
A Floristic Survey of Benedict Prairie (Kenosha County, Wisconsin)

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Abstract. Benedict Prairie is a small railroad prairie that is owned and managed by the University of Wisconsin - Milwaukee Field Station. A floristic survey of the 2.5 ha site was conducted from 1988 to 1990. A total of 191 species, representing 51 families were identified, including *Asclepias purpurascens* and *Parthenium integrifolium*, which are protected in Wisconsin. This list was compared to two others compiled previously for the site. Compilation of all three lists brings the total number of species recorded from the site to 231, but reveals that a number of species appear to have been extirpated.

Introduction

Prairies perhaps have suffered the greatest degree of degradation of any plant community in Wisconsin. Prior to European settlement they are estimated to have covered over two million acres but by the time *The Vegetation of Wisconsin* was published, they had been reduced to no greater than several thousand acres, less than 1% of their original extent (Curtis 1959). Efforts have been increasing to save the high quality prairie remnants that still exist in the state. This study examines the species composition of one such remnant, a railroad prairie in southeast Wisconsin.

Benedict Prairie is a tract of virgin prairie of approximately 2.5 hectares in size, located on an abandoned railroad right-of-way in Kenosha County, Wisconsin. Although this prairie was initially surveyed during the University of Wisconsin-Madison Plant Ecology Lab (PEL) project (Umbanhowar 1993 and pers. comm.), it was not preserved until 1962, when Mrs. Robert "Marge" Reisinger pushed for its purchase by the Wisconsin Chapter of The Nature Conservancy (Iltis, undated manuscript). In 1963, responsibility for management of the tract was turned over to the University of Wisconsin-Milwaukee Field Station.

Like other railroad prairies in southern Wisconsin, the tract is long and narrow (approximately 30.5 m x 0.8 km) and agricultural fields run its length on both sides. A road borders its west side and the prairie grades into woodland at the east end. Despite its small size, it contains elements of wet prairie, mesic prairie, dry-mesic prairie and oak opening (Curtis 1959), and serves as a refuge for numerous prairie species.

The vegetation at the site has been surveyed twice prior to this study. It was surveyed initially as part of the project which culminated in the publication of the *Vegetation of Wisconsin* (Curtis 1959). Based upon locality information, it appears that Benedict Prairie is PEL site W26 (Umbanhowar, pers. comm.). The PEL list contains 64 species. The tract was surveyed at a later date by Iltis and Whitford (undated manuscript), who tallied 112 species of plants, representing nearly 40 families. However, neither of these efforts was intended to be a complete survey of the flora.

In 1988, we determined that a more comprehensive plant list for the site would provide a valuable baseline for future surveys, research and management.

Methods

We surveyed the site once each month from May to October in 1988, and again from June to August in 1989. Two additional surveys were made in May and July of 1990. During each survey we walked slowly through the site and collected representatives of all fertile plant

specimens. The collections provide material to aid in identification of difficult taxa and serve as vouchers, which were not made in previous surveys. A complete set of specimens has been deposited at the University of Wisconsin-Milwaukee Field Station herbarium. Duplicate specimens (if they were made) have been deposited at the herbarium at the University of Wisconsin-Madison (WIS). Specimens were identified using Preliminary Reports on the Flora of Wisconsin where they existed for appropriate families, Swink and Wilhelm (1979), and Voss (1972, 1985). Identifications were checked against material in the University of Wisconsin-Madison herbarium.

Woody vegetation in the prairie was cut in October 1989 and a prescribed burn was performed in early May 1990.

Results

A checklist of plants has been assembled based upon the collections made from 1988 to 1990 and the species lists of previous researchers (Table 1). The complete list contains 231 species in 54 families. We did not relocate all of the species listed either in the PEL data set or in the list compiled by Iltis and Whitford.

Our collection contains 191 species of vascular plants, representing 51 families. Of these, 145 (76%) are native. The families containing the most species are listed in Table 2. With each visit we encountered previously uncollected species, even into the third year of the survey (Table 3).

Notes and symbolism in Table 1 indicate the following:

Species in boldface are non-native.

E = Listed as endangered in Wisconsin.

T = Listed as threatened in Wisconsin.

C = Listed as a species of concern in Wisconsin.

X¹ = Species seen by one of the authors several years prior to the beginning of the study, but not relocated.

Dashes indicate that previous studies listed genus only.

