ERIGENIA

Number 26
Spring 2013

Journal of the
Illinois Native Plant Society

ERIGENIA

Number 26, Spring 2013

The Illinois Native Plant Society Journal

The Illinois Native Plant Society is dedicated to the preservation, conservation, and study of the native plants and vegetation of Illinois.

MEMBERSHIP

Yearly membership includes a subscription to *Erigenia* and the quarterly newsletter, *Harbinger*. For more information, visit our website at www.ill-inps@org or write to:

Illinois Native Plant Society
Forest Glen Preserve
20301 E. 900 North Road
Westville, IL 61883
illinoisplants@gmail.com

ERIGENIA is named for *Erigenia bulbosa* (Michx.) Nutt. (harbinger of spring), one of our earliest blooming woodland plants. The first issue was published in August, 1982.

(ISSN 8755-2000)

COVER ILLUSTRATION: Drawing of showy lady slipper orchid by Kathleen Garness. *Cypripedium reginae* might be our poster child for wetland conservation: even though it can live in a variety of acidic or alkaline habitats, it has not withstood the challenge of habitat change and statewide loss of wetlands. Beautiful and rare, threatened by deer and poaching, there are only a few currently documented populations in our state. Long-lived, colonies once numbered in the hundreds if not thousands. Now, individual populations are down to just a few plants each.

LETTER FROM THE EDITOR:

Greetings fellow plant enthusiasts,

It is with some regret that I am resigning as editor of *Erigenia*. I took the position for the selfish reason of wanting to increase my botanical knowledge base. I am a zoologist by training and wanted to learn more about the plants of Illinois. And I have indeed learned. I have learned about special places, special species, inventory techniques, and special people past and present. *Erigenia* has an important place in the documentation of the flora of Illinois. As for me, I am now on the other end of the research spectrum, submitting my own papers as I work on my Ph.D. My topic is invertebrate diversity in an agricultural landscape. I would like to thank all our botanists (both paid and unpaid) for your work in preserving the native plants of Illinois. I would also like to thank the many members of the Illinois Native Plant Society for your help and support.

Tracy Evans, Editor

ERIGENIA

NUMBER 26, SPRING 2013

TABLE OF CONTENTS

About Our Authors 1

Features

Botany as Advocacy: a History of the Floristic Surveys of the Waukegan Moorlands
Kathleen M. Garness 2

Searching for Sedges in Southern Illinois: Updating the Natural Heritage Database Records for *Carex nigromarginata*
Christopher David Benda 7

The General Land Office Surveyors and Their Work
Paul D. Kilburn 12

Research Papers

Carex of the Zion Beach-ridge Plain
Linda W. Curtis 15

Vascular Floral of a Glacial Drift Hill Prairie of Anthropogenic Origin, Macoupin County, Illinois
William E. McClain and John E. Ebinger 26

Continuing Floristic and Quantitative Evaluations of a Prairie Project Started in 1974 in Northern Ford County, Illinois
Don Gardner 33

Fire Maintained Barren Communities: Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois
William E. McClain and John E. Ebinger 46

Notable Records of Illinois Vascular Plants
Gordon C. Tucker, Loy R. Phillippe, and John E. Ebinger 55

Memoria

Carl E. Darigo 60
Stephen L. Timme 61

About Our Authors

Christopher David Benda completed his M.S. in Biology at the University of Illinois - Urbana/ Champaign and received his B.S. in Biology at Winona State University in Minnesota. He is currently Natural Areas Ecologist for the Illinois Natural Areas Inventory and Adjunct Faculty at Southern Illinois University where he teaches the Flora of Southern Illinois. He is also President of the Southern Chapter of the Illinois Native Plant Society.

Linda Curtis has a Masters in Botany from University of Wisconsin-Milwaukee. She is the author of Aquatic Plants of NE Illinois, and Woodland Carex of the Upper Midwest. Two more works are in progress: Bog-Fen Carex of the Upper Midwest, and Dunesland Carex of Lake Michigan. Linda continues sedge research in Florida, recently finishing Carex of Three Sisters Spring in Crystal River, Florida, and Carex of the Lower Suwannee River.

John E. Ebinger is emeritus professor of botany at Eastern Illinois University. His research focuses on the structure and composition of forest, glade and sand prairie communities in Illinois as well as the tropical genus Acacia.

Don Gardner is a retired dentist having received degrees of B.S. and D.D.S. from the University of Illinois. He has had long-term interests in agriculture and prairie in central Illinois with previous articles published in Erigenia and elsewhere concerning his efforts with prairie reconstruction. He has worked with students and the general public to increase understanding and appreciation of tallgrass prairie.

Kathleen Garness earned a Masters in Religious Education from Loyola University and a B. A. from DePaul University. Her artwork has been featured in the Common Plant Family Guides published online by the Field Museum and in many other publications. She is a freelance scientific and watercolor illustrator focusing on native flora, especially orchids, of Illinois.

Paul Kilburn retired as a professor from Principia College, Elsah, is currently President of the Jefferson County Nature association in Colorado. His major interest is conservation and preserving high plains grasslands.

William McClain is an adjunct research associate in botany at the Illinois State Museum in Springfield Illinois. His interests include forest and prairie ecology, exotic species, and rare plants.

Loy Phillippe is a collection manager for the vascular plants and fungi at the Illinois Natural History Survey. His primary duties include herbarium computerization, specimen collection and preparation and the daily operations of the herbarium. Loy earned a B.S. and M.S. in botany from Eastern Illinois University and a Ph.D. in plant taxonomy from the University of Tennessee.

Gordon Tucker is a professor in Biological Sciences at Eastern Illinois University. He teaches courses in plant taxonomy, dendrology, wetland plants, and ethnobotany. His research interests include sedges of North America, China, and South America.

Erigenia, Number 26, Spring 2013, pp 2–6

Botany as Advocacy: A History of the Floristic Surveys of the Waukegan Moorlands

Kathleen M. Garness

The Early Botanists

Looking at the natural landscape of Illinois Beach State Park and adjacent still-pristine pockets, it's hard to imagine that quiet battles once raged over preserving the landscape. Thankfully, the latter years of the 19th and early years of the 20th centuries produced its share of skilled botanists and advocates. One of the most notable ones in the Chicago region was a physician named Herman Silas Pepoon (1860–1941). The dark-haired, middle-aged Pepoon was a charismatic figure, with a great depth of botanical knowledge and passionate concern for the prairie and woodland flora rapidly being lost to development. Pepoon was also an important scientific influence in the Chicago area, authoring two science texts for Chicago high school students, and later the influential *Flora of the Chicago Region*.

Frank Caleb Gates (1887–1955) often went on field trips with his Lake View High School botany class led by Dr. Pepoon. Gates was used to being out in the field in all weather, becoming familiar with the flora and fauna of the Chicago region. His jaunts included visits to the Waukegan Moorlands, a 4000 acre natural area that extended north from Waukegan Harbor to what is now Chiwaukee Prairie in Wisconsin. After high school graduation in 1906, Gates attended the University of Illinois and would eventually study under Henry Allan Gleason (1882–1975). Gleason and other botanists at the time were aflame with the new science of ecology, often spending weeks in the field collecting specimens and making careful observations of plant communities and their associated flora.

Gates was familiar with the area when he began his college studies of the Waukegan Moorlands. He spent two and a half years of monthly field visits (including two Christmas Bird Counts) accompanied by friends and fellow naturalists. During 1908–1910, Gates studied and collected plants, which were carefully pressed and dried for the herbarium at Champaign. Along the way he discovered rare sedges and several species of orchids, some now extirpated.

From birding notes published through Christmas Bird Counts of the newly established Illinois Audubon Society (Chapman 1909), one can read between the lines and hear the enthusiasm, even a bit of competitiveness, about who made the best wildlife sightings! It makes one feel some camaraderie with them, and enhances our appreciation of this early research, does it not? It is easy to imagine him and the occasional companion covering miles of muck, marsh, and sand in all weather, negotiating quagmires of the Dead River, making notes during breaks, and carrying heavy specimen collection cases. All without benefit of GPS and well before our high-tech footgear and hydration systems! The Model T Ford had only become available in 1908, so it was more likely he would have been carrying his gear for miles to and from the train on foot. In fact, a high proportion of botanical finds in those days were near train stations.

The monograph Gates produced from his plant community research cites each of his trips and lists his companions, which today reads like a botanical Who's Who: Arthur G. Vestal, U of I professor of botany (after whom one of Cook County's first natural area restoration sites, Vestal Grove, would later be named); Levi Umbach, biology chair, North Central College (who acquired a herbarium of over 50,000 specimens in his lifetime, now housed at the University of Wisconsin, Madison); Michigan State botany professor N. L. Partridge; the aforementioned Herman Pepoon; and Henry Gleason, who would go on to teach at the University of Michigan, become director of the New York Botanical Garden and co-author one of our most influential floras, the *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*.

In 1912, Gates published his B.A. monograph on plants of the Moorlands in the Bulletin of the Illinois State Laboratory of Natural History, Urbana IL. At the time, Stephen Forbes was serving as the chief of the Illinois Natural History Survey, predecessor to the Illinois Natural History Survey/Prairie Research Insti-

102 Lathrop, Forest Park, IL USA 60130-1010.

tute. Gates' thesis documents 454 species, including 31 species currently state-listed as threatened or endangered, collected over the space of three years and twenty-nine field study visits over four field seasons (Gates 1912).

Early ecology focused on the floristic associations within the plant communities and how plant communities changed over time. University of Chicago professor Henry Chandler Cowles (1869–1939) made it his life's work. Cowles was inspired by Danish ecologist Eugen Warming and even taught himself Danish to read Warming's manuscripts in the original. Cowles' early studies of the flora of the Indiana Dunes still form a solid foundation for much of what we know of this area's ecology, including the Waukegan Moorlands, although much more has been learned in recent years. While Cowles closely studied the ecology of the southern tip of Lake Michigan, he was also familiar with the flora of the entire Great Lakes region. Cowles documented the process of succession from dune species to woodland, easily seen in the sand dunes of the Moorlands. Following Gates, the next documented account of Waukegan Moorlands flora is by Jesse Lowe Smith (1869–1934), noted naturalist and superintendent of Highland Park schools and good friend to landscape architect and Moorlands advocate Jens Jensen.

A number of species have not been documented from the Moorlands since those years: notably, the state-endangered Speckled Alder (*Alnus incana*), boreal relict Tamarack (*Larix laricina*), and Snakemouth Orchid (*Pogonia ophioglossoides*). He found pogonia "yet abundant in the low grassy shallows of the Flats" (Halsey 1912). Almost extinct is the "tall Purple-fringed Orchis (*Platanthera psycodes*) which in summer holds up crowded spikes of handsome, fragrant purple flowers." He concludes by saying "until the practice of cutting over portions of the Flats for harvesting hay began, there were fringed gentian "pastures" acres in extent" (Halsey 1912).

One of the reasons that so many of these rare, moisture loving plants could survive in the sandy Moorlands was the unusual hydrology that drained Wisconsin watersheds through Dead River and Bull Creek across the different kinds of soils, including clay, that underlay the ridge and swale topography throughout the area. So it is not unheard of to find the moisture-loving Ladies' Tresses Orchid (*Spiranthes cerrnua*) popping up along the xeric dune trails even today in the company of Waukegan Juniper (*Juniperus horizontalis*) and Sand Reed (*Calamovilfa longifolia*). Another species Smith recorded is the now state-endangered Russet Buffaloberry (*Shepherdia canadensis*), not noted by either Gates or Pepoon. Although naturalists sighted a few stems of *Platanthera psycodes* in the early 1990s, the plants noted above have not documented on the Moorlands since 1927 (Appendix).

Gates described the boreal forest remnants of American Larch (*Larix laricina*), White Pine (*Pinus strobus*), White Birch (*Betula papyrifera*), mixed savannas and forests of boreal Black Ash (*Fraxinus nigra*), and successional stands of White, Swamp White, and Bur Oaks (*Quercus alba*, *Q. bicolor*, and *Q. macrocarpa*). Eastward, along the ridges between the swales and wet prairies just inland of the dunes there were stands of Black Oak (*Quercus velutina*), great diversity of poplars and birches, and ten species of willows. The diversity must have delighted him: he documented twelve species of asters, seven milkweeds, fifteen carex, twenty non-carex sedges, seven different rushes, eight polygonums, ten species of orchids, and four different gerardia. Building on this early research, 796 species have been documented by botanists over the last 100 years (although 70 of those have not been recently confirmed) within the Moorlands and its adjacent ridgelines.

FLORAL ZONES

Eight distinct floral zones are described by Gate's teacher Herman Pepoon (later broken down into fourteen specific communities) in his essay about the Moorlands (Pepoon, 1927):

1) Lake dunes and sandy knolls, with Dune Marram Grass (*Ammophila brevigulata*), Sand Reed (*Calamovilfa longifolia*), Whorled and Green Milkweeds (*Asclepias verticillata* and *A. viridiflora*), Bearberry (*Arctostaphylos uva-ursi*), Waukegan Juniper (*Juniperus horizontalis*), sandsedges, Purple Prairie Clover (*Petalostemum purpureum*), Silverweed Cinquefoil (*Argentina anserina*), Carolina Rose (*Rosa carolina*), Flowering Spurge (*Euphorbia corollata*), and even the occasional Ladies' Tresses Orchid (*Spiranthes cernua*) in depressions nearby. The beach proper is home to Winged Pigweed (*Cycloloma atriplicifolium*), Rough Cocklebur (*Xanthium strumarium*), and due to the rarity of the habitat available, several state-listed plants as well as the federally-endangered Piping Plover and Karner Blue Butterfly.
2) Dry ridges, with puccoons (*Lithospermum sp.*), Orange butterfly milkweed (*Asclepias tuberosa*), and rare green milkweeds (*A. viridiflora*, *A. amplexicaulis*), Prickly Pear Cactus (*Opuntia humifusa*), Showy Goldenrod (*Solidago speciosa*), all under a smattering of black oaks and Balm of Gilead trees;
3) Low moist ridges, with a mixture of rare flora, notably the Showy, Yellow, and Prairie White

Lady's Slippers (*Cypripedium reginae*, *C. parviflorum*, *C. candidum*), Scentbottle and Northern Green Orchids (*Platanthera dilatata*, and *P. hyperborea*), mostly extirpated;

4) The transition zone between the black oak ridges and the marshy sedge meadows, often exemplifying mesic prairie at its best, with rushes, orchids, lilies, marsh ferns, gentians, horsetails (*Equisetum sp.*), Shooting Stars (*Dodecatheon meadia*), Golden Alexanders (*Zizia aurea*), and a variety of blazing stars (*Liatris* sp.);
5) The permanent marshes, rich in sedges, cattails, acorus, polygonatums, water lilies, *Sagittaria*, Bog Buckbean (*Menyanthes trifoliata*), and other hydrophilic species;
6) The deep waters of Dead River, Dead Lake, and other open water areas;
7) The Glenwood basal strip;
8) The upper elevations of the Glenwood beach proper, which consist of an entirely different flora, much like the moist woodland habitats further west, with Paperbark Birch (*Betula papyrifera*), *Hepatica nobilis*, Wild Ginger (*Asarum canadense*), Spotted Touch-me-not (*Impatiens capensis* and *I. pallida*), Wild Onions (*Allium canadense* and *A. tricoccum*), Limber Honeysuckle (*Lonicera dioica*), the rare Sandberg's Birch (*Betula* x *sandbergii*), and several species of willows. A seep in that general area, discovered by the Illinois Natural Areas Inventory in 1976, added Great-flowered Trillium (*Trillium grandiflorum*), Inland Shadblow (*Amelanchier laevis*), Skunk Cabbage (*Symplocarpus foetidus*), Witchhazel (*Hamamelis virginiana*), Butternut (*Juglans cinerea*), Canada Mayflower (*Maianthemum canadense*), Dwarf Raspberry (*Rubus pubescens*), Interrupted Fern (*Osmunda claytoniana*), Ostrich Fern (*Matteuchia struthiopteris*), Roundleaf Goldenrod (*Solidago patula*), Black Ash (*Fraxinus nigra*), basswood (*Tilia americana*), and Maidenhair Fern (*Adiantum pedatum*). Sugar Maple (*Acer saccharum*) is also typical of that area. The adjoining Lake County Forest Preserve site, Spring Bluff, is also beautifully characteristic of this habitat.

WHY THE DECLINES?

Gates, Pepoon, and Smith expressed dismay about the declines of the rare plants and their concern about the loss of the area to development, sentiments biologists continue to echo today. Pepoon noted seeing flower collectors in the Calumet region take arms full of the Showy Pink Lady's Slipper (*Cypripedium reginae*) each season (Pepoon 1927). Today there are only a few very small populations in the entire state, well-guarded from deer and poachers by swampy areas full of Poison Sumac. Historically, Illinois was home to almost 50 species of native orchids, ten of those documented in the Moorlands; but one fourth of those orchid species are now extirpated statewide. Of those that remain, many of their populations have greatly decreased in size because of habitat fragmentation, poaching, and incursion by invasive species.

Many historical factors likely come into play to explain declines of native plant populations in the Waukegan area. When the first European settlers arrived in the early 1800s, they found a vast expanse of virgin ridge and swale topography crowned with black oak savanna, pockets of moist sand prairie, marsh, and what is now the globally rare coastal panne system. To the west, along the Glenwood Ridge and beyond, were plenty of woods to be explored and logged for housing and industry. Several treaties between the U.S. government and tribal nations had pushed the First Peoples westward onto reservations, clearing the land for settlement, industry, and agriculture. The region was now a midway point between two growing metropolises, Milwaukee and Chicago.

The settlers' lens at this time was strictly utilitarian. The land and all its resources were there to serve them, with little or no regard for its pristine beauty, their impacts on it, or even for the well-being of future generations. The native flora of the area was of little interest, except as forage for their cattle or as potential medicinal herbs. It would take an emerging generation of dedicated botanists to show the world the endangered natural wonders and be prescient enough to have the land set aside for future generations to enjoy.

Every year more of the natural landscape was lost to development: Chicago, incorporated in 1837, rapidly expanded its borders, taking quick advantage of the new Illinois/Michigan Canal (1848) connecting the Great Lakes to the Mississippi River and from there to the Gulf of Mexico and beyond. Industry magnates built ports, speculated on inexpensive land, and slowly ate away at the few remaining miles of species-rich lakeshore left in the state, all in the name of 'progress'. Establishment of the Chicago/Milwaukee Railway (now Metra line) in 1851 would eventually connect the cities of Waukegan and later Zion, to Chicago. Nurseryman Robert Douglas used a good portion of the dunes for a pines plantation. Ironically, he became one of the Moorlands' greatest advocates as he saw more and more of the unique flora being destroyed.

Continued expansion of industry and establishment of regional military bases created a business and housing boom in Waukegan in the mid- to late 1800s. In the early 1890s, Camp Logan rifle range

was established in the north area of what is now Illinois Beach State Park. Waukegan had also become the busiest harbor in the entire Great Lakes. Asbestos manufacturer Johns Manville and a regional electricity supply company joined existing breweries, barbed wire manufacturers, sugar refineries, meatpacking, and dairy companies near the lakefront. Further south, Chicago and its northern suburbs had houses built almost up to the beach, and used debris from the Great Fire of 1871 to claim more land from the lake.

Another factor impacting populations of native species is that of the 21 aggressive, non-native species documented by area ecologists. Post-settlement fire suppression, along with conversion of land to commercial, industrial and residential uses, facilitated the spread of invasive species and caused concern for this important ecosystem. We will certainly need further study of this area to understand all the factors behind unexplained loss of our local flora. But there was one more factor no one then could predict: over-abundant deer.

Deer populations in Illinois had diminished nearly to extirpation by 1900, so new laws were passed in the 1920s controlling hunting. Wolves, mountain lions, and other large predators had been eliminated in the 1800s, so deer numbers rebounded and then exploded by the 1970s. When Pepoon and Gates were doing their surveys a hundred years ago, the Showy Pink, Prairie White and both Large and Small Yellow Lady's Slipper Orchids were not exactly common, but were frequent enough in occurrence in the Waukegan Moorlands to be recorded. However, by the time of the first Illinois Natural Areas Survey in 1976, not a single one was documented. Deer seem to favor members of the orchid and lily families, and have been documented as a factor in the decline of these now-rare species (Gregg 2004, Miller et al. 1992)

ADVOCACY

The aforementioned Douglas, Smith, Jensen and other botanists such as the Rev. Ellsworth J. Hill (1833–1917), all outspoken about the area's botanical importance, had become concerned for the future of the rare habitats of the Waukegan Moorlands as early as 1888, and many started to enlist support for its preservation.

The Illinois Dunesland Preservation Society, founded in 1944, was one of the first organized groups to lobby for saving the few remaining miles of intact shoreline and its many natural features. The first president of the Dunesland organization was Dean Howard Ganster, who, as a member of the Waukegan Park Board, had advocated for the area since 1914. But it would be another three decades (1948) before funding was found for land acquisition. Noted botanists such as Dr. Margery Carlson (Northwestern University) and Dr. Julian Steyermark (Field Museum of Natural History) would later join their ranks. When efforts to have the land purchased as a public park by the town of Waukegan failed, the Illinois Department of Conservation purchased the first parcels (of what is now Illinois Beach State Park), with more acreage added as sites and funds became available. Finally, on September 10, 1964 a portion of the South Unit of Illinois Beach State Park was dedicated as the state's first Nature Preserve.

Botanist Dr. Elizabeth T. Lunn, chair of the Biology Department at Lake Forest College, was one of the Waukegan Moorlands most vocal advocates, assuming presidency of the Society in 1968, and later authoring the well-known *Plants of the Illinois Dunesland* (1982). Dr. Lunn graciously credits Jannette Aiken Black and Dr. Marjorie Carlson for their efforts in formal state dedication of the site.

RECENT INITIATIVES

But advocacy also needs science to support it, and science needs baselines and well-organized, ongoing data collection. Several seasons of fieldwork by the Illinois Natural Areas Inventory (1976 and 2012) and at Spring Bluff Nature Preserve (in 1976, 1997 and 2012) rediscovered 295 of the original 454 species listed by Gates, confirming continued broad species diversity while also recording a number of new migrant and potentially invasive species. Park naturalists maintained a running list of the more recognizable flora, arranged seasonally by bloom, but it had not been updated in some time. The INAI surveys helped accomplish this. The area is now also monitored by volunteers who track bird, butterfly, and dragonfly migrations, and other monitoring initiatives coordinated by Audubon Chicago Region.

More recently, as the state has scrambled for funding to meet growing budget obligations, the Illinois Department of Natural Resources (IDNR) had to start trimming Park staff in addition to its valued naturalists. Park advocates were dismayed, because education and outreach are such a valuable part of the naturalists' job. Who would take up the slack? In addition, after the passing of Dr. Lunn, the Dunesland Society primarily has focused on asbestos abatement issues at the beach, not native plant conservation per se. Fortunately, since the late 1980s, an independent, dedicated volunteer stewardship group has developed that works with the IDNR heritage biologist doing habitat restoration at the site. The group works primarily in the more highly biodiverse nature preserve areas, clearing non-native invasive species, taking up the banner of Dr. Lunn's

and the early botanists' dream of saving a unique habitat for many succeeding generations. We are hopeful, also, that renewed funding will restore naturalist positions in coming years.

The Illinois Department of Natural Resources is charged with maintaining the largest single parcel of the coastal plain, Illinois Beach State Park, and maintains a rigorous regimen of management, including essential prescribed burns. Large-scale habitat restoration programs work to control high-risk herbaceous and woody invasive species over the entire site, implement a regular prescribed fire regimen, and improve surface water flow. All these efforts help increase native biodiversity and protect populations of listed plant and animal species. In addition, large-scale erosion control projects to protect the park's buildings and natural resources are in the planning stages with other agencies (ICMP Issue Paper 2011).

Addressing the need for more information about the health of our natural areas, the Chicago Botanic Garden formed an initiative in 2001 called Plants of Concern, a regional rare plant monitoring program. It uses a systematic scientific protocol designed to assist land managers with data collected about populations of rare and listed species and the threats pertaining to them.

The botanical story of the Waukegan Moorlands is only one of many in the state of Illinois. Understanding a bit of the human influence behind the preservation of these and other areas is essential in appreciating the work and continued advocacy that is required to maintain nature's legacy to us. We stand on the shoulders of giants. But future generations will need to be taught the importance of these areas and their native species, or else those areas will not hold any value for them, with the tragic result that this heritage may someday be destroyed and these ecological treasures lost forever. Research the stories. Research the people who saved these lands and how they networked. Learn everything you can about these plants and the animals that depend on them. Their future depends on you.

ACKNOWLEDGMENTS

Many thanks to: Audubon Chicago Region founding director, Stephen Packard; North Branch Restoration Project steward and educator, Jane Balaban; Illinois Beach State Park steward Don Wilson and Meredith Mahoney for helpful edits; also to Susanne Masi, for providing POC species data; and Brad Semel and Duane Ambroz, Illinois Department of Natural Resources, for sharing privileged data and helping annotate the collated spreadsheet documenting all the area's historical plant species by documentation source.

LITERATURE CITED

Cassidy, V. M. 2008, August. SYMP 19-5: Henry Chandler Cowles: Pioneer ecologist. In The 93rd ESA Annual Meeting.

Gates, F. C. 1912. The vegetation of the beach area in northeastern Illinois and southeastern Wisconsin (Vol. 9). Illinois State Laboratory of Natural History.

Gregg, K. B. 2004. Recovery of Showy Lady's Slippers (*Cypripedium reginae* Walter) from Moderate and Severe Herbivory by White-tailed Deer (*Odocoileus virginianus* Zimmerman). Natural Areas Journal 24(3):232–241.

Halsey John, J. and L. L. D. 1912. A history of Lake County, Illinois. Roy S. Bates Publishing, Philadelphia. 872 pp.

Illinois Department of Natural Resources. 2012. Illinois Natural Heritage Database. Springfield, Illinois. T. Kienenger, manager.

Illinois Department of Natural Resources. 2013. Illinois Natural Areas Inventory. Springfield Illinois. T. Kienenger, manager.

Illinois Beach State Park. Naturalist Species Lists (not dated, organized by season of bloom).

Illinois Coastal Management Program Issue Paper: Illinois Beach State Park and North Point Marina Including the Dead River and Kellogg Creek Watersheds. 2011. (http://www.dnr.illinois.gov/cmp/Documents/TAG_I_IBSP-NPM_2009_02_19.pdf).

Illinois Natural Areas Inventory surveys: Illinois Beach State Park. 1976.

Illinois Natural Areas Inventory surveys: Illinois Beach State Park. 2012.

Illinois Natural Areas Inventory surveys: Spring Bluff Nature Preserve. 1976.

Illinois Natural Areas Inventory surveys: Spring Bluff Nature Preserve. 1977.

Illinois Natural Areas Inventory surveys: Spring Bluff Nature Preserve. 2012.

Lunn, E. T. 1982. Plants of the Illinois Dunesland. Illinois Dunesland Preservation Society.

Miller, S. G., Bratton, S. P., and Hadidian, J. 1992. Impacts of white-tailed deer on endangered and threatened vascular plants. Natural Areas Journal 12(2):67–74.

Pepoon, H. S. and Cowles, H. C. 1927. An annotated flora of the Chicago area. 554 pp.

Plants of Concern (POC) rare plant monitoring data. 2001–2012.

White, J. 1978. Illinois natural areas inventory technical report. Vol. 1: Survey methods and results. Illinois Natural Areas Inventory, Urbana.

ERIGENIA, Number 26, Spring 2013, pp 7–11

SEARCHING FOR SEDGES IN SOUTHERN ILLINOIS: UPDATING THE NATURAL HERITAGE DATABASE RECORDS FOR *CAREX NIGROMARGINATA*

Christopher David Benda

The thrill of the hunt need not only apply to animals. It also applies to plants, the primary producers of the food chain, and this is a story about a few botanists who went out in search of a pretty little sedge, known as *Carex nigromarginata* or black-edged sedge. It is currently listed as state endangered in Illinois and there are only two Element of Occurrence Records (EOR) for this species in the Natural Heritage database maintained by the Illinois Department of Natural Resources. My companions and I were on a quest to update the occurrence of the species at each of the two sites, both in extreme southern Illinois.

Sedges are grass-like plants. They are monocotyledonous angiosperms (flowering plants) that are more like lilies and irises than sunflowers or mints. They are closely related to grasses and rushes, but not in either family. In fact, they are in their own family, the Cyperaceae. Nearly twenty percent of all plants in Illinois belong to this family, and they are ecologically significant in nearly every natural community.

One can distinguish between grasses, rushes, and sedges by remembering the following rhyme: "Sedges have edges, rushes are round, and grasses have joints when the cops aren't around." The first part of this rhyme refers to the tristichous nature of the sedge leaves (Figure 1). Tristichous means having three vertical rows of leaves, making the stem triangular in cross section. Roll the stem of a sedge in your hand and it feels like it has edges. Roll the stem of a rush (or a grass) in your hand and it feels round, hence the part of the rhyme "rushes are round." Grasses are also round, but they have nodes along the stem, which are also referred to as joints. Rushes do not have nodes. Furthermore, the stems of rushes are pithy (solid inside), whereas grass stems are hollow.

