

An Analysis of MOFEP Ground Flora: Pre-treatment Conditions

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Abstract.—Similarities and differences in MOFEP ground flora species composition were determined at site, block, and treatment levels. Ground flora data were collected across nine sites on 648 permanent forestry plots; more than 10,300 1-m² quadrats were sampled each summer from 1991 through 1995. Approximately 530 species were identified; more than half occurred on fewer than 10 percent of the plots. Highly significant differences among sample years were observed for plot richness, but were regarded as a reflection of improved data quality over the course of the project. Though plots averaged relatively high species diversity, wide ranges from low to high species richness and diversity existed within all sites. Analysis of variance on plot diversity and richness indicated a strong trend of differences between even-aged and control sites. Differences in ground flora species composition and abundance, plot richness, and plot diversity appear strongly correlated with patterns in geology, landform, and soils both within and among the MOFEP sites.

To practice effective ecosystem management, natural resource managers must develop an understanding of relationships among the major components of the systems they are managing. The Missouri Ozark Forest Ecosystem Project (MOFEP) is a large-scale, long-term experiment to investigate effects of even-aged, uneven-aged, and no-harvest management practices on several different components of Missouri's southeastern Ozark forests (Brookshire *et al.* 1993, Kurzejeski *et al.* 1993).

Understory vegetation is an integral part of any forested community. Herbaceous species have been shown to be useful indicators of site disturbance, health, and potential productivity (Daubenmire 1976, Foti and Devall 1993, Host and Pregitzer 1991). Previous studies have evaluated effects of clearcutting, intermediate, and selective harvesting on understory vegetation in the southern and Midwestern sections of the United States (Crouch 1983, Duffy and Meier 1992, Gove *et al.* 1991, Reader 1987). Many studies, particularly those in the Ozark region, have focused primarily on woody regeneration and wildlife forage production (Crawford

1971 and 1976). To date, there has been no comprehensive evaluation of Missouri's upland Ozark ground flora. MOFEP provides an unparalleled opportunity to thoroughly describe current ground flora conditions in mature second-growth oak/hickory and oak/pine forests in the southeast Missouri Ozarks. The project also provides an opportunity to measure both short and long-term effects of standard forest management practices on ground flora composition and structure.

MOFEP is a large-scale experiment with a randomized block design. As MOFEP researchers prepare for post-treatment phases of data collection and analysis, it is critical to understand the pre-treatment differences and similarities among sites, replication blocks, and treatment groups. The primary objective of this paper is to identify existing pre-treatment differences among sites, treatment classes, and replication blocks with respect to ground flora species composition, plot diversity, and plot richness at the site, block, and treatment levels. A secondary objective is to briefly discuss patterns in the ground flora data in relation to environmental conditions both within and among sites. This preliminary evaluation of MOFEP ground vegetation is not intended as a comprehensive analysis of the entire pre-treatment dataset. Our intention, instead, is to provide baseline information to which future

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investigations of both pre- and post-treatment MOFEP ground flora data can refer.

METHODS

Study Area

Overstory Vegetation

The MOFEP study encompasses nine sites in Carter, Reynolds, and Shannon Counties of southeast Missouri (Brookshire *et al.* 1997, see fig. 1). Sites range in size from 265 to 530 ha, and are primarily composed of mature second-growth oak-hickory and oak-pine forests with relatively closed canopies. Common overstory tree species include black oak (*Quercus velutina* Lam.), white oak (*Quercus alba* L.), scarlet oak (*Quercus coccinea* Muench.), post oak (*Quercus stellata* Wang.), shortleaf pine (*Pinus echinata* Mill.), black hickory (*Carya texana* Buckl.), mockernut hickory (*Carya tomentosa* Nutt.), and pignut hickory (*Carya glabra* Mill.). Flowering dogwood (*Cornus florida* L.), blackgum (*Nyssa sylvatica* Marsh.), and sassafras (*Sassafras albidum* Nutt.) are common understory tree and shrub species. Detailed descriptions of overstory vegetation on MOFEP are provided by Brookshire *et al.* (1997), Kabrick *et al.* (1997), and Pallardy (1995).

Geology and Soils

Soils of the Ozarks are typically highly weathered and occur in a very dissected and weathered landscape. Primary parent materials include residuum, hillslope sediments, loess, and alluvium. Residual soil parent materials are from the Roubidoux, Gasconade, Van Buren, Gunter, and Eminence layers of the stratigraphic column. Sandstone, dolomitic limestone, and chert are the dominant lithologies on all sites, with a small amount of rhyolite expressed in site 9. A detailed description of the soils, geology, and landforms on MOFEP areas is provided by Meinert (1997) and Meinert *et al.* (1997).

Experimental Design

Nine sites were grouped geographically into three replicated blocks; each block contained one even-aged, one uneven-aged, and one no-harvest (control) unit. Treatments were randomly allocated within blocks. Stratified random sampling was used to locate vegetation plots, ensuring at least one plot per stand.

From 70 to 76 plots were located in each of the nine sites for a total of 648. More than 90 percent of the vegetation plots were on upland topographic landforms including ridges, shoulder slopes, and backslopes. Upland waterway landforms (floodplains, terraces, alluvial fans, etc.) were probably undersampled due to the existing stand delineations at the time of stratification and plot installation. The MOFEP experimental design is described in detail by Brookshire and Hauser (1993), Kurzejeski *et al.* (1993), and Sheriff and He (1997).

Data Collection

Ground layer vegetation was sampled within the same 0.2-ha circular plots used for MOFEP forestry data collection (Brookshire *et al.* 1997, Jensen 1995). Ground flora data were collected from 16 permanently marked 1-m² quadrats in each 0.2-ha plot. Each 0.2-ha plot contained four 0.02-ha subplots. The 1-m² quadrats were placed 6 m from the 0.02-ha subplot centers at 45°, 135°, 225°, and 315°. This design yielded a total of 10,368 quadrats across all nine sites (648 plots x 16 quadrats per plot). See figure 4 in Brookshire *et al.* (1997) for a diagram of the MOFEP vegetation plot design.

Pre-treatment ground flora data collection typically occurred between early June and middle to late August. Sites 7, 8, and 9 were sampled in 1991; 1 through 7 were sampled in 1992; all nine sites were sampled during each of the 1993, 1994, and 1995 seasons. Sites were sampled in the same order each summer to minimize seasonal differences that could potentially confound year to year comparisons within a site. Evaluations of seasonal effects among sites within a sample year have not been completed.

Within the 1-m² quadrats, all vascular species with leaves less than a meter above the ground were identified and assigned an estimate of percent foliar coverage. Coverage estimates included plants not rooted in the quadrats but with live foliage hanging over them. Information on canopy closure and ground surface materials was also gathered at each quadrat, including estimates of percent coverage by bare ground, mosses and lichens, leaf litter, rock and gravel, dead wood, and live basal area. For an outline of the sampling protocols used to collect pre-treatment MOFEP ground flora data, see Grabner (1997).

Data Analysis

Calculations

A combination of descriptive statistics and analysis of variance was used for this report to examine MOFEP ground vegetation data at the site, replication block, and treatment levels. A comprehensive species list was developed from the 1991-1995 data; nomenclature follows that of Steyermark (1963) (see appendix). This list includes species life history attributes, native status, average relative abundance, and number of occurrences for each sample year.

Relative abundance was calculated at the plot level by summing 1-m² coverages for each species, dividing by the sum of all species coverages for that plot, and multiplying by 100. These values, excluding plots in which the species did not occur, were averaged by plot for each species for the 1993-1995 sampling years. Average relative abundance and the number of 0.2-ha plots on which each species occurred were calculated by site for the 1995 data (see appendix B in Grabner 1997).

In addition, each species was labeled as one of 10 plant types including fern, forb, grass, legume, sedge, shrub, tree, herbaceous vine, and woody vine. Relative abundance was calculated at the plot level for plant types (using 1995 data) by summing species coverages for each type, dividing by the sum of all species coverages in the plot, and multiplying by 100. Species and plant type relative abundances could not be calculated for 1991 or 1992 data because individual coverage estimates were not assigned to woody species (shrubs, trees, and woody vines) during those years.

Species richness was defined as the total number of species identified on each 0.2-ha plot (16 quadrats). Estimates of mean plot richness per site were calculated for all 1991-1995 data. Mean plot richness was also calculated using 1991-1995 data for plots broadly categorized by landtype (e.g., ridges and summits, backslopes, benches, and upland waterways).

Simpson's Index of Diversity and the Shannon-Weiner measure of diversity were calculated at the plot level using 1993-1995 data (1991 and 1992 data were not used for the same reason relative abundances were not calculated for these years). These indices were derived using the following formulas (Krebs 1989):

$$\text{Simpson's Index of Diversity} = 1 / \sum(p_i)^2$$

$$\text{Shannon-Weiner Index of Species Diversity} = -\sum(p_i)(\log_2 p_i)$$

where p_i = proportion of coverage of species_{*i*} in a 0.2-ha plot (based on 16 1-m² quadrats); $= \sum \text{species}_i \text{ coverages for plot} \div \sum \text{all species coverages for plot}$.

Simpson's Index of Diversity has been shown to be more sensitive to changes in common species within a community, while the Shannon-Weiner index is apparently more sensitive to rare species (Krebs 1989). Both measures were analyzed to avoid these biases.

Analysis of Variance Models

Analysis of variance (ANOVA) was performed on mean number of species per plot for 1993-1995 data to evaluate differences among blocks, treatments, and sample years.

$$Y_{ijk} = \mu + \text{block}_i + \text{treatment}_j + \text{year}_T + \text{year} * \text{block}_{ik} + \text{year} * \text{treatment}_{jk} + \varepsilon_{ijk}$$

where "Y_{ijk}" is the expected value, "μ" is the mean number of species per plot (non-transformed), "block_{*i*}" is the effect of each of the three replication blocks, "treatment_{*j*}" is the effect of each of the three treatment groups, "year*block_{*ik*}" is the effect of a year-block interaction, "year*treatment_{*jk*}" is the effect of a year-treatment interaction, and "ε_{ijk}" is the error effect. Mean species richness values were not normally distributed; log₁₀ and natural log (ln) transformations did not effectively normalize the data. Mean, log₁₀-, and ln-transformed values were tested, but no differences in the results of the analyses were found. Only non-transformed plot richness data are presented in this paper. Data from 1991-1992 could not be used in the repeated measures ANOVA because all nine sites were not sampled for those years (see methods).

ANOVA was also used to compare the Simpson's and Shannon-Weiner diversity indices as well as plot richness among replication blocks and treatments for 1993-1995 data. Log₁₀ transformations of calculated diversity indices were used to normalize the data. A simple fixed effects model was used for this analysis:

$$Y_{ij} = \mu + \text{block}_i + \text{treatment}_j + \varepsilon_{ij}$$

where " Y_{ij} " is the expected value, " μ " is the mean diversity index or plot richness, " block_i " is the effect of each of the three replication blocks, " treatment_j " is the effect of each of the three treatment groups, and " ε_{ij} " is the error effect, $N(0, \mu^2)$.

An alpha value of 0.05 was used to test for statistically significant differences for both ANOVA models. Given the low power of the design, however, P-values < 0.2 were considered indicative of potential trends in the data.

RESULTS AND DISCUSSION

General Site Similarities

More than 530 vascular species, representing nearly 275 genera and 85 families, were identified as a result of pre-treatment sampling on MOFEP sites. More than 80 percent were native perennials, and only 25 exotic species were identified (see appendix). Total numbers of species per site (1991-1995) ranged from 309 in site 6 to 381 in site 5, with a mean of 346. Most species were found on two or more sites, with no more than 11 unique to one site (table 1).

Ground flora across the sites was relatively diverse but typically dominated by a few species of woody vines, understory trees, and legumes (fig. 1). The same 5 to 10 species were among the most common across all sites. Tick trefoil (*Desmodium nudiflorum* L.), a legume, was the most common ground flora species on all sites

for all sample years. This plant was consistently found in over 90 percent of all MOFEP vegetation plots and had an average relative abundance more than twice that of most other species (see appendix). Flowering dogwood (*Cornus florida* L.), sassafras (*Sassafras albidum* Nutt.), Virginia creeper (*Parthenocissus quinquefolia* L.), summer grape (*Vitis aestivalis* Michx.), black oak (*Quercus velutina* Lam.), and hog peanut (*Amphicarpa bracteata* L.) were also very common (table 2).

Although the species listed in table 2 averaged high relative cover and frequency, most species on all sites occurred in few plots and had low coverages when present. In each site in 1995, approximately 60 percent of all species were found on fewer than 10 percent of the 0.2-ha plots (fig. 2). Similarly skewed occurrence frequency distributions were observed for 1991 - 1994 (see appendix). Our findings are similar to those of Foti and Devall (1993), who studied herbaceous plants in the Ouachita and Ozark-St. Francis National Forests of Arkansas. They estimated that more than half of the 582 species recorded occurred in only 10 to 15 percent of the stands sampled.

Differences Among Sample Years

Our analysis indicated a highly significant year effect for plot richness ($P < 0.005$), but no year-block or year-treatment interactions (table 3). The large effect of sample year on plot richness may be striking, but it is not surprising. The steady increase in mean number of species

Table 1.—Number of 0.2-ha plots, total number of ground flora species identified in 1-m² quadrats, and number of unique species for each MOFEP site (from 1991-1995 data).

Site	Block	Treatment	Number of plots	Total number of species	Number of unique species
1	1	No-harvest	76	326	5
2	1	Uneven-aged	73	370	6
3	1	Even-aged	72	334	7
4	2	Uneven-aged	74	365	11
5	2	Even-aged	70	381	10
6	2	No-harvest	71	309	1
7	3	Uneven-aged	71	335	9
8	3	No-harvest	70	343	5
9	3	Even-aged	71	355	10
Means	—	—	72	346	7
Totals	—	—	648	530	64

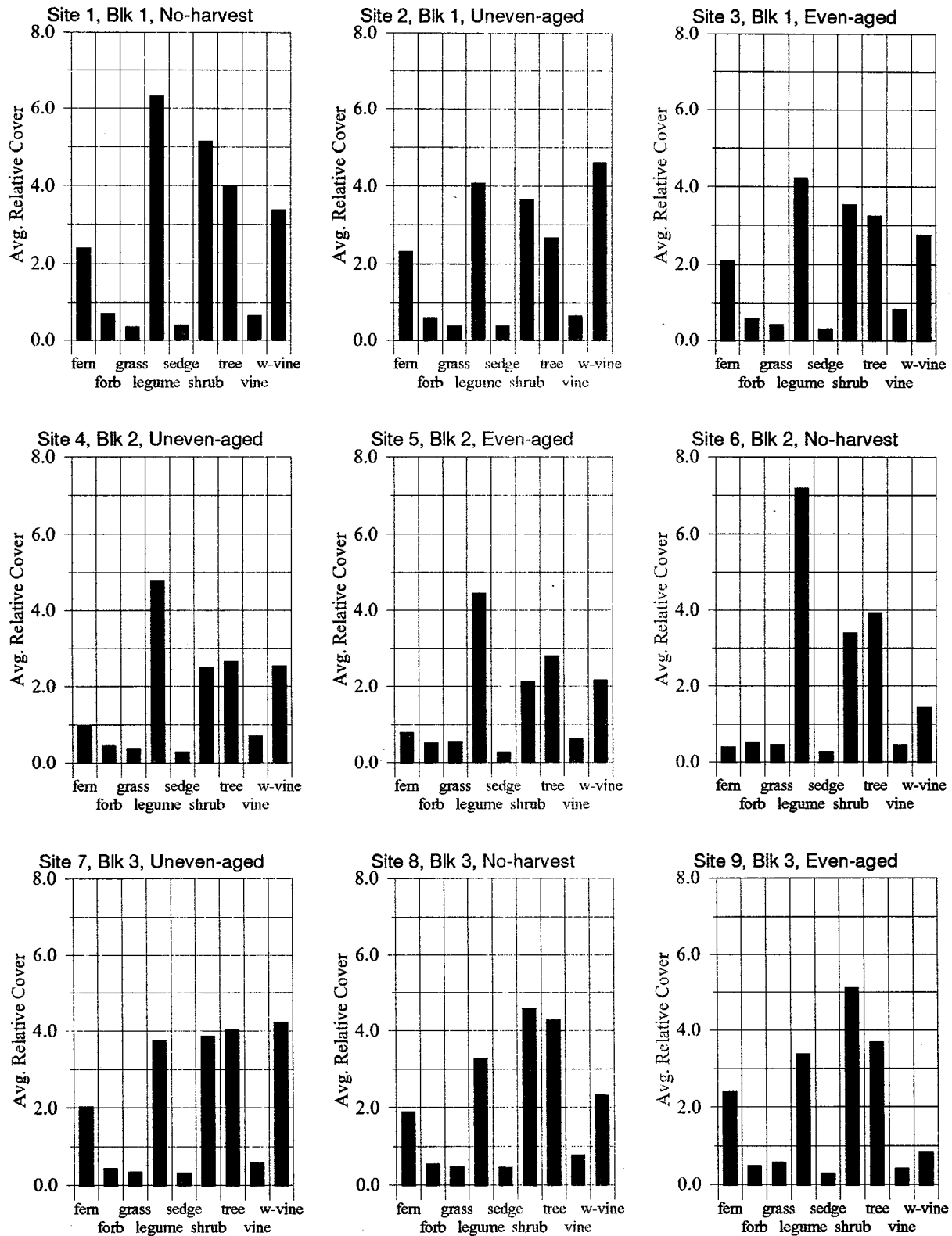


Figure 1.—Average relative abundance by plant type for all sites in 1995. Note the importance of legumes, shrubs, trees, and woody vines on all sites (“w-vine” = woody vines, “vine” = herbaceous vines).



