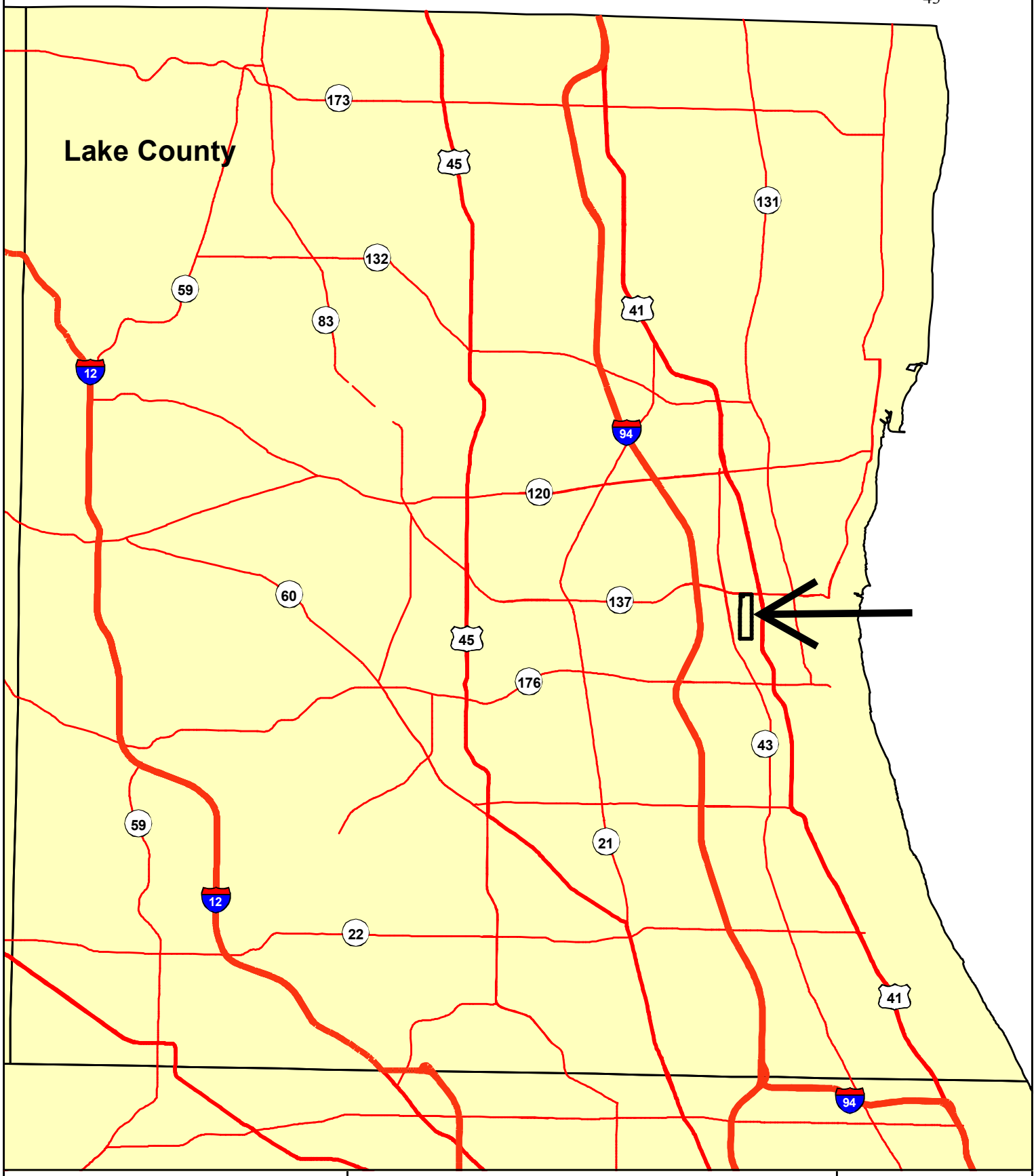

Figure 1. Location of the North Chicago Wetland Mitigation Site in Lake County, Illinois.