In the *Acrocystis* group, *C. nigromarginata* is a species of sedge that is sparsely distributed in Illinois. But it is exactly it's rarity that makes this story interesting. Consider our neighbors to the west. Once thought to be uncommon in Missouri by the renowned botanist Julian Steyermark, *C. nigromarginata* is now known to be widely distributed across the rocky, acidic slopes of the Ozarks. The reason that such a widely distributed species was once thought to be much less common is because this species of sedge is often overlooked or incorrectly identified. This species flowers very early in the spring, and the inflorescences are interspersed among the leaves, making *C. nigromarginata* easily confused with some other sedges, like *C. umbellata* and *C. tonsa. C. nigromarginata* can also be mistaken for *C. albicans*, because of its slender leaves. However, *C. albicans* has inflorescences that are higher than the leaves instead of interspersed among the leaves. In addition, the fruits (called perigynia) of *C. nigromarginata* fall off the stem at maturity and are rapidly dispersed by birds, rodents, and ants (Yatskievych 1999). While animal dispersal may be beneficial to the existence of this species, the collection of perigynia is crucial for accurate identification to the species level (Figure 2).

Mohlenbrock's *Vascular Flora of Illinois* (2002) reports this species of sedge as rare in the extreme southern part of Illinois in dry woods. The only locations known from the Natural Heritage database for this species occur in the Shawnee National Forest. One collection is from 1994 by L.R. Phillippe at the Ozark Hill Prairie Research Natural Area (RNA) in Alexander County and the other from 1997 by Jody Shimp at the Panther Hollow RNA in Hardin County. It was Jody Shimp, Regional Administrator for the Natural Heritage Division at the Illinois Department of Natural Resources, who initiated the search to update the species at each of these two sites.

This story begins with an excursion to re-discover the population of *C. nigromarginata* at Panther Hollow RNA in eastern Hardin County in May 2011. Jody collected this species at this site in 1996 during his graduate research creating flora lists for three Shawnee

32 Terrier Ln Apt. 7A, Carbondale, IL 62901, botanizer@gmail.com.

Figure 1. *Carex nigromarginata* leaves.

National Forest RNAs, including Panther Hollow. Along for the adventure were several ambitious botanists: Chris Evans, Invasive Species Biologist for the River-to-River Cooperative Weed Management Area, John Van Dyk, father-in-law of Chris Evans and retired schoolteacher, and myself, a Natural Areas Ecologist for the Illinois Natural Areas Inventory (INAI). None of us were sedge experts, we tagged along with Jody in hope of learning more about the intricacies of sedge ID; but secretly we all wanted to be the one to find the first specimen of *C. nigromarginata* at each of the locations.

On the long drive out to the site, Jody recounted many interesting experiences he had while traversing southern Illinois in his graduate school days. One of the stranger stories he told was about a man and his boy who stopped to help him fix a flat tire. After they got him on the road, they insisted he join them for breakfast. Back at the family's trailer, Jody was offered a breakfast of microwaved corndogs and a can of cold Budweiser beer!

Once we got near the site and left the gravel road, it became apparent that the Shawnee National Forest is not like it used to be in many respects. One such difference, for better or worse, is the lack of access along old logging roads. At one time, one could get deep into the forest by four-wheel drive vehicle. Now, most of those roads are gated or simply overgrown. We parked the vehicle near the gravel road and walked three-quarters of a mile to get to the south-facing woodland slopes of Buckhart Hollow.

The approach was splendid. After a short distance through an unpleasant pine plantation, we descended into Panther Hollow, and here was where we made our first neat discovery of the day. Shortly after leaving the old road, we stopped to admire *C. oxylepis* var. *pubescens*, a state threatened species. Mohlenbrock (2002) describes the habitat for this species as swampy woods, but we were in the dry upper slopes of the woodland. It goes to show that you can never fully trust field guides. They are terrific sources of information, but there are still many additions and edits to be made to the *Flora of Illinois*, particularly when it comes to sedges.

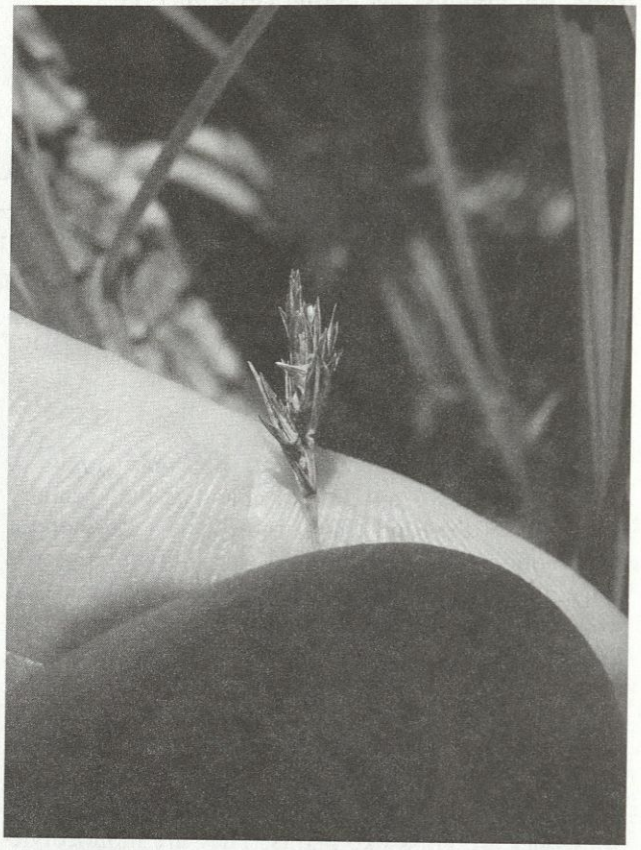

Figure 2. *Carex nigromarginata* scales.

While Panther Hollow RNA had clearly changed significantly in the recent decade due to many intense weather events, the canyon was still remarkable. There were numerous rock cleavages, overhangs, ledges, and sheer walls that contained several rare plant species. Jody pointed out many examples of a small plant known as *Saxifraga virginiensis*, or early saxifrage. This is literally one of two known locations for this species in southern Illinois.

Another interesting find was *Euonymus americanus*, known as strawberry bush. This plant is also rare in Illinois and is classified as a state endangered species. What was particularly interesting was that many of the individuals we saw were in flower. Despite repeated visits to this canyon, Jody had never seen this population in flower. After recording GPS points and photos to submit to the Natural Heritage

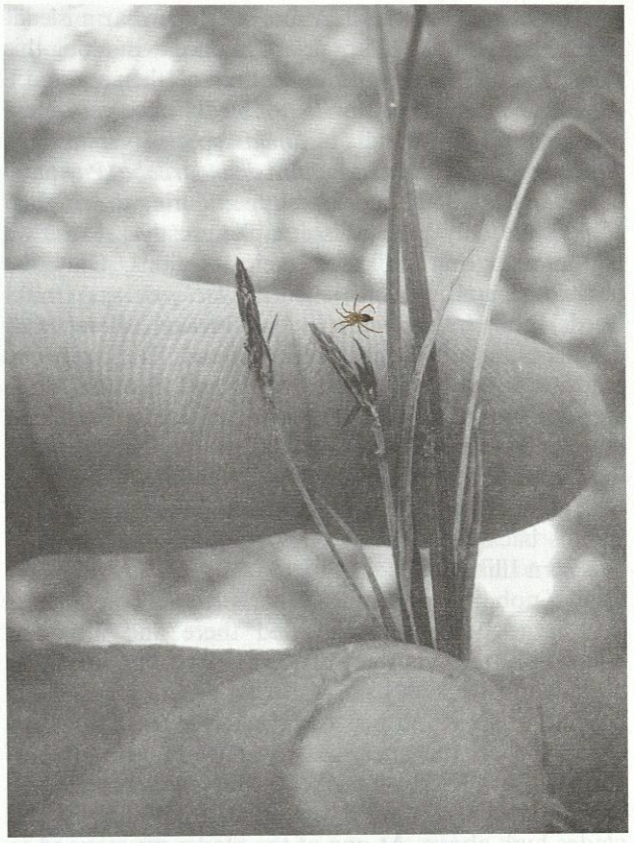

Figure 3. *Carex nigromarginata.*

database, we continued to scramble down the sandstone boulders to the creek below. We were, after all, on a mission.

Once we made it to the small creek in Buckhart Hollow we could see the high water marks from the spring flooding. Record rainfall had caused the Ohio River to rise to historic levels and this caused the water to backup into all the nearby drainages. Despite the high waters of a few weeks prior, we were able to easily cross the creek and proceed up the south-facing slope to the dry upland forest that contained *C. nigromarginata*. There were many neat plants to observe, including *Orbexilum pedunculatum*, or Sampson's Snakeroot, as well as *Cirsium carolinianum*, or Carolina Thistle, both in flower.

While the less seasoned botanists were pondering the differences between *Houstonia purpurea* (broad-leaved bluet) and *H. lanceolata* (lance-leaved bluet), Jody was off looking for *C. nigromarginata* and low and behold, he was the first to find it (Figure 3). The specimens were exemplary. Called black-edged sedge, this species displays a darkened edge along the pistillate scales. Once we acquired a search image, we located several clumps under the *Vaccinium arboretum* (farkleberry), *Ulmus alata* (winged elm), and *Juniperus virginiana* (red cedar). I collected several other sedges that Jody field identified, thinking that if I worked the dichotomous key knowing which species I had to start with, I could learn about the characteristics of each species of sedge.

On our way back, we flipped some rocks in the clear water of the creek. I knew that long-tailed salamanders (*Eurycea longicauda*) occurred in the area, and it is a species I have not photographed before. Trying to get a photo of each species of reptile and amphibian that occurs in southern Illinois, I was really determined to find this species. I was successful! Also exciting was finding another uncommon salamander that I had not photographed: the southern two-lined salamander (*E. cirrigera*). On the hike out, Chris Evans found a copperhead snake (*Agkistrodon contortrix*) and called me back to photograph it. I ran back to see the snake, and while running my boot caught a protruding tree root and I tripped. The root sent me flying like Superman and I laid myself out on the ground with a hard "thud." I got up and dusted myself off, but by the time I made it to where the snake was, it had retreated into a hole in the ground. After finding enough cool things for the day, we finally made it back to our vehicle.

The following Friday we embarked on another quest for *C. nigromarginata*, at an additional location not mentioned above. Jody informed us of a lone record for this species that is not in the Natural Heritage database, from the Lusk Creek Wilderness Area near what is now known as Owl Bluff. This collection was made on May 26th in 1966 by William Hopkins, who was a graduate student with Dr. Robert Mohlenbrock at Southern Illinois University. This place is not the easiest to access, unless you own a horse. We didn't. We parked at a trailhead on the west side of the Lusk Creek Wilderness, and the same four hikers as previously mentioned hiked in on the River to River Trail towards Owl Bluff.

Jody told us an interesting story about Owl Bluff. While doing a survey of Appalachian Bugbane (*Cimicifuga rubifolia*) records in southern Illinois, he found a collection that referred to this particular bluff. He couldn't find the name on any maps, and no one seemed to know where in the Lusk Creek Wilderness this "Owl Bluff" was located. Jody asked the man who knows everything about southern Illinois, Max Hutchison, where this bluff occurred. Max showed him on a map, and said there were a lot of owl pellets on the ground during one of his visits while conducting the original INAI and that is how the area got its name.

Well, Jody went to the base of Owl Bluff and found the Appalachian Bugbane plants. Also along the bottom of this cliff was a large amount of trash. Curious as to where all the trash was coming from, Jody made his way up to the top of the cliff and noticed a "moonscape." The area was devoid of

vegetation and loaded with eroding sediment. The impact of equestrians at this particular overlook was severe, and this is what started a campaign to limit equestrian activity in natural areas of the Shawnee National Forest. Jody took people to this area to show them the damage, and the area began to be commonly known as Owl Bluff. Now all the equestrian folk refer to this overlook as Owl Bluff, and it is even marked on the Shawnee National Forest maps this way. Still today, heavy degradation from horse tethering is evident, and there is even a small grave or memorial of some kind within the denuded area, but the views from the sandstone cliff are still outstanding.

After admiring the views, we set out for the approximate location of the 1966 *C. nigromarginata* record. Hopkins listed the occurrence as next to a footpath along an east-facing slope of oak-hickory-beech upland forest. We searched and we searched, but could not find any specimens of *C. nigromarginata*. Instead we found similar sedges, such as *C. albicans* and *C. umbellata* but those species have skinnier leaves and different locations of the spikelets. We sat on a downed tree to take a closer look at the map, where Jody set down his backpack. John Van Dyk made a joke about not being able to find the sedge because Jody's backpack was covering it up; and when Jody moved his bag, there it was, the only individual we saw that day, right under the tree we were sitting on! This could have been the exact and only plant Hopkins was referring to because it was right where it was supposed to be and there were no other individuals around.

A month passed before Jody and I, along with another colleague, Scott Schuette, were able to make it to the other *C. nigromarginata* location from the Natural Heritage database, this one at the Ozark Hill Prairies RNA in northern Alexander County. The species had been collected at this site in 1994 by Rick Phillippe, Collections Manager at the Illinois Natural History Survey. Although Dr. Phillippe made five collections for *C. nigromarginata* within the Ozark Hill Prairies RNA, we focused our efforts on the location recorded in the Natural Heritage database.

The way in and out of this area is not easy. It is surrounded by private land so parking is difficult. We decided to park at the Dogwood Flats parking area and hike in from there. The first part of the route was easy; the US Forest Service maintained a ridiculously wide path along the ridges that had been recently mowed. Leaving the trail, the hiking was still pleasant until it was time to descend. However, it wasn't the descent though that concerned us; it was the hike back up to the next ridge. Late June in southern Illinois - strike that - anytime in summer in southern Illinois, can be stiflingly humid. Thoroughly soaked with sweat, we made it up the steep and cherty hill and proceeded along the ridge to the Alexander-Union County line.

The name Ozark Hill Prairies is somewhat misleading. Although small hill prairies did once exist along this ridge, there is only little indication of their existence today. The ridge that was undoubtedly once very open and grassy is now a mess of *Smilax* species (greenbriar), *Rubus* species (blackberry) and *Asimina triloba* (Pawpaw) The many small hill prairies mapped during the original INAI were only barely discernable, mostly because we had a map that indicated their locations. Only the occasional prairie plants, such as *Asclepias* sps. (milkweeds) and *Helianthus* sps. (sunflowers), along with different kind of grasses, were observed. Eventually, we made it to the end of the ridge, and the site of *C. nigromarginata*. At this dry and rocky site, we found many individuals of what we were looking for, completing the trifecta of our search for *C. nigromarginata.*

The next year, in April of 2012, I took a group of friends backpacking into one of my favorite places in southern Illinois: Rice Hollow in Gallatin County near High Knob, just north of Karber's Ridge Road. There is a large horse camp located there and although equestrian traffic in the valley is fairly common; this is a place most hikers have not seen. Many hikers have been to High Knob because the River to River Trail runs through the area, but most don't venture into Rice Hollow. We backpacked in for an overnight trip and thoroughly enjoyed the superb cliff ledges and glades high above. At one of the glades we stopped to camp, and one of my companions, Rachel Goad, called me over to examine a species of sedge that looked different. One of the reasons it stood out was because the perigynia were all covered in fuzzy black stuff. It sure looked like *C. nigromarginata*, but we could not be sure so we made a collection for further examination under a microscope.

I took the specimen to Mike Murphy, botanist at the Illinois Natural History Survey, after participating in the sedge workshop he led for the Southern Chapter of the Illinois Native Plant Society at Southern Illinois University in the summer of 2012. I lacked confidence in my identification and anxiously awaited word from Mike. I was disappointed to learn that confirmation on my species ID could not be made, but relieved when I learned that it was due to this unusual specimen. All the plants I collected appeared to have some sort of fungal infection covering the perigynia, probably a smut, that caused them to be diminutive and therefore morphologically inconsistent with the dichotomous keys. I need to return to this area to make a better collection.

While writing this article, I learned that there are actually several other collections for *C. nigromarginata* in Illinois. In the updated *Illustrated Flora of Illinois: Carex* volume, Robert Mohlenbrock (2011) indicates this species in seven counties in Illinois and I learned of an EO for an additional site in Monroe County.

However, only the two locations mentioned in this article are available in the Natural Heritage database. This database is an important tool used by a variety of agencies, including the Illinois Endangered Species Protection Board and the Illinois Department of Transportation (when planning road projects). It is essential for anyone making plant collections or even visual observations to submit an Element of Occurrence (EO) record to the database manager in the Heritage Division at the Illinois Department of Natural Resources. As far as *C. nigromarginata* is concerned, continued search efforts may yield additional updates and new locations for this species.

If this species was considered to be common in Illinois, one would think it would be in the Ozarks Natural Division because the substrate in that area is most similar to the areas across the Mississippi River in Missouri where this species is common. And after all, *C. nigromarginata* was the most plentiful at the site in this natural division. However, the other two (or possibly three) occurrences were in the Shawnee Hills Natural Division, a region that has very different geology and soil conditions. It seems odd, but, as botanists say, the plants don't read the field guides.

LITERATURE CITED

Mohlenbrock, R. H. 2002. Vascular Flora of Illinois. Southern Illinois University Press, Carbondale and Edwardsville. 490 pp.

Mohlenbrock, R. H. 2011. The Illustrated Flora of Illinois, Sedges: Carex. 2nd edition. Southern Illinois University Press, Carbondale and Edwardsville. 429 pp.

Yatskievych, G. A. 1999. Steyermark's flora of Missouri. Volume 1 (rev. ed.). Missouri Department of Conservation, Jefferson City, Missouri. 991 pp.

Erigenia, Number 26, Spring 2013, pp 12–14

The General Land Office Surveyors and Their Work

Paul D. Kilburn

Abstract: The men who surveyed the United States lands outside the original 13 states were rugged, intelligent, and extraordinarily hard working. They performed a unique job for the country, providing a system that allowed permanent land settlement and ownership. They had to do their work in essentially unexplored lands, well away from settlement, comfortable beds and home-cooked food. They often camped for weeks at a time, slept on the ground, endured all kinds of weather, and worked from dawn to dusk in all seasons of the year. They not only established a regularized surveyed landscape in use today, but they also provided the first systematic recording along every section line of several features including understory, soils, topography, geology, water sources and routes, and other notable features. In addition they were excellent tree botanists, for when trees were present, they had to identify, measure distance from corners and determine diameters of two to four trees at all section and quarter-section corners. Their often overlooked efforts were a most important part of the settlement of these western states and our detailed understanding of presettlement vegetation and other features of these lands.

Introduction

The Northwest Ordinance of 1785 opened up lands west of the original 13 states to American settlement. A flood of new settlers packed up their belongings and headed west to some of the richest agricultural lands in the world. This migration displaced the thriving Indian cultures that had occupied these lands for centuries (Clement 1958).

Before settlers could obtain a title to the land for settlement, the land had to be surveyed and a patent issued to the buyer, although squatters living on the land to be surveyed could apply for their patent after the survey in that township was completed. Jefferson's rectangular land survey system shaped the American landscape for all time. First, principal meridians were established, each with a base line running east and west. From this base line, townships were numbered north and south of that line. Then range lines were numbered east and west of the meridian, providing the familiar numbering system for each township which is still used today. Only then was the land divided into townships six miles on a side. When completed the township was then divided into mile-square 640 acre sections. Section lines often became early roads, a pattern used today on the level farmland of the Midwest. Furthermore, farmers did not have roads crossing their land. Now these roads are a permanent feature over much of the country (Clement 1958; Webber 1981; Hutchinson 1988).

Establishing section corners and quarter corners accurately and permanently for these sections was of utmost importance to avoid controversy. In forested areas two to four bearing trees nearest the corner were identified and blazed, the diameter in inches determined, and the distance to the corner stake recorded. On the prairie, where no trees were present, a four foot square mound three feet high was built with a blazed four inch stake erected at the corner. The original notes were carefully recorded and copies are available from most state archives (Hutchinson 1988). Ecologists have made extensive use of the original notes to reconstruct pre-settlement vegetation as shown in Illinois (personal papers). The survey represents a clear benchmark for the restoration of Illinois ecosystems (Sparks et al. 1998; McClain and Ebinger 2007). It is important for ecologists to understand the historical context of the General Land Office (GLO) survey and to understand how it was conducted. This paper represents a review of historical sources of the survey.

The GLO Surveyors and Their Work

A Deputy Surveyor ran the surveying team or crew. He had contracted with the federal government to conduct the survey. He was the instrument man who operated the compass. His crew consisted usually of

Jefferson County Nature Association (JCNA), 6695 Terry Court, Arvada CO 80007.

five or six men; a flagman, one or two axemen, fore and hind chainmen, and often an extra man who drove the team and wagon, acted as cook and helped cut through underbrush for a clear line of sight. Standard pay for crew members was $20 per month.

A team of horses or mules and a wagon were almost essential to carry food, camping supplies and surveying equipment. Work was usually in the wilderness far from any settlement or store. Food supplies included flour, salt pork, white beans, oatmeal, coffee, and smaller amounts of sugar, salt and pepper. These were clearly not the ingredients for gourmet meals, but were sufficient for short work periods (Cook 1896; Stewart 1935). Camping supplies and surveying equipment included the following:

> "A large soldiers tent, Mackinaw blankets, axes, matches, tin pails, basins, plates, knives and forks, spoons, frying pans, tin cans for lard and saleratus [a leavening agent], tin pepper box, soldier drinking cups, etc." (Stewart 1935).

There was some variation of course that took place depending on nature of the land to be surveyed, weather conditions, and other factors. Stewart further lists the needed surveying equipment:

> "Compasses, chain, tally pins, tape line, marking tools, pocket compass, hatchet, whetstone, files, pens, ink paper, field books etc. All these and much more have to be deposited at a general depot, as near the work as possible, and packed thence to the party as needed" (Stewart 1935).

It was hard work. They would typically cover ten miles a day, working every day of the week until finished. Holidays did not stop these crews and work proceeded, not only in every month of the year, but over Christmas Day and New Year's Day without letup. Work started with sunrise and ended at sunset. They worked long days in all kinds of weather. Ira Cook, deputy surveyor in Iowa describes the work as follows:

> "Our work was hard, our days long: in winter or summer we were at work in the morning as soon as we could see, worked as long as we could see at night, and then tramped to camp by moonlight or starlight, often for many miles. We lived on bread, salt pork, beans and coffee. Occasionally we would vary it [dinner] by the capture of wild game ... deer,... honey ... wild hog. This not only helped our larder, but broke the monotony of our lives" (Cook 1896).

The Deputy Surveyor was paid by the mile of line completed, usually $3 a mile; thus pressure was on to work in all kinds of weather. In Iowa surveys proceeded during every month of the year. Winter surveys were sometimes interrupted by heavy snows and spells of subzero weather. During summer surveys sleeping was difficult to impossible as the men were often "excoriated by swarms or rather clouds of mosquitoes" and other "more troublesome insects" (Stewart 1935).

The horse-drawn cart was used to carry food, supplies, tools, stone, charcoal and wooden stakes. A supply of stakes was needed in prairie land. There is little written evidence of survey crews using a horse-drawn cart in Illinois. There are no diaries, letters or photographs. The only record known in Illinois has been recently published (Temple 2008) who records the following notes made in 1840 by Deputy Surveyor D. A. Spaulding Sr. from Winnebago County:

> "Mr. David Deeds not proving to be a very good hand I have discharged him and employed Mr. Ferguson for flagman and Jackson Farwell as an additional hand to assist in making the corners and to drive the team, each at compensation of Twenty Dollars per month".

Additionally, Webber (1981) quotes Deputy Surveyor Lucius Lyon, who in 1831, says "Wednesday 30th Got across the Mississippi ourselves but left our horses" showing clearly that a team of horses was regularly used by the surveying team. Temple (2008) further notes that the Spaulding crew lived locally. Most of the crew lived in Winnebago County while one crew member lived two counties to the west.

In some of the later surveys squatters preceded the survey. Deputy Surveyor Ira Cook described one unusual incident that took place when surveying the Iowa-Minnesota border:

> "One day in running up one of my range lines I struck a man's farm. It was partly in Iowa and partly in Minnesota. When I was through with running my lines, his cultivated land was situated in two states, four townships and six sections" (Cook 1896).

This farmer had a bit of extra work to record his patent.

SURVEYORS AS BOTANISTS

Recording size and location of trees and "posts in mounds" were the best way to establish accurate corners for land ownership and were key to permanent future settlement. This recording system, with identification and size determination of trees, has allowed subsequent ecological researchers a means to analyze the presettlement vegetation of the surveyed area, describe tree species and density of the pre-settlement forest in much of the Midwest, as well as the boundary lines between forest and prairies. In Jersey, Greene and

Macoupin Counties in west-central Illinois the surveyors recorded 41 taxa, species and genera, including ten different species of oak when they were surveyed in 1819 and 1820. Of course they used common names, sometimes made mistakes, and often lumped similar species by genera, such as hickory and elm. In adjacent counties, their records included several additional species, revealing an extraordinary familiarity of tree species. The surveyors accomplished this task in all seasons, often in winter when the trees were leafless and fruitless, and much harder to identify.

How could uneducated surveyors do it? How could they identify all of these tree species. First of all, knowing tree species was almost a requirement for rural people who lived and worked in the woods. Knowing their outdoor environment was vital to building cabins, hunting, timbering, and cutting firewood.

There was a good academic underpinning to tree identification at the time. Botanists had crisscrossed eastern United States since first settlement. One of the first taxonomic books was entitled *Arbustum Americanum: The American Grove or, an Alphabetical Catalogue of Forest Trees and Shrubs, Natives of the American United States* first published in 1785, and written by Humphry Marshall (Marshall 1785). Written before the midwestern states were well explored botanically, and thus omitting many species soon to be discovered, it still describes identification features of leaves, flowers, fruit and other distinctive features of all tree species known at the time. Each species was listed by scientific and common names. The book listed six species of maple, two of buckeye or horse chestnut, and 17 species of oak, although today many of the latter are considered varieties. Most of the oak species of west-central Illinois, including pin, overcup, post, black jack, shingle, bur, are not listed in his book.

But the list of trees recorded expanded quickly. Amos Eaton's *Manual of Botany for North America* (Eaton 1817) added greatly to the list of trees, as well as shrubs and herbaceous plants This Manual was first published in 1817, and by 1833 had gone through six editions. The sixth edition described 40 species of oak. Next to be published was Alfonso Wood's "Class-book of Botany ..." (Wood 1845). While the surveyors never referred to these books and probably never even owned them, their knowledge of different tree species was impressive for that time.

During these primarily 19th century GLO surveys the knowledge of trees filtered down from academicians who wrote the above books to the people who explored, hunted and farmed the land. Tree identification was vital to most rural people and became second nature to them. In this way the early surveyors were able to record detailed notes that remain useful to plant ecologists today. The information provided by the hardy men who carried out the original surveys has been widely used to verify the presettlement vegetation at the time and enable ecologists today to understand changes to these communities. These records are often the basis for preparing sound land management plans and remain a permanent and detailed botanical record of the vegetation cover at the time of the surveys (McClain and Ebinger 2007; Sparks et al. 1998).

LITERATURE CITED

Clement, D. B. 1958. Public land surveys—history and accomplishments. Surveying and Mapping 18(1):213–219.

Cook, I. 1896. Government surveying in early Iowa. Annals of Iowa. Pages 605–615.

Eaton, A. 1817. Manual of Botany for North America. First edition. Albany, NY.

Hutchinson, M. 1988. A guide to understanding, interpreting and using the Public Land Survey Field Notes in Illinois. Natural Areas Journal 8(4):245–255.

Marshall, H. 1785. Arbustum Americanum: The American Grove. Philadelphia, PA.

McClain, W. E. and J. E. Ebinger. 2007. Fire maintained, closed canopy barren communities in western Illinois. Transactions of the Illinois Academy of Science 100:209–222.

Sparks, R. E., J. C. Nelson, and Yao Yin. 1998. Naturalization of the flood regime in regulated rivers. Bioscience 48(9):706–720.

Stewart, L. O. 1935. Public land surveys: history, instructions, methods. Collegiate Press, Inc., Ames, Ia. 202 pp.

Temple, W. 2008. Information on an early survey crew in Illinois. The Illinois Surveyor, Winter 2008:5.

Webber, J. 1981. Early public land surveys in the Northwest Territory and procedure for the retracement of original government surveys in Illinois. R. E. Church Co., Rochester, Illinois. 431 pp.

Wood, A. 1845. Class-book of botany, structure, physiology, and classification of plants with a flora of the United States and Canada. 1st edition. American Book Co., New York, Cincinnati and Chicago.