Table 1. Composite species list for Benedict Prairie, containing 231 species in 54 families. X's indicate which species were noted in each data set.

Species	PEL Data	Ilitis and Whitford	Current
Aceraceae			
<i>Acer negundo</i>		X	X
Amaryllidaceae			
<i>Hypoxis hirsuta</i>	X	X	
Anacardiaceae			
<i>Rhus glabra</i>	X	X	
Apiaceae			
<i>Cicuta maculata</i>			X
<i>Cryptotaenia canadensis</i>			X
<i>Daucus carota</i>			X
<i>Eryngium yuccifolium</i>	X	X	X
<i>Heracleum maximum</i>		X	
<i>Sanicula gregaria</i>	X		
<i>Sanicula marilandica</i>			X
<i>Taenidia integerrima</i>	X	X	X
<i>Zizia aurea</i>		X	X
Apocynaceae			
<i>Apocynum androsaemifolium</i>		X	X
<i>Apocynum cannabinum</i>	X	X	X
Asclepiadaceae			
<i>Asclepias purpurascens</i> (E)	X		
<i>Asclepias sullivantii</i> (T)	X		
<i>Asclepias syriaca</i>	X	X	X
<i>Asclepias tuberosa</i>			X
<i>Asclepias verticillata</i>		X	
Asteraceae			
<i>Achillea millefolium</i>	X	X	X
<i>Ambrosia artemisiifloia</i>	X	X	X
<i>Ambrosia psilostachya</i>		X	
<i>Ambrosia trifida</i>			X
<i>Antennaria</i> sp.		X	

Species	PEL Data	Iltis and Whitford	Current
<i>Arctium minus</i>			X
<i>Aster ericoides</i>	X	X	X
<i>Aster laevis</i>	X	X	X
<i>Aster novae-angliae</i>		X	X
<i>Aster pilosus</i>			X
<i>Aster sagittifolius</i> var. <i>drummondii</i>		X	X
<i>Astragalus canadensis</i>	X		
<i>Bidens vulgata</i>			X
<i>Boltonia latisquama</i>			X
<i>Carduus nutans</i>			X
<i>Cirsium arvense</i>			X
<i>Cirsium discolor</i>	X	X	X
<i>Coreopsis palmata</i>		X	X
<i>Erigeron annuus</i>		X	X
<i>Helenium autumnale</i>			X
<i>Helianthus grosseserratus</i>		X	X
<i>Helianthus rigidus</i>		X	
<i>Helianthus strumosus</i>	X	X	
<i>Helianthus tuberosus</i>		X	
<i>Helipopsis helianthoides</i>		X	X
<i>Lactuca canadensis</i>		X	X
<i>Liatris aspera</i>	X	X	X
<i>Liatris spicata</i> (C)		X	X
<i>Parthenium integrifolium</i> (T)	X		X ¹
<i>Prenanthes racemosa</i>		X	
<i>Ratibida pinnata</i>	X	X	X
<i>Rudbeckia hirta</i>			X
<i>Silphium integrifolium</i>	X	X	X
<i>Silphium laciniatum</i>	X	X	X
<i>Silphium terebinthinaceum</i>	X	X	X
<i>Solidago altissima</i>		X	X
<i>Solidago gigantea</i>		X	X
<i>Solidago juncea</i>		X	
<i>Solidago missouriensis</i>	X	X	X
<i>Solidago nemoralis</i>		X	X
<i>Solidago riddellii</i>		X	

Species	PEL Data	Iltis and Whitford	Current
<i>Solidago rigida</i>	X	X	X
<i>Solidago speciosa</i>			X
<i>Sonchus asper</i>			X
<i>Tanacetum vulgare</i>			X
<i>Taraxacum officinale</i>			X
<i>Tragopogon major</i>			X
<i>Vernonia fasciculata</i>			X
Betulaceae			
<i>Corylus americana</i>		X	X
Boraginaceae			
<i>Lithospermum canescens</i>	X	X	X
Brassicaceae			
<i>Alliaria petiolata</i>			X
<i>Barbarea vulgaris</i>			X
<i>Brassica kaber</i>			X
<i>Lepidium campestre</i>			X
<i>Rorippa sylvestris</i>			X
<i>Thlaspi arvense</i>			X
Caprifoliaceae			
<i>Lonicera morrowi</i>			X
<i>Lonicera tatarica</i>			X
<i>Sambucus canadensis</i>			X
Caryophyllaceae			
<i>Arenaria lateriflora</i>		X	
<i>Dianthus armeria</i>			X
<i>Silene pratensis</i>			X
<i>Silene stellata</i> var. <i>scabrella</i>		X	
Chenopodiaceae			
<i>Chenopodium album</i>			X
Clusiaceae			
<i>Hypericum perforatum</i>			X
Commelinaceae			
<i>Tradescantia ohiensis</i>	X	X	X
Convolvulaceae			
<i>Convolvulus arvensis</i>			X
<i>Convolvulus sepium</i>		X	