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

0 25 50 100
Meters

N

Jarvis 1/18/12

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

Upland
Wetland
Boundary
Transect Lines

High Quality Natural Areas
Marsh
Prairie
Wet Mesic Prairie
Sedge Meadow

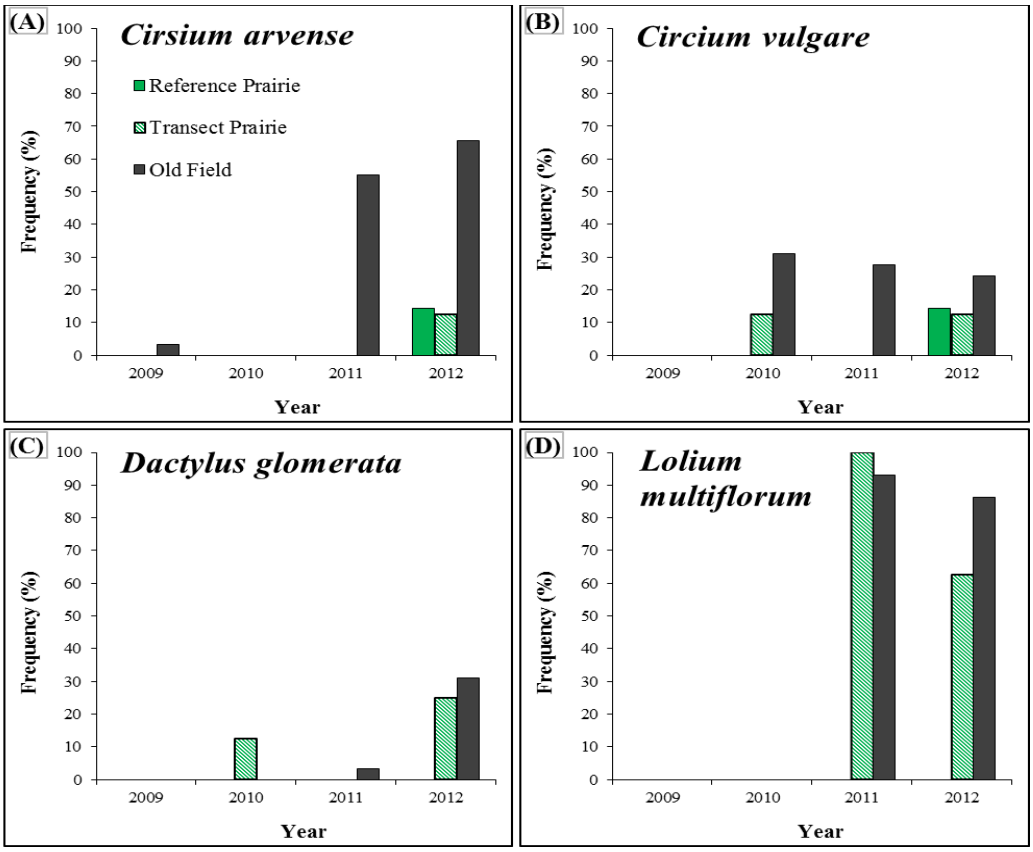

Figure 3a. Frequency trends for selected invasive species by vegetation types at the North Chicago Wetland Mitigation site, Lake County, Illinois.

