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Jimmie D. Thompson

Deborah Q. Lewis  
*Iowa State University*

William R. Norris  
*Western New Mexico University*

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# The Role of an Urban Tallgrass Prairie Remnant in Conservation: A Case Study in Central Iowa (USA)

JIMMIE D. THOMPSON,<sup>1</sup> DEBORAH Q. LEWIS<sup>2</sup> and \*WILLIAM R. NORRIS<sup>3</sup>

<sup>1</sup>19516 515<sup>th</sup> Ave., Ames, Iowa 50014-9302

<sup>2</sup>Department of Ecology, Evolution and Organismal Biology, Iowa State University, Ames, Iowa 50011-1020

<sup>3</sup>Department of Natural Sciences, Western New Mexico University, PO Box 680, 1000 W. College Ave., Silver City, New Mexico 88062

Although more than 85% of Iowa (USA) was covered by tallgrass prairie at the time of settlement by Europeans in the early 19<sup>th</sup> century, less than 0.1% remains. The Richard W. Pohl State Preserve at Ames (IA) High School, surrounded on three sides by structures, roads, and other development, protects 4 ha of tallgrass prairie. The preserve, commonly referred to as Ames High Prairie (AHP), was grazed but never plowed under private ownership until its acquisition by the Ames School District in 1959.

Although considered for development as a parking lot or football field in the 1960s, the residents of Ames voted in 1970 to award The Nature Conservancy (TNC) a 49-year lease to the property (until 2019). This preserve, almost completely open in the 1930s, has been subject to numerous threats, including encroachment by woody plants, entry of non-native and invasive plant species associated with human activity, and erosion associated with storm water runoff, sewer line repair, foot and bike traffic, and major flood events.

Recent management activities at AHP, conducted by volunteer land stewards, high school and college students, TNC summer interns, and private contractors, has consisted of controlled burns, cutting and herbicide treatment of encroaching woody plants, manual removal and herbicide treatment of invasive herbaceous plants, and sowing of seeds (collected on site) into reopened areas.

Three vascular plant inventories of the 8.9 ha preserve (1966, 1995, current study) have documented the occurrence of 465 taxa (329 native) at AHP, including 5 Iowa special concern species. This flora includes 147 native prairie plant taxa, which ranks 8<sup>th</sup> in comparison with the 26 other (and mostly larger) prairies protected as state preserves in Iowa. As a vegetation remnant, AHP protects tallgrass prairie taxa and their gene pools, maintains an example of historically abundant (but now scarce) tallgrass prairie vegetation, and provides citizens an opportunity to experience prairie.

INDEX DESCRIPTORS: Iowa, prairie flora, prairie management, tallgrass prairie, urban prairie, volunteer land stewards.

The natural and cultural histories of Iowa are intertwined through tallgrass prairie. Native Americans made their home here when the last glaciers retreated, and we find compelling evidence that they used fire to remove dead thatch and promote growth of fresh grass, preventing invasion by forest plants and probably extending and maintaining the eastern edge of tallgrass prairie in North America (Pyne 1982; Anderson 1990). The history of exploration and settlement of Iowa prairies by Europeans encompasses the Louisiana Purchase, the Lewis and Clark expedition, the Black Hawk War, the eradication of bison and elk from the landscape, and technological improvements in farm machinery that facilitated conversion of vast acres of prairie to cropland (Smith 2001). Knowledge of this historic prairie vegetation in Iowa during the 19<sup>th</sup> century is available from Government Land Office surveys conducted in Iowa between 1832 and 1859 (Anderson 1996), written accounts of early explorers and settlers (especially those associated with military expeditions), and photographs and illustrations (Rosburg 2001).

Although grasslands historically comprised at least 85% of this state's land area, less than 0.1% of Iowa's original prairie currently remains (Smith 1998). Much of this remainder is owned and managed by public agencies or private conservation organizations. Of the 98 such Iowa prairie remnants summarized by Rosburg (Table 2 in Rosburg 2001), only 17 (19%) contain at least 40 ha (100 ac), and 33 (34%) contain no more than 4 ha (10 ac) of prairie. Smith

(2001) describes these prairie remnants as “damaged” in ways not explicitly described but easy to imagine.

The Richard W. Pohl State Preserve at Ames High School, commonly referred to as Ames High Prairie (AHP), protects one such small (4 ha, 10 ac) prairie remnant. The history of this prairie mirrors that of most other Iowa prairie remnants, with dramatic reduction in land area, cessation of fire, encroachment by native woody species, substantial invasion by exotic plant species, sporadic knowledge of past vegetation, uneven awareness of existence among private citizens, and conflicts among those with differing visions for the conservation and management of this property. AHP faces additional unique challenges due to its occurrence within an urban matrix, especially storm water runoff from surrounding residential neighborhoods, occasional maintenance by city workers on a sewer line that passes through the preserve, frequent foot and bike traffic by local citizens across the prairie, and proximity of cultivated plants that have dispersed to the site. The persistence of AHP, if not most Iowa prairie remnants, is due to the efforts of individuals, conservation organizations, and county or state government agencies willing to purchase, legally protect, and restore these fragments of prairie vegetation.

In this paper, we describe the natural and cultural histories of AHP based on historic photographs and documents, as well as the history of prairie management in the preserve since the 1960s as documented from interviews with 12 individuals who have contributed to various aspects of this effort. Next, we present a checklist of the vascular

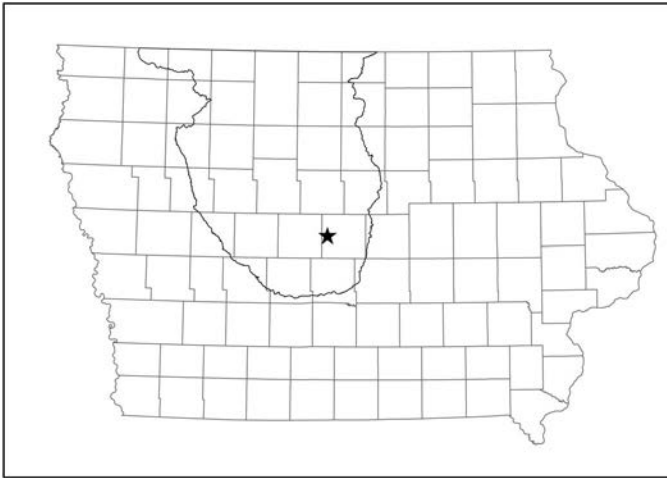


Fig. 1. Location of AHP in Story Co., Iowa. The preserve occurs within the Des Moines Lobe landform region, which is delineated on the map.

plant flora of AHP documented from three plant inventories (Freckmann 1966; Norris 1995; current study), which we compare to the floras of 26 other Iowa prairie remnants protected as state preserves. We then describe the current vegetation present in different regions of the preserve. Finally, we discuss the role of this urban prairie remnant in conservation.