Species	PEL Data	Iltis and Whitford	Current
Cornaceae			
<i>Cornus foemina</i>	X	X	X
Cyperaceae			
<i>Carex aquatilis</i>	-	-	X
<i>Carex bicknellii</i>	-	X	X
<i>Carex foena</i>	-	-	X
<i>Carex lanuginosa</i>	-	-	X
<i>Carex tetanica</i>	-	-	X
<i>Eleocharis erythropoda</i>			X
<i>Rhynchospora alba</i>			X
<i>Rhynchospora capitellata</i>			X
<i>Scirpus atrovirens</i>			X
<i>Scirpus pendulus</i>			X
Equisetaceae			
<i>Equisetum arvense</i>		X	X
<i>Equisetum laevigatum</i>		X	X
Euphorbiaceae			
<i>Euphorbia corollata</i>	X	X	X
Fabaceae			
<i>Amorpha canescens</i>	X	X	X
<i>Amphicarpaea bracteata</i>	X	X	
<i>Baptisia leucantha</i>	X	X	X
<i>Desmodium canadense</i>	X	X	
<i>Desmodium illinoense</i>			X
<i>Lathyrus venosus</i>	X	X	
<i>Lespedeza capitata</i>	X	X	X
<i>Medicago lupulina</i>			X
<i>Medicago sativa</i>			X
<i>Melilotus alba</i>			X
<i>Melilotus officinalis</i>			X
<i>Petalostemum candidum</i>			X
<i>Petalostemum pupureum</i>	X	X	X
<i>Trifolium pratense</i>			X
<i>Vicia americana</i>	X	X	X
Fagaceae			
<i>Quercus macrocarpa</i>	X	X	X

Species	PEL Data	Iltis and Whitford	Current
Gentianaceae			
<i>Gentiana andrewsii</i>		X	X
<i>Gentiana puberula</i>		X	
Geraniaceae			
<i>Geranium maculatum</i>		X	X
Grossulariaceae			
<i>Ribes rubrum</i>			X
Iridaceae			
<i>Iris</i> sp.			X
<i>Sisyrinchium albidum</i>		-	X
<i>Sisyrinchium campestre</i>	X	-	
Juncaceae			
<i>Juncus dudleyi</i>			X
Lamiaceae			
<i>Leonurus cardiaca</i>			X
<i>Lycopus americanus</i>			X
<i>Monarda fistulosa</i>	X	X	X
<i>Nepeta catarica</i>			X
<i>Physotegia virginiana</i>		X	
<i>Prunella vulgaris</i>			X
<i>Pycnanthemum virginianum</i>		X	X
<i>Stachys palustris</i>			X
Liliaceae			
<i>Allium canadense</i>	X	X	X
<i>Allium stellatum</i>			X
<i>Asparagus officinalis</i>			X
<i>Lilium michiganense</i>			X
<i>Polygonatum biflorum</i>			X
<i>Smilacina racemosa</i>			X
<i>Smilacina stellata</i>	X	X	X
Lobeliaceae			
<i>Lobelia cardinalis</i>			X
Malvaceae			
<i>Abutilon theophrastii</i>			X
Nyctaginaceae			
<i>Mirabilis nyctaginea</i>			X