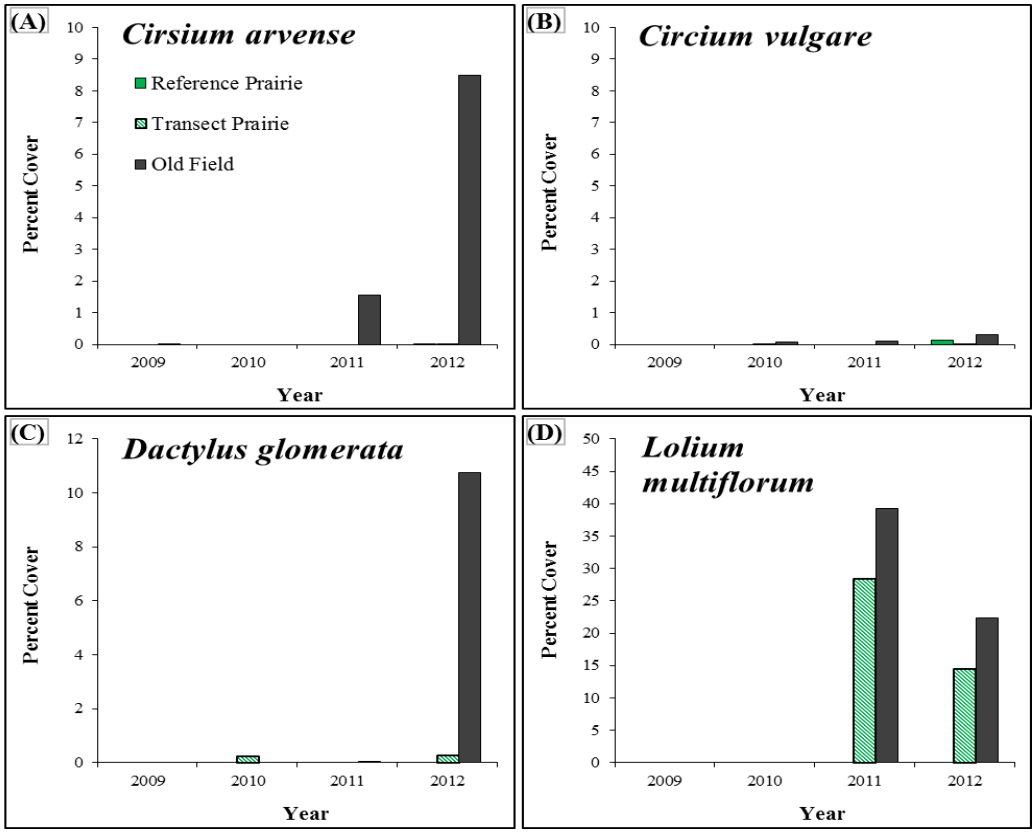

Figure 3b. Percent cover trends by vegetation type for selected invasive species at the North Chicago Wetland Mitagation site in Lake County, Illinois.

Figure 4a. *Cirsium arvense* (Canada thistle), a Eurasian species, was particularly dominant during 2012 bordering burn piles at the North Chicago Wetland Mitigation Site in Lake County, Illinois. Inset is close up of flower heads in fruit and wind-aided seed dispersal method for *C. arvense.*

Figure 4b. *Cirsium arvense* also was locally common away from burn piles in straw-mulched areas.

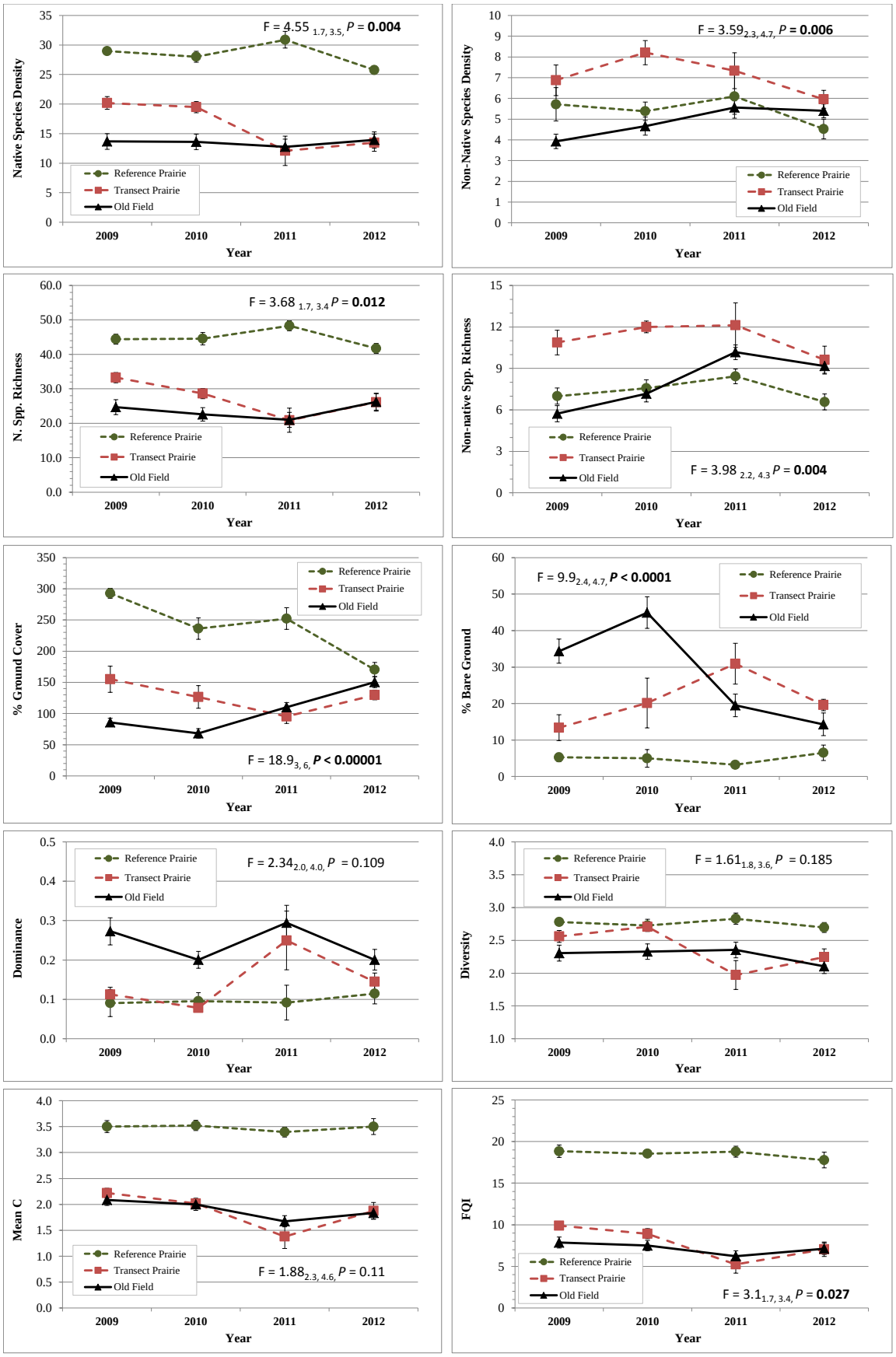

Figure 5. Trends for vegetation types across monitoring years for ground layer vegetation parameters. Significance of the between subject x within subject interaction (vegetation type x year) was tested with a mixed repeated measures analysis of variance design.