ERIGENIA, Number 26, Spring 2013, pp 15–25

CAREX OF THE ZION BEACH-RIDGE PLAIN

Linda W. Curtis

ABSTRACT: The Zion beach-ridge plain is an 18 mile-long migratory landform located on the SW Lake Michigan coast and includes the Kenosha Dunes and Chiwaukee Prairie in Kenosha County, Wisconsin. Adjoining on the Wisconsin Border are Illinois Beach State Park and Spring Bluff Lake County Forest Preserve. Farther south, the Waukegan Dunes in Illinois end at the Waukegan Harbor. More than 750 plant species have been reported. Online searches and 12 herbaria curator responses verified 43 vouchered *Carex* specimens for IBSP including the six new species from this fieldwork: *Carex annectens* E. P. Bicknell var. *xanthocarpa* (Kuk.) Wiegand, *C. cristatella* Britt. , *C. grisea* Wahlenb. , *C. interior* L. H. Bailey, *C. molesta* Mack. , and *C. sparganioides* Willd. One new species was discovered at the Chiwaukee Prairie, *C. suberecta* (Onley) Britton. A total of 54 species resulted from IBSP herbaria specimens plus inventories from adjoining sites.

INTRODUCTION

The Zion beach-ridge plain on the southwestern Lake Michigan coast was called Dunesland before the 1947 purchase of land for Illinois Beach State Park. The southern area in Illinois was known as the Waukegan flats or moors. The Wisconsin portion in Pleasant Prairie was the Kenosha Dunesland and Chiwaukee Prairie-Carol Beach. The Spring Bluff Lake County Forest Preserve near the state border is separated from the Lake Michigan coast by the North Point Marina and adjoins the Illinois Beach State Park (Figure 1). The north and south units of Illinois Beach State Park are separated by Zion's Hosah Park and an electric power plant. The south unit's beach is contiguous with the Waukegan Dunes and Harbor, although partially offset from an industrial site. (Coastal Management Progrgam ICMP 2011).

The Zion beach-ridge plain is a sand and gravel body that resulted from erosion by natural wave action and was deposited by long shore drift along 18 miles from Kenosha, Wisconsin southward through Waukegan, Illinois. This coastal terrace is almost a mile wide near the state border (Kenosha County Mapping System 2012). A corrugated topography of alternating ridges and swales (Figure 2) remain from the shoreline deposition over the course of the past 3,700 years (Hester, N. C. and Fraser, G. S. 1973, ISGS 1972).

P. O. Box 731, Lake Villa, Il 60046
lcurtisbotanist@ameritech. net, www. curtistothethird. com.

METHODS

Maps and aerial photographs from 1939, 1946, 1970, and 2010 included the boundaries of the Zion ridge-beach plain from the Lake Michigan coast to the Union Pacific (formerly the Chicago-Northwestern) railroad on the Holocene Bluff Ridge. Below the ridge was the Glenwood beach of Glacial Lake Chicago when Lake Michigan was much higher. Changes seen in the aerial maps included new roads, evidence of sand mining, a former railway spur for ice and sand, and changes from open marshes in 1939 to forests (Lake County GIS Mapping Division, 2012).

Specimens collected during fieldwork in 2010 and 2011 were photographed with a GPS recording camera. As specified by the permit from the Illinois Nature Preserves Commission, whole plants were not taken. Instead only the matured flowering stem was collected for later identification. No plant inventories of vouchered IBSP specimens were available from the IDNR, INPC, or INAI so herbaria curators were contacted by e-mail and online to search for specimens. Data was slowly accessed after searches of many Midwest herbaria, with 12 institutions affirming IBSP *Carex* (Table 1).

Lab work included scanning fresh culms aside a centimeter ruler, then imaging sheaths and perigynia with scales with a camera mounted bioscope. Floras with identification keys were consulted, as well as photographs and images on herbaria websites. As required in the research permits, the Illinois specimens were sent to curated herbaria: Dr. Andrew Hipp at the Morton Arboretum (MOR), Dr. Hong Qian at the Illinois State Museum (ISM), and to Dr. Rick

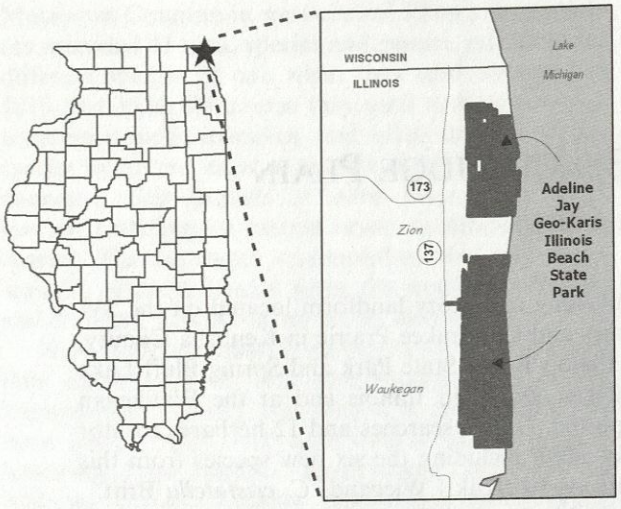

Figure 1. Location map of Illinois Beach State Park.

Figure 2. Aerial photo (1989) of Illinois Beach State Park and Nature Preserve with Dead River by Ken Weik, Lake Forest College.

Phillippe at The Illinois Natural History Survey Herbarium (ILLS). Wisconsin specimens were sent to Ted Cochrane and Mark Wetter at the UW-Madison Herbarium and Dr. Sara Hoot at the UW-Milwaukee Herbarium.

RESULTS

The Chiwaukee Prairie inventory mostly included vouchered specimens listed on the Wisconsin Botanical Information System database website and also on the Morton Arboretum Herbarium website. Plants of Concern for Illinois, Indiana, Michigan and Wisconsin listed 26 *Carex* at Chiwaukee Prairie, compared to 25 on the Chiwaukee Prairie Organization website. The fieldwork at Chiwaukee Prairie during 2009 resulted in 17 species sent to herbaria and an inventory of 31 *Carex*.

Chiwaukee Prairie's foredunes have eroded away and the beach has been armored with limestone rock. The adjoining plain of sand prairie is rich in sedges including *C. richardsonii*, a conspicuous sedge during anther bloom in March and April but nearly impossible to find later. *C. richardsonii* and *C. tonsa* are endangered in Wisconsin. *C. aquatilis* grew in a quicksand creek that flowed into Lake Michigan along 122 St. , a former road that was originally intended for a planned development. A new species for the inventory, *C. suberecta,* grew along the rut road, while *C. stricta* and *C. haydenii* grew with *C. buxbaumii* and *C. pellita* in wet prairie swales. The Krampert Trail followed low ridges and swales where *C. conoidea* and *C. crawei* grew among colorful forbs.

South of the Chiwaukee Prairie and the Wisconsin-Illinois border, the Illinois Beach State Park and Nature Preserve has a corrugated topography with dry, mesic, and wet prairies. The sand prairies below the Holocene Ridge parallel marshy swales and sedge meadows. Mesic prairies and oak savannas on ridges merge into dry sand prairies. A newer habitat, a swamp forest, receives Bull Creek's flow into the IBSP. An 1864 Benton Township Illinois map showed one of the inflowing tributaries of Bull Creek on a property of 160 acres owned by Ich. Bull. The creek flowed east under the railway into marshland and looped south into the Dead River watershed. The 1939 aerial photograph showed trees lining the creek that appeared to flow due east. Access into the Dunesland in 1939 was Beach Road to the South, and 21st to the North. By 1974 Wadsworth Road was constructed as the single entry and cut straight east through the marsh to the beach. The original Dead Lake near the Dead River was drained, but a near-by sand borrow is the new smaller "Dead Lake" on recent maps (Wiki Central 2012). In the 1990's Wadsworth Road entry was restructured to send traffic south in a loop that joined the older Beach Road, but kept the straight east road as the Campground entry. Two sand–mined borrow ponds were created, S pond near the entrance and Campground Pond.

In the 2010 aerial, Bull Creek had a first-growth swamp forest of *Acer saccharinum* (silver maple), *Fraxinus pennsylvanica* (green ash), *Acer negundo* (box elder), and *Populus deltoides* (eastern cottonwood). Bull Creek formed an oxbow and flowed south into ponds and then filtered into the Dead River Watershed. No stumps from previous woodlands were noted during fieldwork. Four new species that were neither vouchered nor inventoried were discovered in the first-growth Bull Creek swamp forest in 2011: *C. cristatella, C. grisea, C. molesta*, and *C. sparganioides* (Figure 3).

One culm of *C. viridula,* a threatened species in Illinois, was sent to the Illinois State Museum. An

Table 1: Herbaria with Dunesland or Illinois Beach State Park specimens.

Acronym	Herbaria	Number of *Carex* species
CHIC	Chicago Botanic Garden Herbarium	5
DEK	Northern Illinois University	1
ETL	Lake Forest College Herbarium	17
F	Chicago Field Museum Herbarium	15
ILL	University of Illinois Plant Biology Herbarium	10
ILLS	Illinois Natural History Survey Herbarium	8
ISM	Illinois State Museum Herbarium	28
MICH	University of Michigan-Ann Arbor Herbarium	2
MO	Missouri Botanical Garden Herbarium	8
MOR	Morton Arboretum Herbarium	31
MIL	Milwaukee Public Museum Herbarium	4
WIS	University of Wisconsin-Madison Herbarium	7

Element of Occurance Report was sent to IDNR-Illinois Natural Heritage Database giving its locations. Other Illinois E & T species include threatened *C. aurea* and endangered *C. garberi* that grew with *C. conoidea*, *C. crawei,* and *C. tetanica*. The associates in sedge meadows were *C. lasiocarpa, C. pellita, C. buxbaumii, C. sterilis,* and *C. stipata. Carex granularis* var. *haleana* grew along Sand Lake (sand borrow area) in Camp Logan. Tussocks of *C. stricta* and the newly discovered *C. interior* grew along the marshy edges of the floodplain behind the Visitor's Center. *Carex annectens* var *xanthocarpa,* a new species, grew in a crevice of the IBSP Visitor's Center parking lot (Figure 3). Weed-whacked before mature in 2010, it survived with culms and mature seed heads in 2011.

In early literature, F. C. Gates recorded 16 species of *Carex* as part of his University of Illinois graduate research and later published *Vegetation of the Beach Area* (1912). The Gates' 1907–1909 specimens were deposited at the Chicago Field Museum Herbarium (F), the University of Michigan-Ann Arbor Herbarium (MICH), Illinois Natural History Survey (ILLS), and University of Illinois (ILL) (Table 2). *Carex filiformis 3027* dated 1908 was annotated as *C. lasiocarpa* in 1998 by Dr. Anton Reznicek from the University of Michigan Herbarium. Dr. Reznicek also annotated specimens at the Chicago Field Museum Herbarium for the vPlants Project in 2002. One sheet labeled *C. filiformis* had two different species, *C. pellita* and *C. lasiocarpa.* Another change, Gate's *C. riparia 2498* at U-Michigan-Ann Arbor (MICH) was annotated as *C. aquatilis* var. *substricta* while another labeled *C. riparia 2786 w*as annotated as *C. lacustris* at the Chicago Field Museum Herbarium (F).

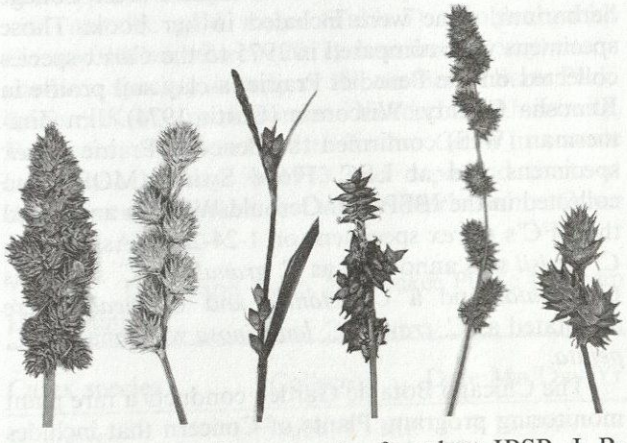

Figure 3. New *Carex* species found at IBSP. L-R: *C. annectens* var. *xanthocarpa, C. cristatella, C. grisea, C. interior, C. sparganioides, C. molesta* (Not to scale).

Gates' specimen of *C. aurea* is now annotated and filed as *C. garberi* at the Field Museum. Gates added a bog sedge *C. trisperma* without a collection number to his 1912 article list, as collected by Dr. H. A. Gleason. Of the two specimens collected by Gleason, one is now at MICH and another at ILLS, both inland from Lake Villa, Illinois, which has Gavin Bog in Grant Forest Lake County Forest Preserve and another from IDNR's Cedar Lake Bog. Neither specimen was collected during 1907–09. Illinois State Museum herbarium has a *C. trisperma* from Lake County and collected by Verne Graham in 1944, but was from a bog, three miles east of Antioch.

The earliest literature describing Lake Michigan Dunesland was by pioneer ecologist Henry Cowles (1899) who collected plants primarily from the Indiana Dunes. One specimen at ISM, *C. emoryi*, was found in Lake County, Illinois, but that was from Lake Forest. Herman Pepoon (1927) also wrote of the Dunesland of Indiana, but no *Carex* from Lake County, Illinois, were found. He collected *C. lupuliformis* from the Glenwood Beach and *C. hystericina* in the reed swamp nearest the beach in Lake County, Indiana, and Cook

Table 2: *Carex* of NE Illinois & SE Wisconsin beach area (Gates 1912). Specimens deposited at Museum Herbarium (F), University of Michigan-Ann Arbor Herbarium (MICH), Illinois Natural History Survey (ILLS), and University of Illinois (ILL).

Carex species	Collection Number	Date Mo-Day-Yr	Barcode or Accession Number
C. aquatilis =riparia	2498	6-08-1908	V0022529F
C. aurea = garberi			
Annotated 1-14-2012	2503	6-08-1908	ILL 10767
C. buxbaumii	2504	6-08-1908	V0022630F and ILL 10769
C. buxbaumii	1668	6-16-1907	ILL 10800
C. comosa	2917	8-07-1908	V0022658F and ILL 10770
C. crawei	2502	6-08-1908	V0022712F and ILL 10771
C. crawei	2821	7-01-1908	V0022713F and ILL 10772
C. garberi = C. aurea	2503	6-08-1908	V0022830F
C. granularis	3054	6-22-1909	V0022871F
C. hystericina (hystricina)	2787	7-01-1908	V0022949F and ILL 10773
C. lacustris (riparia)	2786	7-01-1908	V0023009F
C. lasiocarpa (filiformis)	3027	7-16-1909	1375247 MICH
C. muhlenbergii	2465	6-08-1908	1379831 MICH and ILL 10774
C. muhlenbergii	3163	7-19-1909	1379853 MICH and ILL 10775
C. pellita (lanuginosa)	3027	6-16-1909	344932 F
C. stipata	3052	6-22-1909	V0023465F and ILL 10777
C. stricta	3026	6-16-1909	V0023486F
C. umbellata	2474	6-08-1908	V0023588F, ILL 10779, MICH1390814
C. viridula (oederi pumila)	2509	6-08-1908	V0023627F, ILL 10781 & ILL 10780

County, Illinois, but no herbarium specimens were found for Lake County, Illinois. The name of Dunes Park, Illinois, was changed to Beach Park to avoid confusion with Indiana's Dunes Park in its Lake County. However, the older name remains on old specimen labels.

Another early collector, L. M. Umbach, a professor at Northwestern University in Naperville, mostly collected in the Indiana Dunes in Lake County, Indiana, and Cook County, Illinois, along the Lake Michigan coast. However, he collected 14 *Carex* in Lake County, Illinois, from 1908–1912 during the same period of collection as F. C. Gates. Although Gates had collected on ten dates for his graduate research, Umbach had seven collections on different dates, except on 7-01-1908 when Umbach collected a *C. buxbaumii* while Gates collected *C. crawei, C. hystericina, C. lacustris.* Umbach's herbarium sheet of *C. polygama* had two different species mounted together, *C. buxbaumii* and *C. pellita.* These were separated and given new 5 digit accession numbers by Ted Cochrane and Mark Wetter at the University of Wisconsin-Madison herbarium Many of Umbach's specimens are also at the Morton Arboretum Herbarium (Table 3). Only one specimen was deposited at the Milwaukee Public Museum Herbarium along with others collected by Harvard botanist Sigmund Graenicher (Table 4).

Swink and Wilhelm's *Plants of the Chicago Region* (1994) listed 16 *Carex* species referencing the Illinois Dunes or Lake Michigan coast in Lake County. Many Dunesland specimens by Swink, Wilhelm and Bowles are at the Morton Arboretum. Further searches included Lake Forest College for specimens collected by Dr. Elizabeth Lunn, author of *Plants of the Illinois Dunesland* (1982) (Table 5). Although 16 *Carex* from the IBSP were deposited in the Lake Forest College herbarium, none were included in her book. Those specimens were compared in 1975 to the *Carex* species collected on the Benedict Prairie, a clay soil prairie in Kenosha County, Wisconsin (Curtis 1974). Jim Zimmerman (WIS) confirmed the Benedict Prairie *Carex* specimens and at LFC. Floyd Swink (MOR) also collected in the IBSP. Dr. Gerould Wilhelm annotated the LFC's *Carex* specimens on 1-24-2013. As a result, *C. davisii* was annotated as *C. granularis, C. stricta* as *C. stipata,* and a *C. tetanica* and *C. meadii* were annotated as *C. crawei. C. lanuginosa* was renamed *C. pellita.*

The Chicago Botanic Garden conducts a rare plant monitoring program, Plants of Concern that includes northeastern Illinois, southeastern Wisconsin (includes the Chiwaukee Prairie) and northwestern Indiana. In addition, the Millennium Seed Bank Project (MSBP) for which some of the above specimens were collected,

Table 3: Umbach's Dunesland *Carex* of Lake County, Illinois collected 1908–1912. Specimens deposited at: MOR =Morton Arboretum, WIS=University-Wisconsin, MIL Milwaukee Public Museum.

Carex species	Collection Numbers	Date Mo/Day/Yr	Barcode or Accession Number
C. bebbii	3745	7-03-1909	MOR 36015
C. buxbaumii	5223	5-30-1911	MOR 7447&WIS V026328
C. buxbaumii	2736	7-01-1908	WIS V0262926
C. buxbaumii	31635	6-05-1909	WIS V0263927
C. crawei	3765	7-03-1909	MIL 118113
C. crawei	37884	7-03-1909	WIS V0263875
C. crawei	3765	7-03-1909	WIS V0263930
C. conoidea	3306	7-11-1909	MOR 7483
C. conoidea	3306	6-11-1909	WIS V0263875
C. conoidea	3312	6-11-1909	WIS V0263874
C. conoidea	5375	6-08-1912	WIS V0263876
C. granularis var. haleana	3229	6-05-1909	MOR 35978
C. hystericina	3283	6-11-1909	MOR 35974
C. hystericina	2225	7-01-1908	WIS V0263931
C. hystericina	5372	6-08-1912	WIS V0236933; WIS V0236934
C. molesta	3741	7-03-1909	MOR 35980
C. muehlenbergii	3763; 5217	7-03-1909; 5-30-1911	MOR 7708; MOR 35992
C. pellita (lanuginosa)	31653	6-05-1909	WIS V0263935
C. sterilis	36020	5-30-1911	MOR 36020
C. stipata	5216	5-30-1911	MOR 7814
C. stricta	5281	5-30-1911	MOR 7833
C. viridula	3307	6-11-1909	MOR 7893
C. vulpinoidea	3758	7-03-1909	MOR 7902; WIS V0263925
C. vulpinoidea	3756	7-03-1909	WIS V0263924

records data about plants in nature preserves and public lands (Table 6).

In compiling the *Carex* inventory from herbarium specimens, difficulties arose from old names or out of range species. *C. panicea* is a European species and an early name for *C. tetanica* in the US. *C. multimoda,* now *C. pachystachys,* is a western United States species with metallic gold scales (Table 7). Mohlenbrock's *Flora of Illinois: Carex* (2011) described *C. vaginata*, a northern species, as only at Illinois Beach State Park. Robert Kral, professor at Vanderbilt University, Tennessee, discovered it with 7 other *Carex* in a swale beside the railway in 1973 and deposited them at the Missouri Botanical Garden Herbarium. *Carex vaginata* has recently been annotated again as *C. tetanica.*

Table 4: Dunesland *Carex* Milwaukee Public Museum Herbarium.

Carex species	Collector	Date Mo/Day/Yr
C. crawei	Umbach, L. M.	7-13-1909
C. muehlenbergii	Graenicher, S.	6-11-1911
C. pensylvanica	"	5-04-1911
C. viridula	"	6-12-1911

Many IBSP *Carex* species have been annotated, some several times, an indication of the difficulty of *Carex* identification, but also of taxonomic changes. *Carex heliophila* was originally *C. pensylvanica* when collected by Swink 7-8-1947, but was changed to var. *digyna* by Wilhelm 2-15-1992. Jason Sturner annotated *C. inops* ssp. *heliophila* on 12-21-2006. In *Flora of Illinois: Carex,* it now has species rank: *C. helophilia.* A smaller and paler variety of *C. granularis* grows along the Lake Michigan coast. Known as C. *granularis* var. *heleana* in *Flora of North America* (Ball, P. W. and A. A. Reznicek, eds. 2002), the variety was elevated to species rank as *C. heleana* in *Flora of Illinois: Carex* (Mohlenbrock 2011).

Keying errors are continual problems in identification. Robust specimens of *C. tetanica* were often indistinct from the dimensions of *C. meadii. C. bicknellii is* often misidentified as *C. brevior*, and *C. brevior* as *C. molesta*. Field identification of some *Carex* species requires magnification higher than a hand lens. Culms were taken for a later bioscope examination at greater magnification that captured texture such as tiny white bumps known as papillae. *Carex muhlenbergii* has papillate sheaths.

Table 5: IBSP *Carex* at Lake Forest College Herbarium.

Species	Collection #	Date Mo/Day/Yr
C. bebbii	1163b	6-25-1967
C. blanda	3086	4-14-1969
C. buxbaumii	5083	5-18-1970
C. comosa	844	9-24-1966
C. conoidea	1010, 1002	5-271967
C. crawei	697, 1226	7-08-1967
C. granularis	4050	5-16-1969
C. garberi	00011	6-20-1967
C. muehlenbergii	1225, 1175, 1056, 1207, 1172	6-25-1967
C. pellita	1057, 5403, 1131	5-22-1972 & 6-23-1967
C. pensylvanica	5, 8, 927, 972	5-20-1967
C. scoparia	1163b	6-25-1967
C. stricta	1161	5-27-1967
	5411	6-25-1967
	1008	5-31-1969
C. stipata	4040	7-13-1969
C. suberecta	1129	6-23-1968
C. tetanica	5082	5-18-1970
	5182	5-19-1971
C. viridula	115, 838, 840, 1206, 1291, 1323, 1325, 1332, 1394, 2059	7-02-1967 to 8-31-1968

Two websites with photographs of *Carex* are Illinois Wildflowers with 23 of the 54 species of the combined vouchers and the Robert Freckmann Herbarium website with almost all species photos. However, image names vary and *C. abdita* on the Illinois Wildflowers website is *C. umbellata* on Wisconsin's Robert Freckmann Herbarium Website. Also, *C. annectens* var. *xanthocarpa* in Wisconsin is known as *C. brachyglossa* in Illinois, following Mohlenbrock (2011).

The Illinois Natural Areas Inventory (INAI) lists the plants in high quality natural areas, especially those with endangered species. Begun in 1975, it is maintained by IDNR and species are recorded in their database. (Ambroz, D. , Garness, K. , IDNR 2012) (Table 8). The Illinois Natural Areas Inventory surveyed the IBSP in 1976 and ten *Carex* species were found in their 0. 25m sq. circular sampling plots. Prairies were classified by the INAI as dry sand prairies if no dark A horizon soil was present, similar to sand dunes, while dry mesic prairies had dark A horizon soil. *Carex* in dry sand prairie were *C. pensylvanica, C. umbellata and C. meadii. C. pensylvanica* also grew in mesic prairies while wet sand prairies had *C. buxbaumii* and *C. aquatilis.* No *Carex* species were found on the beach or foredunes. On the ridges with oak savanna were *C. pensylvanica* and *C. muehlenbergii.* Species in the panne near Lake Michigan were *C. viridula, C. lasiocarpa* and *C. pellita.* Sedge meadows had *C. buxbaumii, C. stricta, C. pellita (lanuginosa), C. lasiocarpa*, and *C. spp.* In wetlands, *C. lasiocarpa* also grew in marshes with *Typha sp.* and other marshes with *Scirpus validus*. No *Carex* were noted at the seep (Table 8).

Table 6: IBSP *Carex* at Chicago Botanic Garden Herbarium.

Carex species	Collector	Date Mo/ Day/Yr
C. buxbaumii	D. Sollenberger	6-23-2008
C. crawei	"	6-24-2008
C. richardsonii	"	6-19-2008
C. siccata	"	6-23-2008
C. viridula #2802	Sollenberger and K. DeGroft	5-23-1989
C. viridula #7410	"	7-07-1995

The recent 2012 IDNR database uses the Illinois Natural Areas Inventory of IBSP *Carex* combined with 16 species from Gates' list (1912) with the INAI species from sampling data recorded in 1976, (10 species) 1997, (5 species) and 2010 ground sampling (4 species). The total was 32 species including those at Spring Bluff (Table 8). Of the 43 IBSP *Carex* species vouchered by herbaria (Table 9), the INAI samples at IBSP found 20 of the 43 in sample plots:

Table 7: Dunesland *Carex* at Missouri Botanical Garden collected by Robert Kral. Collection Notes: "Illinois Beach State Park on 5-31-1973, in swales by railroad".

Carex species	Collector number	MO ID	W
C. aquatilis	50390	2672376	OBL
C. multimoda = C. pachystachys	50382	2762677	OBL
C. buxbaumii	50371	2710446	OBL
C. haleana	50361	2759216	FACW+
C. lacustris	50381	2752486 & 2752592	OBL
C. lasiocarpa	50375, 50389	2752592 & 2750739	OBL
C. panicea = tetanica	50391, 50376 50376	2770480 & 2770490	FACW
C. vaginata = tetanica	50363	2809216	

Table 8: Illinois Natural Areas Inventory of IBSP and Spring Bluff. Compiled from 2012 Flora of Illinois Beach State Park and Spring Bluff, IDNR. CC = coefficient of conservation (Swink & Wilhelm 1994) SB = Spring Bluff only. Habitats of 1976: D= Dune, P = panne, WSP = wet sand prairie, SM=sedge meadow, DP = dry sand prairie. DMP = dry mesic prairie, SAV = savanna, MS = mesic swale.

Carex species	GATES	Common name	CC	Habitats IBSP 1976	SB
C. annectens		Yellowfruit Sedge	5		*
C. aquatilis var aquatilis		Water Sedge	5		*
C. aquatilis var substricta	G	Water Sedge	5	MP, WSP	
C. atherodes		Wheat Sedge	5		*
C. aurea	G	Golden Sedge	10		
C. bebbii		Bebb's Oval Sedge	6		
C. bicknellii		Bicknell's Sedge	10		*
C. buxbaumii	G	Buxbaum's Sedge	9	MP, SM, WSP	
C. comosa	G	Bristly Sedge	5		
C. crawei	G	Early Fen Sedge	10		
C. garberi	G	Elk Sedge	10		
C. granularis	G	Limestone Sedge	4		*
C. haydenii		Hayden's Sedge	6		*
C. hystericina	G	Porcupine Sedge	5		
C. interior		Inland Sedge	10		*
C. lacustris	G	Common Lake Sedge	6		
C. lasiocarpa	G	Narrow woolly sedge	10	P, SM,WSP	
C. laxiflora		Looseflower Sedge	10		*
C. meadii		Mead's Sedge	9	DP	
C. muehlenbergii	G	Muehlenberg's Sedge	8	DP	
C. pellita	G	Woolly Sedge	4	P, SM	
C. pensylvanica		Oak Sedge	5	DMP, DP, SAV	
C. rosea		Rose Sedge	4		*
C. sartwellii		Sartwell's Sedge	6		*
C. sterilis		Dioecious Sedge	10		
C. stipata	G	Common Fox Sedge	3		
C. stricta	G	Tussock Sedge	5	P, MS, SM	
C. tetanica		Rigid Sedge	9		*
C. umbellata	G	Umbrella Sedge	10	DP	
C. viridula	G	Little Green Sedge	10	P	
C. vulpinoidea		Brown Fox Sedge	2		

Table 9: *Carex* of the Zion beach-ridge plain in Wisconsin and Illinois. Specimens deposited at: IBSP =Illinois Beach State Park herbaria, CHI =Chiwaukee Prairie, SB =Spring Bluff LCFP, W = Waukegan Dunes. * INAI 2012 ** C. *aquatilis* var *altior* and var. *substricta*.