Species	PEL Data	Iltis and Whitford	Current
Onagraceae			
<i>Circaea quadrisulcata</i>			X
<i>Oenothera biennis</i>			X
Oxalidaceae			
<i>Oxalis fontana</i>			X
Phrymaceae			
<i>Phryma leptostachya</i>			X
Poaceae			
<i>Agropyron repens</i>			X
<i>Agropyron trachycaulum</i>	X	X	
<i>Agrostis gigantea</i>			X
<i>Andropogon gerardii</i>	X	X	X
<i>Andropogon scoparius</i>	X	X	
<i>Bromus inermis</i>			X
<i>Bromus kalmii</i>	X		
<i>Calamagrostis canadensis</i>			X
<i>Dactylis glomerata</i>			X
<i>Elymus villosus</i>			X
<i>Elymus virginicus</i>			X
<i>Hierochloe odorata</i>			X
<i>Muhlenbergia racemosa</i>		X	
<i>Panicum linearifolium</i>		X	
<i>Panicum leibergii</i>		X	X
<i>Panicum oligosanthos</i>	X	X	
<i>Panicum virgatum</i>		X	X
<i>Phalaris arundinacea</i>			X
<i>Phleum pratense</i>			X
<i>Poa pratensis</i>		X	X
<i>Poa compressa</i>			X
<i>Setaria faberi</i>			X
<i>Setaria glauca</i>			X
<i>Sorghastrum nutans</i>		X	
<i>Spartina pectinata</i>	X	X	X
<i>Sporobolus heterolepis</i>	X	X	
<i>Stipa spartea</i>	X	X	X
<i>Zea mays</i>			X

Species	PEL Data	Ittis and Whitford	Current
Polemoniaceae			
<i>Phlox pilosa</i>	X	X	X
Polygalaceae			
<i>Polygala senega</i>		X	
Polygonaceae			
<i>Polygonum pensylvanicum</i>			X
<i>Rumex crispus</i>			X
Primulaceae			
<i>Dodacatheon meadii</i>		X	X
<i>Lysimachia ciliata</i>			X
<i>Lysimachia nummularia</i>			X
Ranunculaceae			
<i>Anemone cylindrica</i>	X	X	X
<i>Aquilegia canadensis</i>		X	
<i>Ranunculus abortivus</i>			X
<i>Ranunculus pensylvanicus</i>			X
<i>Thalictrum dasycarpum</i>	X	X	X
<i>Thalictrum revolutum</i>			X
Rhamnaceae			
<i>Ceanothus americanus</i>		X	
<i>Rhamnus cathartica</i>			X
Rosaceae			
<i>Agrimonia gryosepala</i>			X
<i>Crataegus</i> sp.		X	X
<i>Fragaria virginiana</i>	X	X	X
<i>Geum canadense</i>		-	X
<i>Geum laciniatum</i>		-	X
<i>Potentilla arguta</i>	X	X	X
<i>Potentilla canadensis</i>	X		
<i>Potentilla norvegica</i>			X
<i>Potentilla simplex</i>		X	X
<i>Prunus americana</i>	X		X
<i>Prunus serotina</i>			X
<i>Prunus virginiana</i>			X
<i>Pyrus ioensis</i>		X	
<i>Rosa carolina</i>	-	-	X
<i>Rosa cinnamomea</i>	-	-	X

Species	PEL Data	Ittis and Whitford	Current
<i>Rubus allegheniensis</i>			X
<i>Rubus occidentalis</i>			X
Rubiaceae			
<i>Galium aparine</i>			X
<i>Galium boreale</i>		X	
<i>Galium concinnum</i>		X	X
<i>Galium obtusum</i>		X	X
Salicaceae			
<i>Populus tremuloides</i>			X
<i>Salix interior</i>			X
<i>Salix humilis</i> var. <i>microphylla</i>	X	X	X
<i>Salix humilis</i> var. <i>humilis</i>	X	X	X
<i>Salix nigra</i>			X
<i>Salix petiolaris</i>			X
Santalaceae			
<i>Comandra umbellata</i>	X	X	X
Saxifragaceae			
<i>Heuchera richardsonii</i>		X	X
Scrophulariaceae			
<i>Castilleja</i> sp.			X
<i>Verbascum thapsus</i>			X
<i>Veronicastrum virginicum</i>	X	X	X
Smilacaceae			
<i>Smilax herbacea</i>	X	X	X
Solanaceae			
<i>Physalis heterophylla</i>	X	X	
<i>Physalis virginiana</i>	X	X	X
<i>Solanum americanum</i>			X
<i>Solanum dulcamara</i>			X
Typhaceae			
<i>Typha latifolia</i>			X
Verbenaceae			
<i>Verbena hastata</i>			X
Violaceae			
<i>Viola affinis</i>	-	-	X
<i>Viola pedatifida</i>		X	X
Vitaceae			
<i>Vitis riparia</i>		X	X

Table 2. The predominant vascular plant families based on number of species present. (Compiled from the authors' data only.)