## STUDY SITE

### Natural History

The 8.9 ha (22 ac) preserve, which contains 4 ha (10 ac) of remnant tallgrass prairie, is located in the N<sup>1</sup>/<sub>2</sub> of the SW<sup>1</sup>/<sub>4</sub> of Sec 34, T84N R24W (Franklin Twp) in the north part of Ames, Story County, IA – coordinates: 42.040° N 93.636° W (approximately 42.041° N – 42.038° N, 93.636° W – 93.640° W) (Fig. 1). It lies on the southern portion of the Des Moines Lobe of the Wisconsin glaciation (Herzberg and Pearson 2001; Prior 1991), and is located within ca. 40 km (25 mi) of the eastern extent of the Des Moines Lobe and ca. 64 km (40 mi) from its southern terminus. The preserve varies in topography, from relatively flat floodplain to moderately hilly, with dry ridges and hilltops and moist slopes (Fig. 2, prepared from United States Geological Survey, The National Map Viewer. 1975). A drainage way

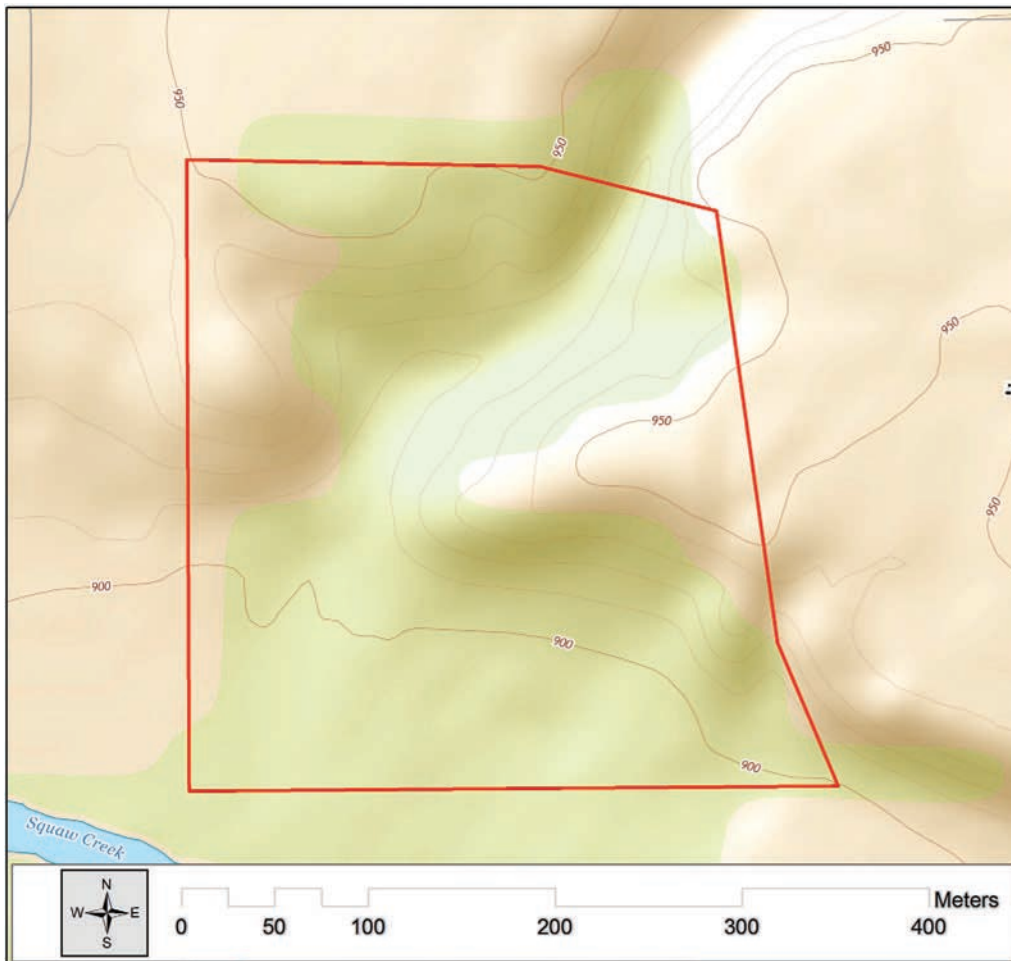


Fig. 2. Topographic map of AHP and surrounding land.

follows the north edge of the east segment of the preserve and then bisects the preserve, flowing southwest to Squaw Creek beyond the preserve boundary.

We present a soil map of AHP in Fig. 3 (prepared from Web Soil Survey). The well-drained upland portions are associated with Storden, Clarion, Spillville, and Lester soils, which are all loams. The first three of these soils developed in association with tallgrass prairie vegetation, while Lester soil developed beneath a mixture of prairie and woodland, i.e., savanna. Coland soil occurs beneath the above mentioned drainage area, which also formed under tallgrass prairie (C.L. Burras, pers. comm., December 29, 2014).

Central Iowa has been classified as mesothermal moist subhumid (Thornwaite 1948). Climatic data available for Ames, IA, for 1981-2010 (National Centers for Environmental Information) shows average yearly precipitation is about 880.62 mm (34.67 in). The average driest (18.8 mm (0.74 in)) and coldest ( $-6.78^{\circ}\text{C}$  ( $19.8^{\circ}\text{F}$ )) month is January, the average wettest (127.76 mm (5.03 in)) month is June, and the warmest ( $23.0^{\circ}\text{C}$  ( $73.4^{\circ}\text{F}$ )) month is July. The average frost-free growing season is from March 30 to November 4 (210 days).

Rosburg (2001) identified mesic tallgrass prairie and dry mesic prairie as the primary and secondary prairie communities, respectively, occurring at AHP. According to Government Land Office (GLO) surveys conducted in Iowa during the mid-19<sup>th</sup> century, all of the land now designated as AHP was occupied by prairie vegetation (Fig. 4a) at the time of these surveys, except for a wooded area in the southwest corner that borders Squaw Creek (Anderson 1996). Figs. 4 b-f (prepared from Iowa Geographic Map Server) show how the extent of prairie vegetation at AHP has changed from the 1930s to the present. Joens (1978) and Norris (1995) presented vegetation maps of AHP, based on their separate vegetation surveys, that identified floodplain forest vegetation as occupying regions of the preserve that were formerly prairie. Later in this paper, we discuss probable circumstances behind this wide variation in the extent of prairie vegetation at AHP, coupled with encroachment by woody vegetation, over the past 80 years.

## Cultural History

*Ownership and Past Land Use.* The preserve property was first owned by John I. Blair, who had large land holdings on the north side of Ames. In 1867, Blair sold the 64.7 ha (160 ac) parcel that includes the prairie to E. B. Campbell. In 1891, Roan McClure bought the property from Mary Campbell. The property, which was annexed into the City of Ames in 1947, remained in the McClure family (later Allen family, when his daughter married Harry Allen) until the family sold it to the Ames Community School District in 1959 (unpublished records, Story County Recorder's Office, Nevada, IA).

The land within the boundaries of the current preserve was used for grazing, and the highest knoll in the current preserve was referred to as "pasture" on a mid-1950s topographic map of the region (Abrams Aerial Survey Corporation 1956). AHP was formerly referred to as the "Pigpen Prairie," as documented on plant specimen labels deposited at the Ada Hayden Herbarium at ISU (ISC) (e.g., "Disturbed area along the "Pig Pen" prairie remnant area, west of Ames new high school," *Potentilla simplex* Michx. - ISC 249339, M.G. Lelong M47, 14 June 1961). However, we have encountered no evidence that the prairie was ever plowed for row crops. Once the land was sold to the Ames School District and construction of a new high school was underway just to the east, construction equipment was parked on the northeast part of the prairie (Anonymous 2003) and possibly some topsoil was removed from the prairie (Freckmann 1966). The school was

occupied either prior to or during 1961 (Ellett et al. 1970). A storm-sewer drainage system was installed in the drainage way before 1970, while the school property to the east and a senior living center to the northeast of the prairie were constructed. Through the years, work on this drainage system has impacted this part of the preserve.

Currently located in an urban area, AHP is largely surrounded by developed properties. Housing developments are adjacent to the preserve on its west (Iowa State University (ISU) student housing) and north (general residential housing) boundaries, and Ames High School is situated on its east boundary. The forest vegetation that currently occupies the south part of the preserve extends southwest to Squaw Creek.