Table 2.—Common ground flora species by site. Rankings were determined by the number of 0.2-ha plots per site in which each species occurred (1995 data only). Replication block and assigned treatments are shown in parentheses below each site number (NH = no-harvest, EA = even-aged, UA = uneven-aged).

(Block, Treatment)	Site								
	1 (1,NH)	2 (1,UA)	3 (1,EA)	4 (2,UA)	5 (2,EA)	6 (2,NH)	7 (3,UA)	8 (3,NH)	9 (3,EA)
Species	Rank								
<i>Desmodium nudiflorum</i> (tick trefoil)	3	7	1	3	2	1	3	3	2
<i>Cornus florida</i> (dogwood)	4	1	4	1	1	2	5	5	3
<i>Sassafras albidum</i> (sassafras)	2	3	2	2	6	6	2	2	1
<i>Vitis aestivalis</i> (summer grape)	1	2	3	6	5	3	1	6	8
<i>Quercus velutina</i> (black oak)	5	9	6	—	8	4	4	1	4
<i>Quercus alba</i> (white oak)	7	5	5	8	7	5	—	4	6
<i>Amphicarpa bracteata</i> (hog peanut)	10	6	8	5	4	8	—	8	7
<i>Parthenocissus quinquefolia</i> (Virginia creeper)	—	4	9	4	3	10	10	—	—
<i>Nyssa sylvatica</i> (blackgum)	8	—	7	7	9	7	—	—	—
<i>Quercus coccinea</i> (scarlet oak)	—	10	10	9	—	—	9	9	—
<i>Aristolochia serpentaria</i> (Virginia snakeroot)	—	—	—	—	10	—	—	—	—
<i>Vaccinium vacillans</i> (lowbush blueberry)	6	—	—	—	—	—	—	10	—
<i>Vitis</i> spp. (grape)	—	—	—	—	—	9	—	—	—
<i>Carya glabra</i> (pignut hickory)	9	8	—	—	—	—	—	—	—
<i>Carex nigromarginata</i> (sedge)	—	—	—	—	—	—	8	—	5
<i>Vaccinium stamineum</i> (highbush blueberry)	—	—	—	—	—	—	6	7	10
<i>Carya</i> spp. (hickory)	—	—	—	10	—	—	—	—	—
<i>Carya tomentosa</i> (mockernut hickory)	—	—	—	—	—	—	—	—	9
<i>Quercus stellata</i> (post oak)	—	—	—	—	—	—	7	—	—

recorded per plot is, in all likelihood, a direct reflection of annual improvements in skill and training of personnel associated with MOFEP botany data collection. In other words, this trend represents the learning curve of field and supervisory staff involved with the study.

Interestingly, though mean values themselves increased significantly each year, the overall

ranking pattern among sites did not change. For 1993-1995, site 5 consistently averaged the highest number of species per 0.2-ha plot, and sites 4 and 9 were ranked second and third, respectively. Sites 2, 3, and 1 were typically in the middle, and sites 6, 7, and 8 were always close together at the bottom (fig. 3). Nearly identical patterns were observed for Simpson's and Shannon-Weiner diversity indices (figs. 4 and 5). Our results are similar to the among-

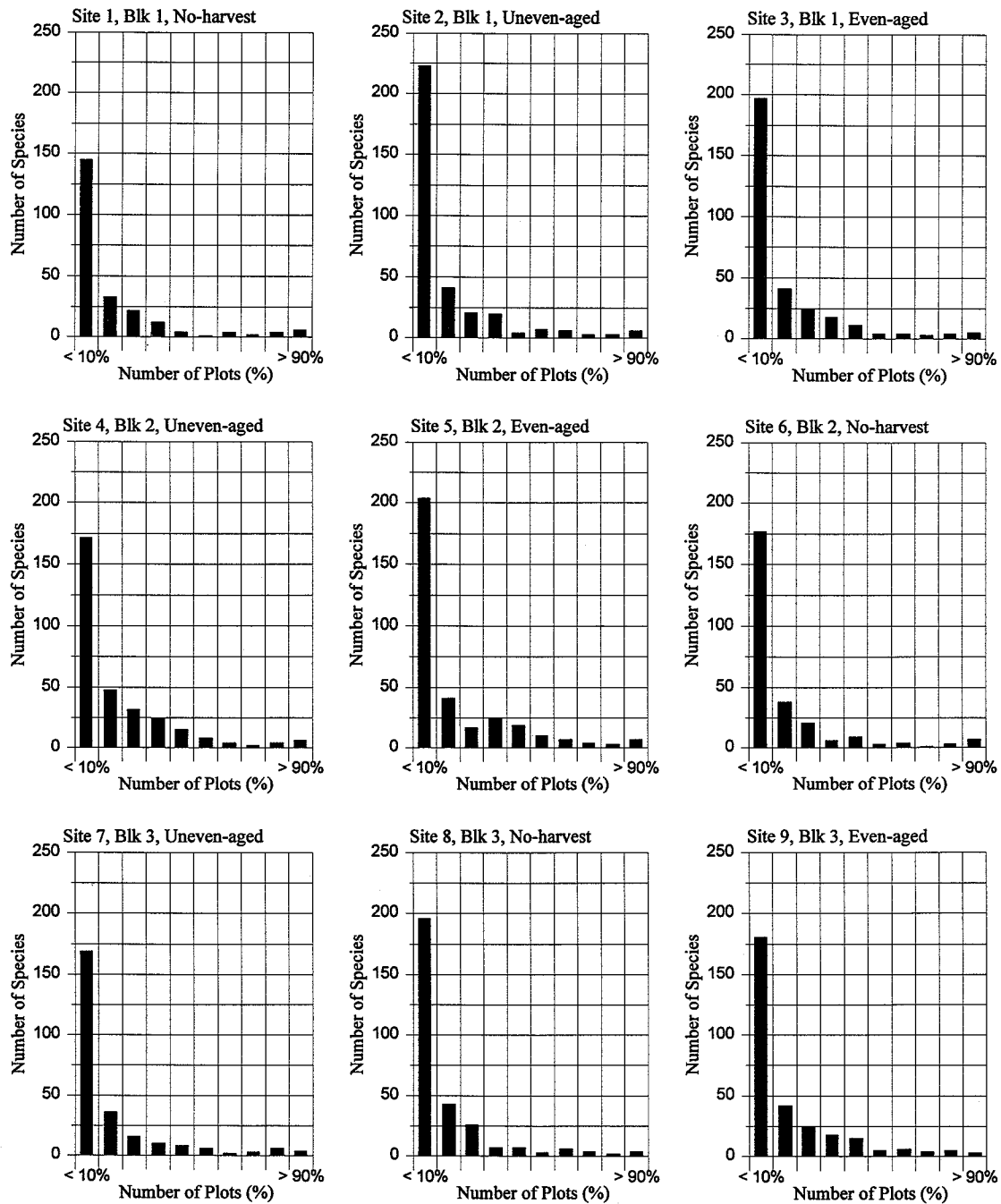


Figure 2.—Species frequency distributions for all sites in 1995. Values represent the number of ground flora species plotted against the number of plots (out of 648) in which they were found. Note that a large majority of species occurred on fewer than 10 percent of the plots in each site.



Table 3.—Repeated measures analysis of variance table of mean number of species per 0.2-ha plot (1993-1995 data, no transformations).

Source	Pillai's trace	F	Num DF	Den DF	Sum of Squares	Pr(F)
Block	—	6.57	2	—	778.30	0.05
Treatment	—	2.53	2	—	300.07	0.19
Block*Treatment	—	—	4	—	236.81	—
Year	0.97	50.64	2	3	—	0.005
Year*Treatment	0.90	1.63	4	8	—	0.257
Year*Block	0.58	0.83	4	8	—	0.544

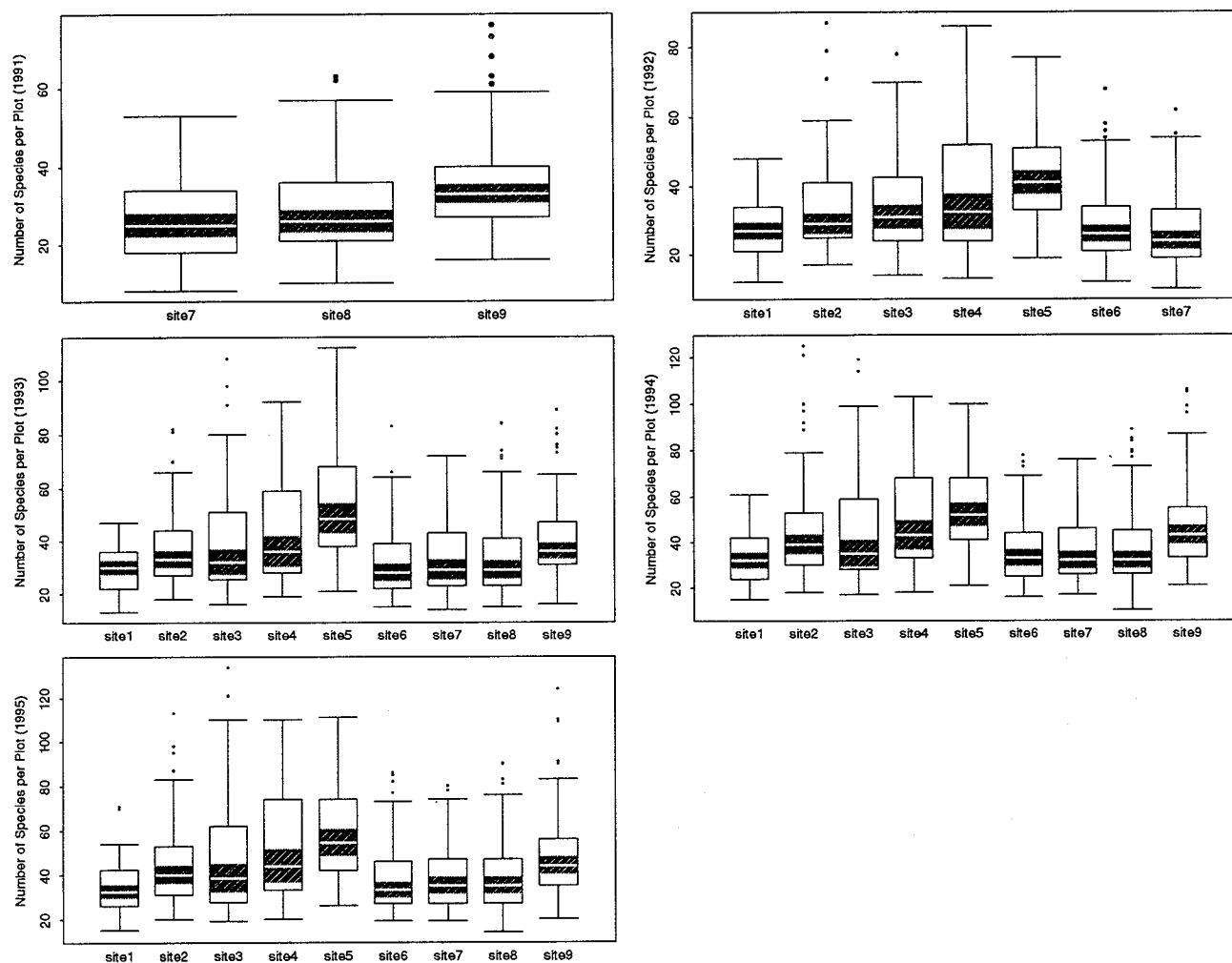


Figure 3.—Number of ground flora species per 0.2-ha plot for each site (1991-1995). Box plots of several attributes summarized by site from plot-level data. The central (white) bar in each box represents the median. The black bars around the median show the 95 percent confidence interval for the median. The rectangular box indicates the range of 50 percent of the data. Brackets indicate the range of continuous data. Dots beyond the brackets indicate values beyond the range of continuous data.

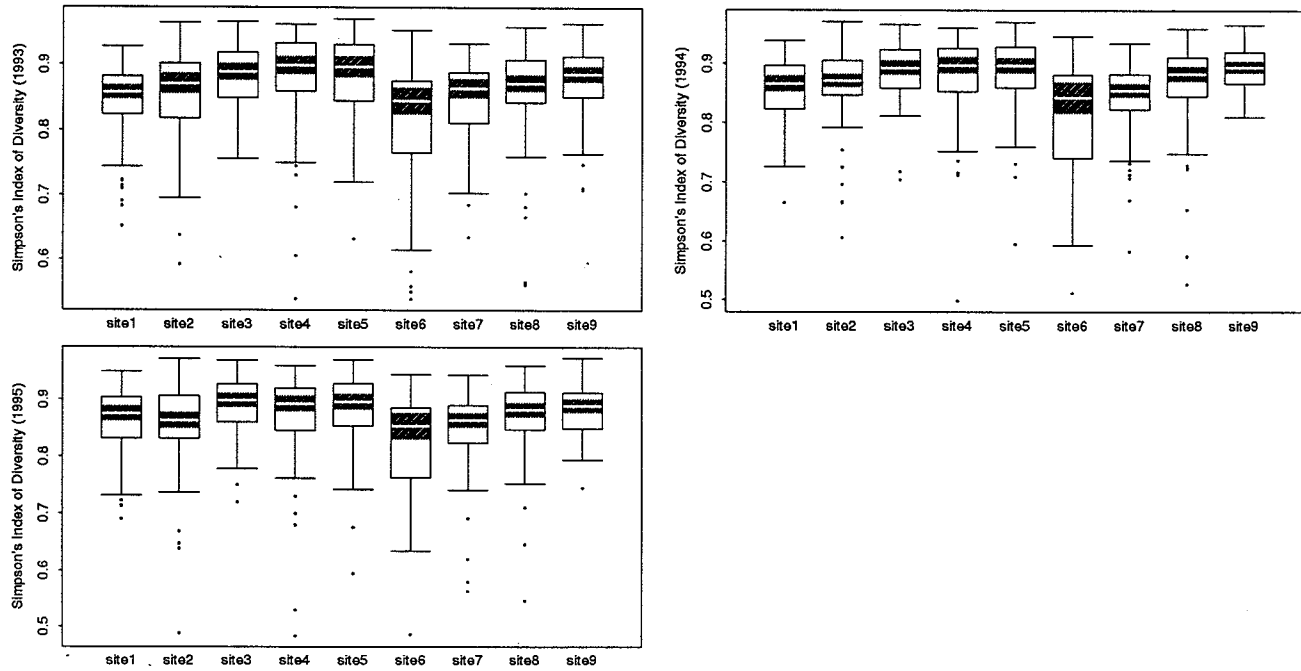


Figure 4.—Simpson's Index of Diversity by site for 1993-1995 ground flora data. Box plots of several attributes summarized by site from plot-level data. The central (white) bar in each box represents the median. The black bars around the median show the 95 percent confidence interval for the median. The rectangular box indicates the range of 50 percent of the data. Brackets indicate the range of continuous data. Dots beyond the brackets indicate values beyond the range of continuous data.