No	Carex species	Common name	Locations			
			IBSP	SB	CHI	W
1	*C. annectens var xanothocapa*	Small Yellow Fox Sedge	√	√		
2	*C. aquatilis* *	Water Sedge	√	√	√	√**
3	*C. atherodes*	Wheat Sedge		√	√	
4	*C. aurea* *	Golden Sedge	√			√
5	*C. bebbii* *	Bebb's Sedge	√	√	√	√
6	*C. bicknellii*	Bicknell's Sedge		√	√	
7	*C. blanda*	Wood Sedge	√			√
8	*C. brevior*	Plains Oval Sedge	√		√	√
9	*C. buxbaumii* *	Buxbaum's Sedge	√	√	√	√
10	*C. cephalophora*	Short-headed Sedge	√			
11	*C. comosa* *	Bristly Sedge	√			
12	*C. conoidea*	Prairie Gray Sedge	√	√	√	
13	*C. crawei**	Early Fen Sedge	√	√	√	√
14	*C. cristatella*	Crested Sedge	√	√		√
15	*C. cryptolepis*	Small Yellow Sedge			√	
16	*C. diandra*	Bog Panicled Sedge			√	
17	*C. festucacae*	Fescue Sedge	√		√	
18	*C. flava*	Large Yellow Sedge			√	
19	*C. garberi**	False Golden Sedge	√			√
20	*C. granularis var haleana*	Pale grain Sedge	√	√	√	√
21	*C. grisea**	Gray Sedge	√			√
22	*C. haydenii*	Hayden's Sedge		√	√	
23	*C. heliophila*	Plains Sedge	√			
24	*C. hyalinolepis*	Shoreline Sedge	√			
25	*C. hystericina* *	Porcupine Sedge	√	√	√	√
26	*C. interior*	Inland Sedge	√	√		
27	*C. lacustris* *	Lake Sedge	√	√		√
28	*C. lasiocarpa* *	Hairy –fruited Sedge	√	√		
29	*C. laxiflora*	Beech Wood Sedge		√		
30	*C. meadii*	Mead's Sedge		√	√	
31	*C. molesta**	Troublesome Sedge	√			√
32	*C. muehlenbergii* *	Sand Bracted Sedge	√	√	√	√
33	*C. normalis*	Normal Sedge			√	√
34	*C. pellita* *	Woolly Sedge	√	√	√	√
35	*C. pensylvanica* *	Penn Sedge	√	√	√	√
36	*C. prairea*	Fen Panicled Sedge			√	
37	*C. retrorsa*	Retrorse Sedge	√		√	√
38	*C. richardsonii*	Richardson's Sedge	√		√	
39	*C. rosea*	Rose Sedge		√		
40	*C. sartwellii*	Running Marsh Sedge	√	√	√	√
41	*C. scoparia*	Pointed Broom Sedge	√			
42	*C. siccata*	Running Prairie Sedge	√	√		
43	*C. sparganioides*	Bur-reed Sedge	√			√
44	*C. sterilis* *	Fen Star Sedge	√	√	√	
45	*C. stipata**	Saw-beak Sedge	√	√	√	√
46	*C. stricta* *	Tussock Sedge	√	√	√	√
47	*C. suberecta*	Wedge Sedge	√		√	
48	*C. tenera*	Remote Sedge		√	√	

Table 9: Continued.

No	Carex species	Common name	Locations			
			IBSP	SB	CHI	W
49	*C. tetanica=panicea*	Stiff Sedge	√	√	√	√
50	*C. tonsa*	Shaved Sedge	√		√	
51	*C. tribuloides*	Bristle-bract Sedge		√	√	√
52	*C. umbellata* *	Umbrella Sedge	√	√	√	√
53	*C. viridula* *	Little Green Sedge	√		√	√
54	*C. vulpinoidea**	Brown Fox Sedge	√	√	√	√

C. aquatilis, C. bebbii, C. buxbaumii, C. comosa, C. crawei, C. granularis, C. grisea, C. hystericina, C. lacustris, C. lasiocarpa, C. muehlenbergii, C. pellita, C. pensylvanica, C. sterilis, C. stipata, C. stricta, C. tetanica, C. viridula, C. umbellata and *C. vulpinoidea.*

In 1976 Wilson, Bowles and Moran sampled both IBSP and the adjoining Spring Bluff for INAI. In August, Spring Bluff had *C. lacustris* in the marsh, *C. sterilis* in the fen and *C. lanuginosa* in the wet prairie. *C. stricta* (?) was questioned as *C. spp* in the mesic prairie. The Spring Bluff samplings were repeated in June, July, and September of 1997 by Schennum, Basing, O'Leary and Leigh, and resulted in 23 *Carex*: *C. annectens, C. aquatilis var. altior, C. atherodes, C. bebbii, C. bicknellii, C. buxbaumii, C. crawei, C. granularis, C. haydenii, C. interior, C. lacustris, C. laxiflora, C. meadii, C. muehlenbergii, C. pellita, C. pensylvanica, C. rosea, C. sartwellii, C. sterilis, C. stipata, C. stricta, C. tetanica*, and *C. umbellata. Carex tribuloides* was not in the INAI data for Spring Bluff but was listed in the LCFP Spring Bluff Inventory. INAI's Spring Bluff samples had species that were not found in their IBSP samples. They were *C. annectens, C. bicknelli, C. haydenii, C. meadii, C. normalis, C. rosea,* and *C. tenera.*

The Waukegan Dunes and Moorlands are the southernmost part of the Zion ridge-beach plain. Located east of the bluff and south of the IBSP, some parts are both east and west of the Union Pacific Railroad (formerly Chicago-Northwestern in 1995) (WIKI Watershed Central). The Waukegan Harbor Citizens Advisory Group (CAG) sponsored a vegetation survey in 2001, 2011 and 2012 (Milde 2012). Four *Carex* that grow in the Waukegan Dunes and not previously known in the IBSP were discovered during fieldwork in 2011 near Bull Creek in IBSP: *C. cristatella, C. molesta,* and *C. grisea and C. sparganoides.* Table 9 includes IBSP vouchered herbarium specimens as well as those inventoried in the Waukegan Dunes. A voucher specimen of endangered *C. garberi* from the Waukegan Dunes has been deposited at the Morton Arboretum (Milde 2012).

CONCLUSIONS

The Illinois Beach State Park and Nature Preserve have 43 *Carex* species with specimens in 12 herbaria. Six new species were discovered during fieldwork in 2010–2012, of which four were woodland species and likely migrants resulting from habitat alterations: *C. annectens* E. P. Bicknell var. *xanthocarpa* (Kuk.) Wiegand, *C. cristatella* Britt. , *C. grisea* Wahlenb. , *C. interior* L. H. Bailey, *C. molesta* Mack. , and *C. sparganioides* Willd. The total number of *Carex* from Illinois Beach State Park, Chiwaukee Prairie, Spring Bluff and Waukegan Dunes was 54 species with only 14 species common to all four locations: *C. aquatilis var altior (Rydb) Fern. , C. bebbii* (L. H. Bailey) Fern. , *C. buxbaumii* Wahlenb. , *C. granularis var. haleana Willd. , C. hystericina* Willd. , *C. grisea* Wahlenb. , *C. muehlenbergii* Willd. , *C. pellita* Willd. , *C. pensylvanica* Lam. , *C. sartwellii* Dewey, *C. stipata* Willd. , *C. stricta* Lam. , *C. umbellata* Willd. , *C. vulpinoidea* Michx. The two varieties of *C. aquatilis* are treated as one species in Tables 9 and 10 but C. *aquatalis var substricta* is *var. altior* in *Swink and Wilhelm* (1994). Nomenclature follows Swink and Wilhelm (1994).

ACKNOWLEDGMENTS

The scope of this research involved botanists, consultants, curators, geologists, librarians, and more, to whom I am most grateful.

Chicago Botanic Garden: Nyree Zerega
Conservation Research Institute: Gerould Wilhelm
Field Museum, Chicago: Christine Niezgoda
IDNR Illinois Natural Heritage Database: Tara Kieninger
Illinois Department of Natural Resources: Duane Ambroz, Greg Behm
Illinois State Geological Survey: Donald Luman, Bryan Luman
Illinois Native Plant Society: Kathy Garness

Illinois Natural History Survey, Rick Phillippe, Diane Szafoni
Illinois Nature Preserves Commission: Kelly Neal
Illinois State Museum Herbarium: Hong Qian
Lake County Mapping Division: Richard Knodel
Lake County Forest Preserves: Ken Klick, Jim Anderson
Lake Forest College: Victoria Jones, Sean Menke, Ken Weik
Millennium Seed Bank Project: David Sollenberger
Missouri Botanical Garden: George Yatskievych
Morton Arboretum: Bethany Brown, Andrew Hipp, Marlin Bowles, Rita Hassert
Milwaukee Public Museum Herbarium: Neil Leubke
New York Botanical Garden Herbarium: Robert Naczi
Plants of Concern: Susanne Masi, Lori Ardimore
University of Illinois Plant Biology Herbarium: Ken Robertson
University of Michigan-Ann Arbor Herbarium: Anton Reznicek
University of Wisconsin-Madison Herbarium: Mark Wetter, Ted Cochrane
University of Wisconsin-Stevens Point Herbarium: Merel Black
Consultants: Patricia Marlowe, Environmental Consultant, Margo Milde, Botany Consultant, Waukegan Dunes
Sheryl DeVore, Managing Editor of Shaw Media.
State and IBSP maps: Tracy Evans, Erigenia Editor

LITERATURE CITED

Ambroz, D. and Garness, K. 2012. Documented Flora of Illinois Beach State Park, Zion, Illinois and Spring Bluff, Winthrop Harbor, Illinois Department of Natural Resources.

Ball, P. W. and A. A. Reznicek. eds. *Cyperaceae*. Flora of North America, Volume 23:254-573. New York: Oxford University Press.

Coastal Management Program (ICMP). 2011. *Illinois Beach State Park and North Point Marina including the Dead River and Kellogg Creek watersheds*, 2011. www.dnr.illinois.gov/cmp/Pages/boundaries.aspx.

Cowles, H. C. 1899. *The ecological relations of the vegetation on the sand dunes of Lake Michigan.* Botanical Gazette 27(5):361–391.

Curtis, L. W. 1974. *A vegetation analysis of Benedict Prairie, Kenosha County, Wisconsin.* Master's thesis, U-Wisconsin-Milwaukee. www.curtistothethird.com.

Gates, F. C. 1912. *The vegetation of the beach area in northeastern Illinois and southeastern Wisconsin.* Bulletin of Illinois State Laboratory of Natural History 9:255–372.

Hester, N. C. and G. S. Fraser. 1973. *Sedimentology of a beach ridge complex and its significance in land-uses planning*. Illinois State Geological Survey, Environmental Geology Notes.

Kenosha County Interactive Mapping System. Kenosha County. civicplus.com http://kcmapping.co.kenosha.wi.us/mapping-v2/(Sgu314i45x20x34mad4uvwks55).

Lake County GIS Mapping Division. 2012. http://maps.lakecountyil.gov/HistoricAerials.

Lunn, E. 1982. *Plants of the Illinois Dunesland*. Illinois Dunesland Preservation Society.

Milde, M. 2012. Floristic Inventories of Waukegan Dunes and Beach and Adjacent Properties in Waukegan Harbor of Concern and Extended Study Area Work.

Mohlenbrock, R. H. 2011. 2nd Ed. *The illustrated flora of Illinois—Sedges: Carex*. Carbondale: Southern Illinois University Press.

Pepoon, H. S. 1927. *An Annotated Flora of Chicago Area*. Chicago: Chicago Academy of Science.

Plants of Concern, rare plant monitoring. Chicago Wilderness and Chicago Botanic Garden. www.plantsofconcern.org.

Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region*. 4th ed. The Morton Arboretum, Lisle, Illinois.

Waukegan Harbor Citizens Advisor Group map. http://waukeganharborcag.com/images/SouthernBuffer Restoration. jpg. Wiki Watershed Central. https://wiki.epa.gov/watershed2/index.php/DeadRiver

Wisconsin Botanical Information, 01N, 23E. http://wisplants.uwsp.edu/TRsearch. htim

APPENDIX

Herbaria

Field Museum of Natural History, Botany Collections Database, Chicago, Illinois. http://emuweb.fieldmuseum.org/botany/Query.php.

Illinois Natural History Survey Botany Collections. http://www.inhs.uiuc.edu/kenr/herbarium.html.

Illinois State Museum Herbarium, Springfield. www.museum.state.il.usmdepts/botany/herbarium.

Lake Forest College Herbarium. https://www.lakeforest.edu/library/archives/herbarium.php.

Missouri Botanical Garden. http://www.tropicos.org.

Morton Arboretum Herbarium Data Access. http://quercus.mortonarb.org.

Northern Illinois University Herbarium, DeKalb: http://www. bios.niu.edu/herbarium.

Stover-Ebinger Herbarium. Eastern Illinois University. http://www.ux1.eiu.edu/~cfgct/eiu-herbarium.htm.

University of Michigan Herbarium. http://www.Michiganflora.net.

University of Illinois Plant Biology Herbarium, Urbana-Champaign. www.life.illinois. edu/plantbio/herbarium.

vPlants Project: A Virtual Herbarium of the Chicago Region. Herbaria: Field Museum (F), Morton Arboretum (MOR), Chicago Botanical Garden (CHIC). http://www.vplants.org.

Wisconsin State Herbarium. http://www.botany.wisc.edu/herbarium.

Wisconsin Plants, U-Wisconsin-Stevens Point, Robert Freckmann Herbarium http://wisplants.uwsp.edu/herbarium.

ERIGENIA, Number 26, Spring 2013, pp 26–32

VASCULAR FLORAL OF A GLACIAL DRIFT HILL PRAIRIE OF ANTHROPOGENIC ORIGIN, MACOUPIN COUNTY, ILLINOIS

William E. McClain[1] and John E. Ebinger[2*]

ABSTRACT: The vascular flora of the small Railroad-cut Glacial Drift Hill Prairie along an active railroad 4 miles southwest of Carlinville, Macoupin County, was studied during the growing seasons of 2009 and 2010. This hill prairie was created by the undercutting and subsequent soil slumping of a steeping slope after railroad construction, before the turn of the 19th century. The 0.3 ha hill prairie is located on a steep south- to southeast- facing slope of Illinoian glacial till in the Carlinville Section of the Western Forest-Prairie Natural Division. A total of 99 vascular plant taxa were observed on the site. More than 55 prairie taxa were encountered along with 16 exotic species and nine tree species. A total of 41 species were encountered in the plots. *Andropogon gerardii* (big bluestem) had the highest importance value followed by *Oligoneuron rigidum* (stiff goldenrod), and *Schizachyrium scoparium* (little bluestem); these three species accounting for over half of the total importance value (I.V. = 200 possible).

INTRODUCTION

Small prairie openings within forests are relatively common in east-central Illinois and were first described and named by Vestal (1918). These small prairies, usually less than 1 ha in size, develop near the crest of slopes of Wisconsin and Illinoian aged till. These "glacial drift hill prairies" are not nearly as common as the loess hill prairies found on the slopes and river bluffs of the Mississippi and Illinois River valleys of western Illinois that develop on wind-blown soils (Evers 1955). In east-central Illinois these prairie openings have been studied on Wisconsin glacial till in Coles County (Ebinger 1981, Reeves et al. 1978, Owens and Cole 2003, Behnke and Ebinger 1989), Moultrie County (Owens et al. 2006), Vermilion County (Owens and Ebinger 2008), on Illinoian glacial till in Jasper County (Edgin et al. 2010) and Macoupin County (McClain et al. 2002); and are not uncommon in the Illinois River valley from Peoria and Tazewell counties north through Marshall, Woodford, and Putnam counties (McFall and Karnes 1995).

Glacial drift hill prairies have many edaphic, physical and floristic similarities. They occur on steep south- to southwest-facing slopes with well-drained soils that are low in organic content and nutrients (Ebinger 1981, McClain et al. 2002, Owens et al. 2006, Owens and Ebinger 2008). The predominant vegetation is native warm season clump grasses complemented by prairie forbs and a sparse ground cover. Drying winds, unstable soil, fire, cutting, and grazing were thought to play significant roles in the development and maintenance of these sites (Vestal 1918, Reeves et al. 1978). The present study was undertaken to describe the composition and structure of the vegetation of a small prairie on steep glacial till of Illinoian age that appears to have been created by anthropogenic factors, particularly soil slumping after the lower part of the slope was removed during railroad construction, possibly as early as the 1850s.

DESCRIPTION OF THE STUDY SITE

Railroad-cut Glacial Drift Hill Prairie is located on a south- to southeast-facing slope along an active railroad line about 4 miles SW of Carlinville, Macoupin County, Illinois (NEQ NWQ Sec 13 T9N R8W). This railroad line was initially called the Alton and Sangamon Railroad. Construction started in 1849 with the intent of connecting Alton and the Mississippi River to Springfield, Illinois. It was completed to Carlinville in 1852 and Springfield in 1854. Eventually, another line was acquired, connected with Chicago, and called the Chicago and Alton Railroad. The railroad went through several ownerships and is now owned and operated by the Union Pacific. Presently, it

[1] Illinois State Museum, Springfield, Illinois 62706.
[2] Department of Biological Sciences, Eastern Illinois University, Charleston, Illinois 61920.
*corresponding author (jeebinger@eiu.edu)

carries eight to ten Amtrak trains per day and twice that many freight trains.

This 0.3 ha prairie is located at an elevation of about 180 m on the Illinoian glacial till plain in the Carlinville Section of the Western Forest-Prairie Natural Division (Schwegman 1973). The Carlinville Section is mostly strongly dissected and was mostly forested in early settlement times, prairie vegetation being restricted to level uplands and accounted for about 12% of the land surface. These prairie soils are high in organic matter and are similar to soils of the Grand Prairie Natural Division (Schwegman 1973). The forest communities varied from floodplain forests along rivers and stream to mesic forest in ravines and areas where fire-breaks decreased or prevented fires, and dry forests, barrens, and savannas where fires were relatively common (Anderson 1991, Ebinger and McClain 1991).

The Hickory Silt Loam of the prairie is highly eroded with little of the original A horizon present (Hodges et al. 1990). This forest soil is on an 18 to 30% slope, well drained, low in organic content, slightly acid (pH of 6.7–6.9), and low in available phosphorus and potassium. Many gravel size rocks to 15 cm in diameter are imbedded in the soil. In this part of Illinois annual precipitation averages 98.01 cm, with May having the highest rainfall (10.8 cm). Mean annual temperature is 11.9°C with July being the hottest month (average of 25.0° C), the coldest being January (−3.2° C). The average number of frost-free days is 182 (Midwestern Regional Climate Center 2011).

MATERIALS AND METHODS

The vascular flora of the prairie and adjacent open woodland margin were visited periodically during the 2009 and 2010 growing seasons. Voucher specimens were collected for most taxa and deposited in the Stover-Ebinger Herbarium of Eastern Illinois University, Charleston (EIU). Nomenclature follows Mohlenbrock (2002), and the assignment of exotic species status was determined using Taft et al. (1997) and Mohlenbrock (2002). The presence of any state endangered and threatened species was recorded (Illinois Endangered Species Protection Board 2005).

Quantitative sampling was conducted in late summer of 2010 using m^2 quadrats located at one-meter intervals along a randomly placed 25 m transects oriented perpendicular to the slope (n = 25 per transect). Even-number quadrats were placed to the right, odd-numbered to the left of each transect. Percent cover of each species was determined using Daubenmire cover class system (Daubenmire 1959) as modified by Bailey and Poulton (1968): class 1 = 0–1%; class 2 = 1–5%; class 3 = 5–25%; class 4 = 25–50%; class 5 = 50–75%; class 6 = 75–95%; class 7 = 95–100%. From these data, frequency (%), mean cover (%), relative frequency, relative cover, and Importance Value (relative frequency + relative cover) were determined (Table 1).

The Floristic Quality Index (FQI) was determined using the coefficient of conservatism (CC) assigned to each species by Taft et al. (1997). As used here, the FQI is a weighted index of species richness (N) and is the arithmetic product of the mean coefficient of conservatism (C-value), multiplied by the square root of species richness ($\sqrt{N}$) of the site [FQI = C-value ($\sqrt{N}$)]. The Sorensen Index of Similarity (ISs) was used to determine the degree of vegetation similarity among hill prairies studied in central Illinois (Mueller-Dombois and Ellenberg 1974). This index utilizes binary data (presence/absence) to measure the similarity in species composition between study sites using the following equation: [ISs = $2C/A+B \times 100$], A equals the number of species in the first community, B equals the number of species in the second community, and C equals the number of species common between the two communities (Table 2).

RESULTS

We collected 99 vascular plant species in and at the edge of the prairie (Appendix). Species present include one fern, one gymnosperm, 19 monocots in three families and 78 dicots in 31 families. Sixteen non-native (exotic) taxa were found, five in the plots. Predominant plant families were Asteraceae (26 species), Poaceae (16), and Fabaceae (9). No state endangered or threatened species were observed. The C-value and FQI for all species were 2.84 and 28.5, respectively, only five species having a CC of seven or more. When considering only native species, the C-value and FQI were 3.38 and 31.2, respectively.

Of the 99 species encountered on the prairie 41 were found in the plots. *Andropogon gerardii* (big bluestem) dominated with the highest importance value (I.V. of 46.1) and mean cover (25.10%) while the prairie forbs *Oligoneuron rigidum* (stiff goldenrod) and *Solidago nemoralis* (gray goldenrod) were second and sixth in I.V. respectively (Table 1). Other common native prairie grasses and grass-like taxa included *Schizachyrium scoparium* (little bluestem), *Scripus pendulus* (nodding bulrush), and *Dichanthelium acuminatum* (panic grass). The non-native cool-season *Poa pratensis* (Kentucky blue grass) was fifth in I.V. while other common exotic taxa included *Melilotus albus* (white sweet clover) and *Daucus carota* (Queen Anne's lace) among the top 10 species encountered. Bare ground and litter were common with a cover of 38%.

DISCUSSION

The glacial drift hill prairies of east-central Illinois share many characteristics, particularly soil type, structure,

Table 1: Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (IV) for the ground layer species encountered at the Railroad-cut Glacial Drift Hill Prairie, Macoupin County, Illinois (*exotic species).

Species	Frequency %	Mean Cover	Relative Frequency	Relative Cover	Importance Value
Andropogon gerardii	100	25.10	9.3	36.8	46.1
Oligoneuron rigidum	96	19.68	8.9	28.9	37.8
Schizachyrium scoparium	84	5.86	7.8	8.6	16.4
Scirpus pendulus	76	4.26	7.0	6.3	13.3
**Poa pratensis*	92	3.22	8.5	4.7	13.2
Solidago nemoralis	72	2.12	6.7	3.1	9.8
Dichanthelium acuminatum	72	0.66	6.7	1.0	7.7
**Melilotus albus*	56	1.26	5.2	1.8	7.0
**Daucus carota*	60	0.60	5.6	0.9	6.5
Brickellia eupatorioides	48	0.34	4.4	0.5	4.9
Ptelea trifoliata	40	0.60	3.7	0.9	4.6
Tridens flavus	20	0.78	1.9	1.1	3.0
Asclepias verticillata	28	0.14	2.6	0.2	2.8
Ruellia humilis	28	0.14	2.6	0.2	2.8
**Lonicera maackii*	8	1.20	0.7	1.8	2.5
Croton monanthogynus	20	0.10	1.9	0.2	2.1
Elymus virginicus	20	0.10	1.9	0.2	2.1
Eupatorium altissimum	16	0.28	1.5	0.4	1.9
Eragrostis spectabilis	4	0.60	0.4	0.9	1.3
Hyprericum punctatum	12	0.16	1.0	0.2	1.2
Acer saccharinum	12	0.06	1.0	0.1	1.1
Aristida oligantha	12	0.06	1.0	0.1	1.1
**Plantago lanceolata*	12	0.06	1.0	0.1	1.1
Rosa carolina	12	0.06	1.0	0.1	1.1
Anemone virginiana	8	0.04	0.7	0.1	0.8
Oxalis fontana	8	0.04	0.7	0.1	0.8
Potentilla simplex	8	0.04	0.7	0.1	0.8
Fraxinus lanceolata	4	0.12	0.4	0.2	0.6
Juniperus virginiana	4	0.12	0.4	0.2	0.6
Silphium terebinthinaceum	4	0.12	0.4	0.2	0.6
Others (11 species)	–	0.22	4.4	–	4.4
Totals		68.14	100.0	100.0	200.0
Bare ground and litter		38.80			

stability, slope, and exposure. Soil slumping, the downhill movement of large masses of soil, is common on these prairies. Our present knowledge suggests that slumping is responsible for the creation and maintenance of glacial drift hill prairies. Railroad-cut Glacial Drift Hill Prairie appears to have been created by soil slumping after the lower part of the slop was removed during railroad construction, possibly as early as the 1850s. Subsequent slumping and erosion of the steep hillside resulted in the removed of the soils A horizon

Table 2: Sorensen Index of Similarity of the ground layer vegetation of four glacial drift hill prairies located in central Illinois in which *Andropogon gerardii* and *Schizachyrium scoparium* are the dominant grass species.

Prairie, County, Reference	Railroad-cut	Capel	Coneflower
Capel (Shelby Co.) (McClain et al. 2013)	37.6		
Coneflower (Moultrie Co.) (Owens et al. 2006)	32.2	35.1	
Roderick (Macoupin Co.) (McClain et al. 2002)	48.6	46.0	43.5

exposing the heavy clay subsoil of Illinois glacial till (Vestal 1918, Owens et al. 2006, McClain et al. 2013).

Slumping has helped maintain glacial drift hill prairies by eliminating surrounding trees and by creating bare, open ground which succeeds to a community containing mostly prairie grasses and forbs (Owens et al. 2006). These prairie grasses and forbs are the "weedy" species that entered open areas created by catastrophic events. Many are well adapted to these clayey habitats, and can out-compete many of our modern-day exotic, non-native species. According to Vestal (1918) slumping creates bare areas on heavy clay soils that facilitate an early succession stage favorable to *Schizachyrium scoparium.* This sun-loving, early to mid-succession species is commonly associated with drier sites with poor soils. As succession progresses *Andropogon gerardii* increased in importance with a corresponding decrease in *Schizachyrium scoparium*.

Glacial drift hill prairies of central Illinois have a similar floristic composition consisting mostly of common prairie grasses and forbs along with a few conservative prairie species. Railroad-cut Glacial Drift Hill Prairie, however, has relatively poor species composition as indicated by the low Floristic Quality Index (FQI of 28.5%). The large number of exotics (16 species), the few conservative prairie species (only five species with a CC of ≥7), and the many woody taxa (nine species) on this hill prairie suggests that edaphic, climatic, exposure, and/or anthropomorphic factors are preventing the accumulation of more conservative prairie species typical of glacial drift hill prairies in central Illinois. It is also possible that the slumping is more recent and not enough time has lapsed to allow the accumulation of conservative species.

Other recently studied hill prairies in which *Andropogon gerardii* and *Schizachyrium scoparium* are the dominate grasses include Coneflower Glacial Drift Hill Prairie Natural Area, Moultrie County (Owens et al. 2006); Capel Glacial Drift Hill Prairie Natural Area, Shelby County (McClain et al. 2013), both on glacial moraine of Wisconsin till; and Roderick Prairie Nature Preserve, Macoupin County on Illinoian till (McClain et al 2002). The vegetation of these four hill prairie has a similarity index (ISs) between 32.2% and 48.6% (Table 2). Roderick Hill Prairie Nature Preserve is more similar to the other prairie examined probably because of it high species diversity (158 ground layer species). Railroad-cut Glacial drift Hill Prairie with only 89 ground layer species has a similarity index of 48.6% to Roderick prairie. These four hill prairies share 14 native and one exotic species in common. Five are prairie grasses (*Andropogon gerardii, Dichanthelium acuminatum, Elymus virginicus Schizachyrium scoparium, Tridens flava*); nine prairie forbs and shrubs (*Echinacea pallida. Euphorbia corollata, Hypericum punctatum, Lithospermum canescens, Physostegia virginiana, Ratibita pinnata, Rosa carolina, Ruellia humilis, Solidago nemoralis*); while the last is *Poa pratensis*, a cool-season exotic grass. All are common prairie species of central Illinois and would be expected in this habitat.

Railroad-cut Glacial Drift Hill Prairie is a work in progress. Though many prairie species are present, they are in low numbers, the clumps of the native grasses are small, and *Poa pratensis* (blue grass) is very common. Also, woody species dominate many parts of the prairie. With proper management, including woody removal and prescribed burns, this prairie may someday develop into a quality glacial drift hill prairie.

ACKNOWLEDGMENTS

The authors would like to thank Ms. Emily Stork of the Illinois Natural Areas Inventory for help with the preliminary examination of the site, and Dr. Loy R. Phillippi, Illinois Natural History Survey, for verified the identification of many of the species.

LITERATURE CITED

Anderson, R. C. 1991. Presettlement forests of Illinois. pp. 9–19 *in* G. V. Burger, J. E. Ebinger, and G. S. Wilhelm, eds., Proceedings of the oak woods management workshop. Eastern Illinois University, Charleston, Illinois.