*TNC Lease Agreement with the City of Ames.* The high quality of the prairie in the current preserve has been recognized for many years. An unsuccessful effort was made in the late 1940s to obtain AHP for use as an outdoor classroom (Gucciardo 1987), and the site has been used for class field trips by ISU faculty at least since the 1960s (Freckmann 1966; R.Q. Landers, Jr., pers. comm., June 10, 2015). Nonetheless, after the Ames Community School District purchased the property and completed the high school buildings in the early 1960s, a proposal was made to build either a parking lot or an athletic field on the eastern end of the prairie (Anonymous, undated and unpublished notes, Ada Hayden Herbarium archives, ISU). The Ames Conservation Council responded by working to increase awareness of the prairie's significance among Ames community members and high school personnel and advocating for its protection (Joens 1978). Participation on this committee by faculty members of Ames High School (Richard "Dick" Trump) and ISU (Duane Isely, Harold S. "Sande" McNabb, Richard "Dick" W. Pohl) was instrumental in this effort (D.R. Farrar, pers. comm., May 21, 2015; R.Q. Landers, Jr., pers. comm., June 10, 2015).

Ultimately, the Ames Conservation Council contacted The Nature Conservancy (TNC) about the possibility of negotiating a TNC lease of the prairie. This proposal came to a vote of the residents of the City of Ames in 1970, and the measure was approved. Terms of TNC's lease were that for a payment of \$1 per year, the lease would run for 49 years, beginning on October 1, 1970 (unpublished TNC lease document 1970, downloadable at Ames High School Prairie 2011). Per terms of the lease, which is set to expire in 2019, TNC oversees the management of AHP.

*Designation as Iowa State Preserve.* In late August 1995, city workers drove heavy equipment across the east portion of the prairie to access a broken sewer line located in the drainage way within the adjacent floodplain forest, scraping the soil off the lower part of the prairie in the process (personal observations of the authors; Reiners 1997; Norris and Farrar 1999). This damage sparked a series of meetings that involved the city, the school board, TNC and other environmental groups, and Ames citizens. A proposal was made that the AHP should become a state preserve. A more detailed management plan was drawn up (Reiners 1997) and presented to the State Preserves Advisory Board and the Iowa Department of Natural Resources (IDNR). At the same time, it was learned that Marjorie Pohl was willing to make a substantial contribution to the TNC for ongoing management if the preserve could be named in memory of her late husband, Richard W. Pohl, an ISU botanist. Richard Pohl had chaired the Ames Conservation Council, conducted research on the prairie, supervised prairie management projects, and led numerous field trips and prairie walks there for ISU students and the public. Ultimately, the prairie was officially dedicated as the Richard W. Pohl Memorial at Ames High Prairie State Preserve on August 18, 1997 (Fig. 5).

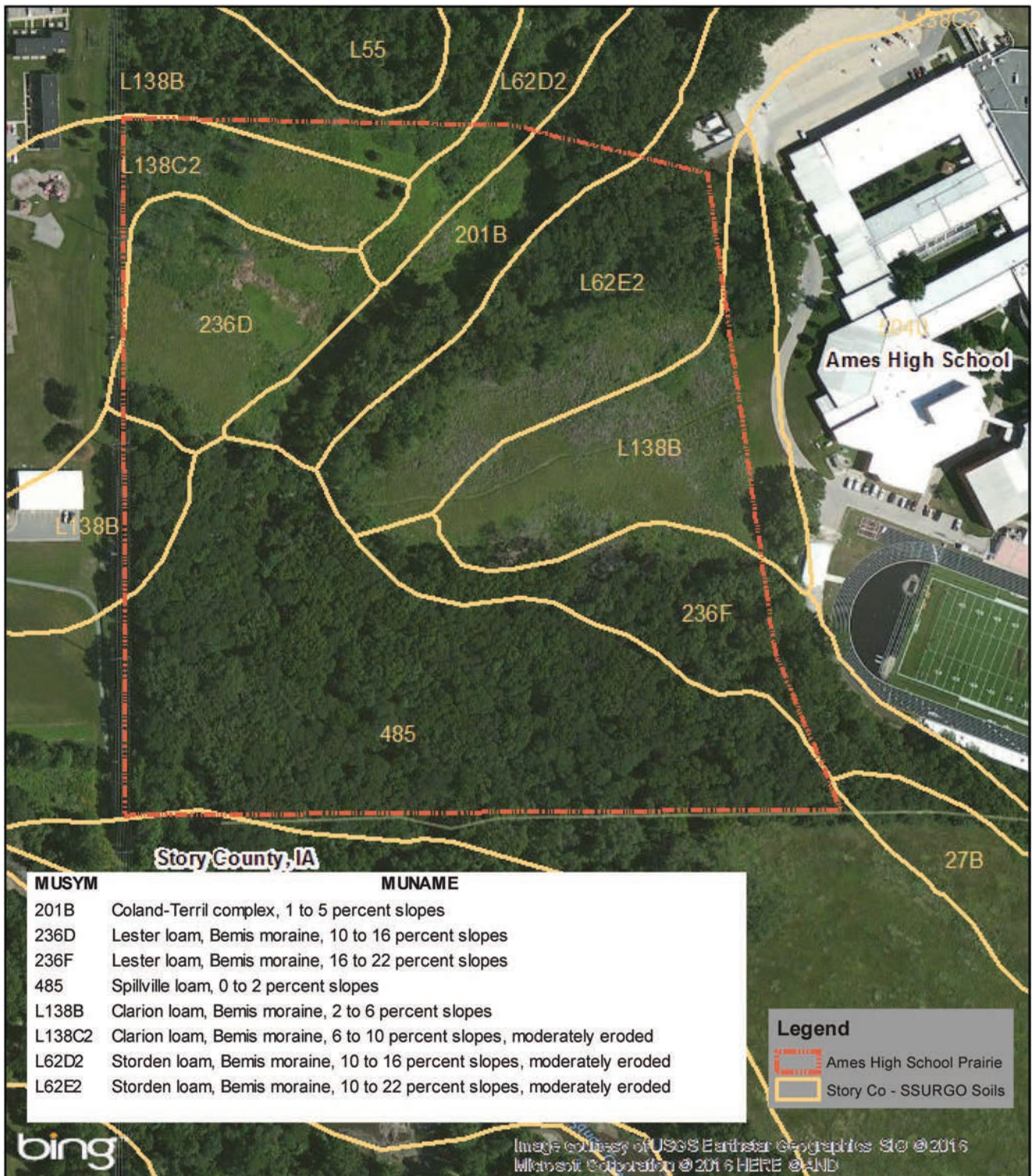


Fig. 3. Soil map of AHP (Web Soil Survey).