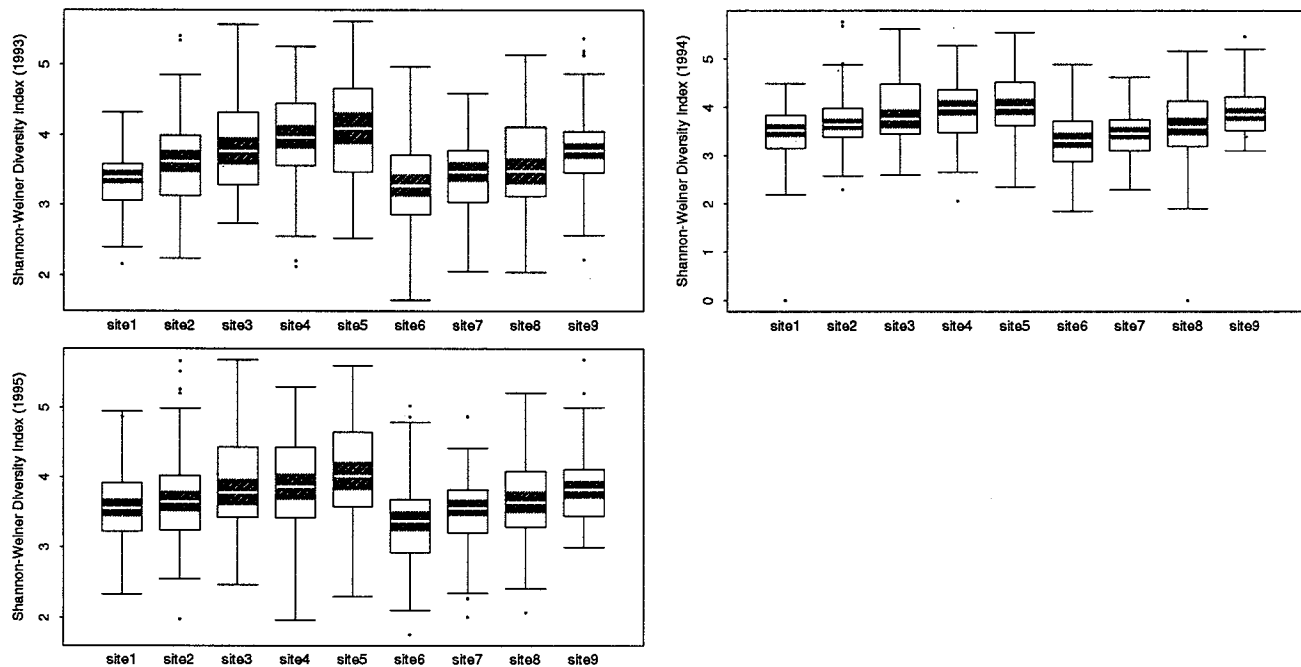


Figure 5.—Shannon-Weiner Diversity Index by site for 1993-1995 ground flora data. Box plots of several attributes summarized by site from plot-level data. The central (white) bar in each box represents the median. The black bars around the median show the 95 percent confidence interval for the median. The rectangular box indicates the range of 50 percent of the data. Brackets indicate the range of continuous data. Dots beyond the brackets indicate values beyond the range of continuous data.



site patterns observed by Kabrick *et al.* (1997) for MOFEP woody vegetation.

Consistency in the relative ranking of sites from year to year, combined with the lack of a year-treatment interaction, further supports our assertion that significant year effects do not represent actual temporal variation within sites. In other words, when a MOFEP site is observed from one pre-treatment year to the next, the data give no reason to expect significant differences in average plot diversity or richness other than those created by observer error.

Species Richness, Diversity, and Composition

Block and Treatment-level Analysis of Variance

In keeping with the overall MOFEP experimental design, accurate assessment of post-treatment effects at the site level depends on understanding within and among block pre-treatment conditions. It is important to be aware of block or treatment effects in the data prior to actual treatment implementation.

Analysis of variance indicated no block effects on plot richness or diversity for the 1993-1995 data ($P > 0.2$, tables 4 and 5).

There were no statistically significant treatment effects ($P > 0.05$) on plot-level species diversity

as estimated by the Simpson's and Shannon-Weiner Indices of Diversity for 1993, 1994, or 1995. Given the low degrees of freedom, however, a strong trend in treatment differences was apparent ($P < 0.2$) (table 4). Additionally, ANOVA revealed a significant treatment effect on plot species richness in 1995 ($P = 0.047$). Marginally significant differences in plot species richness by treatment class were also visible in the 1994 ($P = 0.062$) and 1993 ($P = 0.067$) data (table 5).

These pre-treatment effects by treatment class appear to reflect inherent differences between control and even-aged sites. As mentioned previously, sites 3, 5, and 9 (even-aged) consistently averaged high plot richness and diversity, while sites 1, 6, and 8 (controls) consistently averaged relatively low values (figs. 3-5).

Species Abundance Patterns Among Sites

Species such as *Desmodium nudiflorum*, *Cornus florida*, *Vitis aestivalis*, and *Sassafras albidum* are always among the 10 most dominant on all sites (table 2). Within this same table, however, differences among sites with respect to their common species become apparent. *Vaccinium stamineum*, for example, was among the 10 most frequently encountered species for each of the block 3 sites (7, 8, and 9), but not for any of the other sites. Similarly, *Carya glabra* was one of the top 10 species in sites 1 and 2 (block 1) but not in any others. Further investigation of

Table 4.—Analysis of variance table of Simpson's and Shannon-Weiner diversity indices (1993-1995 data, $\log_{10}$ transformations).

Source	DF	<i>Simpson's</i>		<i>Shannon-Weiner</i>	
		Sum of Squares	Pr (F)	Sum of Squares	Pr (F)
1993					
Block	2	0.00093	0.95	0.031	0.75
Treatment	2	0.060	0.14	0.37	0.12
Error	4	0.036		0.20	
1994					
Block	2	0.0044	0.81	0.013	0.87
Treatment	2	0.060	0.16	0.45	0.08
Error	4	0.040		0.18	
1995					
Block	2	0.0050	0.73	0.0031	0.97
Treatment	2	0.038	0.19	0.24	0.18
Error	4	0.029		0.18	

Table 5.—Analysis of variance table of mean number of species per 0.2-ha plot (1993-1995 data, no transformations).

Source	DF	Sum of Squares	Pr(F)
1993			
Block	2	91.6	0.22
Treatment	2	229.6	0.067
Error	4	401.6	
1994			
Block	2	84.7	0.24
Treatment	2	248.7	0.062
Error	4	82.7	
1995			
Block	2	128.7	0.16
Treatment	2	312.7	0.047
Error	4	86.7	

the 1995 data revealed noticeable differences for several species with respect to their abundances among sites (see appendix B, Grabner 1997).

Relationships Between Ground Flora and Soil-Geo-Landform Patterns Among Sites

Though somewhat similar in overall composition and relative dominance of the most common species, important differences in plot diversity, richness, and species abundances were found among the MOFEP sites. We attributed these observed differences to differences in geology, landform, and soil conditions among the sites.

As mentioned previously, the treatment effects revealed by ANOVA appear to reflect differences between the control and even-aged sites.

MOFEP control sites (1, 6, and 8) contained a relatively low proportion of vegetation plots in the Lower Gasconade, Gunter, and Eminence geologies. The majority of plots on these sites were in the Roubidoux and Upper Gasconade geologic layers, which are typically associated with more highly weathered, ultic soils. In contrast, the Roubidoux-Upper Gasconade and Lower Gasconade-Eminence layers were fairly evenly represented within the even-aged sites (3, 5, and 9) (table 6). Alfic backslopes, benches, moist floodplains, and variable-depth soil units are common to the Lower Gasconade, Gunter, and Eminence strata, and potentially support a more diverse flora.

Figure 6 illustrates differences in the proportional representation of alfic and ultic landforms within each site. Abundance among sites for several species appears correlated with these types of environmental factors.

For example, sites 2 through 6 contained considerably more plots on alfic ridges and mesic backslopes than did sites 1, 7, and 8. Species often associated with relatively rich mesic to dry-mesic forests such as *Acer saccharum*, *Cimicifuga racemosa*, *Desmodium glutinosum*, *Galium concinnum*, and *Ulmus rubra* were much more abundant on sites 2 through 6 than on sites 1, 7, or 8. Conversely, typical dry acid woodland species such as *Vaccinium stamineum*, *Vaccinium vacillans*, *Quercus stellata*, and *Quercus marilandica* were more abundant on sites 1, 7, and 8 (table 7). These interpretations are supported by Kabrick *et al.* (1997), who showed site 1 (block 1) to be most similar to sites 7 and 8 (block 3) with respect to environmental variables. Collectively, sites 1, 7, and 8 contained a greater proportion of acidic soils than the other sites.

Table 6.—Proportions by treatment class of 0.2-ha vegetation plots in Roubidoux and Upper Gasconade vs. Lower Gasconade, Gunter, and Eminence geologic strata.

Treatment	Sites	Roubidoux- Upper Gasconade	Lower Gasconade- Gunter-Eminence
<i>Proportion of plots</i>			
No-harvest	1, 6, 8	0.85	0.15
Uneven-aged	2, 4, 7	0.65	0.35
Even-aged	3, 5, 9	0.53	0.47

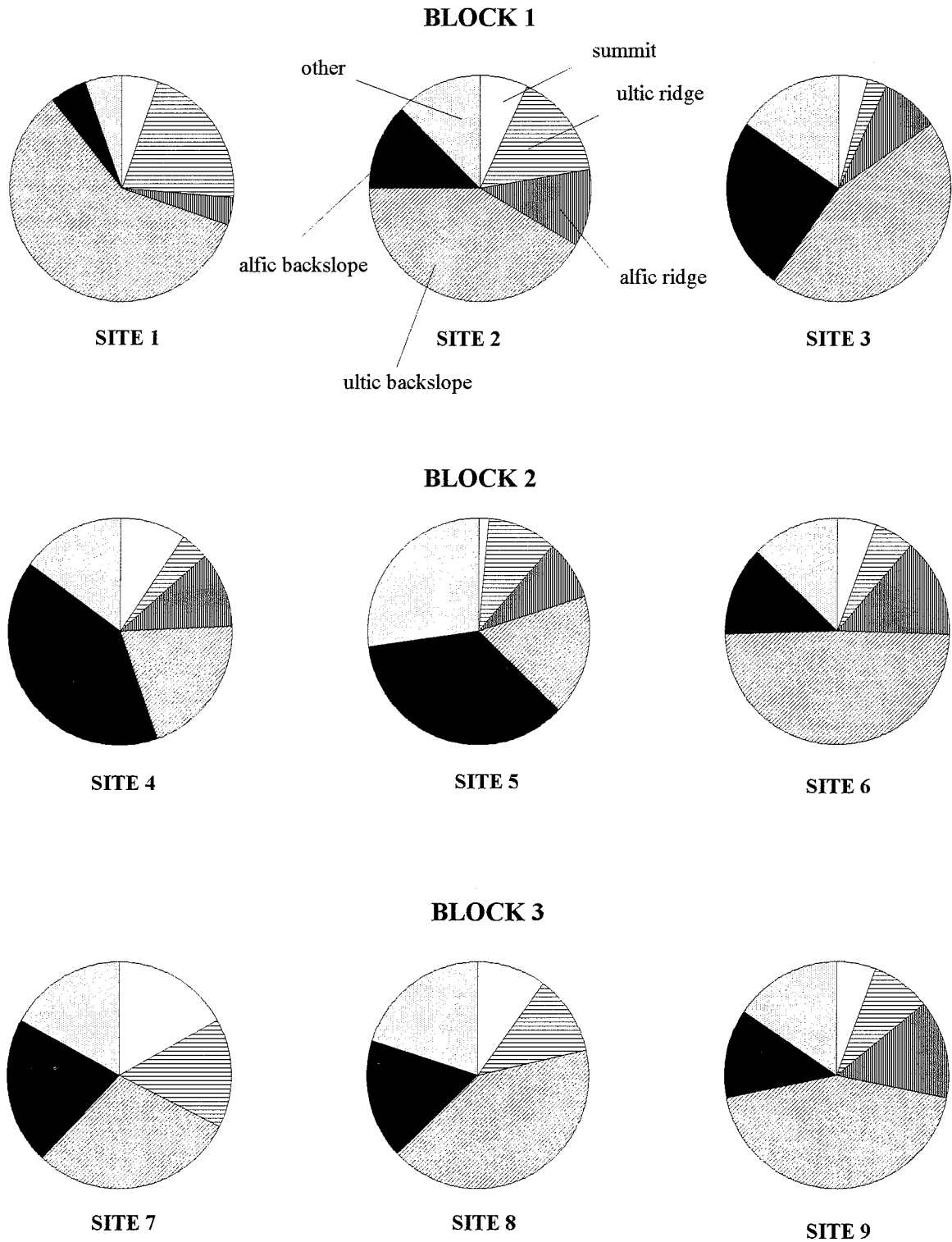


Figure 6.—Proportions of MOFEP vegetation plots by general soil-landform categories. The “other” category includes glades/glade edges, floodplains, benches, toeslopes, and others. Note the differences in ratios of ultic:alfic plots among sites (particularly 3, 4, & 5 vs. 1, 7, & 8).

Table 7.—Ground flora species that differed in frequency among sites. Values are the numbers of 0.2-ha plots in which each species was identified during the 1995 sample year (**Bold** = values especially high or low relative to others).

(Block, Treatment)	Site								
	1 (1,NH)	2 (1, UA)	3 (1, EA)	4 (2, UA)	5 (2, EA)	6 (2, NH)	7 (3, UA)	8 (3, NH)	9 (3, EA)
Species	Number of plots								
<i>Acer saccharum</i>	3	8	11	13	7	5	0	0	0
<i>Carya glabra</i>	63	63	52	36	48	48	19	25	43
<i>Cimicifuga racemosa</i>	6	22	11	25	22	19	0	0	15
<i>Desmodium glutinosum</i>	23	45	36	35	35	20	0	0	22
<i>Desmodium nuttallii</i>	19	29	14	31	28	20	42	43	33
<i>Dioscorea quaternata</i>	19	37	32	44	39	16	8	7	23
<i>Galium concinnum</i>	3	25	14	21	21	10	1	3	13
<i>Hepatica nobilis</i>	4	5	10	19	6	6	0	0	5
<i>Lespedeza virginica</i>	1	2	4	9	3	4	16	13	10
<i>Passiflora lutea</i>	10	14	13	18	14	16	0	2	7
<i>Polystichum acrostichoides</i>	10	4	4	5	8	8	0	1	7
<i>Quercus marilandica</i>	2	7	4	0	2	7	11	19	7
<i>Quercus stellata</i>	13	6	17	20	22	12	58	43	32
<i>Rhus aromatica</i>	10	41	46	41	38	10	7	7	23
<i>Ruellia pedunculata</i>	2	13	12	23	30	12	9	5	10
<i>Scutellaria incana</i>	4	4	2	12	2	2	0	0	3
<i>Smilax bona-nox</i>	0	23	32	32	26	7	6	9	9
<i>Smilax glauca</i>	0	1	0	1	0	1	22	5	15
<i>Ulmus alata</i>	0	10	27	21	24	6	1	3	0
<i>Ulmus rubra</i>	0	31	21	28	34	14	2	5	7
<i>Uvularia grandiflora</i>	14	16	22	22	25	16	0	3	7
<i>Vaccinium stamineum</i>	46	25	34	36	26	26	62	56	53
<i>Vaccinium vacillans</i>	71	44	37	43	39	42	51	53	52
<i>Viburnum rufidulum</i>	3	12	16	15	23	8	1	3	2
<i>Vitis vulpina</i>	10	30	22	23	45	27	8	19	7

Within-Site Variation

Understanding year, block, treatment, and site-level relationships is critical for interpreting harvesting effects within the framework of the overall MOFEP design. Equally important, though, is understanding the amount and sources of variation in the plot data from which site-level means were calculated. In 1994 and 1995, the number of species per 0.2-ha plot ranged from 10 to 125 and from 14 to 134, respectively. Similarly, Simpson's Index of Diversity ranged from 0.5 to 0.97 in 1994, and from 0.48 to 0.97 in 1995 (figs. 3 and 4). Not surprisingly, environmental factors such as light, water, and nutrient availability appear to strongly affect plant species distributions and abundance within the MOFEP sites as well as among them. Brief inspection of 1993-1995 data showed noticeable differences in mean

numbers of species for plots located in upland waterways, structural benches, ridges and summits, sideslopes with deep soil, and sideslopes with soils ranging from very shallow to moderately deep (fig. 7). The variable depth and upland waterway plots had the highest average richness; ridges and summits had the lowest.