Family	No. of Species
Asteraceae	39
Poaceae	20
Rosaceae	15
Fabaceae	12
Cyperaceae	10
Liliaceae	7
Apiaceae	7
Lamiaceae	7
Brassicaceae	6
Ranunculaceae	5
Salicaceae	5

Table 3. Number of taxa added to the checklist during each visit.

Visit	No. of Taxa
May 20, 1988	44
June 23, 1988	53
July 20, 1988	34
August 28, 1988	24
October 12, 1988	7
June 29, 1988	5
July 20, 1989	6
August 16, 1989	7
May 18, 1990	1
July 12, 1990 (after burning)	11

Discussion

This survey resulted in the largest number of plant species recorded in Benedict Prairie to date. It is likely that our repeated visits and vouchering specimens account for most of this increase. For example, collection of vouchers for identification in the lab increased our list of species in the genus *Carex* from the single species listed by Iltis and Whitford to five species.

The addition of more taxa at each visit, especially in years two and three of the study can be explained by at least two phenomena. Drought during the summer of 1988 apparently prevented a number of species, such as *Liatris spicata*, *Coreopsis palmata*, *Geum canadense* and *Heuchera richardsonii* from blooming until 1989. Subsequently, removal of large clones of *Prunus americana* and other shrubs in 1989 followed by a burn in 1990, stimulated the growth of species such as *Asclepias purpurascens*, *Baptisia leucantha*, *Circaea quadrisulcata* and *Cryptotaenia canadensis*, which had been suppressed under the shrubs, and allowed us to locate inconspicuous species such as *Phryma leptostachya*.

A comparison of the species list and most common families (Tables 1 and 2) with tables of common species for Wisconsin prairie communities (Curtis 1959) places Benedict Prairie in the mesic to wet-mesic prairie community. However, the prairie is very heterogeneous despite its small size, partially as a result of the disturbance caused in building the railroad bed. Therefore, some patches of the prairie would individually be classified as mesic, or wet-mesic, with some portions even on the dry-mesic side. Largely because of the heterogeneity of the site, the species diversity is high.

Several species known from the property are of particular interest. Four of the species recorded are rare in Wisconsin: *Asclepias purpurascens* is listed as endangered in Wisconsin, *Parthenium integrifolium* and *Asclepias sullivantii* are threatened, and *Liatris spicata* is a species of concern (a state watch list that does not afford legal protection).

Inferences based upon comparison of the species lists from each study must be made with caution. For example, our list contains more non-native species than that of Iltis and Whitford. This suggests either

that they were focusing mainly on native species as they compiled their checklist, or that a long period with little management allowed the encroachment of weedy European species. The PEL data set purposely ignored non-native species. Another issue that arises in comparing the lists is that of nomenclature. In a number of instances the earlier lists contain species that might be easily confused in the field with those on our list. We have compiled a list that includes all species mentioned, because unavailability of vouchers from the previous studies makes it impossible for us to say in which cases we were seeing the same species and in which we were not.

Keeping in mind this caution, comparison of our list to earlier ones shows the apparent loss of a number of species, notably the protected species *Asclepias sullivantii* and *Parthenium integrifolium* (the latter seen by Kuchenreuther in 1985, but not relocated during our study, and therefore, assumed to be extirpated from the site). Other missing species include: *Andropogon scoparius*, *Ceanothus americanus*, *Galium boreale*, *Hypoxis hirsuta*, *Lathyrus venosus*, *Prenanthes racemosa* and *Sporobolus heterolepis*, as well as several species of *Helianthus* and *Panicum*. This pattern of species loss is expected in small habitat fragments according to the predictions of island biogeographic theory, where the number of species the habitat supports will relax to a lower equilibrium number as habitat size shrinks (MacArthur and Wilson 1967). Leach (1990) observed a similar loss of species from other remnant Wisconsin prairies in the time since the publication of Curtis (1959). In his study, the plants most frequently lost were legumes and plants of short stature, while here even large plants that are ordinarily thought to be quite persistent (e.g., *Andropogon scoparius* and *Sporobolus heterolepis*) were not relocated. This phenomenon has troubling implications for the maintenance of diversity in small preserves over time.

Acknowledgments

The authors wish to thank the UW-Madison Herbarium for the use of its collections and reference materials, Charles Umbanhowar for access to the PEL data set, and James Reinartz, UW-Milwaukee Field Station Manager, for his advice and help during this study.

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