Bailey, A. W. and C. E. Poulton. 1968. Plant communities and environmental relationships in a portion of Tillamook burn, northwestern Oregon. Ecology 49:1–13.

Behnke, G. and J. E. Ebinger. 1989. Woody invasion of glacial drift hill prairies in east-central Illinois. Transactions of the Illinois State Academy of Science 82:1–4.

Daubenmire, R. 1959. A canopy coverage method of vegetation analysis. Northwest Science 33:43–64.

Ebinger, J. E. 1981. Vegetation of glacial drift hill prairies in eastcentral Illinois. Castanea 46:115–121.

Ebinger, J. E. and W. E. McClain. 1991. Forest succession in the prairie peninsula of Illinois. Illinois Natural History Survey Bulletin 34:375–381.

Edgin, B., S. J. Adams, E. J. Stork, and J. E. Ebinger. 2010. Flora and species dominance of Green Prairie, Jasper County, Illinois – A glacial drift hill prairie on Illinoian till. Erigenia 23:24–33.

Evers, R. A. 1955. Hill prairies of Illinois. Bulletin of the Illinois Natural History Survey 26:367–446.

Hodges, M. S., S. Fisher, B. Houghtby, R. Moore, J. Rittterbusch, and L. Sabata. 1990. Soil Survey of Macoupin County. United States Department of Agriculture, Soil Conservation Service, and Illinois

Agricultural Experiment Station. U. S. Government Printing Office.
Illinois Endangered Species Protection Board. 2005, Checklist of Endangered and Threatened Animals and Plants of Illinois. Endangered Species protection Board, Springfield, Illinois.
McClain, W. E., M. A. Phipps, H. H. Eilers, and J. E. Ebinger. 2002. Vascular plants of glacial drift prairies in Macoupin County, Illinois. Castanea 67:54–60.
McClain, W. E., J. E. Ebinger, R. Jansen, and G. C. Tucker. 2013. Vascular floral of Capel Glacial Drift Hill Prairie Natural Area, Shelby County, Illinois. Transactions of the Illinois State Academy of Science 105: (in press)
McFall, D. and J. Karnes. 1995. (Editors). A directory of Illinois Nature Preserves. Volume 2. Northwestern, Central and Southern Illinois. Illinois Department of Natural Resources, Springfield, Illinois.
Midwestern Regional Climate Center. 2011. http://mcc.sws.uiuc.edu
Mohlenbrock, R. H. 2002. Vascular flora of Illinois. Southern Illinois University Press, Carbondale, Illinois.
Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, New York.
Owens, N. L. and G. N. Cole. 2003. 25 years of vegetational changes in a glacial drift hill prairie community in east-central Illinois. Transactions of the Illinois State Academy of Science 96:265–269.
Owens, N. L., G. C. Tucker, and J. E. Ebinger. 2006. Flora and vegetation of Coneflower Glacial Drift Hill Prairie Natural Area, Moultrie County, Illinois. Rhodora 108:370–386.
Owens, N. L. and J. E. Ebinger. 2008. Windfall Glacial Drift Hill Prairie, Vermilion County, Illinois: Present vegetation and changes since 1977. Transactions of the Illinois State Academy of Science 101:157–165.
Reeves, J. T., U. D. Zimmerman, and J. E. Ebinger. 1978. Microclimatic and soil differences between hill prairies and adjacent forests in east-central Illinois. Transactions of the Illinois State Academy of Science 71:156–164.
Schwegman, J. E. 1973. Comprehensive plan for the Illinois Nature Preserves Commission: Part 2. The Natural Divisions of Illinois. Illinois Nature Preserves Commission, Rockford, Illinois.
Taft, J. B., G. S. Wilhelm, D. M. Ladd, and L. A. Masters. 1997. Floristic quality assessment for vegetation in Illinois, a method for assessing vegetation integrity. Erigenia 15:1–95.
Vestal, A. G. 1918. Local inclusions of prairie within forest. Transactions of the Illinois State Academy of Science 11:12–126.

APPENDIX

Vascular plant species encountered at the Railroad-cut Glacial Drift Hill Prairie, Macoupin County, Illinois, are listed alphabetical by family under the major plant groups. Collecting numbers (JEE) are listed after each species. Specimens are deposited in the Ebinger/Stover Herbarium (EIU), Eastern Illinois University, Charleston, Illinois. (*exotic species)

FERN AND FERN-ALLIES

ASPLENIACEAE
Asplenium platyneuron (L.) Oakes: 32233

GYMNOSPERMS

CUPRESSACEAE
Juniperus virginiana L.: 32212

DICOTS

ACANTHACEAE
Ruellia humilis Nutt.: 32198

ACERACEAE
Acer saccharinum L.: 32449

APIACEAE
**Daucus carota* L.: 32326

APOCYNACEAE
Apocynum cannabinum L.: 32241

ASCLEPIADACEAE
Asclepias verticillata L.: 32450

ASTERACEAE
**Achillea millefolium* L.: 32242
Ambrosia artemisiifolia L.: 32713
Aster ericoides L.: 32204
Aster novae-angliae L.: 32195
Aster parviceps (Burgess) Mack. & Bush: 32218
Aster pilosus Willd.: 32208
Brickellia eupatorioides (L.) Shinners: 32187
Cirsium discolor (Muhl.) Spreng.: 32452
Conyza canadensis (L.) Cronq.: 32451
Coreopsis palmata Nutt.: 32214
Echinacea pallida (Nutt.) Nutt.: 32199
Erigeron strigosus Muhl.: 32243
Eupatorium altissimum L.: 32190

Gamochaeta purpurea (L.) Cabrera: 32244
Helianthus strumosus L.: 32630
Hieracium longipilum Torr.: 32312
Lactuca canadensis L.: 32327
Liatris aspera Michx.: 32194
Oligoneuron rigidum (L.) Small: 32205
Ratibita pinnata (Vent.) Barnh,.: 32320
Silphium integrifolium (Michx.: 32321
Silphium terebinthinaceum Jacq.: 32211
Solidago canadensis L.: 32200
Solidago nemoralis Ait.: 32209
Solidago speciosa Nutt.: 32202
Vernonia missourica Raf.: 32311

BORAGINACEAE
Lithospermum canescens (Michx.) Lehm.: 32314

CAESALPINIACEAE
Cercis canadensis L.: 32453

CAMPANULACEAE
Triodanis perfoliatum L.: 32246

CAPRIFOLIACEAE
**Lonicera japonica* Thunb.: 32632
**Lonicera maackii* (Rupr.) Maxim.: 32201
Triosteum perfoliata (L.) Nieuwl.: 32245

CARYOPHYLLACEAE
**Dianthus armeria* L.: 32328

EBENACEAE
Diospyros virginiana L.: 32315

ELAEAGNACEAE
**Elaeagnus umbellata* Thunb.: 32634

EUPHORBIACEAE
Croton monanthogynus Michx.: 32193
Euphorbia corollata L.: 32324

FABACEAE
Amorpha canescens Pursh: 32188
Dalea candida (Michx.) Willd.: 32325
Desmodium paniculatum (L.) DC.: 32454
Desmodium sessilifolium (Torr.) Torr. & Gray: 32636
Lespedeza violacea (L.) Pers.: 32316
**Melilotus albus* Medic: 32637
Stylosanthes leiosperma (T. & G.) Piper: 32186
**Trifolium campestre* Schreb.: 32247
**Trifolium repens* L.: 32248

FAGACEAE
Quercus imbricaria Michx.: 32197
Quercus velutina Lam.: 32638

HYPERICACEAE
Hyprericum punctatum Lam.: 32215

LAMIACEAE
Physostegia virginiana (L.) Benth.: 32639
Prunella vulgaris L.: 32318
Pycnanthemum tenuifolium Schrad.: 32189

MORACEAE
**Maclura pomifera* (Raf.) Schneider: 32640

OLEACEAE
Fraxinus lanceolata Borkh.: 32196

ONAGRACEAE
Oenothera biennis L.:32310

OXALIDACEAE
Oxalis fontana Bunge: 32642

PLANTAGINACEAE
**Plantago lanceolata* L.: 32313
Plantago virginica L.: 32249

RANUNCULACEAE
Anemone virginiana L.: 32456

ROSACEAE
Fragaria virginiana Duchesne: 32250
Potentilla simplex Michx.: 32251
Rosa carolina L.: 32252
**Rosa multiflora* Thunb.:32457
Rubus flagellaris Willd.: 32253

RUBIACEAE
Galium aparine L.: 32254

RUTACEAE
Ptelea trifoliata L.: 32458

SALICACEAE
Populus deltoides Marsh.: 32715

SCROPHULARIACEAE
Penstemon digitalis Nutt.: 32255
Penstemon pallidus Small: 32256
**Verbascum thapsus* L.: 32643

ULMACEAE
Ulmus americana L.: 32644
Ulmus rubra Muhl.: 32645

VERBENACEAE
Verbena stricta Vent.: 32323

MONOCOTS

CYPERACEAE
Carex bushii Mack.: 32234
Scirpus pendulus Muhl.:32455

ORCHIDACEAE
Spiranthes cernua (L.) Rich.: 32646

POACEAE
Agrostis hyemalis (Walt.) BSP.: 32235
Andropogon gerardii Vitman: 32213
Aristida longespica Poir.: 32191
Aristida oligantha Michx.: 32192
Dichanthelium acuminatum (Sw.) Gould & Clark: 32236
Dichanthelium oligosanthes (Schult.) Gould: 32206
**Digitaria sanguinalis* (L.) Scop.:32714
Elymus virginicus L.: 32322
Eragrostis spectabilis (Pursh) Steud.: 32216
**Festuca arundinacea* Schreb.: 32238
Panicum virgatum L.: 32207
**Poa pratensis* L.: 32239
Schizachyrium scoparium (Michx.) Nutt.: 32203
Sorghastrum nutans (L.) Nash: 32210
Tridens flavus (L.) Hitchc.: 32319
Vulpia octoflora (Walt.) Rydb.: 32240

ERIGENIA, Number 26, Spring 2013, pp 33–45

CONTINUING FLORISTIC AND QUANTITATIVE EVALUATIONS OF A PRAIRIE PROJECT STARTED IN 1974 IN NORTHERN FORD COUNTY, ILLINOIS

Don Gardner

ABSTRACT: Attempts to recreate tallgrass prairie are necessarily long-term efforts. Periodic floristic and quantitative surveys enhance the understanding of the development while drawing attention to potential problems on the evolving project. Prairie reconstruction work started in 1974 on a 3 ha former permanent pasture in northern Ford County. There was a floral survey of the site in 1991–92 with voucher specimens filed in the Illinois State Natural History Survey herbarium (ILLS). Point-intercept quantitative surveys were conducted in 1993, 1998 and 2004. This paper reports floral and quantitative surveys of the site that were repeated in 2012 with comparisons to the results from the earlier studies. The 1991–92 floral survey identified 189 vascular plant species, 138 were natives and 51 alien. The 2012 plant list has a total of 203 species with 158 natives and 45 aliens. The species increase is partially due to the addition of a prairie pothole to the otherwise mesic site. The recent quantitative survey encountered 84.9% native species, while in 1993 the intercepts encountered 66.2% native species. These surveys recorded data whose relative numbers were combined to assign Importance Values (IV) to the encountered species. Changes in IV rankings are reported for selected species. Comparisons are made for the top 20 ranked IV species in each of the four reporting periods. There has been a general decrease in the IV of non-native species. In the top 20 IV rankings there has been a decrease from nine alien species in 1993 to three in 2012. The results demonstrate both the improvements that occurred over time on this prairie project and also the slowness of the process of prairie reconstruction.

INTRODUCTION

The number and size of quality prairie remnants in the east central Illinois counties of Champaign, McLean, Livingston, and Ford is insignificant and is directly related to the high agricultural quality of the soils, which have been converted to row crop farming. Those four counties comprise a total of 3678.8 square miles or 652,826 ha (Illinois State Geological Survey. 2012). Only 5.6 ha of quality prairie remained of that vast, originally mostly prairie, region (White. 1978), a miniscule 0.0009% of the total land area. Thus it becomes an especially desirable area in which to attempt prairie reconstruction. Habitat restoration has been heralded as an important tool to ameliorate the tremendous impact that humans have had on natural ecosystems (Robertson 2008). It is this region, possibly more than others, that brings back images of the wide and extensive mostly treeless pre-settlement Grand Prairie of Illinois. This study undertakes a continuing floristic and quantitative appraisal of a prairie restoration project initiated in this region almost 40 years ago.

3584 N 1300 East Rd, Kempton, Illinois 60946.

METHODS

A former 3 ha pasture in Ford County at Kempton, Illinois (T28N R9E S6; lat. 40.93366N, long. −88.23690W) with no history of tillage at least since 1900 is the site of an attempt to recreate a semblance of the prairie that once dominated east- central Illinois. The site lies within the Grand Prairie Section of the Grand Prairie Natural Division of Illinois (Schwegman et al. 1973). The soils are Swygert and Bryce, somewhat poorly drained, fine-textured silty clay loams (Fehrenbacher 1990). The topography is gently rolling with an elevation difference of about 4.6 m (15 ft.) between the high and low portions of the field. Most land in the immediate area is under corn and soybean cultivation. This field was a permanent pasture from at least 1900 until 1965 when grazing ceased and it evolved into an old field until the prairie project

Table 1: Point intercept results for the reconstruction transects.

3–8 June 2012

Summary	
Intercept Point Locations	975
Intercept Count: Total individuals	1524
Species Count	53
Intercept Count: Native individuals	1401
% Native Species	84.9%
% Individual Native Intercepts	91.9%

Family	Species	Density	Frequency	Rel. Density	Rel. Freq.	IV (200)
POACEAE	*Andropogon gerardii*	419	366	27.5%	26.5%	54.0
APIACEAE	*Zizia aurea*	203	167	13.3%	12.1%	25.4
SCROPHULARIACEAE	*Pedicularis canadensis*	108	108	7.1%	7.8%	14.9
FABACEAE	*Dalea candida*	75	74	4.7%	5.4%	10.3
PRIMULACEAE	*Dodecatheon meadia*	62	61	4.1%	4.4%	8.5
POACEAE	*Sorghastrum nutans*	64	56	4.2%	4.0%	8.2
FABACEAE	*Trifolium pratense**	57	49	3.7%	3.5%	7.3
ASTERACEAE	*Oligoneuron rigidum*	51	50	3.3%	3.6%	7.0
APIACEAE	*Eryngium yuccifolium*	44	44	2.9%	3.2%	6.1
POACEAE	*Sporobolus heterolepis*	44	35	2.9%	2.5%	5.4
POACEAE	*Schizachyrium scoparium*	43	35	2.8%	2.5%	5.4
ASTERACEAE	*Coreopsis tripteris*	36	36	2.4%	2.6%	5.0
ASTERACEAE	*Parthenium integrifolium*	34	29	2.2%	2.1%	4.3
FABACEAE	*Dalea purpurea*	27	27	1.8%	2.0%	3.7
FABACEAE	*Lespedeza capitata*	27	27	1.8%	2.0%	3.7
FABACEAE	*Amorpha canescens*	26	24	1.7%	1.7%	3.4
POACEAE	*Poa spp.**	22	22	1.4%	1.6%	3.0
POACEAE	*Bromus inermis**	24	19	1.6%	1.4%	2.9
ASTERACEAE	*Liatris spp.*	14	13	0.9%	0.9%	1.9
ASTERACEAE	*Helianthus pauciflorus*	13	13	0.9%	0.9%	1.8
LAMIACEAE	*Physostegia virginiana*	13	13	0.9%	0.9%	1.8
ASTERACEAE	*Echinacea pallida*	9	9	0.6%	0.7%	1.2
ASTERACEAE	*Silphium integrifolium*	10	8	0.7%	0.6%	1.2
ASTERACEAE	*Aster novae-angliae*	8	8	0.5%	0.6%	1.1
ASTERACEAE	*Aster pilosus*	8	8	0.5%	0.6%	1.1
ASTERACEAE	*Achillea millefolium**	7	7	0.5%	0.5%	1.0
FABACEAE	*Medicago lupulina**	7	7	0.5%	0.5%	1.0
ROSACEAE	*Fragaria virginiana*	6	6	0.4%	0.4%	0.8
ASTERACEAE	*Silphium laciniatum*	6	6	0.4%	0.4%	0.8
GENTIANACEAE	*Gentianella quinquifolia*	6	6	0.4%	0.4%	0.8
ASTERACEAE	*Ambrosia trifida*	5	5	0.3%	0.4%	0.7
ASTERACEAE	*Ratibida pinnata*	5	5	0.3%	0.4%	0.7
SCROPHULARIACEAE	*Veronicastrum virginicum*	5	4	0.3%	0.3%	0.6
FABACEAE	*Baptisia alba*	4	4	0.3%	0.3%	0.6
CYPERACEAE	*Carex brevior*	3	3	0.2%	0.2%	0.4
ASTERACEAE	*Leucanthemum vulgare**	3	3	0.2%	0.2%	0.4
LAMIACEAE	*Pycnanthemum pilosum*	3	3	0.2%	0.2%	0.4
CYPERACEAE	*Eleocharis verrucosa*	2	2	0.1%	0.1%	0.3
ASTERACEAE	*Lactuca canadensis*	2	2	0.1%	0.1%	0.3
POACEAE	*Phleum pratense**	2	2	0.1%	0.1%	0.3
IRIDACEAE	*Sisyrinchium albidum*	2	2	0.1%	0.1%	0.3
ASTERACEAE	*Solidago altissima*	2	2	0.1%	0.1%	0.3
FABACEAE	*Astragalus canadensis*	2	2	0.1%	0.1%	0.3

Table 1: Continued.

Family	Species	Density	Frequency	Rel. Density	Rel. Freq.	IV (200)
ASTERACEAE	*Silphium terebinthinaceum*	2	2	0.1%	0.1%	0.3
ASTERACEAE	*Ambrosia artemisiifolia*	1	1	0.1%	0.1%	0.1
ASCLEPIADACEAE	*Asclepias tuberosa*	1	1	0.1%	0.1%	0.1
ASTERACEAE	*Erigeron strigosus*	1	1	0.1%	0.1%	0.1
FABACEAE	*Melilotus spp.**	1	1	0.1%	0.1%	0.1
VIOLACEAE	*Viola pratincola*	1	1	0.1%	0.1%	0.1
EUPHORBIACIAE	*Euphorbia corollata*	1	1	0.1%	0.1%	0.1
ONAGRACEAE	*Oenothera biennis*	1	1	0.1%	0.1%	0.1
ROSACEAE	*Rosa carolina*	1	1	0.1%	0.1%	0.1
VIOLACEAE	*Viola pedatifida*	1	1	0.1%	0.1%	0.1
Absence of cover 24		1524	1383	100%	100%	200.0

*Alien species
Liatris spp. combines *L. Pycnostachya & L. spicata*
Melilotus spp. combines *M. alba & M. officinalis*
Poa spp. combines *P. compressa & P. pratensis*

started in 1974. It was dominated by cool season alien grasses such a *Poa pratensis* (Kentucky bluegrass).

The climate for the region is seasonally highly-variable with the hottest month being July with an average high temperature at the Pontiac reporting station for the past five years of 83.1°F. The coldest month is January with a five-year average low temperature of 14.0°F. For the 2007–2011 time period the average annual precipitation was 101 cm (39.9 in.) (Illinois State Water Survey 2012).

Regional ecotype seed was hand-collected and applied to separate plots progressively across the field. The size of the plots varied with the amount of seed available each year. The first plot was seeded in 1974 and the last in 1990 with concurrent and subsequent enrichment seeding. Methods of soil preparation, timing, plot designations, and seed application are discussed in a previous paper (Gardner 1995a). In 2001 an adjacent agricultural field was added to the site, which now totals 6.1 ha. Prairie reconstruction on that site was initiated then and continues to the present. This field is included in the floristic survey, but the quantitative survey is restricted to the original 3 ha reconstruction field as were the previous surveys in 1993 (Gardner 1995b), 1998, and 2004 (Gardner 2006). Within the field a 0.19 ha portion served as a control in all sampling periods. There was no introduction of additional species or intervention other than annual burning in this area. After 1974 the remaining part of the field was burned annually with a different portion (about 20%) left unburned each year.

Five north-south line transects totaling about 339 m were established across the field in June 1993 and were retained for the sampling in 1998, 2004, and 2012. Vegetation along these transects was identified and recorded using a point-intercept method. Point-intercept can provide accurate quantitative estimates of non-forest communities for description purposes (Becker and Crockett 1973, Mueller-Dombois and Ellenberg 1974).

This method was modified by using five holes spaced at 20 cm intervals in the horizontal portion of the point-intercept frame, which was supported on legs about one meter above ground level. A pointed steel rod, 3.4 mm in diameter, was passed successively through each hole. Each plant contacted by the point during descent of the rod was recorded by species. Upon completion of the five intercept readings, the frame was moved along the line transect and the process repeated at 1.5 m intervals. In 2012 readings were taken at 975 intercept points on transects in the reconstruction portion of the study site. A transect passed through the control area where there was sampling at 155 intercept points. Both the reconstruction and the control were burned in March 2012.

For this point-intercept study frequency is defined as the number of points at which a species is encountered and thus is an expression of the distribution of the species over the extent of the transects. Density is the number of times individual plants of a given species are encountered. These numbers were converted to relative density (RD) and relative frequency (RF). The sum of relative density and relative frequency (200) gives the importance value (IV) for each species (RD+RF=IV). Cover is defined as the first contact of the descending rod at each point. It provides information as to the aspect of the field, but it over-emphasizes the topmost level of the vegetation and is not recorded here or used for determining IV.

The alien grasses, *Poa pratensis* (Kentucky bluegrass) and *Poa compressa* (Canada blue grass) were combined as *Poa* spp. due to difficulty at times in differentiating them in the field. Early in the growing season it can be difficult to differentiate *Melilotus alba* (white sweet clover) and *Melilotus officinalis* (yellow sweet clover). They have been combined as *Melilotus* spp. *Liatris pycnostachya* (prairie blazing star) and *Liatris spicata* (marsh blazing star) were treated as *Liatris* spp.

RESULTS

Quantitative survey

Reconstruction Transects

On the four transects across the reconstructed part of the site there were 1524 individual plants comprising 53 species. The individual plants were 91.9% natives. The species encountered were 84.9% natives (Table 1). In 1993 the intercepts were with 66.2% native species (Gardner 1995b). The three most common families encountered were Asteraceae with 19 species, Fabaceae 9, and Poaceae 7. Contacts with individual plants within those families were Poaceae 618, Fabaceae 226, and Asteraceae 217.

Examples of changes are *Ratibida pinnata* (yellow coneflower), which decreased in IV from 4.6 in 1993 to 0.7 in 2012 and *Elymus canadensis* (nodding wild rye) that was 1.9 in 1993 and was not encountered on the transects in 2012 although they continued to occur in the field. Both of these are considered to be pioneer species whose populations would be expected to decrease over time.

During the period from 1965 until 1974 as the site succeeded into an old field, one of the prominent species was *Aster pilosus* (hairy aster). When the first survey was conducted in 1993 it was the second most prominent with an IV of 16.5 (Table 2). In subsequent years that ranking dropped and in 2012 it was 25th receiving an IV of 1.1. Similarly *Daucus carota* (wild carrot), a pervasive old field species, moved from third rank in 1993 with an IV of 11.7 to failure to be recorded on the trnsects in 2012.

Comparisons of the 20 species with the highest IV rankings in the four study periods are presented in Table 2. There has been a general decrease in the IV of alien species with a decrease from nine species in 1993 to three in 2012. An exception is *Trifolium pratense* (red clover). It maintained a substantial, but essentially unchanged IV of 5.7, 5.7, and 5.5 during the first three data collection periods. However, in 2012 there was an increase to IV 7.3. It is not apparent why this occurred, but it presents a possible problem that will require close monitoring in the future.

A continuing problem has been the presence of the aliens *Melilotus alba* (white sweet clover) and *M. officinalis* (yellow sweet clover). After rising between 1993 and 1998 from IV 2.9 to 7.8 there was a concerted control effort. In 2004 the IV fell to 3.0 and in 2012 it dropped out of the top twenty species to IV 0.1. Control of this species has involved a combination of hand pulling with removal of seed bearing plants from the field and spot applications of 2,4-D amine spray. This will continue as long as plants appear.

Bromus inermis (smooth brome) has a continued presence on the site, but very few individuals are found in the interior of the field. Review of the intercept worksheets reveals that 64% of the encounters with that species occurred within the 4.5 m perimeter area of the field. The field edge appears to be an area of competition between native and alien species. The higher populations of certain alien species in perimeter areas have been noted elsewhere (Christiansen 1990, Taft 2005).

Over the twenty-year period of the study there have been increases in IV of native species including *Pedicularis canadensis* (wood betony), *Dodecatheon meadia* (shooting star), *Dalea candida* (white prairie clover), *Dalea purpurea* (purple prairie clover), *Sporobolus heterolepis* (prairie dropseed), *Amorpha canescens* (leadplant), *Eryngium yuccifolium* (rattlesnake master), *Zizia aurea* (golden Alexander), and others (Table 2). These increases appear to have been due to a combination of natural recruitment and, to a lesser extent, enrichment seeding.

In each of the four reporting periods *Andropogon gerardii* (big bluestem) has maintained the highest IV rank reflecting the generally heavy applications of that seed. However, personal observation indicates that the height and robustness of those plants have decreased over the years and its presence has not interfered with establishment and population increases of quality prairie species (Table 2) and in the plant list found in the Appendix. Large early populations of *A. gerardii* appear to hasten the displacement of some alien species.

Control Transect

After 1974 the control area was burned annually. It received no other disturbance and there was no intervention with seed application. This survey included 155 intercept points on the transect passing through the control area. Native species accounted for 85.2% of the encounters. Individual native plant intercepts comprised 95.7% of the total contacts with individual plants (Table 3).

Over the years there have been distinct population changes on the control area. In 1993 *Poa pratensis* retained dominance with the IV of 34.5. That ranking progressively fell to an IV of 3.2 in 2012 (Table 4). Other non-native species also decreased in ranking or were no longer encountered. In 1993 there were ten non-native species in the top 20 IV ratings. In 2012 there were three.

Table 2: Comparisons of twenty species with highest importance values on reconstruction transects.

	1993	IV	1998	IV	2004	IV	2012	IV
1	*Andropogon gerardii*	51.4	*Andropogon gerardii*	73.8	*Andropogon gerardii*	68.2	*Andropogon gerardii*	54.0
2	*Aster pilosus*	16.5	***Poa* spp.**	10.4	*Zizia aurea*	18.2	*Zizia aurea*	25.4
3	***Daucus carota***	11.7	*Sporobolus heterolepis*	10.2	*Pedicularis canadensis*	15.2	*Pedicularis canadensis*	14.9
4	***Achillea millefolium***	11.5	***Bromus inermis***	9.6	*Sorghastrum nutans*	11.1	*Dalea candida*	10.3
5	*Sorghastrum nutans*	10.6	***Achillea millefolium***	9.0	***Bromus inermis***	8.2	*Dodecatheon meadia*	8.5
6	*Schizachyrium scoparium*	9.8	*Zizia aurea*	8.1	*Sporobolus heterolepis*	7.7	*Sorghastrum nutans*	8.2
7	***Poa* spp.**	6.8	***Melilotus* spp.**	7.8	***Trifolium pratense***	5.5	***Trifolium pratense***	7.3
8	*Ambrosia artemisiifolia*	6.0	*Pedicularis canadensis*	7.3	*Oligoneuron rigidum*	5.3	*Oligoneuron rigidum*	7.0
9	***Trifolium pratense***	5.7	*Fragaria virginiana*	6.5	*Dodecatheon meadia*	4.8	*Eryngium yuccifolium*	6.1
10	***Potentilla recta***	4.6	*Ratibida pinnata*	6.4	***Poa* spp.**	4.4	*Sporobolus heterolepis*	5.4
11	*Ratibida pinnata*	4.6	*Schizachyrium scoparium*	5.9	*Ratibida pinnata*	3.8	*Schizachyrium scoparium*	5.4
12	***Medicago lupulina***	4.4	***Trifolium pratense***	5.7	***Achillea millefolium***	3.5	*Coreopsis tripteris*	5.0
13	*Monarda fistulosa*	3.9	*Aster pilosus*	2.9	*Schizachyrium scoparium*	3.2	*Parthenium integrifolium*	4.3
14	***Phleum pretense***	3.8	*Aster ericoides*	2.9	***Melilotus* spp.**	3.0	*Dalea purpurea*	3.7
15	*Aster ericoides*	3.5	*Dodecatheon meadia*	2.7	*Dalea candida*	2.9	*Lespedeza capitata*	3.7
16	***Melilotus* spp.**	2.9	*Monarda fistulosa*	2.6	***Dactylis glomerata***	2.7	*Amorpha canescens*	3.4
17	*Helianthus pauciflorus*	2.8	*Carex brevior*	2.4	*Helianthus pauciflorus*	2.6	***Poa* spp.**	3.0
18	*Pedicularis canadensis*	2.7	*Sporobolus heterolepis*	2.4	*Amorpha canescens*	2.1	***Bromus inermis***	2.9
19	***Bromus inermis***	2.6	*Amorpha canescens*	1.6	*Eryngium yuccifolium*	2.1	*Liatris* spp.	1.9
20	*Juncus interior*	2.0	***Elytrigia repens***	1.6	*Dalea purpurea*	1.9	*Helianthus pauciflorus*	1.8
	Species encountered	71	Species encountered	67	Species encountered	63	Species encountered	53
	Native species	66.2%	Native species	71.6%	Native species	75.8%	Native species	84.90%

Bold indicates alien species
Melilotus spp.combines *M. alba* & *M. officinalis*
Liatris spp. combines *L. spicata* & *L. pycnostachya*
Poa spp. combines *P. compressa* & *P. pratensis*

Table 3: Point intercept results control transect.