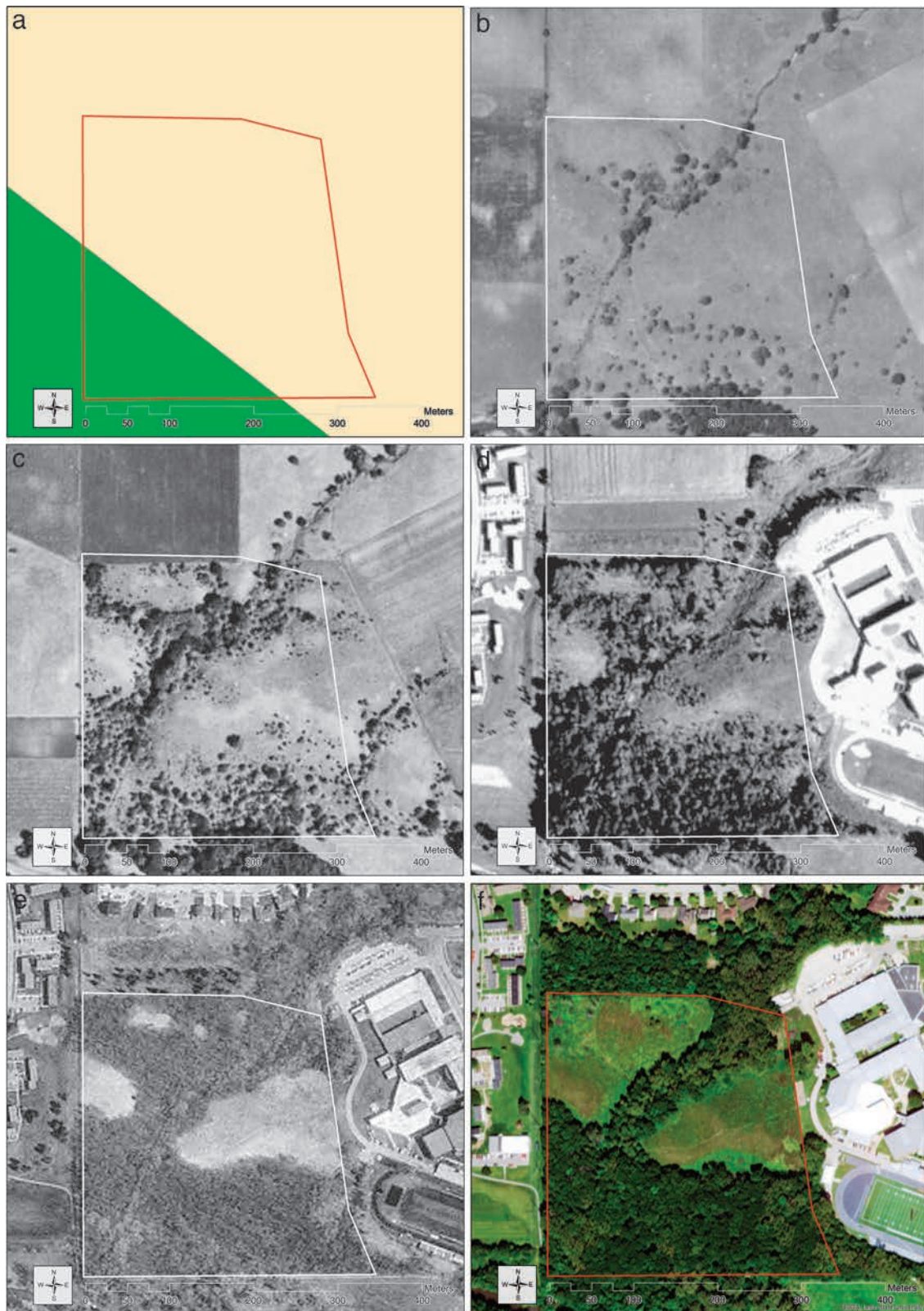


Fig. 4. AHP land cover in a) mid-19<sup>th</sup> century; b) 1939; c) 1953; d) 1972; e) 1994; f) 2015.



Fig. 5. AHP Preserve sign, posted at east entrance.

**Management**

*Friends of Ames High Prairie and Volunteers.* At about the time that TNC obtained the 49-year lease for AHP, a smooth-wire fence was erected around the property (R.Q. Landers, Jr., pers. comm., June 10, 2015; L.G. Crim, pers. comm., June 15, 2015). Although the majority of the land now designated as AHP was open prairie through the first half of the 20<sup>th</sup> century (Fig. 4b-c), by the 1970s woody plants had encroached on well over half of the property (Fig. 4d; Fig. 9 in Joens 1978). For two decades after the above-mentioned lease was obtained (1970), volunteers organized as the “Friends of Ames High Prairie” or working independently removed invasive woody plants and non-native forbs from the main prairie and conducted prescribed burns at AHP (D.R. Farrar, pers. comm., May 21, 2015; C.L. Johnson, pers. comm., Apr. 28, 2015; J.F. Shearer, pers. comm., July 4, 2015).

In the early 1990s, a volunteer who had taken responsibility for management of the prairie at AHP, D.M. Brenner, prepared a management plan for the prairie remnants there (Fig. 6) and established regular schedules for prairie management activities (e.g.,

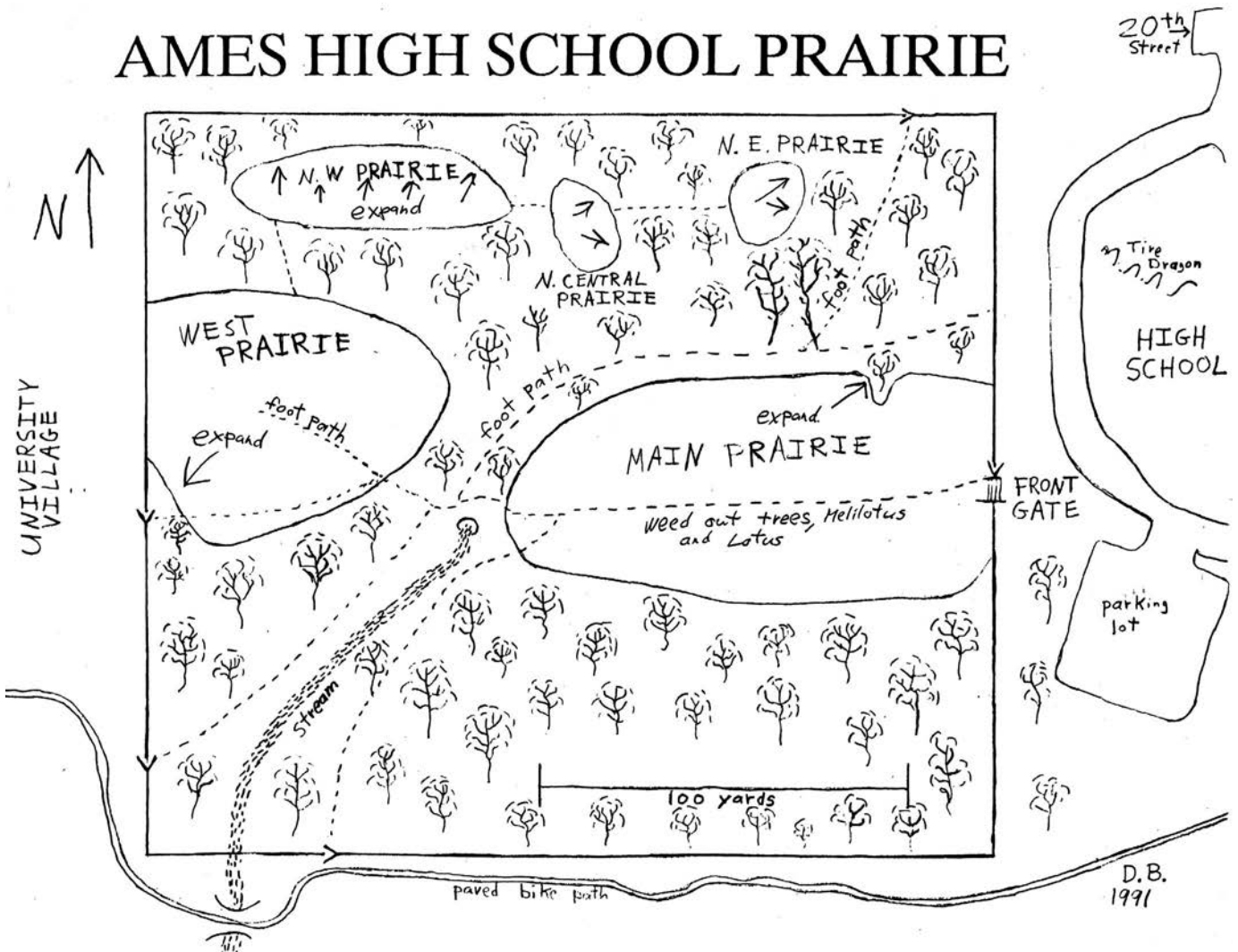


Fig. 6. AHP map identifying management priorities in 1991.

wood cutting, weed pulling) (D.M. Brenner, pers. comm., Apr. 28, May 25, June 11, and June 13, 2015). Despite the above work conducted by volunteers, which proceeded with little to no supervision (J.F. Shearer, pers. comm., July 4, 2015; D.M. Brenner, pers. comm., Apr. 28, 2015), by at least the mid-1980s, former tallgrass prairie vegetation was reduced to three separate parcels (Fig. 4e).