Detailed investigations of the relationships between vegetation and environmental factors using direct and indirect multivariate ordinations are in progress. Preliminary interpretations of both a Two-Way Indicator Species Analysis (TWINSpan) and a Detrended Correspondence Analysis (DCA) on a subset of the 1995 data support our associations between species abundances and soil-geo-landform patterns at both the site and plot levels (data not shown). Geology and landform appear to be

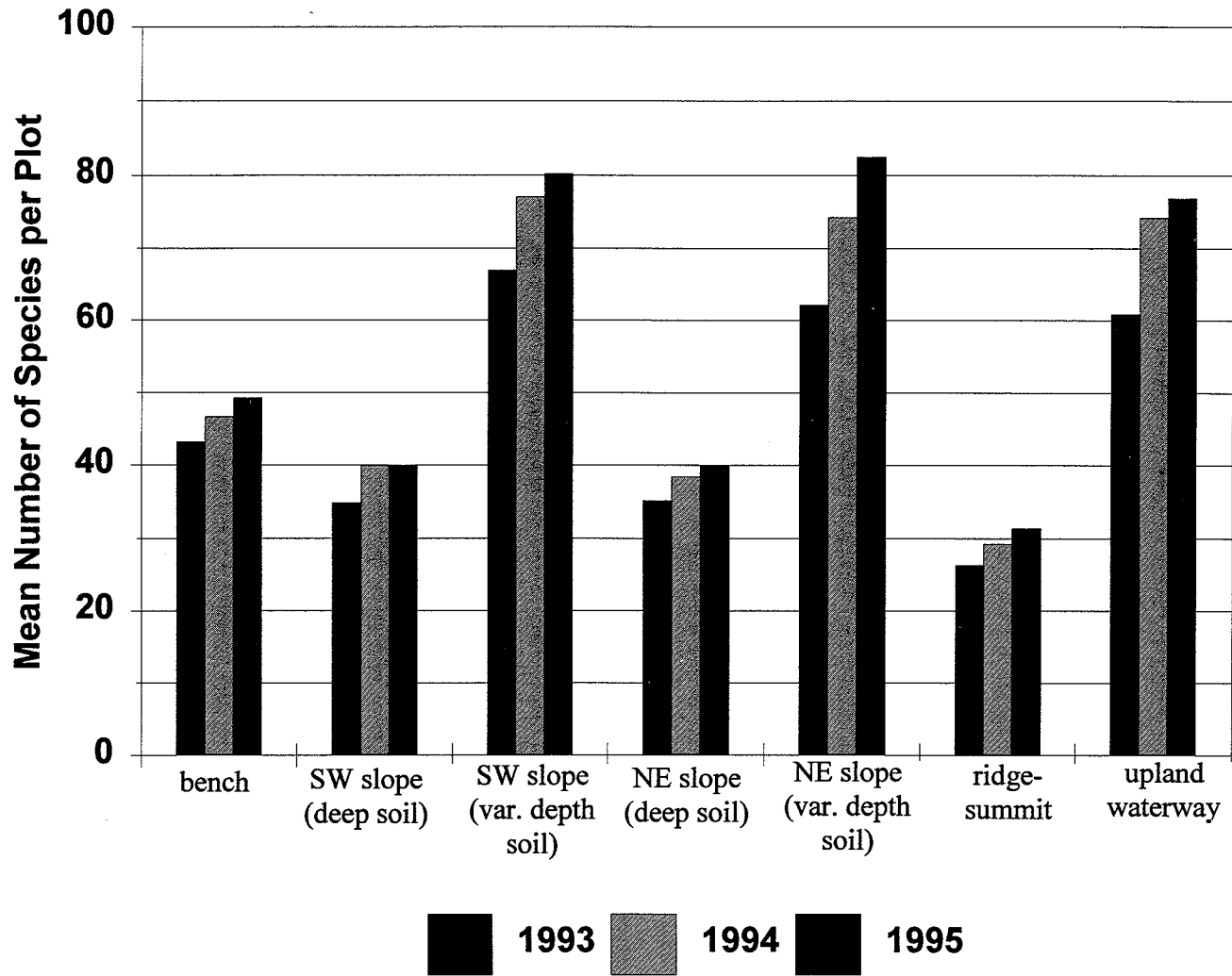


Figure 7.—Mean plot richness by landtype (1993-1995).

controlling factors such as soil depth, base saturation, and water availability, which in turn directly affect ground flora species distribution and abundance.

SUMMARY AND CONCLUSIONS

Ground-layer vegetation data were collected across nine sites on 648 0.2-ha plots from 1991 through 1995 as part of the Missouri Ozark Forest Ecosystem Project. More than 300 species were identified on each of the nine sites, with no more than 11 unique to any one site, for a total of over 530 species. A few species of legumes, trees, and woody vines dominated in cover and frequency on all sites. Most species (> 60 percent) occurred on fewer than 10 percent of the sample plots in each site.

There were very large sample year effects on mean plot richness. We regard this as a reflection of improvement in plant identification skill over the course of the study rather than a biological phenomenon. We recommend using the 1994 and 1995 data as the baseline from which to interpret future post-treatment results. Given that the increases in mean plot diversity from year to year were likely due to observer error, we concluded there was no evidence of temporal variation within sites. No year-treatment interaction was detected, and the relative ranking of sites from highest to lowest mean plot richness and diversity was very consistent among years. Sites 5, 4, and 9 consistently averaged the highest plot richness and diversity; sites 6, 7, and 8 typically averaged the lowest.

Though MOFEP sites were found to be somewhat similar in composition (particularly in terms of abundant species), important site and treatment-level differences in species abundance, plot richness, and plot diversity were revealed. Analysis of variance showed even-aged sites (3, 5, and 9) averaged consistently greater plot richness and diversity than did no-harvest sites (1, 6, and 8). Brief inspection of relative cover and frequency data indicated noticeable differences among sites for several species. We attributed these vegetation patterns to differences in geology, landforms, and soil conditions among the sites.

Wide ranges and large variances typify the within-site MOFEP ground flora data. As with among-site patterns, significant amounts of the variation among plots is likely due to differences in geology, landform, and soil factors. When categorized by major landtype, plots in upland waterways averaged more species per plot than did glades, ridges, or sideslopes.

Further analysis of among- and within-site relationships between MOFEP ground flora and soil-geo-landform patterns is in progress.

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APPENDIX**MOFEP Ground Flora: Pre-treatment Species List**

ALL CAPS denotes species on Federal or Missouri State Rare and Endangered lists.

Italics indicates non-native species.

Relative abundances were calculated from 1993, 1994, and 1995 MOFEP botany data, and represent the mean relative cover per 0.2-ha plot for each species. As in the paper, these values have been multiplied by 100 to fit them within limited column widths. Average relative abundance values reflect only those plots on which the species occurred.

Number of plots per species per year was calculated from the 1991 - 1995 data by summing the number of 0.2-ha plots on which species occurred in at least one of the sixteen 1-m² quadrats.

Species	Family	Type	Number of Plots				Avg. Rel. Abundance			
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Acalypha</i> spp.	Euphorbiaceae	nat. ann. forb	0	0	0	2	0	0.00	0.03	0.00
<i>Acalypha virginica</i>	Euphorbiaceae	nat. ann. forb	7	19	6	26	16	0.55	0.07	0.09
<i>Acer negundo</i>	Aceraceae	nat. per. tree	0	0	1	1	1	1.21	0.45	1.17
<i>Acer rubrum</i>	Aceraceae	nat. per. tree	66	304	353	347	353	3.62	3.99	4.40
<i>Acer saccharum</i>	Aceraceae	nat. per. tree	0	30	55	64	47	1.27	1.35	1.47
<i>Achillea millefolium</i>	Asteraceae	ex. perennial forb	2	1	1	1	1	0.16	0.03	0.02
<i>Actaea pachypoda</i>	Ranunculaceae	nat. per. forb	0	0	3	2	1	0.46	0.02	0.46
<i>Actaea rubra</i>	Ranunculaceae	nat. per. forb	0	0	0	1	0	0.00	0.03	0.00
<i>Adiantum pedatum</i>	Polypodiaceae	nat. per. fern	0	5	5	5	5	1.76	1.21	1.40
<i>Aesculus glabra</i>	Hippocastanaceae	nat. per. tree	0	0	0	0	1	0.00	0.00	0.40
<i>Agrimonia parviflora</i>	Rosaceae	nat. per. forb	1	20	21	7	3	0.89	0.51	0.67
<i>Agrimonia pubescens</i>	Rosaceae	nat. per. forb	17	49	96	112	98	0.83	0.88	0.83
<i>Agrimonia rostellata</i>	Rosaceae	nat. per. forb	0	0	0	0	20	0.00	0.00	0.78
<i>Agrimonia</i> spp.	Rosaceae	nat. per. forb	0	0	1	6	17	0.42	0.03	0.12
<i>Agrostis perennans</i>	Poaceae	nat. per. grass	0	0	0	0	2	0.00	0.00	0.13
<i>Allium</i> spp.	Liliaceae	nat. per. forb	0	0	1	2	1	0.03	0.04	0.82
<i>Ambrosia artemisiifolia</i>	Asteraceae	nat. ann. forb	5	3	5	9	5	0.24	0.08	0.32
<i>Ambrosia coronopifolia</i>	Asteraceae	nat. per. forb	0	0	0	0	0	0.00	0.00	0.00
<i>Ambrosia trifida</i>	Asteraceae	nat. ann. forb	1	0	0	1	1	0.00	0.48	0.05
<i>Amelanchier arborea</i>	Rosaceae	nat. per. tree	14	53	132	113	127	1.41	1.81	1.35
AMIANTHIUM										
<i>MUSCITOXICUM</i>	Liliaceae	nat. per. forb	0	0	4	5	5	0.36	0.75	0.24
<i>Amphicarpa bracteata</i>	Fabaceae	nat. per. legume	169	423	550	551	555	6.81	5.93	6.93
<i>Andropogon gerardi</i>	Poaceae	nat. per. grass	18	7	61	60	53	1.33	0.76	0.61
<i>Andropogon scoparius</i>	Poaceae	nat. per. grass	5	20	107	115	115	0.93	0.92	0.91
<i>Andropogon</i> spp.	Poaceae	nat. per. grass	0	5	3	5	2	0.14	0.14	0.72
<i>Andropogon virginicus</i>	Poaceae	nat. per. grass	62	104	9	28	11	0.89	0.73	0.33
<i>Anemone</i> spp.	Ranunculaceae	nat. per. forb	1	0	0	0	0	0.00	0.00	0.00
<i>Anemone virginiana</i>	Ranunculaceae	nat. per. forb	0	1	18	7	10	0.20	0.18	0.25
<i>Anemonella</i>										
<i>thalictroides</i>	Ranunculaceae	nat. per. forb	8	93	149	123	148	0.25	0.19	0.18
Antennaria										
<i>plantaginifolia</i>	Asteraceae	nat. per. forb	58	117	150	156	151	0.80	0.72	0.67
<i>Aplectrum hyemale</i>	Orchidaceae	nat. per. forb	2	0	0	0	0	0.00	0.00	0.00
<i>Apocynum cannabinum</i>	Apocynaceae	nat. per. forb	0	3	57	60	72	0.65	0.94	0.87
<i>Apocynum medium</i>	Apocynaceae	nat. per. forb	21	45	38	3	1	1.00	0.47	1.83
<i>Apocynum</i> spp.	Apocynaceae	nat. per. forb	0	17	0	5	1	0.00	0.56	0.06
<i>Aquilegia canadensis</i>	Ranunculaceae	nat. per. forb	0	0	0	1	0	0.00	0.91	0.00
<i>Arabis canadensis</i>	Brassicaceae	nat. bien. forb	0	0	1	0	2	0.06	0.00	0.19
<i>Arabis laevigata</i>	Brassicaceae	nat. bien. forb	0	0	0	2	1	0.00	0.16	0.01
<i>Arabis</i> spp.	Brassicaceae	nat. bien. forb	0	1	0	5	5	0.00	0.07	0.38
<i>Aralia racemosa</i>	Araliaceae	nat. per. forb	0	0	0	3	0	0.00	0.97	0.00
<i>Arctium minus</i>	Asteraceae	ex. bien. forb	0	0	1	0	0	0.93	0.00	0.00
<i>Arisaema atrorubens</i>	Araceae	nat. per. forb	0	0	1	3	3	0.71	0.38	0.39
<i>Arisaema dracontium</i>	Araceae	nat. per. forb	0	0	0	2	1	0.00	0.20	0.02
<i>Aristolochia serpentaria</i>	Aristolochiaceae	nat. per. forb	89	262	385	419	437	0.27	0.27	0.24
<i>Aruncus dioicus</i>										
<i>pubescens</i>	Rosaceae	nat. per. forb	0	0	2	0	5	1.32	0.00	0.68
<i>Asarum canadense</i>	Aristolochiaceae	nat. per. forb	1	22	6	8	4	1.14	0.99	0.92
<i>Asclepias hirtella</i>	Asclepiadaceae	nat. per. forb	0	0	3	1	1	0.96	0.16	0.02
<i>Asclepias purpurascens</i>	Asclepiadaceae	nat. per. forb	0	0	0	1	4	0.00	0.15	0.33
<i>Asclepias quadrifolia</i>	Asclepiadaceae	nat. per. forb	0	4	56	70	100	0.23	0.23	0.23
<i>Asclepias</i> spp.	Asclepiadaceae	nat. per. forb	0	3	2	4	2	1.11	0.24	0.03

Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
Asclepias tuberosa	Asclepiadaceae	nat. per. forb	0	1	2	3	2	0.40	0.13	0.21
Asclepias verticillata	Asclepiadaceae	nat. per. forb	0	2	10	12	10	0.21	0.19	0.27
Asclepias viridiflora	Asclepiadaceae	nat. per. forb	0	0	3	8	3	0.02	0.48	0.18
Ascyrum hypericoides	Hypericaceae	nat. per. forb	9	8	9	7	30	0.33	0.52	0.36
Asimina triloba	Annonaceae	nat. per. tree	2	17	31	35	31	3.46	3.95	4.00
Asplenium platyneuron	Polypodiaceae	nat. per. fern	23	53	81	80	82	0.27	0.22	0.19
Aster anomalus	Asteraceae	nat. per. forb	23	62	90	121	155	0.40	0.44	0.35
Aster azureus	Asteraceae	nat. per. forb	4	11	44	46	24	0.37	0.33	0.31
Aster cordifolius	Asteraceae	nat. per. forb	0	0	1	0	3	0.43	0.00	0.30
Aster laevis	Asteraceae	nat. per. forb	0	1	17	22	26	0.42	0.68	0.52
Aster lateriflorus	Asteraceae	nat. per. forb	0	0	3	0	4	0.25	0.00	0.54
Aster linariifolius	Asteraceae	nat. per. forb	2	24	20	18	13	0.18	0.29	0.08
Aster novae-angliae	Asteraceae	nat. per. forb	0	1	6	1	2	0.55	1.31	0.92
Aster oblongifolius	Asteraceae	nat. per. forb	0	0	4	5	6	0.53	0.17	0.30
Aster patens	Asteraceae	nat. per. forb	49	100	103	130	128	0.32	0.29	0.27
Aster sagittifolius	Asteraceae	nat. per. forb	0	0	7	7	13	0.48	0.51	0.54
Aster sericeus	Asteraceae	nat. per. forb	2	4	2	7	1	0.20	0.49	0.38
Aster spp.	Asteraceae	nat. per. forb	7	30	29	12	14	0.47	0.11	0.30
Aster turbinellus	Asteraceae	nat. per. forb	0	0	13	20	26	0.27	0.37	0.32
Astragalus mexicanus	Fabaceae	nat. per. legume	0	2	5	1	1	0.84	0.02	1.36
Baptisia leucophaea	Fabaceae	nat. per. legume	15	15	39	44	42	0.99	1.00	0.72
Baptisia spp.	Fabaceae	nat. per. legume	0	0	0	0	0	0.00	0.00	0.00
Berchemia scandens	Rhamnaceae	nat. per. shrub	1	5	9	10	9	4.13	3.53	3.87
Berlandiera texana	Asteraceae	nat. per. forb	0	0	0	1	0	0.00	0.76	0.00
Betula nigra	Betulaceae	nat. per. tree	1	0	0	0	0	0.00	0.00	0.00
Bidens spp.	Asteraceae	nat. ann. forb	0	0	1	2	1	0.02	0.09	0.03
Blephilia ciliata	Lamiaceae	nat. per. forb	0	8	10	3	3	0.39	0.30	0.31
Blephilia hirsuta	Lamiaceae	nat. per. forb	0	5	6	2	3	0.70	0.26	0.15
Blephilia spp.	Lamiaceae	nat. per. forb	1	1	0	0	0	0.00	0.00	0.00
Boehmeria cylindrica	Urticaceae	nat. per. forb	2	2	0	9	1	0.00	0.96	0.32
Boraginaceae family	Boraginaceae	nat. forb	1	0	0	0	0	0.00	0.00	0.00
Botrychium dissectum	Ophioglossaceae	nat. per. fern	2	0	0	0	4	0.00	0.00	0.27
Botrychium spp.	Ophioglossaceae	nat. per. fern	0	0	0	4	21	0.00	0.14	0.04
Botrychium virginianum	Ophioglossaceae	nat. per. fern	19	43	104	115	109	0.21	0.63	0.14
Bouteloua curtipendula	Poaceae	nat. per. grass	2	1	4	3	3	0.11	0.84	0.23
Bouteloua spp.	Poaceae	nat. per. grass	0	0	1	0	0	0.02	0.00	0.00
Brachyelytrum erectum	Poaceae	nat. per. grass	14	88	94	154	171	1.15	1.20	0.88
Bromus purgans	Poaceae	nat. per. grass	0	4	78	48	55	0.52	0.19	0.22
Bromus spp.	Poaceae	nat. per. grass	1	29	8	0	6	0.28	0.00	0.05
Bumelia lanuginosa	Sapotaceae	nat. per. tree	7	16	34	50	56	0.99	0.56	0.47
Cacalia atriplicifolia	Asteraceae	nat. per. forb	2	17	27	19	26	1.05	0.91	0.84
Cacalia spp.	Asteraceae	nat. per. forb	0	0	0	0	1	0.00	0.00	0.02
Callitriche terrestris	Callitrichaceae	nat. ann. forb	0	0	0	0	2	0.00	0.00	0.05
Campanula americana	Campanulaceae	nat. ann. forb	0	1	0	3	15	0.00	0.49	0.37
Campsis radicans	Bignoniaceae	nat. per. w-vine	2	6	13	12	11	1.31	0.82	0.88
Carex amphibola	Cyperaceae	nat. per. sedge	0	0	0	7	2	0.00	0.40	0.17
Carex artitecta	Cyperaceae	nat. per. sedge	0	0	0	33	0	0.00	0.31	0.00
Carex blanda	Cyperaceae	nat. per. sedge	0	0	1	34	60	0.30	0.23	0.28
Carex cephalophora	Cyperaceae	nat. per. sedge	0	0	4	51	18	0.30	0.16	0.08
Carex complanata	Cyperaceae	nat. per. sedge	0	0	21	65	64	0.27	0.21	0.27
Carex crawei	Cyperaceae	nat. per. sedge	0	0	2	3	4	0.86	0.04	0.14
Carex digitalis	Cyperaceae	nat. per. sedge	0	0	0	1	4	0.00	0.02	0.76
Carex glaucoidea	Cyperaceae	nat. per. sedge	0	0	1	0	2	0.26	0.00	0.06
Carex hirtifolia	Cyperaceae	nat. per. sedge	0	0	1	0	0	0.58	0.00	0.00



Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Carex laxiculmis</i>	Cyperaceae	nat. per. sedge	0	0	0	0	1	0.00	0.00	0.27
<i>Carex meadii</i>	Cyperaceae	nat. per. sedge	0	0	3	2	2	1.14	0.05	0.13
<i>Carex muhlenbergii</i>	Cyperaceae	nat. per. sedge	0	0	32	0	59	0.45	0.00	0.19
CAREX										
NIGROMARGINATA	Cyperaceae	nat. per. sedge	0	0	0	319	377	0.00	0.44	0.43
<i>Carex oligocarpa</i>	Cyperaceae	nat. per. sedge	0	0	0	42	49	0.00	0.24	0.14
<i>Carex retroflexa</i>	Cyperaceae	nat. per. sedge	0	0	87	31	65	0.56	0.28	0.31
<i>Carex</i> spp.	Cyperaceae	nat. per. sedge	197	401	396	281	155	0.59	0.26	0.31
<i>Carex umbellata</i>	Cyperaceae	nat. per. sedge	0	0	273	262	316	0.58	0.22	0.26
<i>Carpinus caroliniana</i>	Betulaceae	nat. per. tree	1	4	7	7	15	1.66	2.39	1.50
<i>Carya cordiformis</i>	Juglandaceae	nat. per. tree	3	12	8	21	19	2.13	0.89	1.72
<i>Carya glabra</i>	Juglandaceae	nat. per. tree	64	253	276	393	397	2.85	3.41	3.18
<i>Carya ovata</i>	Juglandaceae	nat. per. tree	0	0	19	2	0	3.06	0.64	0.00
<i>Carya</i> spp.	Juglandaceae	nat. per. tree	13	1	86	251	339	0.36	0.77	0.70
<i>Carya texana</i>	Juglandaceae	nat. per. tree	124	320	501	386	320	4.11	3.73	3.75
<i>Carya tomentosa</i>	Juglandaceae	nat. per. tree	91	166	334	281	336	3.51	3.52	3.75
<i>Cassia fasciculata</i>	Fabaceae	nat. ann. legume	18	16	15	3	10	0.29	0.03	0.29
<i>Cassia marilandica</i>	Fabaceae	nat. per. legume	0	0	2	3	3	0.73	0.18	0.19
<i>Cassia nictitans</i>	Fabaceae	nat. ann. legume	0	1	21	13	8	0.14	0.31	0.21
<i>Cassia</i> spp.	Fabaceae	nat. legume	0	0	0	7	7	0.00	0.06	0.19
Caulophyllum										
thalictroides	Berberidaceae	nat. per. forb	0	0	0	1	0	0.00	0.55	0.00
<i>Ceanothus americanus</i>	Rhamnaceae	nat. per. shrub	30	60	125	105	92	1.01	0.86	0.78
<i>Celastrus scandens</i>	Celastraceae	nat. per. w-vine	0	0	2	1	7	0.61	0.27	0.65
<i>Celtis laevigata</i>	Ulmaceae	nat. per. tree	0	2	0	3	10	0.00	0.90	0.79
<i>Celtis occidentalis</i>	Ulmaceae	nat. per. tree	4	44	126	146	139	1.25	1.56	1.25
<i>Celtis</i> spp.	Rosaceae	nat. per. tree	31	51	24	22	69	1.32	0.66	0.82
<i>Celtis tenuifolia</i>	Ulmaceae	nat. per. tree	0	0	12	19	7	1.22	1.39	1.28
Cephalanthus										
occidentalis	Rubiaceae	nat. per. tree	0	0	0	0	1	0.00	0.00	0.70
<i>Cercis canadensis</i>	Fabaceae	nat. per. tree	18	88	138	148	137	2.26	1.85	1.91
Chaerophyllum										
procumbens	Apiaceae	nat. ann. forb	0	1	0	0	0	0.00	0.00	0.00
<i>Cheilanthes feei</i>	Polypodiaceae	nat. per. fern	0	1	2	2	3	0.15	0.29	0.11
<i>Chenopodium album</i>	Chenopodiaceae	ex. ann. forb	0	0	0	0	1	0.00	0.00	0.10
Chrysanthemum										
leucanthemum	Asteraceae	ex. peren. forb	0	1	1	0	0	0.37	0.00	0.00
<i>Cicuta maculata</i>	Apiaceae	nat. bien. forb	0	0	0	0	1	0.00	0.00	0.03
<i>Cimicifuga racemosa</i>	Ranunculaceae	nat. per. forb	17	91	107	120	120	4.71	3.73	3.69
<i>Circaea quadrisulcata</i>	Onagraceae	nat. per. forb	0	0	0	1	3	0.00	0.54	0.24
<i>Cirsium altissimum</i>	Asteraceae	nat. per. forb	0	0	16	25	19	0.48	0.42	0.47
<i>Cirsium carolinianum</i>	Asteraceae	nat. bien. forb	0	0	0	0	2	0.00	0.00	0.41
<i>Cirsium discolor</i>	Asteraceae	nat. per. forb	0	0	0	0	1	0.00	0.00	0.15
<i>Cirsium</i> spp.	Asteraceae	perennial forb	0	0	1	3	11	0.03	0.20	0.67
<i>Clematis virginiana</i>	Ranunculaceae	nat. per. vine	1	0	1	0	1	0.05	0.00	0.12
<i>Clitoria mariana</i>	Fabaceae	nat. per. legume	70	122	127	173	165	1.02	0.86	0.71
<i>Cocculus carolinianus</i>	Menispermaceae	nat. per. vine	4	8	5	10	11	0.59	0.46	0.37
<i>Comandra richardsoniana</i>	Santalaceae	nat. per. forb	0	3	21	18	16	0.41	0.32	0.23
<i>Convolvulus pellitus</i>	Convolvulaceae	ex. peren. vine	0	0	0	2	0	0.00	0.85	0.00
<i>Convolvulus sepium</i>	Convolvulaceae	nat. per. vine	1	14	6	4	9	0.75	0.94	0.31
<i>Convolvulus</i> spp.	Convolvulaceae	perennial vine	0	3	5	0	1	0.32	0.00	0.02
<i>Corallorhiza odontorhiza</i>	Orchidaceae	nat. per. forb	0	3	0	0	0	0.00	0.00	0.00
<i>Coreopsis lanceolata</i>	Asteraceae	nat. per. forb	0	0	0	2	2	0.00	0.18	0.75
<i>Coreopsis palmata</i>	Asteraceae	nat. per. forb	24	16	46	50	47	0.40	0.31	0.40

Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Coreopsis pubescens</i>	Asteraceae	nat. per. forb	0	0	0	1	0	0.00	0.31	0.00
<i>Coreopsis</i> spp.	Asteraceae	nat. per. forb	0	1	0	0	3	0.00	0.00	0.06
<i>Coreopsis tripteris</i>	Asteraceae	nat. per. forb	0	3	9	11	13	0.30	0.37	0.25
<i>Cornus drummondii</i>	Cornaceae	nat. per. tree	0	3	3	0	8	0.84	0.00	0.63
<i>Cornus florida</i>	Cornaceae	nat. per. tree	150	437	616	607	635	10.90	10.61	9.25
<i>Cornus</i> spp.	Cornaceae	nat. per. tree	0	4	3	2	3	0.74	0.05	2.29
<i>Corylus americana</i>	Betulaceae	nat. per. tree	10	32	62	57	71	2.46	2.81	2.10
<i>Crataegus</i> spp.	Rosaceae	nat. per. tree	21	52	70	78	73	0.68	0.45	0.49
<i>Crotalaria sagittalis</i>	Fabaceae	nat. ann. forb	0	0	1	1	1	0.08	0.15	0.16
<i>Croton capitatus</i>	Euphorbiaceae	nat. ann. forb	0	5	2	0	0	0.08	0.00	0.00
<i>Croton glandulosus</i>	Euphorbiaceae	nat. ann. forb	1	1	0	0	0	0.00	0.00	0.00
<i>Croton monanthogynus</i>	Euphorbiaceae	nat. ann. forb	0	0	5	4	4	0.28	0.25	0.05
<i>Croton</i> spp.	Euphorbiaceae	nat. ann. forb	0	1	0	0	2	0.00	0.00	0.02
<i>Cryptotaenia canadensis</i>	Apiaceae	nat. per. forb	4	1	3	8	12	0.67	0.50	0.54
<i>Cucurbita pepo</i>	Curcubitaceae	ex. peren. vine	4	0	0	0	0	0.00	0.00	0.00
<i>Cunila origanoides</i>	Lamiaceae	nat. per. forb	78	163	192	210	208	1.92	1.42	1.52
<i>Cuphea petiolata</i>	Lythraceae	nat. ann. forb	0	1	0	0	0	0.00	0.00	0.00
<i>Cynoglossum officinale</i>	Boraginaceae	ex. bien. forb	0	1	16	3	0	0.50	0.61	0.00
<i>Cynoglossum</i> spp.	Boraginaceae	forb	0	1	1	2	0	0.28	0.30	0.00
<i>Cynoglossum virginianum</i>	Boraginaceae	nat. per. forb	0	7	2	2	4	0.62	0.84	0.57
<i>Cypripedium calceolus</i>	Orchidaceae	nat. per. forb	0	0	0	0	1	0.00	0.00	0.01
<i>Cystopteris fragilis</i>	Polypodiaceae	nat. per. fern	0	0	2	2	3	0.03	0.03	0.03
<i>Danthonia spicata</i>	Poaceae	nat. per. grass	37	81	107	119	120	0.37	0.28	0.27
<i>Daucus carota</i>	Apiaceae	ex. bien. forb	0	2	1	3	1	0.56	0.21	0.25
<i>Delphinium carolinianum</i>	Ranunculaceae	nat. per. forb	0	1	1	0	0	0.05	0.00	0.00
<i>Delphinium tricornis</i>	Ranunculaceae	nat. per. forb	2	2	0	0	0	0.00	0.00	0.00
<i>Desmodium ciliare</i>	Fabaceae	nat. per. legume	0	0	4	7	2	0.45	1.51	1.53
<i>Desmodium cuspidatum</i>	Fabaceae	nat. per. legume	0	1	28	13	20	0.81	0.55	0.60
<i>Desmodium dillenii</i>	Fabaceae	nat. per. legume	0	0	6	0	0	1.07	0.00	0.00
<i>Desmodium glutinosum</i>	Fabaceae	nat. per. legume	23	172	203	204	216	2.28	2.29	2.30
<i>Desmodium laevigatum</i>	Fabaceae	nat. per. legume	54	65	88	115	132	1.17	1.21	1.03
<i>Desmodium marilandicum</i>	Fabaceae	nat. per. legume	8	4	17	12	7	0.62	0.41	0.52
<i>Desmodium nudiflorum</i>	Fabaceae	nat. per. legume	196	479	616	614	622	15.46	15.87	15.61
<i>Desmodium nuttallii</i>	Fabaceae	nat. per. legume	55	64	171	196	259	1.25	1.64	1.42
<i>Desmodium paniculatum</i>	Fabaceae	nat. per. legume	83	33	84	64	45	1.07	0.99	0.61
<i>Desmodium pauciflorum</i>	Fabaceae	nat. per. legume	24	125	67	130	33	0.77	1.11	0.99
<i>Desmodium rigidum</i>	Fabaceae	nat. per. legume	2	0	1	3	0	1.75	0.28	0.00
<i>Desmodium rotundifolium</i>	Fabaceae	nat. per. legume	41	78	106	115	110	1.10	1.13	1.11
<i>Desmodium sessilifolium</i>	Fabaceae	nat. per. forb	0	0	0	0	1	0.00	0.00	0.97
<i>Desmodium</i> spp.	Fabaceae	nat. per. legume	11	10	27	86	128	0.78	0.07	0.09
<i>Diodia teres</i>	Rubiaceae	nat. ann. forb	0	0	0	0	0	0.00	0.00	0.00
<i>Dioscorea quaternata</i>	Dioscoreaceae	nat. per. vine	3	184	201	227	225	1.08	1.16	1.09
<i>Dioscorea</i> spp.	Dioscoreaceae	nat. per. vine	0	0	4	112	61	0.03	0.22	0.16
<i>Dioscorea villosa</i>	Dioscoreaceae	nat. per. vine	59	137	218	131	194	0.78	0.52	0.62
<i>Diospyros virginiana</i>	Ebenaceae	nat. per. tree	20	25	117	114	152	2.58	2.13	1.77
<i>Dodecatheon meadia</i>	Primulaceae	nat. per. forb	0	0	2	0	0	0.19	0.00	0.00
<i>Echinacea pallida</i>	Asteraceae	nat. per. forb	0	1	8	15	13	0.67	0.57	0.52



Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Echinacea purpurea</i>	Asteraceae	nat. per. forb	0	0	4	3	3	0.71	0.47	0.58
<i>Echinacea</i> spp.	Asteraceae	nat. per. forb	0	0	0	0	4	0.00	0.00	0.07
<i>Elaeagnus umbellata</i>	Elaeagnaceae	ex. peren. tree	1	1	2	3	5	0.52	1.55	2.44
<i>Elephantopus</i>										
<i>carolinianus</i>	Asteraceae	nat. per. forb	1	1	6	5	9	0.80	1.11	1.07
<i>Elymus canadensis</i>	Poaceae	nat. per. grass	0	1	0	2	4	0.00	0.21	0.02
<i>Elymus</i> spp.	Poaceae	nat. per. grass	0	0	0	9	15	0.00	0.18	0.12
<i>Elymus virginicus</i>	Poaceae	nat. per. grass	11	18	17	18	16	0.24	0.21	0.15
<i>Erechtites hieracifolia</i>	Asteraceae	nat. ann. forb	0	3	9	24	16	0.16	0.54	0.31
<i>Erigeron annuus</i>	Asteraceae	nat. ann. forb	0	0	0	1	1	0.00	0.01	0.03
<i>Erigeron canadensis</i>	Asteraceae	nat. ann. forb	0	0	0	0	1	0.00	0.00	0.46
<i>Eryngium yuccifolium</i>	Apiaceae	nat. per. forb	3	3	10	5	6	0.38	0.63	0.26
<i>Euonymus</i>										
<i>atropurpureus</i>	Celastraceae	nat. per. tree	1	0	4	0	2	1.19	0.00	0.02
<i>Eupatorium perfoliatum</i>	Asteraceae	nat. per. forb	1	0	1	1	0	0.16	0.01	0.00
<i>Eupatorium purpureum</i>	Asteraceae	nat. per. forb	0	2	6	5	11	0.83	0.84	0.86
<i>Eupatorium rugosum</i>	Asteraceae	nat. per. forb	0	2	35	26	26	0.67	1.66	1.09
<i>Eupatorium</i> spp.	Asteraceae	nat. per. forb	1	1	0	0	9	0.00	0.00	2.06
<i>Euphorbia commutata</i>	Euphorbiaceae	nat. per. forb	0	0	0	3	2	0.00	0.08	0.03
<i>Euphorbia corollata</i>	Euphorbiaceae	nat. per. forb	53	96	150	144	157	0.21	0.24	0.20
<i>Euphorbia dentata</i>	Euphorbiaceae	nat. ann. forb	0	0	1	10	1	0.43	0.08	0.03
<i>Euphorbia heterophylla</i>	Euphorbiaceae	nat. ann. forb	0	0	0	4	1	0.00	0.14	0.06
<i>Euphorbia</i> spp.	Euphorbiaceae	nat. forb	0	0	2	1	0	0.03	0.03	0.00
<i>Evolvulus nuttallianus</i>	Convolvulaceae	nat. per. forb	0	0	1	0	0	0.28	0.00	0.00
<i>Festuca</i> spp.	Poaceae	grass	0	0	0	0	9	0.00	0.00	0.24
<i>Festuca obtusa</i>	Poaceae	nat. per. grass	0	0	0	0	0	0.00	0.00	0.00
<i>Festuca octoflora</i>	Poaceae	nat. ann. grass	0	0	0	0	9	0.00	0.00	0.09
<i>Fimbristylis caroliniana</i>	Cyperaceae	nat. per. sedge	0	0	1	3	3	3.43	0.61	0.95
<i>Fragaria virginiana</i>	Rosaceae	nat. per. forb	10	7	3	2	8	0.50	0.02	0.33
<i>Fraxinus americana</i>	Oleaceae	nat. per. tree	7	49	111	127	95	3.07	2.99	2.64
<i>Fraxinus pennsylvanica</i>	Oleaceae	nat. per. tree	1	12	5	8	59	2.69	2.08	2.83
<i>Fraxinus</i> spp.	Oleaceae	nat. per. tree	13	0	12	6	11	1.71	1.34	0.35
<i>Galactia volubilis</i>	Fabaceae	nat. per. legume	41	10	50	57	99	0.37	0.53	0.30
<i>Galium aparine</i>	Rubiaceae	nat. ann. forb	0	1	1	0	2	2.09	0.00	0.16
<i>Galium arkansanum</i>	Rubiaceae	nat. per. forb	27	77	72	81	78	0.49	0.30	0.48
<i>Galium circaezans</i>	Rubiaceae	nat. per. forb	0	10	143	193	209	0.18	0.14	0.15
<i>Galium concinnum</i>	Rubiaceae	nat. per. forb	16	75	100	108	111	1.18	0.64	0.84
<i>Galium obtusum</i>	Rubiaceae	nat. per. forb	29	106	28	35	21	0.10	0.08	0.13
<i>Galium pilosum</i>	Rubiaceae	nat. per. forb	48	111	119	81	89	0.15	0.11	0.07
<i>Galium</i> spp.	Rubiaceae	nat. per. forb	0	5	3	30	42	0.18	0.06	0.04
<i>Galium tinctorium</i>	Rubiaceae	nat. per. forb	0	0	5	15	7	0.97	0.31	0.07
<i>Galium triflorum</i>	Rubiaceae	nat. per. forb	2	14	19	20	22	0.72	0.38	0.40
<i>Gentiana puberula</i>	Gentianaceae	nat. per. forb	0	0	0	5	3	0.00	0.14	0.10
<i>Geranium maculatum</i>	Geraniaceae	nat. per. forb	0	110	138	122	131	0.64	0.60	0.68
<i>Gerardia flava</i>	Scrophulariaceae	nat. per. forb	1	12	43	35	33	0.61	0.82	0.70
<i>Gerardia grandiflora</i>	Scrophulariaceae	nat. per. forb	0	2	0	0	2	0.00	0.00	0.25
<i>Gerardia pedicularia</i>	Scrophulariaceae	nat. ann. forb	1	0	4	6	9	2.21	1.57	0.52
<i>Gerardia</i> spp.	Scrophulariaceae	nat. per. forb	1	7	1	3	0	1.90	0.15	0.00
<i>Geum canadense</i>	Rosaceae	nat. per. forb	11	32	55	30	39	0.33	0.22	0.38
<i>Geum</i> spp.	Rosaceae	nat. per. forb	0	2	10	80	73	0.14	0.20	0.25
<i>Geum vernum</i>	Rosaceae	nat. per. forb	20	10	1	2	1	0.23	0.06	0.29
<i>Gillenia stipulata</i>	Rosaceae	nat. per. forb	0	5	14	18	15	0.60	0.49	0.50
<i>Gleditsia triacanthos</i>	Fabaceae	nat. per. tree	2	5	3	6	1	1.03	0.21	0.45

Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
Gnaphalium										
obtusifolium	Asteraceae	nat. bien. forb	0	0	0	2	1	0.00	0.25	0.05
Hackelia virginiana	Boraginaceae	nat. bien. forb	0	0	0	0	0	0.00	0.00	0.00
Hamamelis vernalis	Hamamelidaceae	nat. per. tree	0	0	0	0	0	0.00	0.00	0.00
Hamamelis virginiana	Hamamelidaceae	nat. per. shrub	0	2	0	0	0	0.00	0.00	0.00
Hedeoma pulegioides	Lamiaceae	nat. ann. forb	11	1	2	0	5	0.18	0.00	0.87
<i>Hedera helix</i>	Araliaceae	ex. peren. vine	1	0	0	0	0	0.00	0.00	0.00
Helianthus hirsutus	Asteraceae	nat. per. forb	0	1	186	145	211	0.82	0.74	0.74
Helianthus spp.	Asteraceae	nat. per. forb	0	228	18	14	11	1.00	0.43	0.12
Helianthus strumosus	Asteraceae	nat. per. forb	0	0	125	198	151	0.99	1.10	1.04
Heliopsis helianthoides	Asteraceae	nat. per. forb	0	0	11	24	32	0.29	0.44	0.42
Heliotropium tenellum	Asteraceae	nat. ann. forb	0	0	0	1	0	0.00	0.03	0.00
Hepatica nobilis	Ranunculaceae	nat. per. forb	3	46	48	55	55	0.82	1.00	0.81
Heuchera spp.	Saxifragaceae	nat. per. forb	0	6	0	1	0	0.00	0.30	0.00
Hieracium gronovii	Asteraceae	nat. per. forb	23	61	61	68	66	0.32	0.24	0.17
Houstonia longifolia	Rubiaceae	nat. per. forb	6	8	9	18	14	0.11	0.21	0.05
Houstonia nigricans	Rubiaceae	nat. per. forb	3	9	21	19	20	1.12	1.08	0.67
Houstonia spp.	Rubiaceae	nat. per. forb	0	0	0	1	1	0.00	0.05	0.02
Hybanthus concolor	Violaceae	nat. per. forb	0	25	10	6	7	0.77	0.53	1.96
Hydrangea arborescens	Saxifragaceae	nat. per. tree	3	23	36	37	44	1.91	2.50	2.54
Hydrastis canadensis	Ranunculaceae	nat. per. forb	39	30	15	4	6	0.94	1.25	0.70
Hypericum punctatum	Hypericaceae	nat. per. forb	0	0	1	2	2	0.46	0.61	0.16
Hypericum spathulatum	Hypericaceae	nat. per. shrub	0	0	4	2	0	0.43	0.25	0.00
Hypericum										
sphaerocarum	Hypericaceae	nat. per. forb	0	0	2	8	0	0.39	0.33	0.00
Hypericum spp.	Hypericaceae	nat. per. forb	0	0	1	6	3	0.07	0.25	0.14
Hystrix patula	Poaceae	nat. per. grass	0	0	10	1	1	0.26	0.14	0.26
Impatiens capensis	Balsaminaceae	nat. ann. forb	0	0	0	0	3	0.00	0.00	0.07
<i>Ipomaea hederacea</i>	Convolvulaceae	ex. ann. vine	0	0	0	0	2	0.00	0.00	0.76
Ipomoea pandurata	Convolvulaceae	nat. per. vine	22	35	44	44	44	0.56	0.64	0.60
Iris cristata	Iridaceae	nat. per. forb	0	0	2	0	1	1.07	0.00	1.03
Iris spp.	Iridaceae	nat. per. forb	0	0	0	0	1	0.00	0.00	0.41
Juglans nigra	Juglandaceae	nat. per. tree	3	5	11	9	11	0.62	0.31	0.44
Juglans spp.	Juglandaceae	nat. per. tree	0	0	0	3	0	0.00	0.70	0.00
Juncus marginatus	Juncaceae	nat. per. sedge	0	0	0	1	0	0.00	0.02	0.00
Juncus spp.	Juncaceae	nat. per. sedge	0	0	0	2	0	0.00	0.26	0.00
Juniperus virginiana	Cupressaceae	nat. per. tree	6	27	29	27	33	0.66	0.92	0.77
Justicia americana	Acanthaceae	nat. per. forb	3	0	0	0	0	0.00	0.00	0.00
Krigia biflora	Asteraceae	nat. per. forb	22	106	131	137	166	0.43	0.33	0.32
Kuhnia eupatorioides	Asteraceae	nat. per. forb	0	1	7	12	10	0.45	0.41	0.69
Lactuca canadensis	Asteraceae	nat. bien. forb	0	0	1	8	17	0.11	0.41	0.21
Lactuca floridana	Asteraceae	nat. bien. forb	0	0	2	5	8	0.53	0.15	0.24
Lactuca spp.	Asteraceae	nat. bien. forb	3	4	20	6	1	0.27	0.13	0.07
Laportea canadensis	Urticaceae	nat. per. forb	0	5	1	0	0	0.79	0.00	0.00
Lathyrus venosus	Fabaceae	nat. per. legume	0	0	0	0	0	0.00	0.00	0.00
Lechea villosa	Cistaceae	nat. per. forb	0	0	0	1	0	0.00	0.60	0.00
Leersia virginica	Poaceae	nat. per. grass	0	0	0	0	2	0.00	0.00	0.09
Lespedeza capitata	Fabaceae	nat. per. legume	0	0	1	1	0	0.30	0.58	0.00
<i>Lespedeza cuneata</i>	Fabaceae	ex. peren. legume	14	35	12	3	10	0.38	0.46	0.27
Lespedeza hirta	Fabaceae	nat. per. legume	30	55	64	42	68	0.66	1.22	0.86
Lespedeza intermedia	Fabaceae	nat. per. legume	71	84	199	259	242	0.59	0.74	0.68
Lespedeza nuttallii	Fabaceae	nat. per. legume	0	0	2	0	0	0.63	0.00	0.00
Lespedeza procumbens	Fabaceae	nat. per. legume	44	71	77	114	123	0.88	0.69	0.74



Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Lespedeza repens</i>	Fabaceae	nat. per. legume	99	103	130	161	171	1.11	1.08	0.89
<i>Lespedeza</i> spp.	Fabaceae	nat. per. legume	26	1	19	98	91	0.12	0.06	0.06
<i>Lespedeza stipulacea</i>	Fabaceae	ex. ann. legume	4	82	12	4	6	1.21	0.17	0.75
<i>Lespedeza striata</i>	Fabaceae	ex. ann. legume	1	21	3	3	1	0.40	0.49	0.05
<i>Lespedeza violacea</i>	Fabaceae	nat. per. legume	0	0	102	19	6	0.39	0.30	0.17
<i>Lespedeza virginica</i>	Fabaceae	nat. per. legume	32	73	54	57	62	0.55	0.52	0.49
<i>Liatris aspera</i>	Asteraceae	nat. per. forb	1	3	24	15	13	0.19	0.31	0.31
<i>Liatris cylindracea</i>	Asteraceae	nat. per. forb	0	0	3	5	7	0.83	0.47	0.46
<i>Liatris pycnostachya</i>	Asteraceae	nat. per. forb	1	1	5	1	0	0.28	0.14	0.00
<i>Liatris</i> spp.	Asteraceae	nat. per. forb	1	0	5	2	4	0.14	0.04	0.16
<i>Ligusticum canadense</i>	Apiaceae	nat. per. forb	3	1	41	31	41	0.46	0.43	0.57
<i>Lindera benzoin</i>	Lauraceae	nat. per. tree	4	34	32	32	38	3.16	3.51	5.31
<i>Linum medium</i>	Linaceae	nat. per. forb	0	0	0	0	2	0.00	0.00	0.07
<i>Linum striatum</i>	Linaceae	nat. per. forb	0	0	1	0	0	0.27	0.00	0.00
<i>Lithospermum</i>										
<i>canescens</i>	Boraginaceae	nat. per. forb	0	8	23	17	26	0.52	0.46	0.69
<i>Lobelia inflata</i>	Campanulaceae	nat. ann. forb	0	0	10	0	5	0.22	0.00	0.66
<i>Lobelia spicata</i>	Campanulaceae	nat. per. forb	1	1	11	24	21	0.28	0.12	0.18
<i>Lobelia</i> spp.	Campanulaceae	nat. forb	0	0	1	0	2	0.50	0.00	0.71
<i>Lonicera</i> spp.	Caprifoliaceae	nat. per. w-vine	0	60	108	110	128	1.36	1.19	1.09
<i>Lysimachia lanceolata</i>	Primulaceae	nat. per. forb	0	2	16	35	52	0.31	0.25	0.31
MALAXIS UNIFOLIA	Orchidaceae	nat. per. forb	0	0	1	0	5	0.05	0.00	0.03
<i>Matelea decipiens</i>	Asclepiadaceae	nat. per. vine	0	0	6	15	17	0.47	0.87	0.63
<i>Matelea</i> spp.	Asclepiadaceae	nat. per. vine	3	7	13	0	0	0.93	0.00	0.00
<i>Menispermum</i>										
<i>canadense</i>	Menispermaceae	nat. per. vine	0	1	20	31	28	0.39	0.27	0.24
<i>Monarda russeliana</i>	Lamiaceae	nat. per. forb	61	133	183	178	195	0.79	0.79	0.79
<i>Monarda</i> spp.	Lamiaceae	nat. per. forb	0	0	0	1	0	0.00	0.05	0.00
<i>Monotropa hypopithys</i>	Pyrolaceae	nat. per. forb	1	0	1	0	5	0.05	0.00	0.03
<i>Monotropa uniflora</i>	Pyrolaceae	nat. per. forb	2	0	0	1	2	0.00	0.04	0.12
<i>Morus rubra</i>	Moraceae	nat. per. tree	0	10	30	21	31	1.07	0.90	0.38
<i>Muhlenbergia sobolifera</i>	Poaceae	nat. per. grass	13	31	55	45	45	0.71	0.57	0.85
<i>Muhlenbergia</i> spp.	Poaceae	nat. per. grass	0	0	6	7	4	0.30	0.32	0.44
<i>Muhlenbergia tenuiflora</i>	Poaceae	nat. per. grass	0	0	0	0	1	0.00	0.00	0.26
<i>Nyssa sylvatica</i>	Cornaceae	nat. per. tree	95	346	505	505	530	3.51	3.99	3.70
<i>Onosmodium</i> spp.	Boraginaceae	nat. per. forb	0	0	0	6	0	0.00	0.21	0.00
<i>Onosmodium</i>										
<i>subsetosum</i>	Boraginaceae	nat. per. forb	0	0	1	0	0	0.02	0.00	0.00
<i>Ophioglossum</i>										
<i>engelmannii</i>	Ophioglossaceae	nat. per. fern	0	0	0	0	1	0.00	0.00	0.17
<i>Osmorhiza claytoni</i>	Apiaceae	nat. per. forb	0	2	0	0	1	0.00	0.00	0.37
<i>Ostrya virginiana</i>	Betulaceae	nat. per. tree	0	15	3	9	6	0.68	2.61	1.60
<i>Oxalis</i> spp.	Oxalidaceae	nat. per. forb	0	8	3	5	2	0.02	0.02	0.02
<i>Oxalis stricta</i>	Oxalidaceae	nat. per. forb	4	4	19	38	33	0.22	0.12	0.10
<i>Oxalis violacea</i>	Oxalidaceae	nat. per. forb	2	0	5	2	6	0.03	0.05	0.17
<i>Oxypolis rigidior</i>	Apiaceae	nat. per. forb	0	1	1	0	1	0.50	0.00	0.43
<i>Panicum anceps</i>	Poaceae	nat. per. grass	0	0	1	2	1	1.85	0.16	1.84
<i>Panicum boscii</i>	Poaceae	nat. per. grass	82	205	308	362	306	0.71	0.77	0.69
<i>Panicum capillare</i>	Poaceae	nat. ann. grass	1	0	0	1	1	0.00	0.39	0.40
<i>Panicum clandestinum</i>	Poaceae	nat. per. grass	1	86	8	2	18	0.56	1.16	0.25
<i>Panicum commutatum</i>	Poaceae	nat. per. grass	65	174	227	224	258	0.36	0.44	0.28
<i>Panicum depauperatum</i>	Poaceae	nat. per. grass	44	24	3	0	2	0.47	0.00	0.05
<i>Panicum dichotomum</i>	Poaceae	nat. per. grass	86	146	196	217	187	0.31	0.29	0.26

Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Panicum lanuginosum</i>	Poaceae	nat. per. grass	25	14	56	63	47	0.25	0.32	0.35
<i>Panicum laxiflorum</i>	Poaceae	nat. per. grass	2	0	1	1	1	0.47	0.81	0.03
<i>Panicum linearifolium</i>	Poaceae	nat. per. grass	0	0	40	100	129	0.25	0.17	0.22
<i>Panicum oligosanthos</i>	Poaceae	nat. per. grass	0	0	0	0	3	0.00	0.00	0.31
<i>Panicum sphaerocarpon</i>	Poaceae	nat. per. grass	0	1	5	3	37	0.17	1.92	0.44
<i>Panicum</i> spp.	Poaceae	nat. per. grass	24	14	47	109	145	0.10	0.06	0.07
<i>Panicum virgatum</i>	Poaceae	nat. per. grass	3	10	6	16	13	1.47	1.70	0.83
<i>Parietaria pensylvanica</i>	Urticaceae	nat. ann. forb	0	0	0	3	0	0.00	0.06	0.00
<i>Paronychia canadensis</i>	Caryophyllaceae	nat. ann. forb	0	0	1	2	0	1.48	0.17	0.00
<i>Paronychia fastigiata</i>	Caryophyllaceae	nat. ann. forb	0	0	0	1	0	0.00	0.38	0.00
<i>Parthenium hispidum</i>	Asteraceae	nat. per. forb	9	54	17	0	4	0.64	0.00	0.53
<i>Parthenium integrifolium</i>	Asteraceae	nat. per. forb	45	151	173	177	172	0.81	0.90	0.81
<i>Parthenocissus quinquefolia</i>	Vitaceae	nat. per. w-vine	141	391	486	501	532	7.05	7.06	7.41
<i>Passiflora lutea</i>	Passifloraceae	nat. per. vine	14	97	84	85	94	0.26	0.29	0.29
<i>Pedicularis canadensis</i>	Scrophulariaceae	nat. per. forb	2	3	2	2	3	1.17	0.03	0.17
<i>Pellaea atropurpurea</i>	Polypodiaceae	nat. per. fern	1	1	7	14	8	0.22	0.28	0.52
<i>Penstemon pallidus</i>	Scrophulariaceae	nat. per. forb	0	0	1	1	0	0.39	0.03	0.00
<i>Penstemon</i> spp.	Scrophulariaceae	nat. forb	0	0	0	0	2	0.00	0.00	0.26
<i>Petalostemon</i> spp.	Fabaceae	nat. per. forb	0	0	0	1	1	0.00	0.02	0.01
<i>Petalostemum candidum</i>	Fabaceae	nat. per. forb	0	0	1	3	3	0.02	0.18	0.40
<i>Petalostemum purpureum</i>	Fabaceae	nat. per. forb	2	1	8	5	9	0.39	0.33	0.21
<i>Phaseolus polystachios</i>	Fabaceae	nat. per. legume	2	69	31	51	18	1.19	3.82	1.35
<i>Phlox divaricata</i>	Polemoniaceae	nat. per. forb	0	20	20	39	29	0.20	0.25	0.17
<i>Phlox pilosa</i>	Polemoniaceae	nat. per. forb	0	0	6	20	16	0.18	0.13	0.13
<i>Phlox</i> spp.	Polemoniaceae	nat. per. forb	3	1	2	1	5	0.10	0.04	0.03
<i>Phryma leptostachya</i>	Phrymaceae	nat. per. forb	7	67	73	165	180	0.47	0.40	0.39
<i>Physalis heterophylla</i>	Solanaceae	nat. per. forb	0	7	10	2	1	0.28	0.08	0.02
<i>Physalis longifolia</i>	Solanaceae	nat. per. forb	0	0	0	1	0	0.00	1.63	0.00
<i>Physalis</i> spp.	Solanaceae	nat. per. forb	0	0	1	10	6	0.01	0.11	0.07
<i>Physalis virginiana</i>	Solanaceae	nat. per. forb	0	0	4	2	31	0.21	0.15	0.19
<i>Physocarpus opulifolius</i>	Rosaceae	nat. per. forb	0	1	0	0	0	0.00	0.00	0.00
<i>Physostegia virginiana</i>	Lamiaceae	nat. per. forb	0	0	2	4	4	0.15	0.51	0.46
<i>Phytolacca americana</i>	Phytolaccaceae	nat. per. forb	0	0	1	0	0	0.20	0.00	0.00
<i>Pilea pumila</i>	Urticaceae	nat. ann. forb	0	1	3	2	17	0.45	0.50	1.05
<i>Pinus echinata</i>	Pinaceae	nat. per. tree	24	83	118	129	179	0.61	0.48	0.44
PLANTAGO										
<i>CORDATA</i>	Plantaginaceae	nat. per. forb	1	4	0	0	0	0.00	0.00	0.00
<i>Plantago major</i>	Plantaginaceae	ex. ann. forb	1	0	1	1	1	0.19	0.14	0.46
<i>Plantago rugelii</i>	Plantaginaceae	nat. ann. forb	0	0	0	0	2	0.00	0.00	0.23
<i>Plantago</i> spp.	Plantaginaceae	ann. forb	0	3	3	0	1	0.54	0.00	0.01
<i>Plantago virginica</i>	Plantaginaceae	nat. ann. forb	0	0	0	4	2	0.00	0.42	0.74
<i>Poa</i> spp.	Poaceae	peren. grass	0	0	0	1	2	0.00	0.02	0.03
<i>Poa sylvestris</i>	Poaceae	nat. per. grass	0	0	0	0	1	0.00	0.00	0.01
<i>Podophyllum peltatum</i>	Berberidaceae	nat. per. forb	0	4	6	13	12	0.51	0.75	0.94
<i>Polygala senega</i>	Polygalaceae	nat. per. forb	0	0	0	2	3	0.00	0.63	0.43
<i>Polygonatum biflorum</i>	Liliaceae	nat. per. forb	9	32	3	5	1	0.38	0.45	0.02
<i>Polygonum convolvulus</i>	Polygonaceae	ex. ann. vine	0	0	1	0	1	0.03	0.00	0.02
<i>Polygonum scandens</i>	Polygonaceae	nat. per. vine	0	1	4	12	12	0.05	0.07	0.48
<i>Polygonum</i> spp.	Polygonaceae	forb	0	0	0	1	0	0.00	0.03	0.00

Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
Polygonum virginianum	Polygonaceae	nat. per. forb	1	2	2	4	8	0.75	1.68	0.95
Polystichum										
acrostichoides	Polypodiaceae	nat. per. fern	7	35	42	43	47	0.84	1.08	0.94
Potentilla norvegica	Rosaceae	nat. ann. forb	0	1	0	0	0	0.00	0.00	0.00
Potentilla recta	Rosaceae	ex. peren. forb	0	2	6	1	6	0.27	0.45	0.20
Potentilla simplex	Rosaceae	nat. per. forb	70	145	215	232	240	0.63	0.53	0.59
Potentilla spp.	Rosaceae	peren. forb	0	53	0	0	0	0.00	0.00	0.00
Prenanthes alba	Asteraceae	nat. per. forb	2	4	1	44	18	0.20	0.28	0.36
Prenanthes altissima	Asteraceae	nat. per. forb	2	1	30	14	19	0.34	0.34	0.20
Prenanthes aspera	Asteraceae	nat. per. forb	0	0	0	1	0	0.00	0.12	0.00
Prenanthes spp.	Asteraceae	nat. per. forb	0	1	3	4	17	0.16	0.22	0.17
Prunella vulgaris	Lamiaceae	ex. peren. forb	0	0	4	2	9	0.18	0.17	0.23
Prunus americana	Rosaceae	nat. per. tree	1	0	4	18	52	1.36	0.68	0.99
Prunus serotina	Rosaceae	nat. per. tree	57	163	223	256	266	1.02	0.71	0.78
Prunus spp.	Rosaceae	peren. tree	7	11	40	60	18	0.99	0.73	0.55
Psoralea psoraloides	Fabaceae	nat. per. legume	3	0	36	16	26	1.26	1.20	0.99
Psoralea tenuiflora	Fabaceae	nat. per. legume	0	0	1	1	2	0.79	0.01	0.88
Ptelea trifoliata	Rutaceae	nat. per. tree	0	0	0	1	0	0.00	0.18	0.00
Pteridium aquilinum	Polypodiaceae	nat. per. fern	52	135	175	179	188	4.72	3.56	3.72
Pycnanthemum										
albescens	Lamiaceae	nat. per. forb	1	7	1	2	8	0.54	0.26	0.42
Pycnanthemum pilosum	Lamiaceae	nat. per. forb	0	0	1	4	2	0.45	1.10	0.12
Pycnanthemum spp.	Lamiaceae	nat. per. forb	0	1	0	0	0	0.00	0.00	0.00
Pycnanthemum										
tenuifolium	Lamiaceae	nat. per. forb	12	12	9	2	10	0.36	0.16	0.18
Pyrrhopappus										
carolinianus	Asteraceae	nat. ann. forb	2	1	1	0	0	0.03	0.00	0.00
Pyrus malus	Rosaceae	ex. peren. tree	0	0	0	0	1	0.00	0.00	0.03
Quercus alba	Fagaceae	nat. per. tree	157	413	569	573	573	3.75	4.09	3.87
Quercus coccinea	Fagaceae	nat. per. tree	125	275	413	439	486	1.94	1.85	1.85
Quercus marilandica	Fagaceae	nat. per. tree	25	14	38	45	59	3.00	2.84	2.66
Quercus muehlenbergii	Fagaceae	nat. per. tree	13	40	68	75	75	1.39	1.41	1.12
Quercus rubra	Fagaceae	nat. per. tree	0	0	0	5	5	0.00	0.36	0.49
Quercus shumardii	Fagaceae	nat. per. tree	2	0	0	0	2	0.00	0.00	0.67
Quercus spp.	Fagaceae	nat. per. tree	0	2	3	49	99	0.37	0.10	0.09
Quercus stellata	Fagaceae	nat. per. tree	138	155	212	255	223	5.37	4.78	4.88
Quercus velutina	Fagaceae	nat. per. tree	167	410	553	553	577	3.21	3.35	3.53
Ranunculus abortivus	Ranunculaceae	nat. per. forb	0	0	0	1	0	0.00	0.01	0.00
Ranunculus hispidus	Ranunculaceae	nat. per. forb	1	16	50	58	44	0.36	0.29	0.31
Ranunculus recurvatus	Ranunculaceae	nat. per. forb	0	2	2	4	4	0.18	0.37	0.17
Ranunculus										
septentrionalis	Ranunculaceae	nat. per. forb	0	0	5	0	15	0.23	0.00	0.23
Ranunculus spp.	Ranunculaceae	nat. per. forb	0	1	1	2	32	0.03	0.35	0.21
Ratibida pinnata	Asteraceae	nat. per. forb	1	1	4	6	9	0.60	0.65	0.59
Rhamnus caroliniana	Rhamnaceae	nat. per. tree	81	166	269	331	374	2.07	1.71	1.35
Rhus aromatica	Anacardiaceae	nat. per. shrub	28	179	218	219	223	3.84	3.74	3.37
Rhus copallina	Anacardiaceae	nat. per. tree	18	11	36	33	34	1.56	1.74	1.27
Rhus glabra	Anacardiaceae	nat. per. tree	2	9	3	4	3	1.99	1.22	1.54
Rhus radicans	Anacardiaceae	nat. per. w-vine	64	206	279	276	302	1.97	1.98	1.79
Rhus spp.	Anacardiaceae	nat. per. tree	0	0	1	0	0	0.51	0.00	0.00
Ribes missouriense	Rosaceae	nat. per. shrub	0	0	0	2	1	0.00	0.11	0.47
Robinia pseudo-acacia	Fabaceae	nat. per. tree	0	1	1	3	4	0.20	1.14	0.25
Rosa carolina	Rosaceae	nat. per. shrub	0	0	114	130	182	0.54	0.45	0.45
Rosa multiflora	Rosaceae	ex. peren. shrub	2	4	16	13	11	0.47	0.63	0.71

Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Rosa setigera</i>	Rosaceae	nat. per. shrub	0	1	59	58	16	0.45	0.35	0.36
<i>Rosa</i> spp.	Rosaceae	peren. shrub	32	131	17	23	11	0.10	0.08	0.09
<i>Rubus enslenii</i>	Rosaceae	nat. per. w-vine	0	0	140	71	187	1.03	0.90	1.18
<i>Rubus flagellaris</i>	Rosaceae	nat. per. w-vine	0	0	103	171	61	1.51	1.35	1.15
<i>Rubus occidentalis</i>	Rosaceae	nat. per. w-vine	0	0	11	14	12	1.26	1.59	2.31
<i>Rubus pensilvanicus</i>	Rosaceae	nat. per. w-vine	0	0	102	123	112	2.58	2.39	2.63
<i>Rubus</i> spp.	Rosaceae	nat. per. w-vine	87	222	21	40	45	0.41	0.48	0.43
<i>Rubus trivialis</i>	Rosaceae	nat. per. w-vine	0	0	2	0	0	0.11	0.00	0.00
<i>Rudbeckia fulgida</i>	Asteraceae	nat. per. forb	0	0	0	0	4	0.00	0.00	0.19
<i>Rudbeckia hirta</i>	Asteraceae	nat. per. forb	10	5	5	2	14	0.48	0.90	0.41
<i>Rudbeckia</i> <i>missouriensis</i>	Asteraceae	nat. per. forb	0	12	24	18	19	3.27	4.03	4.07
<i>Rudbeckia</i> spp.	Asteraceae	nat. per. forb	1	4	2	6	3	0.37	0.15	0.12
<i>Rudbeckia</i> <i>subtomentosa</i>	Asteraceae	nat. per. forb	1	0	1	0	1	0.27	0.00	0.28
<i>Rudbeckia triloba</i>	Asteraceae	nat. bien. forb	0	0	2	3	0	0.76	0.14	0.00
<i>Ruellia humilis</i>	Acanthaceae	nat. per. forb	0	6	9	14	17	0.63	0.46	0.49
<i>Ruellia pedunculata</i>	Acanthaceae	nat. per. forb	0	44	94	116	116	0.28	0.32	0.27
<i>Ruellia</i> spp.	Acanthaceae	nat. per. forb	0	3	1	8	15	0.11	0.23	0.19
<i>Rumex acetosella</i>	Polygonaceae	ex. peren. forb	0	0	0	0	1	0.00	0.00	0.02
<i>Sabatia angularis</i>	Gentianaceae	nat. bien. forb	1	0	3	0	2	0.10	0.00	0.33
<i>Salvia lyrata</i>	Lamiaceae	nat. per. forb	1	0	6	8	18	0.46	1.01	0.74
<i>Sambucus canadensis</i>	Caprifoliaceae	nat. per. tree	0	0	0	1	2	0.00	0.24	1.10
<i>Sanguinaria canadensis</i>	Papaveraceae	nat. per. forb	0	0	5	1	10	0.49	0.01	0.39
<i>Sanicula canadensis</i>	Apiaceae	nat. bien. forb	30	56	113	106	51	0.73	0.67	0.77
<i>Sanicula gregaria</i>	Apiaceae	nat. per. forb	0	9	2	9	15	0.27	0.25	0.95
<i>Sanicula</i> spp.	Apiaceae	nat. forb	0	1	35	143	189	0.17	0.55	0.51
<i>Sassafras albidum</i>	Lauraceae	nat. per. tree	201	450	606	619	620	7.36	7.65	7.66
<i>Satureja arkansana</i>	Lamiaceae	nat. per. forb	0	1	9	6	8	1.21	0.66	1.17
<i>Schrankia uncinata</i>	Fabaceae	nat. per. legume	6	10	10	4	1	0.36	0.45	0.88
<i>Scirpus</i> spp.	Cyperaceae	nat. per. sedge	0	0	0	0	1	0.00	0.00	0.16
<i>Scleria</i> spp.	Cyperaceae	nat. per. sedge	0	0	15	51	61	0.56	0.66	0.30
<i>Scleria triglomerata</i>	Cyperaceae	nat. per. sedge	0	0	0	32	31	0.00	0.60	0.91
<i>Scutellaria bushii</i>	Lamiaceae	nat. bien. forb	2	4	2	4	5	0.48	0.30	0.19
<i>Scutellaria elliptica</i>	Lamiaceae	nat. bien. forb	0	7	27	3	10	0.24	0.27	0.20
<i>Scutellaria incana</i>	Lamiaceae	nat. per. forb	0	19	49	32	29	0.51	0.29	0.26
<i>Scutellaria nervosa</i>	Lamiaceae	nat. bien. forb	6	3	0	0	0	0.00	0.00	0.00
<i>Scutellaria ovata</i>	Lamiaceae	nat. per. forb	0	17	20	7	16	0.32	0.15	0.53
<i>Scutellaria parvula</i>	Lamiaceae	nat. per. forb	0	1	7	3	3	0.16	0.06	0.02
<i>Scutellaria</i> spp.	Lamiaceae	nat. per. forb	6	25	8	6	4	0.08	0.19	0.02
<i>Senecio aureus</i>	Asteraceae	nat. per. forb	2	3	0	0	2	0.00	0.00	0.11
<i>Senecio obovatus</i>	Asteraceae	nat. per. forb	0	0	3	6	6	0.25	0.58	0.30
<i>Senecio plattensis</i>	Asteraceae	nat. per. forb	1	0	1	0	0	0.23	0.00	0.00
<i>Senecio</i> spp.	Asteraceae	nat. per. forb	0	0	3	2	15	0.19	0.51	0.10
<i>Setaria</i> spp.	Poaceae	ex. ann. grass	0	0	0	0	1	0.00	0.00	0.06
<i>Setaria viridis</i>	Poaceae	ex. ann. grass	0	1	0	0	1	0.00	0.00	0.46
<i>Seymeria macrophylla</i>	Scrophulariaceae	nat. per. forb	0	1	0	0	0	0.00	0.00	0.00
<i>Silene stellata</i>	Caryophyllaceae	nat. per. forb	1	3	5	9	11	0.26	0.14	0.19
<i>Silene virginica</i>	Caryophyllaceae	nat. per. forb	0	0	1	7	7	0.19	0.28	0.21
<i>Silphium asteriscus</i>	Asteraceae	nat. per. forb	0	5	24	56	69	0.54	0.44	0.27
<i>Silphium integrifolium</i>	Asteraceae	nat. per. forb	0	0	3	2	13	0.33	1.01	0.37
<i>Silphium</i> spp.	Asteraceae	nat. per. forb	0	0	0	0	6	0.00	0.00	0.28
<i>Silphium</i> <i>terrebinthinaceum</i>	Asteraceae	nat. per. forb	0	18	24	22	21	2.20	2.24	2.74



Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Sisyrinchium campestre</i>	Iridaceae	nat. per. forb	0	0	0	1	1	0.00	0.04	0.02
<i>Smilacina racemosa</i>	Liliaceae	nat. per. forb	67	177	248	236	265	0.66	0.64	0.71
<i>Smilax bona-nox</i>	Liliaceae	nat. per. w-vine	17	102	137	149	144	2.22	2.16	2.05
<i>Smilax ecirrhata</i>	Liliaceae	nat. per. w-vine	0	0	0	0	1	0.00	0.00	0.23
<i>Smilax glauca</i>	Liliaceae	nat. per. w-vine	37	23	23	40	45	0.66	0.69	0.67
<i>Smilax herbacea</i>	Liliaceae	nat. per. w-vine	0	13	31	1	8	0.73	0.23	0.52
<i>Smilax pulverulenta</i>	Liliaceae	nat. per. w-vine	0	1	26	61	60	0.54	0.50	0.44
<i>Smilax rotundifolia</i>	Liliaceae	nat. per. w-vine	0	1	10	15	29	1.30	0.42	0.76
<i>Smilax</i> spp.	Liliaceae	nat. per. w-vine	3	2	11	42	32	0.11	0.31	0.07
<i>Smilax tamnoides</i>	Liliaceae	nat. per. w-vine	4	46	56	21	26	1.21	0.96	0.90
<i>Solanum americanum</i>	Solanaceae	nat. ann. forb	1	1	0	1	0	0.00	0.02	0.00
<i>Solanum carolinense</i>	Solanaceae	nat. per. forb	4	1	3	4	4	0.51	0.37	0.39
<i>Solanum</i> spp.	Solanaceae	nat. per. forb	1	0	0	6	0	0.00	0.23	0.00
<i>Solidago arguta</i>	Asteraceae	nat. per. forb	5	1	22	1	1	0.46	0.35	0.05
<i>Solidago flexicaulis</i>	Asteraceae	nat. per. forb	4	48	92	49	93	0.73	0.50	0.54
<i>Solidago hispida</i>	Asteraceae	nat. per. forb	11	50	155	145	126	0.58	0.59	0.46
<i>Solidago juncea</i>	Asteraceae	nat. per. forb	0	1	6	2	2	0.46	0.58	0.17
<i>Solidago nemoralis</i>	Asteraceae	nat. per. forb	0	0	0	3	20	0.00	0.30	0.28
<i>Solidago petiolaris</i>	Asteraceae	nat. per. forb	0	0	15	77	9	0.63	0.57	0.69
<i>Solidago radula</i>	Asteraceae	nat. per. forb	19	0	26	30	10	0.47	0.29	0.34
<i>Solidago</i> spp.	Asteraceae	nat. per. forb	54	269	222	76	62	0.71	0.42	0.35
<i>Solidago ulmifolia</i>	Asteraceae	nat. per. forb	0	0	9	206	248	0.52	0.81	0.77
<i>Sorghastrum nutans</i>	Poaceae	nat. per. grass	0	1	4	12	9	0.79	0.48	0.79
<i>Sorghum halepense</i>	Poaceae	ex. peren.grass	0	0	2	1	1	0.18	0.12	0.54
<i>Specularia perfoliata</i>	Campanulaceae	nat. ann. forb	0	0	0	0	1	0.00	0.00	0.01
<i>Sphenopholus obtusata</i>	Poaceae	nat. per. grass	0	0	0	0	1	0.00	0.00	0.07
<i>Sporobolus asper</i>	Poaceae	nat. per. grass	1	0	0	6	13	0.00	0.60	1.14
<i>Sporobolus</i> spp.	Poaceae	nat. per. grass	2	0	0	0	3	0.00	0.00	0.03
<i>Sporobolus vaginiflorus</i>	Poaceae	nat. ann. grass	0	0	0	3	2	0.00	0.03	0.27
<i>Staphylea trifolia</i>	Staphyleaceae	nat. per. tree	0	2	2	2	3	2.08	4.14	2.38
<i>Strophostyles</i>										
<i>leiosperma</i>	Fabaceae	nat. ann.legume	0	3	8	0	0	0.39	0.00	0.00
<i>Strophostyles umbellata</i>	Fabaceae	nat. per.legume	0	0	0	8	3	0.00	0.36	0.28
<i>Stylosanthes biflora</i>	Fabaceae	nat. per.legume	12	10	37	49	53	0.21	0.15	0.17
<i>Symphoricarpos</i>										
<i>orbiculatus</i>	Caprifoliaceae	nat. per. shrub	37	72	110	107	110	1.81	1.71	1.69
<i>Taenidia integerrima</i>	Apiaceae	nat. per. forb	0	4	9	10	13	0.49	0.43	0.36
<i>Tephrosia virginiana</i>	Fabaceae	nat. per.legume	62	67	102	100	104	1.51	1.71	1.47
<i>Thalictrum dioicum</i>	Ranunculaceae	nat. per. forb	0	0	1	1	3	0.15	0.30	0.40
<i>Thaspium barbinode</i>	Apiaceae	nat. per. forb	0	33	24	44	14	0.72	0.69	0.54
<i>Thaspium</i> spp.	Apiaceae	nat. per. forb	0	1	3	8	40	0.20	0.06	0.47
<i>Thaspium trifoliatum</i>	Apiaceae	nat. per. forb	8	62	56	56	32	0.63	0.49	0.46
<i>Thelypteris</i>										
<i>hexagonoptera</i>	Polypodiaceae	nat. per. fern	0	18	14	4	8	2.39	7.02	4.53
<i>Tradescantia longipes</i>	Commelinaceae	nat. per. forb	0	0	0	4	3	0.00	0.03	0.17
<i>Tragia cordata</i>	Euphorbiaceae	nat. per. vine	0	0	1	4	3	0.23	0.17	0.14
<i>Tridens flavus</i>	Poaceae	nat. per. grass	2	3	1	1	0	0.33	0.02	0.00
<i>Trifolium pratense</i>	Fabaceae	ex. bien.legume	0	0	0	0	1	0.00	0.00	0.21
<i>Trillium</i> spp.	Liliaceae	nat. per. forb	0	0	0	2	4	0.00	0.09	0.17
<i>Triosteum</i>										
<i>angustifolium</i>	Caprifoliaceae	nat. per. forb	4	0	0	1	2	0.00	0.02	0.30
<i>Triosteum aurantiacum</i>	Caprifoliaceae	nat. per. forb	0	2	0	1	1	0.00	0.42	0.02
<i>Triosteum</i> spp.	Caprifoliaceae	nat. per. forb	2	0	0	1	1	0.00	0.14	0.02
<i>Triphora trianthophora</i>	Orchidaceae	nat. per. forb	0	0	0	1	4	0.00	0.03	0.08

Species	Family	Type	Number of Plots					Avg. Rel. Abundance		
			'91	'92	'93	'94	'95	'93	'94	'95
<i>Ulmus alata</i>	Ulmaceae	nat. per. tree	8	49	93	59	92	1.36	1.06	0.85
<i>Ulmus americana</i>	Ulmaceae	nat. per. tree	2	74	31	45	49	1.26	1.47	1.35
<i>Ulmus rubra</i>	Ulmaceae	nat. per. tree	15	113	134	129	142	2.35	2.67	2.31
<i>Ulmus</i> spp.	Ulmaceae	nat. per. tree	6	3	14	70	44	0.59	0.69	0.28
<i>Uniola latifolia</i>	Poaceae	nat. per. grass	4	12	12	11	17	1.33	1.22	1.05
<i>Uvularia grandiflora</i>	Liliaceae	nat. per. forb	0	43	109	120	125	0.47	0.52	0.51
<i>Vaccinium arboreum</i>	Ericaceae	nat. per. shrub	0	0	87	107	72	3.04	3.29	2.25
<i>Vaccinium</i> spp.	Ericaceae	nat. per. shrub	192	369	125	14	14	8.17	1.22	0.24
<i>Vaccinium stamineum</i>	Ericaceae	nat. per. shrub	0	0	316	343	364	5.53	4.80	4.62
<i>Vaccinium vacillans</i>	Ericaceae	nat. per. shrub	0	0	357	422	432	6.10	5.79	6.47
<i>Verbena canadensis</i>	Verbenaceae	nat. per. forb	0	0	0	2	2	0.00	0.02	0.33
<i>Verbena simplex</i>	Verbenaceae	nat. per. forb	0	1	1	0	2	2.36	0.00	0.02
<i>Verbena</i> spp.	Verbenaceae	nat. per. forb	1	0	0	0	0	0.00	0.00	0.00
<i>Verbena urticifolia</i>	Verbenaceae	nat. per. forb	5	2	5	1	1	2.08	0.67	0.66
<i>Verbesina helianthoides</i>	Asteraceae	nat. per. forb	14	35	72	88	83	1.39	1.36	1.23
<i>Verbesina virginica</i>	Asteraceae	nat. per. forb	0	0	0	1	0	0.00	3.82	0.00
<i>Vernonia altissima</i>	Asteraceae	nat. per. forb	0	0	2	8	7	0.78	0.64	0.62
<i>Vernonia baldwini</i>	Asteraceae	nat. per. forb	6	32	90	112	74	0.72	0.60	0.70
<i>Vernonia crinita</i>	Asteraceae	nat. per. forb	2	7	17	20	14	0.51	0.53	0.53
<i>Vernonia</i> spp.	Asteraceae	nat. per. forb	0	4	4	8	0	0.28	0.33	0.00
<i>Veronicastrum virginicum</i>	Scrophulariaceae	nat. per. forb	1	1	2	3	4	0.23	0.16	0.11
<i>Viburnum rufidulum</i>	Caprifoliaceae	nat. per. tree	5	34	61	74	89	1.01	0.61	0.61
<i>Viburnum</i> spp.	Caprifoliaceae	nat. per. tree	0	0	6	0	1	0.96	0.00	0.59
<i>Vicia americana</i>	Fabaceae	nat. per. forb	0	0	0	0	1	0.00	0.00	0.21
<i>Vicia caroliniana</i>	Fabaceae	nat. per. legume	13	11	16	21	26	0.24	0.21	0.08
<i>Vicia</i> spp.	Fabaceae	peren. legume	0	0	0	3	2	0.00	0.18	0.04
<i>Viola pedata</i>	Violaceae	nat. per. forb	0	1	25	27	27	0.19	0.12	0.10
<i>Viola sagittata</i>	Violaceae	nat. per. forb	0	5	6	6	12	0.15	0.22	0.14
<i>Viola sororia</i>	Violaceae	nat. per. forb	0	2	140	157	192	0.41	0.47	0.56
<i>Viola</i> spp.	Violaceae	nat. per. forb	73	229	68	202	167	0.30	0.09	0.07
<i>Viola striata</i>	Violaceae	nat. per. forb	0	3	7	6	7	1.42	2.86	2.15
<i>Viola triloba</i>	Violaceae	nat. per. forb	0	18	232	169	248	0.33	0.20	0.25
<i>Viola viarum</i>	Violaceae	nat. per. forb	0	1	37	89	20	0.16	0.19	0.06
<i>Vitis aestivalis</i>	Vitaceae	nat. per. w-vine	187	480	348	574	600	2.85	3.74	3.41
<i>Vitis</i> spp.	Vitaceae	nat. per. w-vine	23	33	463	446	405	2.67	0.23	0.12
<i>Vitis vulpina</i>	Vitaceae	nat. per. w-vine	4	1	36	117	191	0.57	0.81	1.01
<i>Woodsia obtusa</i>	Polypodiaceae	nat. per. fem	0	0	1	0	1	0.23	0.00	0.02
<i>Zizia aptera</i>	Apiaceae	nat. per. forb	3	0	1	0	0	0.27	0.00	0.00
<i>Zizia aurea</i>	Apiaceae	nat. per. forb	0	3	0	0	1	0.00	0.00	1.30
<i>Zizia</i> spp.	Apiaceae	nat. per. forb	0	1	2	0	2	0.15	0.00	0.24
None	none	none	58	118	64	59	45	0.00	0.00	0.00
Forb	Unknown	unknown forb	66	150	55	161	300	0.30	0.17	0.09
Grass	Unknown	unknown grass	23	39	21	58	49	0.50	0.13	0.19
Legume	Fabaceae	unkn. legume	7	17	13	31	33	0.22	0.07	0.05
Woody	Unknown	peren. tree	5	33	27	121	85	0.61	0.09	0.13
Composite	Asteraceae	unknown forb	0	6	11	5	26	0.69	0.05	0.33
Fern	Polypodiaceae	fern	2	3	2	13	1	0.11	0.09	0.02
Mint	Lamiaceae	unknown forb	3	3	1	2	0	0.03	0.16	0.00
Unknown	Unknown	unknown	37	31	0	10	1	0.00	0.82	0.03
Unknown vine	Unknown	unknown vine	2	9	4	5	17	0.31	0.15	0.07