	Summary	
	Intercept Point Locations	155
	Intercept Count - Total Individuals	186
	Species Count	27
	Intercept Count - Native Individuals	178
	% Native Species	85.2%
3–8 June 2012	% Individual Native Intercepts	95.7%

Family	Species	Density	Frequency	Rel. Density	Rel. Freq.	IV (200)
POACEAE	*Sorghastrum nutans*	60	60	32.3%	32.4%	64.7
POACEAE	*Andropogon gerardii*	33	33	17.7%	17.8%	35.6
LILIACEAE	*Smilacina stellata*	20	20	10.8%	10.8%	21.6
ASTERACEAE	*Antennaria neglecta*	14	14	7.5%	7.6%	15.1
ASTERACEAE	*Ambrosia trifida*	8	7	4.3%	3.8%	8.1
FABACEAE	*Lespedeza capitata*	7	7	3.8%	3.8%	7.5
ASTERACEAE	*Ratibida pinnata*	6	6	3.2%	3.2%	6.5
CYPERACEAE	*Carex brevior*	3	3	1.6%	1.6%	3.2
FABACEAE	*Dalea candida*	3	3	1.6%	1.6%	3.2
SCROPHULARIACEAE	*Pedicularis canadensis*	3	3	1.6%	1.6%	3.2
POACEAE	*Poa spp.**	3	3	1.6%	1.6%	3.2
RANUNCULACEAE	*Anemone virginiana*	3	3	1.6%	1.6%	3.2
LAMIACEAE	*Monarda fistulosa*	3	3	1.6%	1.6%	3.2
ASTERACEAE	*Achillea millefolium**	2	2	1.1%	1.1%	2.2
ASTERACEAE	*Liatris spp.*	2	2	1.1%	1.1%	2.2
FABACEAE	*Medicago lupulina**	2	2	1.1%	1.1%	2.2
ROSACEAE	*Rosa carolina*	2	2	1.1%	1.1%	2.2
ASTERACEAE	*Solidago altissima*	2	2	1.1%	1.1%	2.2
CONVOVULACEAE	*Calystegia sepium*	2	2	1.1%	1.1%	2.2
ASTERACEAE	*Ambrosia artemisiifolia*	1	1	0.5%	0.5%	1.1
POACEAE	*Bromus inermis**	1	1	0.5%	0.5%	1.1
CYPERACEAE	*Carex bebbii*	1	1	0.5%	0.5%	1.1
ASTERACEAE	*Echinacea pallida*	1	1	0.5%	0.5%	1.1
POACEAE	*Elymus canadensis*	1	1	0.5%	0.5%	1.1
APIACEAE	*Eryngium yuccifolium*	1	1	0.5%	0.5%	1.1
GENTIANACEAE	*Gentiana puberulenta*	1	1	0.5%	0.5%	1.1
ASTERACEAE	*Helianthus grosseseratus*	1	1	0.5%	0.5%	1.1
Absence of cover 6		186	185	100%	100%	200.0

*Alien species
Liatris spp. combines *L. pycnostachya & L. spicata*
Melilotus spp. combines *M. alba & M. officinalis*
Poa spp. combines *P. compressa & P. pratensis*

The control area is bordered by the prairie reconstruction that is present on the remainder of the site. Establishment of prairie species has been accompanied by an encroachment of native species onto the control area. This is reflected by the 48.5% native species encountered on the control in 1993 and 85.2% in 2012.

The successional changes on an evolving prairie are exemplified again by *Ratibida pinnata.* On the control this pioneering species showed an increase in IV from 3.8 in 1993 to 14.1 in 2004. In 2012 the IV dropped to 6.5, which would be expected on a site that is increasing in native species diversity and coverage.

Sorghastrum nutans (Indian grass) and *Andropogon gerardii* (big bluestem) have gained in dominance on the control area. Other native species that have appeared or moved up in ranking are *Smilacina*

Table 4: Comparisons of twenty species with highest importance values on control transect.

	1993	IV	1998	IV	2004	IV	2012	IV
1	***Poa spp.***	34.5	*Andropogon gerardii*	64.0	*Sorghastrum nutans*	49.4	*Sorghastrum nutans*	64.7
2	***Daucus carota***	29.5	***Poa* spp.**	23.8	*Antennaria neglecta*	34.2	*Andropogon gerardii*	35.6
3	***Phleum pratense***	16.9	*Antennaria neglecta*	20.5	*Andropogon gerardii*	27.6	*Smilacina stellata*	21.6
4	*Aster pilosus*	16.4	*Sorghastrum nutans*	15.7	*Ratibida pinnata*	14.1	*Antennaria neglecta*	15.1
5	***Achillea millefolium***	10.9	*Ambrosia trifida*	11.2	*Ambrosia trifida*	13.6	*Ambrosia trifida*	8.1
6	*Dichanthelium acuminatum*	10.9	***Achillea millefolium***	10.7	***Poa* spp.**	9.7	*Lespedeza capitata*	7.5
7	***Brassica rapa***	8.7	*Ratibida pinnata*	7.7	***Achillea millefolium***	5.2	*Ratibida pinnata*	6.5
8	*Antennaria neglecta*	7.7	***Bromus inermis***	7.7	*Juncus interior*	5.2	*Carex brevior*	3.2
9	*Ambrosia artemisiifolia*	6.6	*Aster pilosus*	5.7	***Elytrigia repens***	4.8	*Dalea candida*	3.2
10	***Potentilla recta***	5.5	***Phleum pratense***	4.0	*Asclepias syriaca*	3.7	*Pedicularis canadensis*	3.2
11	***Plantago lanceolata***	4.9	*Carex brevior*	3.6	***Brassica rapa***	3.7	***Poa spp.***	3.2
12	*Andropogon gerardii*	4.4	*Asclepias verticillata*	2.9	*Carex brevior*	3.7	*Anemone virginiana*	3.2
13	*Fragaria virginiana*	4.4	*Dichanthelium acuminatum*	2.9	*Aster pilosus*	3.3	*Monarda fistulosa*	3.2
14	***Elytrigia repens***	*3.8*	*Chamaechrista fasciculata*	2.7	*Anemone virginiana*	3.0	***Achillea millefolium***	2.2
15	*Ratibida pinnata*	3.8	*Fragaria virginiana*	2.7	*Carex bebbii*	3.0	*Liatris* spp.	2.2
16	*Sorghastrum nutans*	3.8	***Brassica rapa***	2.0	*Oligoneuron rigidum*	3.0	***Medicago lupulina***	2.2
17	*Carex brevior*	3.3	***Persicaria vulgaris***	2.0	*Rosa carolina*	2.2	*Rosa carolina*	2.2
18	***Pastinaca sativa***	3.3	***Melilotus* spp.**	1.6	*Chamaechrista fasciculata*	1.5	*Solidago altissima*	2.2
19	*Aster ericoides*	2.2	*Elymus canadensis*	1.3	*Echinacea pallida*	1.5	*Calystegia sepium*	2.2
20	***Bromus inermis***	2.2	*Eupatorium altissimum*	1.3	*Asclepias verticillata*	0.7	*Ambrosia artemisiifolia*	1.1
	Species encountered	33	Species encountered	29	Species encountered	28	Species encountered	27
	Native species	48.5%	Native species	58.6%	Native species	67.9%	Native species	85.2%

Bold indicates alien species
Melilotus spp. combines *M. alba & M. officinalis*
Poa spp. combines *P. compressa & P. pratensis*
Liatris spp. combines *L. spicata & L. pycnostachya*

stellata (starry false Solomon's seal), *Lespedeza capitata* (round-headed bush clover), *Pedicularis canadensis* (wood betony), *Dalea candida* (white prairie clover), and *Liatris spicata* (marsh blazing star) among others. *Antennaria neglecta* (cat's-foot) was on the site when it was a pasture and has retained that presence.

The changes in species on the control area over the twenty-year period of the surveys appear to reinforce the personal observation that prairie can develop satisfactorily when three conditions are met: 1) the elimination of disturbances such as cultivation, intensive grazing, and repeated close mowing; 2) the occurrence of periodic fire; and 3) the proximity or introduction of a diverse and abundant native seed source.

Floristic survey

A floristic survey was conducted on the site in 1991–92 (Gardner 1995a) with voucher specimens filed in the Illinois Natural History Survey herbarium (ILLS). A current revised plant list accompanies this paper. This list includes plant species now established in the adjacent field that was added in 2001 had been largely destroyed through attempts at surface drainage. In 2001 it was altered in order to restore the seasonal wetland, which has a small prairie pothole. This wetland area increases the number of species suitable for the site. Those species are identified in the current plant list presented in the Appendix. Nomenclature and designation follows Mohlenbrock (2002).

The 1991–92 survey recorded 189 vascular plant species, 138 were natives and 51 alien. There were 37 families represented. The current list has a total of 203 species with 158 natives and 45 aliens in 43 families.

Additions to the established natives include *Gentiana* spp., *Lobelia spicata* (spiked lobelia) and *Potentilla arguta* (prairie cinquefoil), which were introduced in original seeding, but had not appeared at the time of the earlier plant list. Several of the additions are species adapted to the seasonally wetter conditions found in the wetland. Examples of these include *Lathyrus palustris* (marsh vetchling), *Spiraea alba* (meadow sweet), *Lobelia cardinalis* (cardinal flower), *Carex pellita* (wooly sedge), *Carex haydenei* (Hayden's sedge), and *Asclepias incarnata* (swamp milkweed). These were introduced transplants. *Schoenoplectus tabernaemontani* (soft-stem bulrush) appeared and was possibly introduced by waterfowl.

Among the natives that are no longer present are *Bouteloua curtipendula* (side-oats grama). Although present for several years after introduction the population decreased and it has not been observed for the past two or three years. This may be due to the competition on the heavy mesic soils on the site. *Heliopsis helianthoides* (ox-eye sunflower), *Koeleria macrantha* (June grass), and *Hierochloe odorata* (sweet grass) were introductions that are also no longer found on the site. *Perideridia americana* (perideridia) was initially present, but has disappeared.

An alien sedge, *Carex hirta* (hairy sedge) started to invade the northwest corner of the site, possibly from a nearby railroad. Continuing efforts have been made to remove the species using spot applications of glyphosate spray and it appears that extirpation has been successful, but until there is repeated confirmation it continues to be included on the plant list. There have been successful efforts through spot spraying and physical removal to extirpate from the field the infrequently found aliens *Rosa multiflora* (multiflora rose) and *Ornithogalum umbellatum* (star-of-Bethlehem).

Some annual species have been displaced through successional change and are no longer present on the original core part of the site, but are included on the list since they continue to occur on the more recently disturbed portions of the field added after 2001. These include the native annual grasses *Panicum capillare* (witch grass) and *Panicum dichotomiflorum* (fall panicum). Among alien annuals that are not found on the older part of the site and are disappearing elsewhere are *Mollugo verticillatus* (carpet weed) and *Cerastium fontanum* (common mouse-eared chickweed).

DISCUSSION

This project exemplifies the slow progress in attempting to recreate prairie. There has been the gratifying increase in established native species to 158, but 45 non-natives continue to be present. Because of that continuing, though decreasing, presence it is unlikely that total recreation of pre-settlement prairie will ever occur. That should in no way discourage the attempt. Black soil prairie remnants in the region are small and infrequent, but they can serve as models and guides for reconstruction efforts (Robertson 2004). By setting expectations high it is more likely that satisfactory results will be achieved over time.

Periodic surveys such as these and maintenance of annual notes are helpful in providing an objective view of how the project is developing and encourage staying focused on the project. They may identify and permit early attention to problems that appear such as a gradual increase in populations of invasive species as well as providing the satisfaction of quantifying what is hoped will be the long-term improvement of prairie plant populations.

LITERATURE CITED

Becker, D. A. and J. J. Crockett. 1973. Evaluation of sampling techniques on tall-grass prairie. Journal of Range Management 26:61–65.

Christiansen, P. A. 1992. Alien species cover on the perimeter of two northwest Iowa prairies. pp. 127–129 *in* D. D. Smith and C. A. Jacobs, eds., Proceedings of

the 12th North American Prairie Conference. University of Northern Iowa, Cedar Falls, Iowa.
Fehrenbacher, D. J. 1990. Soil survey of Ford County, Illinois. Illinois Agricultural Experiment Station Soil Report no. 128.
Gardner, D. 1995a. Prairie restoration on an east-central Illinois field. Erigenia 14:18–31.
Gardner, D. 1995b. Vegetation analysis of a prairie restoration, Ford County, Illinois. Erigenia 14: 32–36.
Gardner, D. 2006. Continuing vegetation analyses of a prairie restoration in Ford County, Illinois. Erigenia 21:3–9.
Illinois State Geological Survey. 2012. Illinois counties area. http://www.isgs.illinois.edu/education/hi-low/arearank.shtml
Illinois State Water Survey. 2012. Climatologist Data. Station 16910 Pontiac. http://www.isws.illinois.edu/data/climatedb/data.asp
Mohlenbrock, R. H. 2002. Vascular flora of Illinois. Southern Illinois University Press, Carbondale and Edwardsville, Illinois.
Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley & Sons, New York.
Robertson, K. R. 2004. List of plant species at three natural blacksoil prairie remnants in central Illinois. Illinois Natural History Survey. Champaign, Illinois. http://www.inhs.uiuc.edu/animals_plants/prairie/plants/Prairielist.html
Robertson, K. R. 2008. The tallgrass prairie in Illinois. Illinois Natural History Survey. Champaign, Illinois. http://www.inhs.uiuc.edu/~kenr/prairierestoration.html
Schwegman, J. E., M. Hutchison, E. G. Paulson, G. B. Fell, W. M. Shepherd, and J. White. 1973. Comprehensive plan for the Illinois Nature Preserves System: Part 2. The natural divisions of Illinois. Illinois Nature Preserves Commission, Rockford, Illinois.
Taft, J. B. 2005. Are small, isolated prairie preserves sustainable? Illinois Natural History Survey Reports 384:5.
White, J. 1978. Illinois natural areas inventory technical report: Vol. 1. Urbana, Illinois.

APPENDIX

Plant List Revised 2012
Gardner Prairie Project. Kempton, Illinois.
Mona Township. Ford County
Sec 6 T28N R9E: Lat.40.93366 N, Long.88.23690 W
Nomenclature and native-alien designations follow Mohlenbrock, R.H. 2002.
Vascular Flora of Illinois.
Carbondale:Southern Illinois University Press.
Asterisk indicates alien species.
Bold indicates species increases from added wetland

MONOCOTS

COMMELINACEAE	*Tradescantia ohiensis*	Ohio Spiderwort
CYPERACEAE	*Carex bebbii*	Bebb's Sedge
	Carex bicknellii	Bicknell's Sedge
	Carex blanda	
	Carex brevior	
	Carex cristatella	Round-spiklet sedge
	Carex frankii	Frank's Sedge
	Carex gravida	
	Carex haydenii	Hayden's Sedge
	*Carex hirta**	Hairy Sedge
	Carex meadii	Mead's Sedge
	Carex mesochorea	Midland Sedge
	Carex molesta	
	Carex muhlenbergii	Muhlenberg's Sedge
	Carex pellita	Wooly sedge
	Carex vulpinoidea	Foxtail Sedge
	Cyperus acuminatus	Pointed Flatsedge
	Cyperus esculentus	Yellow Nut Sedge
	Eleocharis compressa	Flat-stemmed Spikerush
	Eleocharis verrucosa	Warty Spikerush
	Schoenoplectus tabernaemontani	Soft-stem Bulrush
	Scirpus atrovirens	Dark Green Bulrush
	Scirpus pendulus	Nodding Bulrush
IRIDACEAE	*Iris shrevei*	Blue Flag
	Sisyrinchium albidum	Blue-eyed Grass
JUNCACEAE	*Juncus dudleyi*	Dudley's Rush
	Juncus interior	Inland Rush
	Juncus tennuis	Path Rush
	Juncus torreyi	Torrey's rush
LILIACEAE	*Asparagus officinalis**	Asparagus
	Smilacina stellata	Starry Solomon's-seal
POACEAE	*Agrostis gigantea**	Red Top
	Andropogon gerardii	Big Bluestem
	Aristida oligantha	Three-Awn
	*Bromus inermis**	Smooth Brome
	Calamagrostis canadensis	Blue Joint Grass
	*Dactylis glomerata**	Orchard Grass
	Dichanthelium acuminatum	Panic Grass
	*Echinochloa crus-galli**	Barnyard Grass

	Elymus canadensis	Nodding Wild Rye
	Elymus virginicus	Virginia Wild Rye
	*Elytrigia repens**	Quack Grass
	*Festuca pratensis**	Meadow Fescue
	Heterostipa spartea	Porcupine Grass
	*Hordeum jubatum**	Squirrel-tail Grass
	Leersia oryzoides	Rice Cutgrass
	Panicum virgatum	Switch Grass
	*Phleum pratense**	Timothy
	*Poa compressa**	Canada Blue Grass
	*Poa pratensis**	Kentucky Blue Grass
	Schizachyrium scoparium	Little Bluestem
	Sorghastrum nutans	Indian Grass
	Spartina pectinata	Cord Grass
	Sporobolus compositus	Dropseed
	Sporobolus heterolepis	Prairie Dropseed
TYPHACEAE	*Typha latifolia*	Common Cat-tail
DICOTS		
ACANTHACEAE	*Ruellia humilis*	Wild Petunia
AMARANTHACEAE	*Amaranthus retroflexus**	Rough Pigweed
APIACEAE	*Daucus carota**	Wild Carrot
	Eryngium yuccifolium	Rattlesnake Master
	*Pastinaca sativa**	Parsnip
	Zizea aurea	Golden Alexanders
ASCLEPIADACEAE	***Asclepias incarnata***	Swamp Milkweed
	Asclepias sullivantii	Prairie Milkweed
	Asclepias syriaca	Common Milkweed
	Asclepias tuberosa	Butterfly-weed
	Asclepias verticillata	Horsetail Milkweed
ASTERACEAE	*Achillea millefolium**	Yarrow
	Ambrosia artemisiifolia	Common Ragweed
	Ambrosia trifida	Giant Ragweed
	Antennaria neglecta	Pussy-toes
	*Arctium minus**	Common Burdock
	Aster ericoides	Heath Aster
	Aster laevis	Smooth Aster
	Aster novae-angliae	New England Aster
	Aster pilosus	Hairy Aster
	Aster praealtus	Willow Aster
	Bidens frondosa	Common Beggar's Ticks
	*Cichorium intybus**	Chicory
	Cirsium discolor	Pasture Thistle
	Coreopsis palmata	Prairie Coreopsis
	Coreopsis tripteris	Tall Coreopsis
	Echinacea pallida	Pale Coneflower
	Echinacea purpurea	Purple Coneflower
	Erigeron strigosus	Fleabane
	Eupatorium altissimum	Tall Boneset
	Euthamia graminifolia	Grass-leaved goldenrod
	Helianthus grosseserratus	Sawtooth Sunflower
	Helianthus pauciflorus	Prairie Sunflower
	Lactuca canadensis	Wild Lettuce
	*Lactuca serriola**	Prickly Lettuce
	*Leucanthemum vulgare**	Ox-eye Daisy
	Liatris aspera	Rough Blazing-star

	Liatris pycnostachya	Prairie Blazing-star
	Liatris spicata	Marsh Blazing-star
	Oligoneuron album	Stiff Aster
	Oligoneuron rigidum	Stiff Goldenrod
	Parthenium integrifolium	Wild Quinine
	Prenanthes aspera	Rough White Lettuce
	Ratibida pinnata	Yellow Coneflower
	Rudbeckia hirta	Black-Eyed Susan
	Rudbeckia triloba	Brown-eyed Susan
	Silphium integrifolium	Rosin Weed
	Silphium laciniatum	Compass-plant
	Silphium perfoliatum	Cup-plant
	Silphium terebinthinaceum	Prairie Dock
	Solidago altissima	Tall Goldenrod
	Solidago juncea	Early Goldenrod
	Solidago nemoralis	Gray goldenrod
	*Sonchus oleraceus**	Common Sow Thistle
	*Taraxacum officinale**	Common Dandelion
BORAGINACEAE	*Lithospermum canescens*	Hoary Puccoon
BRASSICACEAE	*Brassica rapa**	Field Mustard
	*Lepidium campestre**	Field Pepper-grass
	Rorippa palustris	Marsh Yellow Cress
	*Syanapis arvensis**	Charlock
	*Thlaspi arvense**	Penny Cress
CAESALPINIACEAE	*Chamaechrista fasciculata*	Partridge Pea
CAMPANULACEAE	***Lobelia cardinalis***	Cardinal Flower
	Lobelia spicata	Spiked Lobelia
CAROPHYLLACEAE	*Cerastium fontanum**	Mouse-Ear Chickweed
	*Silene pratensis**	White Campion
CHENOPODIACEAE	*Chenopodium album**	Lamb's Quarters
CONVOLVULACEAE	*Calystegia sepium*	Bindweed
	*Ipomoea hederacea**	Ivy-leaved Morning-glory
FABACEAE	*Amorpha canescens*	Lead Plant
	Apios americana	Groundnut
	Astragalus canadensis	Canadian Milk Vetch
	Baptisia alba	White Wild Indigo
	Baptisia bracteata	Cream Wild Indigo
	Dalea candida	White Prairie Clover
	Dalea purpurea	Purple Prairie Clover
	Lathyrus palustris	Marsh Vetchling
	Lespedeza capitata	Round-headed Bush Clover
	*Medicago lupulina**	Black Medick
	*Melilotus albus**	White Sweet Clover
	*Melilotus officinalis**	Yellow Sweet Clover
	Orbexilum onobrychis	French Grass
	*Trifolium hybridum**	Alsike Clover
	*Trifolium pratense**	Red Clover
	*Trifolium repens**	White Clover
GENTIANACEAE	*Gentiana alba*	Yellow Gentian
	Gentiana andrewsii	Closed Gentian
	Gentiana puberulenta	Downy Gentian
	Gentianella quinquefolia	Stiff Gentian
HYPERICACEAE	*Hypericum sphaerocarpum*	Round-fruited St.Johns-wort
LAMIACEAE	*Leonurus cardiaca**	Motherwort
	Monarda fistulosa	Wild Bergamot
	Physostegia virginiana	False Dragonhead

	Prunella vulgaris	Self-heal
	Pycnanthemum pilosum	Hairy Mountain Mint
	Pycnanthemum tenuifolium	Slender Mountain Mint
	Pycnanthemum virginianum	Common Mountain Mint
LYTHRACEAE	***Ammania robusta***	Tooth-cup
MIMOSACEAE	*Desmanthes illinoensis*	Illinois Mimosa
MOLLUGINACEAE	*Mollugo verticillatus**	Carpetweed
ONAGRACEAE	*Oenothera biennis*	Evening Primrose
	Oenothera pilosella	Prairie Sundrops
OXALIDACEAE	*Oxalis stricta*	Yellow Wood Sorrel
	Oxalis violacea	Purple Wood Sorrel
PLANTAGINACEAE	*Plantago lanceolata**	Buckhorn
	Plantago rugelii	Rugel's Plantain
POLEMONIACEAE	*Phlox glaberrima*	Smooth Phlox
	Phlox pilosa	Downy phlox
POLYGALACEAE	*Polygala sanguinea*	Field Milkwort
	Polygala verticillata	Whorled Milkwort
	Persicaria pensylvanica	Pinkweed
	*Persicaria vulgaris**	Lady's Thumb-print
	*Rumex crispus**	Curly Dock
PRIMULACEAE	*Dodecatheon meadia*	Shooting Star
	Lysimachia lanceolata	Loosestrife
RANUNCULACEAE	*Anemone canadensis*	Meadow Anemone
	Anemone cylindrica	Thimbleweed
	Anemone virginiana	Tall Anemone
	Ranunculus abortivus	Small-flowered Crowfoot
	Thalictrum dasycarpum	Purple Meadow Rue
RHAMNACEAE	*Ceanothus americanus*	New Jersey Tea
ROSACEAE	*Filipendula rubra*	Queen of the Prairie
	Fragaria virginiana	Wild Strawberry
	Geum canadense	White Avens
	Geum laciniatum	Rough Avens
	Potentilla arguta	Prairie Cinquefoil
	*Potentilla recta**	Sulfur Cinquefoil
	Potentilla simplex	Common Cinquefoil
	Rosa carolina	Pasture Rose
	Rubus sp.	Blackberry
	Spiraea alba	Meadow-sweet
RUBIACEAE	*Galium aparine*	Cleavers
	Galium boreale	Northern Bedstraw
SANTALACEAE	*Comandra umbellata*	False Toadflax
SAXIFRAGACEAE	*Heuchera richardsonii*	Prairie Alumroot
SCROPHULARIACEAE	*Pedicularis canadensis*	Lousewort
	Veronicastrum virginicum	Culver's-root
SOLANACEAE	*Physalis heterophylla*	Ground Cherry
	*Physalis longifolia**	Ground Cherry
	*Solanum carolinense**	Horse-nettle
	*Solanum dulcamara**	Bittersweet Nightshade
VERBENACEAE	*Verbena urticifolia*	White Vervain
VIOLACEAE	*Viola pedatifida*	Prairie Violet
	Viola pratincola	Common Blue Violet
VITACEAE	*Vitis aestivalis*	Summer Grape

Erigenia, Number 26, Spring 2013, pp 46–54

Fire Maintained Barren Communities: Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois

William E. McClain[1] and John E. Ebinger[2]

Abstract: In early settlement times barrens were common in Illinois, many being described by early settlers and the Government Land Office surveyors. These fire-maintained communities had an open canopy and a grass-dominated ground layer with both forest and prairie species. According to the early surveyors the barrens were extensive, covering many square miles of usually rolling topography. Fire suppression resulted in canopy closure and the loss of many open woodland and prairie species from the barrens. Two small barrens at Henry Eilers Shoal Creek Conservation Area, each about 1 ha in size, are currently being managed by fire. The canopy overstories, which would be classified as woodland communities (50 to 85% cover), were dominated by *Quercus stellata* (post oak), *Q. alba* (white oak), and *Q. rubra* (red oak). The woody understory was relatively open due to management fires, while the ground layer was a mixture of prairie and woodland grasses and forbs. Some changes in ground layer vegetation were observed after five years of management with the similarity index varying from 36.8 to 63.2.

Introduction

Barrens are generally described as open forests with a ground layer of prairie grasses and forbs that also had an unusually high proportion of forest herbs (Ellsworth 1838, Vestal 1936). The woody vegetation of barrens consisted of stunted trees with *Quercus stellata* (post oak), *Q. alba* (white oak), and *Carya* spp. (hickories) dominating the overstory. The common associated shrubs were *Corylus americana* (hazelnut), *Rhus glabra* (smooth sumac), and *R. copallina* (winged sumac) (Worthen 1868).

These fire-maintained communities were common in the hilly topography of southern and western Illinois in early settlement time (McClain and Elzinga 1994). The numerous prairie fires would commonly burn into the barrens particularly when fuel-loads were high. Barrens started to disappear from the Illinois landscape soon after Native Americans left and landscape fires stopped (Bourne 1820, Worthen 1868, 1870). By the 1860s it was realized that barrens were transient communities and, due to fire suppression, would soon be replaced by forest (Engelmann 1863). Presently few good quality examples of barrens exist in Illinois (Edgin 2000, Taft 2003, Edgin et al. 2005, McClain et al. 2007).

As this community is presently uncommon, attempts are being made to re-establish barrens where they previously existed (Bowles and McBride 1994, Bowles et al. 1994, Ebinger et al. 1994, Homoya 1994, Taft 2003, Edgin et al. 2005). The present study was undertaken to determine the composition and structure of the woody vegetation of two small barrens at Henry Eilers Shoal Creek Conservation Area, and to compare changes in the ground layer vegetation after management fires.