*TNC Management Plans (1997, 2003).* Just prior to designation of AHP as a state preserve, TNC prepared a management plan for the site which summarized previous ownership history and natural history of AHP, and stated two primary goals for the preserve: preservation of native prairie, and provision of biological educational experiences for local high school and university students (Reiners 1997). This document states that “burning and mechanical elimination of woody plants will be the primary tools” to maintain “open grassland conditions, the dominance of the vegetation by a diverse variety of native grasses and forbs, and the control of woody plants and non-native forbs.” Seed collection would be permitted for State Preserve Advisory Board projects, especially reconstruction/restoration projects of areas at AHP, that require local ecotype seeds not available commercially or locally from private sources. Finally, the plan mandates that a stewardship endowment fund of at least \$50,000 should be established and administered by TNC to be used for maintenance of AHP.

After designation of AHP as a state preserve, this plan was revised (Klaas and 1997 ISU Restoration Ecology Class 2003) to incorporate the work of an ISU Restoration Ecology class, taught by ISU professor E.E. Klaas, which had adopted development of a management strategy for AHP as a class project. This revised plan added management goals to those identified in Reiners (1997) to include expansion of prairie remnants into one contiguous prairie, and restoration of a major drainage-way to a more natural state. This document then outlined management strategies (e.g., tree removal, control of invasive species, prescribed fire, reintroduction of native plant species using seed collected on site, filling and re-leveling of eroded areas, placement of erosion control structures to slow water flow) to achieve these goals. Finally, this revised management plan recommended that “a corps of volunteer stewards...be trained to conduct management practices, supervise other volunteers, keep records, and serve as ambassadors to the community.”

*Recent Management at AHP.* Since the late 1990s, management of AHP has been conducted by numerous entities including volunteers working independently or collectively (“Friends of Ames High Prairie”) (J. Murdock, pers. comm., April 29, 2015), Ames High School students (Fig. 7a-d) (M. Todd, pers. comm., July 8, 2015), ISU students (E.E. Klaas, pers. comm., April 27, 2015), summer TNC and Conservation Corps interns (S. Moats, pers. comm., July 2, 2015), and private contractors (S. Moats, pers. comm., July 2, 2015). This work has included tree and shrub removal, herbicide treatment of invasive plant species, collection of native prairie seed on site and reintroduction of the seed into recently cleared sites within preserve boundaries, and prescribed fires.

A series of work plans for AHP has been prepared by TNC staff (with frequent input from Friends of Ames High Prairie) to guide volunteer stewards during the years 2010-2013 (Filipiak and Friends of Ames High Prairie 2010); 2013-2015 (Tucker 2013), and 2016-2019 (Maxson 2015). The current work plan identifies four threats to the prairie, in order of urgency: 1) woody encroachment; 2) herbaceous invasive species; 3) small size/fragmentation; and 4) lack of awareness/understanding of the prairie. It then states that realistic management goals for 2016-2019 are to: 1) maintain and enhance the native diversity of the existing prairie; 2) expand the existing prairie opening with the long-term goal of reconnecting

management zones 2 and 3 with management zone 1; and 3) provide for early detection of new threats.

This work plan identifies specific objectives for reaching these goals as: 1) continued overstory tree removal from management zones 5 and 6; 2) collection of native seed from AHP and nearby remnant prairies for seeding into recently cleared areas; 3) aggressive management of invasive species; and 4) continued monitoring of the prairie remnants at AHP for new introductions of other invasive species. Finally, Maxson (2015) presents detailed protocols for meeting these objectives. These include the timing of woody plant removal (objective 1), recommended herbicide types (objectives 1 and 3), procedures for collection, storage, and dispersal of seed onto prairie remnants (objective 2), establishment of permanent photo points (objective 4), and annual documentation of prairie remnant boundaries using a GPS unit (objective 4).

## METHODS

### Field Work

Thompson conducted extensive plant inventories in AHP during the 2011 field season (128 d, 640 h), as well as during several additional days of field work in subsequent years (2012-2015) to search for overlooked plant species. During this inventory, he repeatedly visited all the preserve’s habitats, including forests, native prairies, stream banks, mud and sandbars, and sites impacted by human disturbance. These latter areas included the preserve’s roadway and soil disturbed during repair work on the storm sewer in 2011 that extends through the preserve. Thompson collected 714 voucher specimens to document the preserve flora during this field work.

### Data Analysis

*Compilation of the Vascular Plant Checklist.* We compiled a checklist of all vascular plant taxa encountered during the current inventory of AHP, as well as taxa reported by Freckmann (1966) and Norris (1995) during prior plant inventories of the preserve. Scientific nomenclature for plant taxa follows Flora of North America Committee (1993+) from volumes available at the time of this study, the United States Department of Agriculture Plants Database (PLANTS 2011-2015), and Widrlechner (1998) for the genus *Rubus*. Common names follow (in order of priority) Eilers and Roosa (1994) and the United States Department of Agriculture Plants Database (PLANTS 2011-2015). Family circumscriptions and organizations of plants into larger groups follow Judd et al. 2008. Gleason and Cronquist (1991) was the primary reference used for plant identification. All taxa encountered by Thompson during the current study are documented by a specimen deposited in the Ada Hayden Herbarium (ISC) at ISU. For each vascular plant taxon encountered at AHP by Thompson during the current study, we include in the checklist the collection number of a voucher specimen documenting its occurrence in the preserve.

We provide the following additional information for each taxon in the checklist: source of each taxon report (i.e., Freckmann 1966; Norris 1995; current study), phytogeographic origin (following Eilers and Roosa 1994 and the United States Department of Agriculture Plants Database (PLANTS 2011-2015), and whether or not it is a native Iowa prairie plant). In the checklist, we also provide information about the habitat preferences of each plant encountered at AHP during the current inventory, utilizing the following habitat codes (adapted from Norris et al. 2001): tree dominated (T), prairie (P), wetland (W), and open (O); the latter category represents sites primarily associated with human





Fig. 7. Prairie management conducted by Ames High School students (2011): a) collecting seed; b) cutting heads of musk thistle; c) hoeing exotic plants; d) spreading seed.

disturbance, including the preserve's roadway and storm sewer repair work. Within each of these main categories, there are several subcategories as described in Table 1. Finally, we present an abundance code (slightly modified from Eilers and Roosa 1994 and Norris et al. 2001) for each vascular plant taxon encountered during the current study, as follows:

**Common:** widely distributed and often found growing in large quantities in several different habitats.

**Frequent:** widespread but not abundant and usually found in only one type of habitat.

**Infrequent:** not widespread and often not found in places where it might be expected to occur.

**Sparse:** found in only one or a few places.

In this paper we describe the status of vascular plant taxa at AHP that are of special interest and conservation concern to botanists and natural resource managers. These include taxa listed as of "special concern" in Iowa (Iowa Administrative Code 2002), taxa new to the published checklist of Iowa vascular plants (Eilers and Roosa 1994), and conspicuous introduced taxa we encountered at AHP.

*Floristic Comparisons with other Iowa Prairie Remnants.* We compared the native Iowa prairie flora of AHP with that documented from 26 other prairies protected in the Iowa State preserve system (summarized in Freese and Norris 2015) in several ways. First, we compiled the floras documented from these other prairies from available sources (e.g., published floras, plant lists available in M.S theses or Ph.D. dissertations, plant lists and vegetation plot data available in unpublished reports to sponsoring conservation agencies, etc.) into a spreadsheet. We categorized a given native vascular plant taxon in these floras as a "native Iowa prairie species" if 1) it was listed as occurring in prairie habitat by Eilers and Roosa 1994, or 2) if it occurs in a list of Iowa prairie plants compiled by John A. Pearson (plant ecologist, IDNR) in the late 1980s and early 1990s (Pearson 1993, available in Norris 1995, Appendix C). We then compared the number of "Iowa prairie species" documented from each of these 27 prairies (including AHP) that are protected in the Iowa state preserve system.