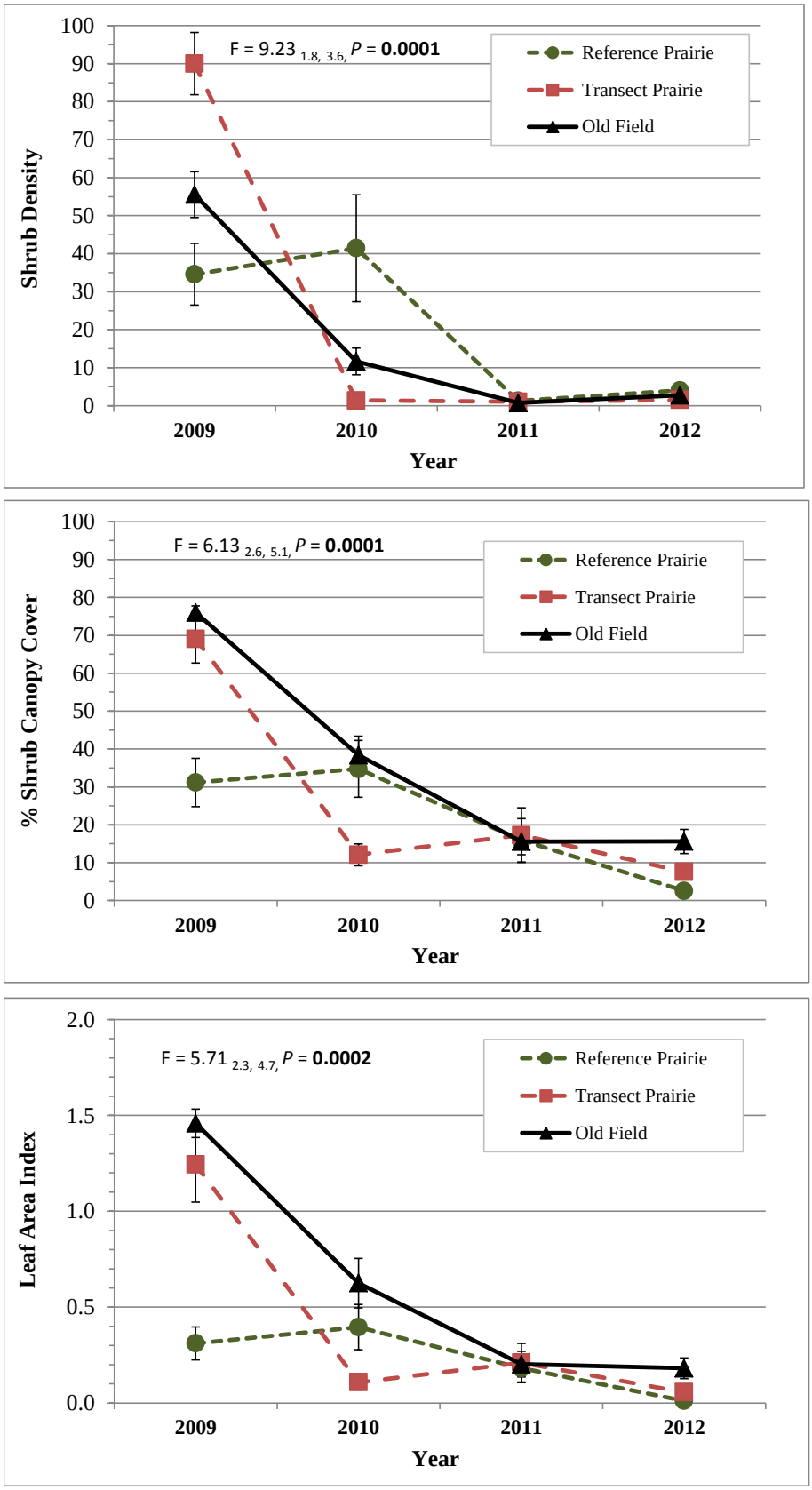

Figure 6. Trends for vegetation types across monitoring years for vegetation parameters in the shrub/sapling stratum. Significance of the between subject x within subject interaction (vegetation type x year) was tested with a mixed repeated measures analysis of variance design.