Description of the Study Area

The two barrens examined were within 300 m of each other at Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois. The South Barren was located on a nearly flat upland about 25 m east of Lake Lou Yaeger, while the North Barren was on the upper- and mid-slope of a southwest-facing hillside. The Preserve consists of approximately 105 ha of land owned by the City of Litchfield along the southeast shore of Lake Lou Yaeger, about 4 km northeast of Litchfield (NW1/4 S25 T9N R5W) at the extreme northwest edge of the Effingham Plain Section of the Southern Till Plain Natural Division (Schwegman 1973). The lake was created in the early 1960s by damning Shoal Creek. Sandstone and shale bedrock outcrops are common in the steep-sided ravines and

[1] Illinois State Museum, Springfield, Illinois 62706.
[2] Department of Biological Sciences, Eastern Illinois University, Charleston, Illinois 61920; corresponding author (jeebinger@eiu.edu).

along the creek bluffs that are now the lakeshore. At the time of European settlement oak-hickory forests, woodlands, and barrens dominated the rugged topography while prairies were mostly restricted to the level uplands (Anderson 1991). According to the Government Land Office (GLO) survey records this area was part of a relatively extensive barren in early settlement times (Hutchinson 1988).

Both barrens were small, less than 1 ha in size and had an open canopy. Both would presently be classified as mature second-growth dry-mesic upland woodland with 50 to 85% canopy cover. The open canopy and the open understory were probably the result of management fires. According to Henry Eilers (personal communication) the South Barrens (Central Barrens) was burned in 1990, 1992, 1993, 1994, 1995, 1998, 1999, 2005, 2008, and 2009, the North Barrens (Rocky Hollow Barrens) in 1990, 1994, 1998, 2006 and 2008.

The soils of the Preserve are Hickory loam and Hosmer silt loam that developed under forest in loess, while the ridge-top soils are Story silt loam that developed under forest on glacial till (Downey & Odell 1969). Elevation ranges from 195 m to 230 m. The climate is continental, characterized by humid, hot summers and cold winters. The average annual precipitation of 98 cm falls mostly as rain from March through November. January is the coldest month with an average high temperature of 1°C and an average low of −8°C. July is the hottest month with an average low of 19°C and an average high of 31°C. The frost-free growing period averages 182 days with a low of 137 and a high of 205 days (Midwestern Regional Climate Center, 2010; Carlinville, Illinois).

METHODS

Floristic composition

The Preserve was visited six to ten times each year throughout the growing seasons of 2005 and 2010. During these visits voucher specimens were collected and deposited in the herbarium of the Eastern Illinois University, Charleston, Illinois (EIU). The designation of exotic species follows Gleason and Cronquist (1991) and Mohlenbrock (2002), while nomenclature follows Mohlenbrock (2002), the listing for endangered species follows the Illinois Endangered Species Protection Board (2011).

Sampling

During the summer of 2005 the woody overstory was surveyed using contiguous quadrats 25 m on a side and all living woody individuals ≥10.0 cm dbh in these quadrats were identified and their diameters recorded. From these data, the living-stem density (stems/ha), basal area (m^2/ha), relative density, relative dominance, importance value (IV), and average diameter (cm) were calculated for each species. The I.V. was the sum of the relative density and relative dominance (McIntosh 1957).

Woody understory composition and density (stems/ha) were determined using nested /circular plots 0.0001, 0.001, and 0.01 ha in size located at about 20 m intervals along transect lines through each study area. Four additional 0.0001 ha circular plots were located 6 m from the center points along cardinal compass directions. In the 0.0001 ha plots, woody seedlings (≤50 cm tall) and all shrubs were counted; in the 0.001 ha circular plots small saplings (>50 cm tall and <2.5 cm dbh) were recorded; and in the 0.01 ha circular plots large saplings (2.5–9.9 cm dbh) were tallied [South Barren: seedlings (n=16), small saplings (n=4), and large saplings (n=4); North Barrens: seedlings (n=32, small saplings (n=8), large saplings (n=8)].

The ground layer vegetation was surveyed using two transects 25 m long located randomly in each study area. Along each transect, 1 m^2 quadrats were located at 1 m intervals (n=25/transect), odd-numbered quadrats to the right even-numbered to the left. A random numbers table was used to determine the number of meters (0 to 9) a quadrat was located from the transect line. Cover was determined by using the Daubenmire cover class system (Daubenmire 1959) as modified by Bailey and Poulton (1968). Importance value (I.V.) for ground layer species was determined by summing relative cover and relative frequency. Each barren was studied twice, once in late summer of 2005 and again in 2010.

The Sorensen Index of Similarity (ISs) was used to determine the degree of vegetation similarity between the barrens surveyed (Mueller-Dombois and Ellenberg 1974). This index utilizes binary data (presence/absence) to measure the similarity in species composition between study sites using the following equation: [ISs = 2C/A+B × 100], A equals the number of species in the first community, B equals the number of species in the second community, and C equals the number of species common between the two communities. Pairwise comparisons were made between each of the communities examined for the 2005 and 2010 ground layer surveys.

RESULTS

Floristic composition

We collected and/or observed 100 species of ground layer and shrub species in and at the edge of the two barren communities (Appendix). Of the species present 23 were monocots in five families while 77 species were

Table 1: Density (#/ha), basal area (m^2/ha), relative values, importance values, and average diameters (cm) of the tree species encountered at two barrens, Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois.

Species	Density (#/ha)	Basal Area (m^2/ha)	Rel. Den.	Rel. Dom.	IV	Average Diameter (cm)
South Barrens						
Quercus stellata	144	8. 024	40. 8	39. 4	80. 2	25. 2
Quercus alba	96	7. 578	27. 3	37. 2	64. 5	30. 6
Carya ovata	40	1. 440	11. 4	7. 1	18. 5	21. 3
Quercus rubra	24	1. 776	6. 8	8. 7	15. 5	28. 3
Fraxinus americana	8	0. 824	2. 3	4. 0	6. 3	36. 2
Ostrya virginiana	16	0. 192	4. 5	0. 9	5. 4	12. 2
Carya tomentosa	8	0. 264	2. 3	1. 3	3. 6	20. 4
Quercus marilandica	8	0. 216	2. 3	1. 1	3. 4	18. 4
Acer saccharum	8	0. 064	2. 3	0. 3	2. 6	10. 3
Totals	352	20. 378	100. 0	100. 0	200. 0	
North Barrens						
Quercus alba	120	12. 492	53. 5	68. 1	121. 6	33. 5
Quercus rubra	20	2. 392	8. 9	13. 0	21. 9	37. 2
Quercus stellata	28	1. 156	12. 5	6. 3	18. 8	21. 7
Quercus velutina	16	1. 424	7. 1	7. 8	14. 9	33. 1
Carya ovata	16	0. 584	7. 1	3. 2	10. 3	20. 1
Carya tomentosa	12	0. 140	5. 3	0. 8	6. 1	12. 0
Fraxinus lanceolata	8	0. 108	3. 8	0. 6	4. 4	13. 3
Ulmus americana	4	0. 036	1. 8	0. 2	2. 0	10. 7
Totals	224	18. 332	100. 0	100. 0	200. 0	

dicots in 24 families. Two non-native (exotic) taxa were found, but none were observed in the ground layer plots. Predominant plant families were Asteraceae (26 species), Poaceae (16), and Fabaceae (15). No state endangered or threatened species were encountered.

Woody overstory

On the two barrens examined oaks accounted for over 80% of the IV (Table 1). On the South Barrens *Quercus stellata* was the dominant species (I.V. of 80.2) followed by *Q. alba* (I.V. of 64.5) while on the North Barrens *Q. alba* dominated (I.V. of 121.6) followed by *Q. rubra* L. (red oak) (I.V. of 21.9), and *Q. stellata* accounted for only 18.8 of the I.V. As both barrens had a park-like appearance; the understory was very open. Small saplings averaging between 2293 stems/ha on the South Barrens to 9007 stems/ha on the North Barrens, while large saplings averaged between 114 and 120 stems/ha on the barrens (Table 2). Numerous tree seedlings were present, however, and averaged between 11,564 and 15,417 stems/ha. Many tree seedlings had an enlarged caudex indicating that they re-sprouted after each fire. These sprouts rarely reached the sapling layer due to the recurring fires.

Ground layer

On both barren sites the ground layer vegetation was relatively sparse in the 2005 survey, bare ground and litter had mean cover values of near 51.0%. In the 2005 survey *Helianthus divaricatus* (woodland sunflower) dominated both barrens with a mean cover greater than 9.0% and an I.V. that ranged from 25.5 to 33.1 (Table 3). Other common species on both barrens were *Schizachyrium scoparium* (little bluestem) (I.V. of 28.0 and 10.5), *Ceanothus americanus* (New Jersey tea) (I.V. of 18.0 and 20.0), and *Rosa carolina* (pasture rose) (I.V. of 14.3 and 9.6). Also, in 2005 a few species were common components of the South Barrens, but rare or absent from the North Barrens. These included *Tephrosia virginiana* (goat's-rue), *Aster turbinellus* (top-shaped aster), *Solidago nemoralis*, and *Lespedeza virginica* (slender bush clover) while on the North Barrens *Solidago* ulmifolia (elm-leaved goldenrod), *Desmodium glutinosum* (pointed tick trefoil), and *Lespedeza violacea* (violet bush clover) were common ground layer species not found on the South Barrens. These two barrens had a similarity index of 44.4 in 2005 (Table 4).

During the 2010 ground layer surveys bare ground and litter had a mean cover values of near 36% on both

Table 2: Density (stems/ha) of woody seedlings, shrubs, small saplings, and large saplings encountered at two barrens, Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois.

Species	Seedlings	Small Saplings	Large Saplings
South Barrens			
Quercus stellata	5833	500	8
Quercus alba	2917	250	16
Carya ovata	2500	250	–
Quercus rubra	1667	667	16
Amelanchier arborea	833	42	24
Prunus serotina	833	–	–
Carya tomentosa	417	458	32
Cercis canadensis	417	–	–
Quercus marilandica	–	42	–
Ostrya virginiana	–	–	16
Acer saccharum	–	–	8
Others (2 species)	–	84	–
Totals	15417	2293	120
North Barrens			
Quercus alba	6875	625	13
Sassafras albidum	1250	1438	50
Cercis canadensis	1250	188	–
Prunus serotina	625	188	–
Quercus velutina	313	438	25
Diospyros virginiana	313	313	–
Quercus rubra	–	2125	–
Carya ovata	–	938	13
Ostrya virginiana	–	750	13
Fraxinus lanceolata	–	625	–
Carya tomentosa	–	188	–
Carya cordiformis	–	125	–
Amelanchier arborea	–	125	–
Rubus allegheniensis	938	563	–
Others (6 species)	–	378	–
Totals	11564	9007	114

barrens, a decrease from that found in 2005 (Table 3). On both barrens the dominant species were still similar but *Schizachyrium scoparium* had decreased in important on the north barren by 2010. Also, the species not found on a barren in 2005 were mostly still absent. On both barrens the number of species observed in the plots was higher in 2010, while the average number of species per plot also increased (Table 3). By 2010 the north and south barrens had a similarity index of 46. 0, the south barren had a similarity index of 62.7 when comparing years while the north barren had a similarity index of 63.2 between the two years (Table 4).

On both barrens prairie and forest edge species were common (Table 3 and Appendix)) with about 60% of the species recorded in the plots we considered prairie species, 30% were species common to woodlands, and about 10% were weedy, exotic, and common species associated with both community types (Appendix).

DISCUSSION

At the time of European settlement in the early 1800s a broad mosaic of prairie and open- to closed-canopy oak-dominated communities (forest, woodland, savanna, barren) existed in Illinois (Transeau 1935, Anderson 1983, Davies 1994). Mostly prairie and savanna occurred on the relatively flat upland; the extensive forests, woodlands, and barrens common on dissected land with more topographic relief. These woods were common since rough topography act as fire-breaks, particularly on lee sides of topographic and wetland fire breaks. Fire frequency and intensity were important in determining composition and structure of these wooded areas. Intense and frequent fires created prairie and savanna, less intense and less frequent fires causing barrens and woodlands, while low intensity, infrequent fires allowed closed forests to persist (Ebinger and McClain 1991).

Table 3: Importance value (IV) of species encountered in the fall of 2005 and 2010 in the Barrens at Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois. Also listed are the total number of species encountered and the average number of species/plot. Only species with an IV of ≥ 3.0 are included.

Species	South Barrens 2005	South Barrens 2010	North Barrens 2005	North Barrens 2010
Helianthus divaricatus	33.1	22.0	25.5	27.8
Schizachyrium scoparium	28.0	27.3	10.5	3.9
Ceanothus americanus	18.0	27.4	20.0	15.5
Rosa carolina	14.3	14.2	9.6	9.4
Tephrosia virginiana	13.1	7.9	–	–
Aster turbinellus	12.9	9.0	1.9	3.2
Solidago nemoralis	12.2	9.3	0.3	–
Lespedeza virginca	10.1	11.2	–	–
Carex spp.	16.8	8.9	4.0	5.5
Pycnanthemum tenuifolium	6.1	5.4	–	1.2
Danthonia spicata	6.0	0.3	0.9	–
Monarda bradburiana	4.4	4.0	6.6	6.9
Coreopsis palmata	4.0	3.2	2.0	1.0
Liatris aspera	3.1	–	0.3	0.2
Verbesina helianthoides	2.9	6.1	3.9	11.7
Lespedeza capitata	2.2	6.5	–	–
Quercus alba	2.1	0.4	7.4	5.4
Andropogon gerardii	1.0	4.9	–	3.2
Chamaecrista fasciculata	0.4	3.6	0.6	–
Desmodium glabellum	0.4	7.4	2.2	9.8
Solidago ulmifolia	–	4.1	15.1	10.9
Desmodium glutinosum	–	0.2	9.4	10.7
Lespedeza violacea	–	0.3	9.8	12.1
Aster anomalus	–	0.9	7.1	2.5
Bromus pubescens	–	–	6.4	2.1
Amphicarpaea bracteata	–	0.2	6.0	13.2
Hypericum sphaerocarpum	–	–	5.2	6.7
Dichanthelium latifolium	–	–	4.2	3.9
Galium obtusum	–	–	4.0	1.3
Elymus virginicus	–	0.8	3.7	1.9
Ratibida pinnata	–	–	3.1	2.2
Potentilla simplex	–	0.3	2.1	1.0
Dichanthelium acuminatum	–	3.2	0.6	1.2
Elymus villosus	–	–	–	4.1
Others	8.9	11.0	27.6	21.5
Totals	200.0	200.0	200.0	200.0
Bare ground and litter cover	51.45	36.44	51.01	36.95
Total species encountered	26	39	53	60
Average number species/plot	6.14	9.20	7.28	10.76

Table 4: Similarity index of the barren communities during the 2005 and 2010 season at Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois.

Barrens/year	South/2005	South/ 2010	North/2005
South/2010	62.7		
North/2005	44.4	51.1	
North/2010	36.8	46.0	63.2

Based on early literature and GLO survey notes, it is evident that most upland forests in Illinois had open canopies (Vestal 1936, Anderson and Anderson 1975, Ebinger and McClain 1991). These open canopy forests (woodlands, barrens, savannas) represented a transition between prairies and closed-canopy forests of dissected terrain of river valleys. These open woodlands, savannas, and barrens were fashioned by climate, topography, edaphic factors, and periodic fires (Heikens and Robertson 1994, McClain and Elzinga 1994). With the cessation of landscape fires soon after arrival of European settlers, woody plant encroachment usually resulted in canopy closure except where edaphic factors slowed tree growth. Aborigines were probably responsible for most fires (Williams 1989, Davies 1994, McClain and Elzinga 1994).

During the past 15 years a group known as the "Shoal Creek Volunteers" has periodically burned these two barren communities, trying to re-creating the barren aspect of pre-settlement times. Occasional prescribed fires are being used to slowly open the canopy. As a result the present ground layer contains many plant species that we commonly associate with prairie, open woodlands, and barrens (Table 3). Presently, the shrub layer of sumac, hazel, and the stunted trees reported by the early GLO surveyors are lacking, as are oak and hickory grubs (Vestal 1936).

It is possible that under the present management of occasional prescribed fires, the "barrens of the early 1800s" cannot be attained. It is likely that more intense, landscape fires are necessary; the slow moving ground fires presently being used are not hot enough or intense enough. These ground fires are not killing the large canopy trees. The continued management with fire, however, will slowly open the canopy and promote an increase in some prairie species. Presently, however, there is no clear trend toward an increase in prairie species. Both barren communities need more intense management with an increase in fire frequency and intensity. Also, the size of the area needs to be increased to include much of the buffer areas, expanding each site until they are united. Barrens were landscape communities in early settlement time and usually encompassed many square miles. To recreate this community size is an important criterion that must be considered.

ACKNOWLEDGMENTS

The authors thank the Illinois Department of Natural Resources, the Shoal Creek Volunteers, and Mr. Henry Eilers of Litchfield, Illinois for permission to examine the barrens and for information concerning the history of the Preserve. Dr. Gorden Tucker, Eastern Illinois University, was very helpful in the identification of the *Carex* species, while Dr. Loy R. Phillippi, Illinois Natural History Survey, verified the identification of many of the other species.

LITERATURE CITED

Anderson, R. C. 1983. The eastern prairie-forest transition – an overview. PP. 86–92 *in* R. Brewer, ed. Proceedings of the Eighth North American Prairie Conference. Western Michigan University, Kalamazoo, Michigan.

Anderson, R. C. 1991. Presettlement forests of Illinois. PP. 9–19 *in* G. V. Burger, J. E. Ebinger, and G. S. Wilhelm, eds. Proceedings of the oak woods management workshop. Eastern Illinois University, Charleston, Illinois.

Anderson, R. C. and M. R. Anderson. 1975. The presettlement vegetation of Williamson County, Illinois. Castanea 40:345–363.

Bailey, A. W. and C. E. Poulton. 1968. Plant communities and environmental relationships in a portion of the Tillamook burn, northwestern Oregon. Ecology 49:1–13.

Bourne, A. 1820. On the prairies and barrens of the west. American Journal of Science and Arts 2:30–34.

Bowles, M. L. and J. L. McBride. 1994. Presettlement barrens in the glaciated prairie region of Illinois. PP. 75–83 *in* J. S. Fralish, R. C. Anderson, J. E. Ebinger, and R. Szafoni, eds. Proceedings of the North American Conference on Savannas and Barrens. Illinois State University, Normal, Illinois.

Bowles, M. L., M. D. Hutchison, and J. L. McBride. 1994. Landscape pattern and structure of oak savanna, woodland, and barrens in northeastern Illinois at the time of European settlement. PP. 65–71 *in* J. S. Fralish, R. C. Anderson, J. E. Ebinger, and R. Szafoni, eds. Proceedings of the North American Conference on Savannas and Barrens. Illinois State University, Normal, Illinois.

Daubenmire, R. 1959. A canopy coverage method of vegetation analysis. Northwest Science 33:43–64.

Davies, K. M. Jr. 1994. Some ecological aspects of northeastern American Indian agroforestry practices. Northern Nut Growers Association Annual Report 85:25–37.

Downey, C. E. and R. T. Odell. 1969. Soil survey of Montgomery County, Illinois. United States Department of Agriculture, Soil Conservation Service, in cooperation with the Illinois Agricultural Experiment Station, U. S. Government Printing Office, Washington, D. C.

Ebinger, J. E. and W. E. McClain. 1991. Forest succession in the prairie peninsula of Illinois. Illinois Natural History Survey Bulletin 34:375–381.

Ebinger, J., R. Buhrmester, and W. McClain. 1994. Vegetation of some post oak barrens in Saline County, Illinois. PP. 335–339 *in* J. S. Fralish, R. C. Anderson, J. E. Ebinger, and R. Szafoni, eds. Proceedings of the North American Conference on Savannas and Barrens. Illinois State University, Normal, Illinois.

Edgin, B. R. 2000. The beauty and bounty of barrens. Illinois Audubon 275:2–14.

Edgin, B. R., R. Beadles, and J. E. Ebinger. 2005. Vascular flora of Beadles Barrens Nature Preserve, Edwards County, Illinois. Castanea 70:47–58.

Ellsworth, H. L. 1838. Illinois in 1837–38; a sketch descriptive of the situation, boundaries, face of the country, prominent districts, prairies, rivers, minerals, animals, agricultural productions, public lands, plans of internal improvement, manufactures, and commerce of the State of Illinois. Augustus Mitchell, Philadelphia, Pennsylvania.

Engelmann, H. 1863. Remarks upon the causes producing the different characters of vegetation known as prairie, flats, and barrens in southern Illinois, with special reference to observations made in Perry and Jackson counties. American Journal of Science 86:384–396.

Gleason, H. A. and A. Cronquist. 1991. Manual of the vascular plants of northeastern United States and adjacent Canada. Second Edition. The New York Botanical Garden, Bronx, New York.

Heikens, A. L. and P. A. Robertson. 1994. Barrens of the Midwest: a review of the literature. Castanea 59:184–194.

Homoya, M. A. 1994. Barrens as an ecological term: an overview of usage in the scientific literature. PP. 295–299 *in* J. S. Fralish, R. C. Anderson, J. E. Ebinger, and R. Szafoni, eds. Proceedings of the North American Conference on Savannas and Barrens. Illinois State University, Normal, Illinois.

Hutchison, M. 1988. A guide to understanding, interpreting, and using the Public Land Survey field notes in Illinois. Natural Areas Journal 8:245–255.

Illinois Endangered Species Protection Board 2011. Checklist of Endangered and Threatened Animals and Plants of Illinois, Springfield, Illinois.

McIntosh, R. P. 1957. The York Woods. A case history of forest succession in southern Wisconsin. Ecology 38:29–37.

McClain, W. E. and S. L. Elzinga. 1994. The occurrence of prairie and forest fires in Illinois and other midwestern states, 1679–1854. Erigenia 13:79–90.

McClain, W. E., B. R. Edgin, T. L. Esker, and J. E. Ebinger. 2007. Two closed-canopy barren plant communities in East-central Illinois. Northeastern Naturalist 14:35–50.

Midwestern Regional Climate Center. 2010. http://mcc.sws.uiuc.edu

Mohlenbrock, R. H. 2002. Vascular flora of Illinois. Southern Illinois University Press, Carbondale, Illinois.

Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, New York.

Schwegman, J. E. 1973. Comprehensive plan for the Illinois Nature Preserves System. Part 2. The natural divisions of Illinois. Illinois Nature Preserves Commission, Rockford, Illinois.

Taft, J. B. 2003. Fire effects on community structure, composition, and diversity in a dry sandstone barrens. Journal of the Torrey Botanical Society 130:170–192.

Transeau, E. N. 1935. The prairie peninsula. Ecology 16:423–437.

Vestal, A. G. 1936. Barrens vegetation in Illinois. Transactions of the Illinois State Academy of Science 29:29–30.

Williams, M. 1989. Americans and their forests: a historical geography. Cambridge University Press, New York.

Worthen, A. H. 1868. Geological Survey of Illinois, Volume 3. State Journal Steam Press, Springfield, Illinois.

Worthen, A. H. 1870. Geological Survey of Illinois, Volume 4. State Journal Steam Press, Springfield, Illinois.

APPENDIX

The ground layer and shrub species encountered in two barrens at Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois are listed alphabetical by family under the major plant groups. Collecting numbers are preceded by the initial of the collector (E = John E. Ebinger; M= William E. McClain). A few species were not collected and are listed as observed. Specimens are deposited in the Stover-Ebinger Herbarium at Eastern Illinois University (EIU). (*exotic species)

MONOCOTS

COMMELINACEAE
Tradescantia ohiensis Raf. : E26273

CYPERACEAE
Carex cephalophora Willd. : E26293
Carex muhlenbergii Willd. : E26295
Carex pensylvanica Lam. : E26476

JUNCACEAE
Juncus dudleyi Wieg. : E32625

ORCHIDACEAE
Liparis liliifolia (L.) Rich. : E32081
Platanthera lacera (Michx.) G. Don: M2823

POACEAE
Agrostis hyemalis (Walt.) BSP. : E32557

Andropogon gerardii Vitman: E32558
Bromus pubescens Muhl. : E26581
Danthonia spicata (L.) Roem. & Schultes: E32626
Dichanthelium acuminatum (Sw.) Gould & Clark: E32559
Dichanthelium bosci (Poir.) Gould 7 Clark: E26582
Dichanthelium latifolium (L.) Gould & Clark: E32560
Dichanthelium linearifolium (Scribn.) Gould: E26296
Dichanthelium oligosanthes (Sw.) Gould & Clark: E32628
Elymus virginicus L. : E32561
Festuca subverticillata (Pers.) E. B. Alexeev. : M2868
Koeleria macrantha (Ledeb.) Spreng. : E26282
Muhlenbergia sobolifera (Muhl.) Trin. : E32562
**Poa pratensis* L. : E26292
Schizachyrium scoparium (Michx.) Nash: E32563
Sorghastrum nutans (L.) Nash: E32629

DICOTS

ANACARDIACEAE
Toxicodendron radicas (L.) Kuntze: E32733

APIACEAE
Sanicula canadensis L. : M2828
Taenidia integerrima (L.) Drude: M2867
Thaspium barbinode (Michx.) Nutt. : E32564

ARISTOLOCHIACEAE
Aristolochia serpentaria L. : M2821

ASCLEPIADACEAE
Asclepias purpurascens L. : M2827
Asclepias verticillata Raf. : E32599

ASTERACEAE
Ageratina altissima (L.) R. M. King & H. Robins. : E32734
Antennaria plantaginifolia (L.) Hook: E32619
Arnoglossum atriplicifolium (L.) H. Robin. : E32085
Aster anomalus Engelm. : E26447, E32566
Aster patens Aiton: E32565
Aster turbinellus Lindl. : E32567
Brickellia eupatorioides (L.) Shinners: E32089
Cirsium altissimum (L.) Spreng. : E32568
Coreopsis palmata Nutt. : E32569
Eupatorium altissimum L. : E32570
Eupatorium serotinum Michx. : E32621
Eupatorium sessilifolium L. : E32620
Helianthus divaricatus L. : E32571
Heliopsis helianthoides (L.) Sweet. : E32572
Liatris aspera Michx. : E32573
Oligoneuron rigidum (L.) Small: E32574
Ratibida pinnata (Vent.) Barnh. : E32575
Silphium terebinthinaceum Jacq. : E32576
Solidago canadensis L. : E32622
Solidago missouriensis Nutt. : E26444
Solidago nemoralis Ait. : E32623
Solidago radula Nutt. : E32624
Solidago speciosa Nutt. : E26445a
Solidago ulmifolia Muhl. : E32577
Verbesina helianthoides Michx. : E32578
Vernonia gigantea (Walt.) Trel. : E32579

BORAGINACEAE
Lithospermum canescens (Michx.) Lehm. : E32580

CAESALPINIACEAE
Chamaecrista fasciculata (Michx.) Greene: E32092

CONVOLVULACEAE
Calystegia spithamaea (L.) Pers. : M2866

CAPRIFOLIACEAE
Symphoricarpos orbiculatus Moench. : E32735

CORYLACEAE
Corylus americana Walt. : observed

EUPHORBIACEAE
Euphorbia corollata L. : E32582

FABACEAE
Amphicarpaea bracteata (L.) Fern. : E32583
Baptisia alba (L.) Vent. : E32603
Baptisia bracteata Ell. : E32602
Crotalaria sagittalis L. : E32601
Dalea candidum (Michx.) Willd. : E32604
Desmodium cuspidatum (Muhl.) Loud. : E32586
Desmodium glabellum (Michx.) DC. : E32605
Desmodium glutinosum (Muhl.) A. Wood: E32584
Desmodium perplexum B. G. Schub. : E32585
Lespedeza capitata Michx. : E32608
Lespedeza violacea (L.) Pers. : E32587
Lespedeza virginica (L.) Pers. : E32607
Orbexilum onobrychis (Nutt.) Rydb. : E32588
Stylosanthes biflora (L.) BSP. : E32610
Tephrosia virginiana (L.) Pers. : E32611

HYPERICACEAE
Hypericum sphaerocarpum Michx. : E32589

LAMIACEAE
Cunila organoides (L.) Britt. : E32590
Monarda bradburiana Beck: E32612
Pycnanthemum tenuifolium Schrad. : E32591

PHRYMACEAE
Phryma leptostachya L. : E32592

POLEMONIACEAE
Phlox pilosa L. : E26279

POLYGALACEAE
Polygala verticillata L. : E26451

RANUNCULACEAE
Anemone virginiana L. : E32593
Thalictrum revolutum DC. : E32615

RHAMNACEAE
Ceanothus americanus L. : E32594

ROSACEAE
Agrimonia rostellata Wallr. : E32595
Porteranthus stipulatus (Muhl.) Britt. : E32596
Potentilla simplex Michx. : E32616
Rosa carolina L. : E32597
**Rosa multiflora* Thunb. : E32740
Rubus allegheniensis Porter: observed

RUBIACEAE
Galium circaezans Michx. : E26266
Galium obtusum Bigel. : observed
Houstonia purpurea L. : E26291

SAXIFRAGACEAE
Heuchera richardsonii R. Br. : M2870

SCROPHULARIACEAE
Aureolaria grandiflora (Benth.) Pennell: E32100
Penstemon pallidus Small: E32598

VIOLACEAE
Viola palmata L. : E32618

ERIGENIA, Number 26, Spring 2013, pp 55–59

NOTABLE RECORDS OF ILLINOIS VASCULAR PLANTS

Gordon C. Tucker[1], Loy R. Phillippe[2], and John E. Ebinger[1,2*]

ABSTRACT: Some new and uncommon species to the Illinois flora are discussed. Most of the taxa reported are exotic species that should probably be considered adventive in Illinois, including: *Lycopodium hickeyi, Ginkgo biloba, Metasequoia glyptostroboides, Achyranthes japonica,* and *Pistia stratiotes.* Three hybrids involving native species are included: *Acer* × *freemanii*, *Lespedeza* × *longifolia*, and *Elymus canadensis* × *Elymus hystrix. Orobanche riparia*, a recent segregate of *O. ludoviciana,* is discussed. *Ulmus serotina* was a member of the Illinois flora based on some early herbarium specimens, but is probably no longer extant. Range extensions are given for some exotic species (*Anoda cristata, Chaenomeles japonica, Melissa officinalis, Sagina japonica, Stachys byzantina*) and native species (*Chenopodium strictum, Schoenoplectus americanus, Lemna gibba, Spirodela punctata, Tipularia discolor*).