We then compared the number of native Iowa prairie plant taxa of high conservation concern in AHP with those documented from the other 26 prairies. Specifically, we used Iowa Coefficient of

**Table 1. Codes used to describe preferred habitats of vascular plants in Ames High School Prairie.**

1) T (Tree dominated habitats)	
df	dry forest
mf	moist forest
wf	wet forest—typically in bottomlands
ed	edge
2) P (Prairie habitats)	
dr	dry prairie
ms	moist prairie
wt	wt prairie—includes wet meadow vegetation
3) W (Wetland habitats)	
rp	riparian—grassy stream edges and sandbars
4) O (Open habitats—primarily associated with human disturbance)	
ss	sanitary sewer excavation work soil disturbance
dw	preserve access driveway

Conservatism (ICC) values assigned by a panel of experts to each native vascular plant taxon in the Iowa flora (Drobney et al. 2001). As typically developed and implemented in numerous states, coefficients of conservatism values range from 0 to 10, and reflect the likelihood that a given plant taxon will occur in natural habitat (Swink and Wilhelm 1994, Bourdaghs et al. 2006). Following Taft et al. (1997), who state that Illinois plant taxa assigned coefficient of conservatism values of 7-10 associate mostly with (or are restricted to) natural areas, we tallied the number of native Iowa prairie taxa with ICC values equal to 7, 8, 9, or 10 reported for each prairie to allow comparison. Although it was tempting to calculate and compare floristic quality indices (Swink and Wilhelm 1994) and mean ICC values among all 27 prairies protected as Iowa State Preserves, we decided against this because of potential effects of area on those measures (Matthews 2003, Matthews et al. 2005) and because of the great range in area of prairie vegetation (1.3-121.4 ha) represented among the 27 prairies included in this comparison.

**RESULTS**

**Flora Analysis**

*Checklist of Vascular Plants.* The checklist of vascular plants compiled for AHP from this and the two previous floristic studies (Freckmann 1966; Norris 1995) includes 465 taxa (329 native, 70.8%) (Appendix). The occurrences of all but 9 of the above taxa at AHP are documented by at least 1 voucher specimen housed in the Ada Hayden Herbarium (ISC). The most diverse plant families in the AHP flora are Asteraceae (70 taxa), Poaceae (68), Rosaceae (25), and Cyperaceae (24), and the most diverse genera in this flora are *Carex* (21 taxa), *Symphyotrichum* (11), *Pericaria* (6), and *Poa* (6) (Table 2). During field work for the current study (2011-2015), Thompson found 306 taxa not reported in either of the two previous studies. Among these are 20 taxa not listed in the checklist of Iowa vascular plants (Eilers and Roosa 1994), the majority of which (19 taxa; 95%) are not native to central Iowa (Table 3). (Note: 9 of these 20 taxa have previously been reported in Iowa in floristic studies conducted since publication of Eilers and Roosa 1994, and the remaining 11 taxa are reported as naturalized in Iowa for the first time.)

The plants at AHP were encountered in a variety of habitats (Table 4) and varied widely in abundance (Table 5). Five taxa in this flora are considered to be of “special concern” by the Iowa Natural Resource Commission (Iowa Administrative Code 2002): glomerate sedge (*Carex aggregata* Mack.), quill sedge (*Carex echinodes* (Fernald) P. Rothr., Reznicek & Hipp), Richardson’s sedge (*Carex richardsonii* R.

**Table 2. Floristic Composition of the Ames High Prairie flora. A) Major Groups, Families, Genera and Taxa**

Major Groups	Families	Genera	Taxa (Hybrid)
Ferns and Fern Allies	3	3	5
Conifers	1	1	1
Magnoliids	1	1	1
Monocots	13	55	111 (1)
Eudicots	66	219	347 (5)
Total	84	279	465 (6)

**B) Ten Largest Families**

Family	Native to Central Iowa	Native Elsewhere in Iowa	Native Elsewhere in United States	Non-Native in United States	Total (Hybrid)
Asteraceae	56			14	70
Poaceae	38		1	29	68 (1)
Rosaceae	19			6	25 (1)
Cyperaceae	24				24
Fabaceae	16	1		6	23
Lamiaceae	9			6	15
Brassicaceae	4			9	13
Polygonaceae	7			5	12
Apiaceae	7			4	11
Amaranthaceae	6			3	9

**C) Eleven Largest Genera**

Genus	Native to Central Iowa	Non-Native to United States	Total
<i>Carex</i>	21		21
<i>Symphyotrichum</i>	11		11
<i>Pericaria</i>	4	2	6
<i>Poa</i>	2	4	6
<i>Acer</i>	4	1	5
<i>Cbenopodium</i>	3	2	5
<i>Cirsium</i>	3	2	5
<i>Dichanthelium</i>	5		5
<i>Potentilla</i>	3	2	5
<i>Solidago</i>	5		5
<i>Viburnum</i>	2	3	5

Br.), Hill’s thistle (*Cirsium hillii* (Canby) Fern.), and meadow bluegrass (*Poa wolffii* Scribner).

*Analysis of Floristic Change at Ames High Prairie.* The 447 vascular plant taxa encountered at AHP during the current study include 309 taxa (69%) native to central Iowa. In comparison, Freckmann (1966) reported 143 vascular plant taxa occurring on the prairie at AHP in the early 1960s, of which 112 (78%) are native to central Iowa.

During the current study, Thompson documented the occurrences of 318 vascular plant taxa at AHP not reported by Freckmann (1966). Of these previously unreported taxa, 210 (66.0%) are taxa native to central Iowa, and 59 (18.6%) are native Iowa prairie taxa, by the criteria explained above. In contrast, Freckmann (1966) documented the occurrence of 16 vascular plant taxa at AHP in the 1960s not encountered during the current study, including 13 (81.3%) which are native, and 11 (68.8%) which are native Iowa prairie taxa.

Similar comparisons with the early 1990s flora of AHP (Norris 1995) are not possible, because that study focused solely on prairie taxa while ignoring non-native taxa as well as native taxa characteristic of other habitats.

**Table 3. Taxa collected at Ames High Prairie and which are not listed in the Iowa checklist of vascular plants (Eilers and Roosa 1994).**

* <i>Berberis cf. koreana</i> Palib. × <i>B. thunbergii</i> DC. (Korean barberry × Japanese barberry)
* <i>Clematis cf. terniflora</i> de Candolle (sweet Autumn clematis)
* <i>Euonymus fortunei</i> (Turcz.) Hand.-Maz. (winter creeper)
* <i>Geranium sibiricum</i> L. (Siberian geranium)
* <i>Ligustrum obtusifolium</i> Sieb. & Zucc. (border privet)
* <i>Lonicera × bella</i> Zabel ( <i>L. tatarica</i> × <i>L. morrowii</i> ) (showy fly honeysuckle)
* <i>Lonicera maackii</i> (Rup.) Maxim. (Amur honeysuckle)
* <i>Lonicera cf. ruprechtiana</i> Regel (Manchurian honeysuckle)
* <i>Lunaria annua</i> L. (money-plant, silver dollar)
* <i>Myosotis sylvestris</i> Hoffm. (garden forget-me-not)
* <i>Phellodendron</i> sp. (corktree)
* <i>Polygonum aviculare</i> L. subsp. <i>neglectum</i> (Besser) Arcangeli (narrow-leaf knotweed)
* <i>Prunus cf. cerasifera</i> Ehrh. (group) (cherry plum, purple-leafed plum)
<i>Rosa × rudiuscula</i> Greene ( <i>R. arkansana</i> × <i>R. carolina</i> ) (hybrid rose)
* <i>Rubus parvifolius</i> L. (Asian raspberry)
* <i>Salix × rubens</i> Schrank ( <i>S. alba</i> × <i>s. fragilis</i> ) (hybrid crack willow)
* <i>Syringa reticulata</i> (Blume) H. Hara (Japanese tree lilac)
* <i>Veronica polita</i> Fr. (gray field speedwell)
* <i>Viburnum lantana</i> L. (wayfaringtree)
* <i>Viburnum sieboldii</i> Miq. (Siebold's arrowwood)

*Floristic Comparisons With Other Prairies Protected In The Iowa State Preserve System.* The AHP flora documented by Freckmann (1966), Norris (1995), and the current study includes 147 native Iowa prairie taxa, and in this regard ranks 8<sup>th</sup> among 27 Iowa state preserves that protect prairie vegetation (Fig. 8a). Among these native Iowa prairie taxa at AHP are 45 that are assigned high (7-10) Iowa coefficient of conservatism values. In this comparison, the AHP flora ranks 15<sup>th</sup> in comparison to the other 26 Iowa state preserves which feature prairie (Fig. 8b).