The purpose of this paper is to document the occurrence of several species new to the Illinois state flora. Also, included are county records for some exotic taxa new to eastern-central and southern Illinois. In general, specimens were collected by the authors. Subsequent searches of collections at Eastern Illinois University (EIU), the University of Illinois (ILL), Illinois Natural History Survey (ILLS), Illinois State Museum (ISM), Southern Illinois University (SIU) and other herbaria turned up several additional collections of these species noted below as new state or county records. Nomenclature generally follows Gleason and Cronquist (1991) and/or Mohlenbrock (2002). Distribution information within Illinois follows Mohlenbrock and Ladd (1978) or Mohlenbrock (2002). Distribution information for other states comes from Gleason and Cronquist (1991) or USDA, NRCS (2012).

Fern and fern-allies

Lycopodiaceae

Lycopodium hickeyi Wagner, Beitel and Moran. This clubmoss is reported as new to Illinois based on the specimen identification by Arthur Haines (New England Wildflower Society). It is primarily a species of the northeastern states, southeastern Canada and the Appalachian Mountains and is becoming established in Illinois. It is known from several adjacent states (Michigan, Indiana, and Wisconsin). Characters for distinguishing *L. hickeyi* from its close relatives, *L. dendroideum* and *L. obscurum*, both of which also occur in Illinois, are given in Flora of North America (Wagner, Jr. and Beitel 1993). Some botanists have recently placed these three species in the genus *Dendrolycopodium* Haines, in which case Hickey's clubmoss becomes *Dendrolycopodium hickeyi* (Wagner, Beitel and Moran) A. Haines. Iroquois Co.: Iroquois County Conservation Area, NE corner of Iroquois County, growing beneath *Quercus palustris* and with *Aronia melanocarpa*, *Rubus hispidus*, *Carex swanii*, population about 6 × 6 meters, 24 Sep 2003, *L. R. Phillippe and J. E. Ebinger 36272* (EIU, ILLS); Iroquois County State Conservation Area, NE1/4 S23, T29N R11W, shrub prairie community, growing with *Rubus hispidus, Populus tremuloides* saplings, *Aronia melanocarpa, Vaccinium angustifolium*, about 50 above ground stems here, second plant with about 5 stems nearby, 3 Dec 2001, *L. R. Phillippe, R. Larimore, P. Marcum, and J. E. Ebinger 33825* (ILLS). Schuyler Co.: narrow, densely shaded ravine, oak maple forest, SE1/4 S30 T2N R1E, scattered colonies over xeric ridge, 5 Sep 1994, *S. Tyson 2206* (EIU, ISM).

Gymnosperms

Ginkgoaceae

Ginkgo biloba L. Ginkgo, well known as a cultivated tree native to China, has not been reported to spread from cultivation in Illinois, but appears to be rarely adventive. Coles Co.: 2 year-old seedling, lowland woods at edge of stream, Charleston. Area

[1] Deptartment of Biological Sciences, Eastern Illinois University, Charleston, IL 61920.
[2] Illinois Natural History Survey, 1816 South Oak St., Champaign, IL 61820.
* corresponding author (jeebinger@eiu.edu)

was originally a pine plantation, but presently with many deciduous shrubs and trees in the understory. Seeds probably came from a cultivated tree 30 m away, 1 Nov 2011, *J. E. Ebinger 33288* (EIU, ILLS). McLean Co.: Bloomington, Illinois Wesleyan University Campus, E. Beecher St. at Franklin Ave., plentiful volunteers in flower beds and shrub plantings, 9 Jul 2010, *G. C. Tucker 15570* (EIU, ILLS).

Cupressaceae

Metasequoia glyptostroboides Hu and W. C. Cheng. Dawn Redwood has occasionally been planted in North America since its discovery in China in the middle of the twentieth century. We recently found some adventive individuals. Coles Co.: flower bed just N of the Life Science Building, Eastern Illinois University, Charleston, 25 Sep 2011, *J. E. Ebinger and G. C. Tucker 33143* (EIU) and 30 Oct 2011, *G. C. Tucker 15787* (EIU, ILLS, MOR).

Dicots

Aceraceae

Acer × *freemanii* Murray. Freeman Maple, a selected hybrid between *A. rubrum* L. and *A. saccharinum* L., is a commonly cultivated taxon sometimes confused with or sold as red or silver maple. The species has not been formally reported from the state, although we have made collections from six counties. Collections from Clark and Massac counties were verified in 1980 by Edward Murray, author of this taxon. Clark Co.: terrace forest 5 miles ESE of Westfield, 20 Jun 1974, *R. W. Nyboer 144* (EIU). Coles Co.: small wetland, Eastern Illinois University campus, Renewable Energy Center site, 2 Jul 2010, *G. C. Tucker 15551* (EIU, ILLS); floodplain forest N end of Lake Paradise, Mattoon, 23 May 2003, *G. C. Tucker 13325* (BRIT, DAO, EIU, GH, ILLS, ISM, SIU). Cumberland Co.: white pine plantation and roadside, Union Center, 12 Aug 2003, *G. C. Tucker 13401* (EIU, ILLS). Jasper Co.: near lake, Prairie Ridge State Natural Area, CIPS Management Area, 17 Jun 2005, *G. C. Tucker 14047* (BKL, DAO, EIU, ILLS), 7 Sep 2007, *G. C. Tucker 15169* (EIU). Lawrence Co.: Red Hill State Park, 13 Jul 1997, *B. Edgin 624* (EIU), 14 May 1999, *B. Edgin 2083* (EIU). Massac Co.: field 3 miles E of Joppa, 25 Oct 1973, *J. E. Ebinger 14324* (EIU).

Amaranthaceae

Achyranthes japonica (Miq.) Nakai. Japanese chaff flower is an eastern Asian species new to Illinois. It has previously been reported from several states along the Ohio River (PLANTS 2012). Besides our collection from Pulaski Co., we are aware of reports from 9 other counties in southern Illinois (Alexander, Gallatin, Hardin, Johnson, Massac, Pope, Pulaski, Williamson, and Union; Chris Evans, pers. comm.; John Schwegman, pers. comm.). We encourage field botanists to collect specimens documenting the extent of this exotic species in Illinois. Massac Co.: 3 miles east of Metropolis along the Ohio River, 2008, *Schwegman s.n.* (ILLS). Pulaski Co.: along trail bordering floodplain woods, 2.7 km SE of Perks at Lower Cache River Canoe Access, 17 Sep 2011, *G. C. Tucker 15729* (EIU, GH, ILLS).

Caryophyllaceae

Sagina japonica (Sw.) Ohwi. This eastern Asian species was previously known only from Coles and Sangamon counties. Williamson Co.: Little Grassy Fish Hatchery, damp edge of lawn bordering brick building, 11 Jun 2002, *G. C. Tucker 12780A* (EIU, ILLS).

Chenopodiaceae

Chenopodium strictum Roth var. *glaucophyllum* (Aellen) Wahl. This species is rare in the state and had not been collected since the 1800's, and only from Peoria and St. Clair counties (Mohlenbrock 2002). The specimen listed here was collected by Darrin Mossman, a student in Tucker's Plant Taxonomy class, and verified by Steven Clemants, author of this family for Flora of North America. Kankakee Co.: old field, Kankakee Valley Forest Preserve, off Heiland Road, St. Anne, 25 Sep 1999, *D. Mossman 86* (EIU).

Chenopodium pumilio R. Br. This spreading to prostrate annual is native to Australia and is naturalized in waste places throughout much of northeastern United States (Gleason and Cronquist 1991). Flora of North America reported this taxon for Illinois as *Dysphania pumilio* (R. Br.) Mosyakin and Clemants (Clemants and Mosyakin 2003). Coles Co.: weed, greenhouse courtyard, Eastern Illinois University, Charleston, 14 Aug 2002, *G. C. Tucker 13093* (EIU, ILLS) and 14 Jun 2005, *G. C. Tucker 14062* (EIU, ILLS).

Fabaceae

Lespedeza × *longifolia* DC. A hybrid of *L. capitata* Michx. and *L. hirta* (L.) Hornem. that is rare and scattered through eastern North America. Iroquois Co.: *Quercus velutina* Lam. sand savanna, Iroquois County State Conservation Area, 23 Sep 2003, *L. R. Phillippe and J. E. Ebinger 36247* (ILLS, EIU).

Lamiaceae

Melissa officinalis L. Lemon balm, a European native, is a rare adventive in Illinois, noted only from Jackson, Lawrence, and Wabash counties in the southern part of the state (Mohlenbrock 2002). Coles

Co.: weedy thicket in floodplain forest, Lincoln Highway, Charleston, NWQ S27 T12N R9E, 29 Sep 1996, *G. C. Tucker 11243* (EIU, ILLS); edge of road 1 mile SW of Charleston on road to Lincoln Log Cabin State Park, 7 Aug 1997, *J. E. Ebinger 27337* (EIU). Sangamon Co.: Mechanicsburg, Nazarene Acres Campground, 25 Jul 2005, *G. C. Tucker 14223* (EIU).

Stachys byzantina C. Koch. The woolly hedge hyssop, a native to the Mediterranean region, was known in Illinois only from Du Page County (Mohlenbrock 2002). Coles Co.: Mattoon, NE shore of Lake Paradise, disturbed grassy roadside, 29 Jun 2005, *G. C. Tucker 14124* (EIU).

Malvaceae

Anoda cristata (L.) Schlecht. Native to the southwestern U.S. and Mexico, Crested Anoda was previously reported from Hancock, Kankakee, and Massac counties (Mohlenbrock 2002). This taxon is becoming common and we have located six county records. Alexander Co.: cultivated field, road to Miller City, 6 Sep 1993, *M. A. Basinger 6731* (ILLS). Champaign Co.: edge of field, South Farms, University of Illinois, 2 Oct 1984, *K. Robertson s.n.* (ILL). Douglas Co.: grassy roadside ditch, S of Kemp, CR 1275 E, 1/2 mile N of Coles County line, 22 Sep 2001, *G. C. Tucker 12568* (BH, CONN, EIU, ILLS, ISM, WVA). La Salle Co.: weed in field, 2.5 miles S of Sandwich, Aug 1982, *A. Beuerman s.n.* (ILL). Monroe Co.: roadside, Maeystown Creek, 11 Oct 1998, *S.R. Hill 31163* (ILLS). Union Co.: floodplain forest, Ware, route 3, 26 Oct 2001, *S. R. Hill and J. A. Koontz 34408* (ILLS).

Orobanchaceae

Orobanche ludoviciana was recently divided into two species (Collins et al. 2009): a sand prairie taxon parasitic on perennial members of the Asteraceae (*O. ludoviciana*), and a taxon of alluvial sand deposits of floodplains that is mostly parasitic on *Ambroisa trifida* and *Xanthium strumarium* (*O. riparia*).

Orobanche ludoviciana Nutt. Louisiana Broomrape is an Illinois endangered species and we are listing a collection from each county were we have located a herbarium specimen. Bureau Co.: sand area, 4 miles N of Mineral, 18 Jan 1972, *W. Shepherd s.n.* (ILLS). Carroll Co.: sand prairie, 17 Nov 1996, *W. C. Handel 1080* (ILLS). Henry Co.: sandy soil 3.5 miles NE of Annawan, 4 Oct 1972, *A. C. Koelling 4788* (ISM). Lee Co.: sand prairie, SW of Nelson, 8 May 1968, *R. A. Evers 94279* (ILLS). Mason Co.: sand prairie, H. A. Gleason Nature Preserve, 20 Jul 1981, *R. C. Moran 1570* (ILLS). Tazewell Co.: sandy bluff near Clear Lake, 5 Aug 1948, *V. H. Chase 10035* (ILL). Herkert and Ebinger (2002) reported this species from Whiteside County but we have not located a voucher specimen.

Orobanche riparia L. T. Collins. River Broomrape is a recently described species and is more widely distributed in Illinois than indicated in the original publication (Collins et al. 2009) where it was found in bottomland habitats of four Illinois counties (Cumberland, Mason, Menard, Wabash). We have found this species in floodplains in three additional counties in central Illinois. Coles Co.: 3 miles S of Charleston, in field near Embarras River, under *Ambrosia trifida*, SW1/4 S35 T12N R9E, 4 Oct 1984, *J. E. Ebinger 23140* (EIU); Embarras River Bottoms, S of Fox Ridge State Park, parasite on *Ambrosia trifida*, 17 Feb 1994, *R. E. Szafoni s.n.* (ILLS). Fayette Co.: 6.5 miles W of Beecher City in the floodplain of the Kaskaskia River, NW1/4 S6 T8N R3E, 2 Sept. 1992, *J. E. Ebinger 25576* (EIU). White Co.: on *Ambrosia trifida*, 1909, *H. A. Gleason s.n.* (GH). Herkert and Ebinger (2002) reported this species from Logan County but we have not located a voucher specimen.

Rosaceae

Chaenomeles japonica (Thunb.) Lindl. Japanese quince, a native to Japan, had only been reported as adventive in Illinois from Jackson County (Mohlenbrock 2002). Marion Co.: roadside ditch S of Kinmundy, Prairie Ridge State Natural Area, Guymon Tract, 16 Aug 2006, *G. C. Tucker 15000* (EIU, ILLS, MOR).

Ulmaceae

Ulmus serotina Sarg. The first report we have been able to locate that lists this species for Illinois is Miller (1923). He mentions this species "has been reported by Ridgway in the extreme northeast corner of Wayne County, but we have not yet found this species." Jones and Fuller (1955) listed this species, noting that "they have seen no Illinois collections of this autumn-flowering species whose range is apparently south of Illinois." Sherman-Broyles (1997), in the Flora of North America attributed *U. serotina* to Illinois. We have recently located two early collections of this species from Illinois, but doubt this species presently exists in the state. The Jackson County specimen was annotated in 1988 by Sherman-Broyles. Jackson Co.: Grand Tower, 28 Aug 1900, *H. A. Gleason 1850* (A). Richland Co.: Gentry Creek, Nov 1918, *R. Ridgway s.n.* (A).

Monocots

Araceae

Pistia stratiotes L. Water lettuce or Nile cabbage is an African species cultivated as a water garden and aquarium plant. It is naturalized in several southeastern states. Visits to the site in Mattoon in subsequent years have failed to turn up any additional plants.

Coles Co.: SW cove of Lake Paradise, Mattoon, scattered floating plants, 5 Sep 2002, *G. C. Tucker 13185* (CONN, EIU, ILLS).

Cyperaceae

Schoenoplectus americanus (Pers.) Volk. ex Schinz and R. Keller [*Scirpus americanus* Pers.; *Scirpus olneyi* of authors]. Chairmaker's bulrush was first reported from Illinois in 2001 from Jasper County (Tucker 2001). The collection from Douglas County shows it has been here for decades, but overlooked. Since then we have found this species in several more counties. Illinois Dept. of Natural Resources fisheries biologist Michael Mounce has shown us additional locations in Coles County. Champaign Co.: Rantoul, North Century Drive, roadside ditch, 27 Aug 2009, *G. C. Tucker 15488* (EIU, ILLS). Coles Co.: Mattoon, Mattoon Grain Elevator near CR 720 E and CR 550N, 14 Jul 2005, *G. C. Tucker 14188* (EIU). Douglas Co.: edge of creek in pasture 1 mile N of Hindsboro, NW1/4 S32 T15N R10E, 7 Oct 1971, *J. E. Ebinger 11034* (EIU). Jasper Co.: small *Typha* marsh, Prairie Ridge State Natural Area, W of office, 25 Aug 2000, *G. C. Tucker and J. E. Ebinger 12323* (EIU); 28 Sep 2000, *G. C. Tucker 12363* (EIU), *12323* (EIU).

Scirpus hattorianus Mak. Mosquito bulrush was reported by Mohlenbrock (2002) from only three counties in northern Illinois (Carroll, Cook, Kankakee). This collection extends the range further south into the Wabash Border Natural Division. Vermilion Co.: Forest Glen Preserve, shaded seep, 10 Sep 2012, *G. C. Tucker 15919* (EIU, ILLS, MOR).

Lemnaceae

Lemna gibba L. Previous records of swollen duckweed in Illinois come from DuPage, Knox, Mason and Will counties. The mixed collection below is the first record of the species from the southern half of the state. Lawrence Co.: 3 miles NE of Lawrenceville, pond, [mixed with *Landoltia punctata*], S29 T4N R11W, 16 Aug 1971, *J. E. Ebinger 10733* (CONN, EIU, ILLS).

Spirodela punctata (Mey.) C. H. Thompson [*Landoltia punctata* (Mey.) Les and Crawford]. Dotted duckweed has traditionally been included in the genus *Spirodela,* although recently a new genus (*Landoltia*) has been recognized (Les and Crawford 1999). Illinois records come only from Alexander, Johnson, and Union counties (Mohlenbrock 2002), while we have located vouchers for three additional counties. Effingham Co.: Mason, Wildcat Hollow State Forest, Fulfer Creek, 14 Oct 2005, *G. C. Tucker 14577* (CONN, EIU, ILLS). Lawrence Co.: 2 miles W of Bridgeport, pond, S13 T3N R13W, 16 Aug 1971, *J. E. Ebinger 10762* (CONN, EIU). Saline Co.: 5.2 miles SW of Equality, floodplain pond, 11 Oct 1986, *E. A.Lisowski s.n.* (ILLS).

Orchidaceae

Tipularia discolor (Pursh) Nutt. Crane Fly Orchid was previously noted as restricted to the southern 1/6 of the state (Mohlenbrock 2002), and we have seen specimens from Johnson, Massac, Pope, and Saline counties (ILL, ILLS). Our report from Jasper Co. is a substantial northward extension that has been verified by Charles Sheviak (NYS). Jasper Co.: deciduous woods, Prairie Ridge State Natural Area, 24 July 2009, *G. C. Tucker 15463* (EIU, ILLS).

Poaceae

Elymus canadensis L. × *E. hystrix* L. This hybrid ryegrass, which has no formal name, was collected during a botanical survey at Prairie Ridge State Natural Area and subsequently identified by Stephen A. Darbyshire (DAO). Jasper Co.: Prairie Ridge State Natural Area, CIPS Tract, 17 June 2005, *G. C. Tucker 14076* (EIU, DAO).

ACKNOWLEDGMENTS

Thanks to Arthur Haines (New England Wildflower Society) for checking the identification of the *Lycopodium hickeyi* specimens, Donald Les (CONN) for verifying the identification of *Lemna gibba* and *Spirodela punctata*, Charles J. Sheviak (NYS) for confirming the identification of *Tipularia discolor*, and Stephen A. Darbyshire (DAO) for providing the identification of *Elymus canadensis* × *E. hystrix*.

LITERATURE CITED

Clements, S. E. and S. L. Mosyakin. 2003. *Dysphania in* Flora of North America 4:267–275.

Collins, L. T., A. E. L. Colwell, and G. Yatskievych. 2009. *Orobanche riparia* (Orobanchaceae), a new species from the American Midwest. Journal of the Botanical Research Institute of Texas 3:3–11.

Gleason, H. A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. New York Botanical Garden, Bronx, New York.

Herkert, J. R. and J. E. Ebinger eds. 2002. Endangered and Threatened Species of Illinois: Status and Distribution, Volume 1 – Plants. Illinois Endangered Species Protection Board, Springfield, Illinois. 161 pp.

Jones, G. N. and G. D. Fuller. 1955. Vascular plants of Illinois. The University of Illinois Press, Urbana and Illinois State Museum, Springfield, Illinois.

Les, D. H. and D. J. Crawford. 1999. *Landoltia*, a new genus of duckweeds. Novon 9:530–533.

Miller, R. B. 1923. First report on a forestry survey of Illinois. Bulletin Illinois Natural History Survey 14:291–377.

Mohlenbrock, R. H. and D. M. Ladd. 1978. Distribution of Illinois Vascular Plants. Southern Illinois University Press, Carbondale.

Mohlenbrock, R. H. 2002. Vascular flora of Illinois. Southern Illinois University Press, Carbondale, Illinois.

Sherman-Broyles, S. L. 1977. *Ulmus.* In Flora of North America 3:369–375.

Tucker, G. C. 2001. *Scirpus* sensu lato (Cyperaceae) in Illinois: an update. Transactions of the Illinois State Academy of Science 94:53.

U. S. Department of Agriculture, Natural Resources Conservation Service. 2012. The PLANTS database <http://plants.usda.gov/plants>. National Plant Data Center, Baton Rouge, Louisiana 70874-4490 U.S.A.

Wagner, Jr. W. H. and J. M. Beitel. 1993. Lycopodiaceae. In Flora of North America 2:18–37.

Erigenia, Number 26, Spring 2013, pp 60

Carl E. Darigo
Memorium

Carl E. Darigo (1927–2012) was bestowed the Julian A. Steyermark Award for his work with bryophytes in Missouri. Missouri lost an industrious and dedicated bryologist earlier this year with the death of Carl E. Darigo. During his time at the Missouri Botanical Garden, Carl determined thousands of Missouri collections sent to him by nearly every Missouri botanist interested either in mosses, or the general floristic composition of a particular region. In addition to the great amount of time Carl spent identifying mosses and liverworts, he also published numerous peer-reviewed papers on bryophytes. His work has significantly contributed to Missouri conservation survey projects as well as to the overall documentation of Missouri bryophytes.

Carl began volunteering in the bryophyte herbarium at the Missouri Botanical Garden in 1992, and was appointed Research Associate in 2002. He was to receive a twenty-year service award from the Missouri Botanical Garden this coming year. Carl was principally interested in bryophyte floristics. He was a patient and analytical taxonomist, and this made him a critical observer of the subtle taxonomic characteristics used to name mosses. Although Carl dedicated much of his time to producing comprehensive, specimen based checklists for Missouri and Maryland, he also worked diligently in naming the undetermined specimen backlog in the MO herbarium, including bryophytes from Kansas, Nebraska, Oklahoma, and Maryland (about 4500 specimens). In addition, Carl regularly checked the determinations of incoming specimens, annotated existing herbarium specimens, and contributed his own specimens to the herbarium (about 4000 specimens). Most importantly, because of his incredible work ethic, he processed all of these specimens and returned the names to the collectors in a timely manner. He collaborated with numerous amateur and professional botanists throughout Missouri including members of the Missouri Department of Conservation, the Missouri Department of Natural Resources, the Missouri Master Naturalist program, the Missouri Native Plant Society, and the Webster Groves Nature Study Society. As a result of his efforts, he contributed over 10,000 identified specimens to the MO herbarium.

These collections formed the basis for his numerous publications. During his career at the Missouri Botanical Garden, Carl published 35 manuscripts in peer-reviewed journals that included 26 papers on the bryophytes of Missouri (see attached bibliography). The majority of these publications contained new Missouri county records for mosses based primarily on specimens Carl received from collectors. These records established the foundation for a revised checklist and atlas of Missouri mosses, which Carl nearly completed before his death. His manuscript is currently being completed for future publication in Missouriensis. In his published work Carl reported 17 new Missouri records; excluded a species from Missouri on the basis on a misdetermined specimen; and elevated an infraspecific taxon to the species level. Carl also co-authored a paper on a new species found not only in Missouri, but throughout the Interior Highlands of North America.

Carl Darigo posthumously received the Missouri Native Plant Society Steyermark award. Julian A. Steyermark, a former curator at the Field Museum of Natural History, is listed in the Guinness Book of World Records as the "champion plant collector," having made an unrivaled total of more than 137,000 collections. He discovered and described more plant species than any other botanist of recent times.

Carl Darigo's obituary is available at: http://www.legacy.com/obituaries/stltoday/obituary.aspx?page=lifestory&pid=155664798#fbLoggedOut.

This memorial was reprinted with permission from Petal Pusher 27(4): 6 (July–August 2012).

Erigenia, Number 26, Spring 2013, pp 61

Stephen L. Timme
Memorium
27 August 1950 ~ 10 April 2012

Well-known botanist and teacher Dr. Stephen L. Timme, passed away on 10 April 2012 at the age of 61 after a battle with cancer.

Steve received his B.S. and M.S. degrees at Missouri State University and went on to earn his Ph.D. at Mississippi State University. He spent most of his professional career at Pittsburg State University in southeastern Kansas, where he taught courses in biology and curated the herbarium. In addition to his skills in field botany and vascular plant taxonomy, Steve was an accomplished bryologist.

He was active in both the Kansas and Missouri Native Plant Societies and served as the president of MONPS from 1993 to 1995. He also led field trips and workshops for our group. In addition to his skills as a botanist, Steve was also a talented photographer, who maintained a file of plant images for MONPS during the years that he was active with the group. Steve published several field guides that included his photographs, including wildflower guides for southeastern Kansas, Mississippi, and the Natchez Trace.

Steve's obituary may be viewed online at: http://www.atkinsonfuneralhome.com/fh/obituaries/obituary.cfm?o_id=1447768&fh_id=13328

This memorial was reprinted with permission from Petal Pusher.

INVITATION FOR SUBMISSION OF ARTICLES

ERIGENIA is a peer-reviewed journal of the Illinois Native Plant Society. We invite the submission of original articles on the biota of Illinois and adjacent states. This is a partial list of articles of interest to society members.

TAXONOMY of vascular plants, fungi, lichens, and mosses

ECOLOGY of native species and plant communities; interactions and effects of birds, mammals, and insects on our ecosystem

NATURAL HISTORY of our state, including geology and geography

ETHNOBOTANY of native plants, their use by Native Americans

CULTURAL HISTORY as it intersects with natural history

BOTANISTS, SCIENTISTS, EXPLORERS, and BOTANICAL ARTISTS who have played a major role in our understanding of our state and its natural resources

RESTORATION of our native landscapes, management techniques and results

HORTICULTURE as it relates to native plants in restored or cultural environments

INSTRUCTIONS FOR AUTHORS

Authors may submit material as an e-mail attachment to erigenia.editor@gmail.com

Manuscripts must be submitted as an MS Word document in a single font, double-spaced, and left-aligned. Tables and illustrations must fit in a 7 x 9 inch area. Authors should retain copies of all material submitted.

The title page of the manuscript should state the affiliation and complete addresses of all the authors; the telephone number of the corresponding author should also be supplied. All papers will be reviewed and copy-edited.

ABSTRACTS

Research and technical papers should include a one-paragraph abstract of not more than 250 words. The abstract should state concisely the goals, principal results, and major conclusions of the paper.

TAXONOMIC NAMES

Either a standard taxonomic manual should be cited whose names are followed consistently, or the scientific names should be followed by their authority. Common names, if used, should be referenced to a scientific name. Thereafter, scientific names are recommended, but either may be used if done so consistently.

PAGE CHARGES

Page charges for society members are $50.00 per article. Page charges of $25 per page will be assessed for non-members.

1 About Our Authors

Feature

2 Botany as Advocacy: a History of the Floristic Surveys of the Waukegan Moorlands
Kathleen M. Garness

7 Searching for Sedges in Southern Illinois: Updating the Natural Heritage Database Records for *Carex nigromarginata*
Christopher David Benda

12 The General Land Office Surveyors and Their Work
Paul D. Kilburn

Research Papers

15 *Carex* of the Zion Beach-Ridge Plain
Linda W. Curtis

26 Vascular Floral of a Glacial Drift Hill Prairie of Anthropogenic Origin, Macoupin County, Illinois
William E. McClain and John E. Ebinger

33 Continuing Floristic and Quantitative Evaluations of a Prairie Project Started in 1974 in Northern Ford County, Illinois
Don Gardner

46 Fire Maintained Barren Communities: Henry Eilers Shoal Creek Conservation Area, Montgomery County, Illinois
William E. McClain and John E. Ebinger

55 Notable Records of Illinois Vascular Plants
Gordon C. Tucker, Loy R. Phillippe, and John E. Ebinger

Memoria

60 Carl E. Darigo

61 Stephen L. Timme