**Status of Vascular Plant Taxa of Special Interest**

*Endangered, Threatened, and Special Concern Taxa.* Two of the five Iowa Special Concern taxa encountered by Thompson at AHP during the current study occurred in prairie habitat: Richardson's sedge and Hill's thistle. Richardson's sedge occurred in two widely separated populations—the larger (occupying 100 m<sup>2</sup>) on the west hill prairie, the smaller (20 m<sup>2</sup>) on the east hill prairie. Likewise, Hill's thistle grew in two widely separated populations on these same east and west hill prairies. In 2014, two plants in both the east (50 m<sup>2</sup>, 30 rosettes) and west (40 m<sup>2</sup>, 12 plants) Hill's thistle populations bolted and produced flower heads.

Two additional Iowa special-concern sedge taxa occurred in both open prairie and forest habitats at AHP: glomerate sedge (frequent in

**Table 4. Habitat of Ames High Prairie flora documented during current study. Habitat codes defined in Table 1.**

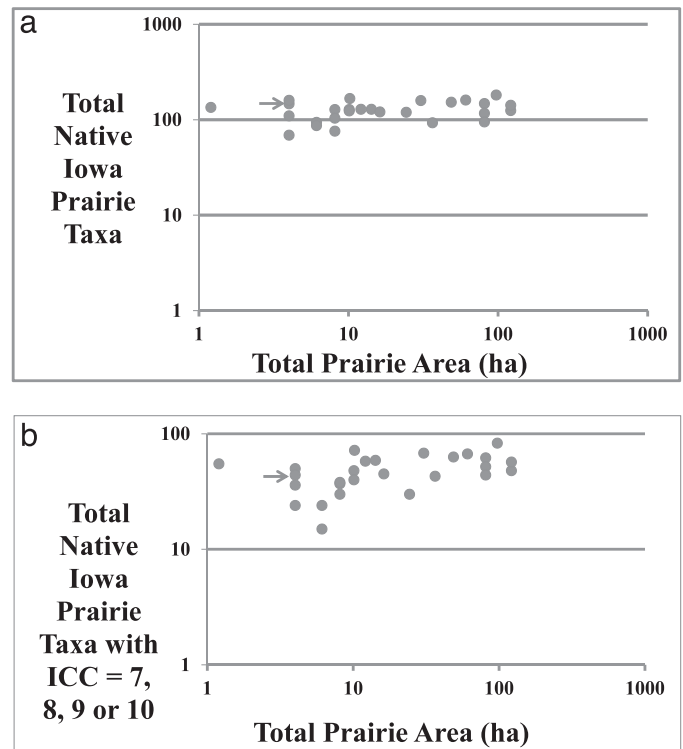
Habitat Type	No. of Taxa	%
Prairie	282	63
Tree-dominated	212	47
Wetland	67	15
Other	44	10
More than one type	115	26

**Table 5. Abundance of Ames High Prairie flora documented during current study. Abundance codes defined in text.**

Abundance	No. of Taxa	%
Common	127	28
Frequent	68	15
Infrequent	54	12
Sparse	198	44

some areas of both prairie and forest) and quill sedge (represented by large populations in open prairies and one small population in dense forest). Large tree stumps are present in the now open prairie areas where these two sedge taxa were found, suggesting that conditions may have been shaded when these sedge populations were established. The fifth state-listed special-concern species, meadow bluegrass, is a forest bluegrass species that Thompson vouchered from a large population that he encountered in the floodplain forest of Squaw Creek.

*Taxa New to the Iowa Checklist of Vascular Plants.* Thompson discovered five forb taxa new to the Iowa checklist of vascular plants (Eilers and Roosa 1994). Two of these occurred in the Squaw Creek floodplain within the preserve boundaries: Siberian geranium (*Geranium sibiricum* L.), vouchered from a single plant growing in the Squaw Creek floodplain forest of the preserve, and money plant (*Lunaria annua* L.). It is likely that these two forb species arrived on



**Fig. 8. Floristic comparison of AHP with 26 other prairies protected in the Iowa State Preserves System. a) Relationship between total number of native Iowa prairie plant taxa versus total prairie area for 27 prairies protected in the Iowa state preserve system; b) relationship between total number of native Iowa prairie plant taxa assigned high (7, 8, 9 or 10) values of the Iowa Coefficient of Conservatism (ICC) versus total prairie area. AHP is identified with an arrow in each figure.**

the floodplain through seed dispersal during periods of flooding. Thompson found gray field-speedwell (*Veronica polita* Fr.) (population extent: ~10m in diameter) growing on the prairie edge bordering the floodplain forest. Finally, Thompson encountered the other two forb taxa new to the Iowa checklist growing along a creek-edge mudbar: forget-me-not (*Myosotis sylvestris* Hoffm.), and narrow-leaf knotweed (*Polygonum aviculare* L. subsp. *neglectum* (Besser) Arcangeli). This mudbar occurs along the large north-south drainage gully mentioned above, suggesting that the seed source for these two taxa may have been garden waste from a wooded ridge on high school property or from a retirement community adjacent to the preserve.

Thompson found eight woody plant taxa not listed in Eilers and Roosa (1994) growing in forest and edge habitats at AHP. The most common of these were Amur honeysuckle (*Lonicera maackii* (Rupr.) Maxim.) and showy fly honeysuckle (*Lonicera ×bella* Zabel), which varied in size from small seedlings to 3m tall and which grew prolifically (frequently in bloom) in shrub thickets throughout the preserve's floodplain forest among other honeysuckle taxa vouchered from the preserve.

The following seven woody plant taxa, also new to the Iowa checklist of vascular plants, were infrequent or sparse in the understory of AHP forests: corktree (*Phellodendron* sp.), Japanese tree lilac (*Syringa reticulata* (Blume) H. Hara), Manchurian honeysuckle (*Lonicera* cf. *ruprechtiana* Regel), wayfaringtree (*Viburnum lantana* L.), Siebold's arrowwood (*Viburnum sieboldii* Miq.), sweet autumn clematis (*Clematis* cf. *terniflora* de Candolle), and winter creeper (*Euonymus fortunei* (Turcz.) Hand.-Maz.). Possible sources of corktree, Siebold's arrowwood, and winter creeper are the ISU campus (ISU Campus Landscape Maps), while Japanese tree lilac probably escaped from residential areas or the ISU campus in Ames, where it is a commonly planted landscape shrub (D.Q. Lewis and J.D. Thompson, personal observations). It is likely that recent flood events facilitated entry of many of the above woody plant taxa into AHP, particularly those which occur in the floodplain. However, animal-mediated dispersal is also a possibility.

Waterways that drain areas surrounding the preserve are the preferred habitat of hybrid crack willow (*Salix × rubens* Schrank) that, while not listed in the checklist of Iowa vascular plants, has recently been reported as naturalized in several other central Iowa locations. Thompson found two of these willow hybrids at AHP—one approximately 10m tall, and the other (uprooted many years ago but with several surviving vertical branches) with a trunk measuring approximately 1m in diameter.

Finally, Thompson discovered five woody plant taxa not listed in the state checklist that occur in prairie habitats at AHP. One of these, rough rose (*Rosa × rudiuscula* Greene), is the lone native plant taxon found during the current study that does not appear in the state checklist (Eilers and Roosa 1994). Significantly, we determined that all native roses collected at AHP are this hybrid taxon. Cherry plum tree (*Prunus* cf. *cerasifera* Ehrh.; a single, approximately 1.5m tall tree growing on the open, lower hillside of the west, main hill prairie), corktree (< 1m tall saplings; supplementing their occurrence in forest edge habitat mentioned above), Asian raspberry (*Rubus parvifolius*; observed by Thompson to occur elsewhere in Ames and surrounding areas), and an unnamed barberry hybrid, *Berberis* cf. *koreana* Palib. × *B. thunbergii* DC (which is cultivated elsewhere in Ames; M.P. Widrechner, pers. comm., 2011) were also encountered growing in prairie habitats at AHP.

**Introduced and Invasive Species.** AHP is located in the center of an urban area and its flora is susceptible to influence by a variety of human activities that occur almost daily, both outside and inside its boundaries. Below, we describe specific human activities and flood

events that we have seen directly contribute to the introduction of many of the 137 non-native taxa (Appendix) into the preserve.

**Garden and Yard Waste.** Some plant taxa found in the preserve, both native and non-native, are undoubtedly introductions from a woodland ridge top inside of high school property and from a retirement community. Both of these facilities are located just north of AHP at the head of the large north-south drainage gully that transects the preserve for its entire length, from the northeast corner to the southwest corner (Fig. 2). Gardens and flowerbeds in the retirement community, and tree trimmings, flower bed, yard and garden waste regularly disposed of along the ridge top on the north edge of a high school parking lot, are likely sources of plant introductions at AHP. Over the years, many heavy rains have flowed in torrents down this gully into Squaw Creek and undoubtedly transported discarded vegetation and seeds of numerous non-native species into the preserve. The most abundant of these, garlic mustard (*Alliaria petiolata* (Bieb.) Cavara & Grande), was first observed at AHP in 2011 growing on the high school ridge; it soon expanded into the preserve along the large drainage gully, as well as into a low-lying area of open prairie and throughout the floodplain forest.

**Stormwater Runoff.** Additional sources of non-native plants at AHP are closed courtyards within the high school building. One of the courtyards contains a greenhouse and a pond with water that overflows into these storm drains. In the past, teachers at Ames High School planted many ornamental plants in the pond and around the greenhouse, including purple loosestrife (*Lythrum salicaria* L.). These storm drains discharge into two underground tiles (M. Todd, pers. comm., Jan. 28 2015), which then empty directly onto the ground on the west side of the high school. This drainage water has over time eroded a shallow trench at the head of a small drainage gully that enters the larger drainage gully mentioned above. Consequently, several purple loosestrife plants currently grow along the entire length of the smaller gully.

**Apiculture.** From the mid-1960s until the spring of 1991, teachers cared for beehives for educational purposes behind the high school immediately adjacent to the preserve (M. Todd, pers. comm., summer 2012). A large population of honeyweed (*Leonurus sibiricus* L.), most likely planted for use by the bees, currently grows in this area, and is no doubt the source of a large population of this plant which currently occurs within the preserve on one of the open prairie hilltops.

**Flood Events.** The Squaw Creek floodplain forest currently covers nearly half of the southern tier of AHP (Fig. 4f). With the occurrence of several major flood events in central Iowa since the early 1990s, the seeds of many native and non-native species have been deposited in the floodplain of the preserve. Non-native bush honeysuckles (*Lonicera* spp.) and garlic mustard that currently occur throughout this floodplain forest, and shrub species (common buckthorn (*Rhamnus cathartica* L.), black raspberry (*Rubus occidentalis* L.), and rough-leaf dogwood (*Cornus drummondii* C. A. Meyer)), which are now common in ecotone habitats at the junction of floodplain forest and prairie, were probably introduced (at least in part) by flood waters.

**Potential Future Management Problems.** Several species may present ongoing or new management problems at AHP in the future. These include bird's-foot trefoil (*Lotus corniculatus* L.), which is currently scattered throughout the prairie in large, dense populations that are displacing native prairie species. A large number of American plum (*Prunus americana* Marsh.) saplings (1-2 m tall) have re-sprouted from previously removed mature trees on the prairie and have the potential to proliferate. Following removal of woody shrubs in the ongoing effort to expand prairie habitat at AHP, numerous invasive plants rapidly colonized these newly opened areas—especially common burdock (*Arctium minus* Berhn.), common mullein



Fig. 9. Management zones (1-10) and units (identified by letter within each zone) at AHP (Filipiak and Friends of Ames High Prairie 2010). Reproduced by permission of The Nature Conservancy (Iowa Chapter).

(*Verbascum thapsus* L.), Canada thistle (*Cirsium arvense* (L.) Scop.), foxtail species (*Setaria* spp.), common motherwort (*Leonurus cardiaca* L.), and Canada horseweed (*Conyza canadensis* (L.) Cronq.). Land managers at AHP will be challenged to keep the above invasive species, as well as any new ones, in check.

### Vegetation Map

Fig. 9 (Fig. 1 in Filipiak and Friends of Ames High Prairie 2010, reproduced by permission) presents a map of AHP divided into 10 management zones (i.e., zones 1-10). Zones 1-3, in which most of the prairie vegetation featured at AHP occurs, are subdivided into management units labelled by zone and by letter (e.g., unit 1C). Below, we describe the vegetation community in each management zone, as well as recent management activities that have occurred therein.

### Prairie

**Zones 1-2.** Management units 1A-1F and 2A-2E (Fig. 9) are the most pristine prairie zones with the highest diversity of prairie species. The preserve's highest hilltops, with dry, well-drained soil, are found throughout the length of the center of these zones. This is the favored habitat of plains muhly (*Muhlenbergia cuspidata* (Torrey) Rydb.), hairy grama (*Bouteloua hirsuta* Lag.), prairie dandelion (*Nothocalais cuspidata* (Pursh) Greene), silky aster (*Symphotrichum sericeum* (Vent.) G.L. Nesom), ground plum (*Astragalus crassicaarpus* Nutt.), white prairie clover (*Dalea candida* Willd.), purple prairie clover (*Dalea purpurea* Vent.), fringed puccoon (*Lithospermum incisum* Lehm.), and gray goldenrod (*Solidago nemoralis* Aiton). On the lower, moister perimeter of the above zones, the following prairie species reach the peak of their abundance: American vetch (*Vicia americana* Muhl. ex Willd.), Canada anemone (*Anemone canadensis* L.), Culver's root (*Veronicastrum virginicum* (L.) Farw.), Richard's alumroot

(*Heuchera richardsonii* R. Br.), downy gentian (*Gentiana puberulenta* J. Pringle), and Missouri goldenrod (*Solidago missouriensis* Nutt.).

Even though zones 1 and 2 have the highest diversity of native prairie species, excessive growth by invasive taxa (including some native taxa) is evident in some management units within each. Zone 1 has a number of these species, including Canada goldenrod (*Solidago altissima* L.), bird's-foot trefoil, sweet clover (*Melilotus officinalis* (L.) Pallas), crown vetch (*Securigera varia* (L.) Lassen), common burdock, common mullein, beggarslice (*Hackelia virginiana* (L.) I.M. Johnston), poison ivy (*Toxicodendron radicans* (L.) Kuntze ssp. *negundo* (Greene) Gillis), wild parsnip (*Pastinaca sativa* L.), rough-leaved dogwood, American plum, giant foxtail (*Setaria faberi* Herm.), Kentucky bluegrass (*Poa pratensis* L.), and smooth brome (*Bromus inermis* Leysser). Poison ivy and Kentucky bluegrass are also conspicuous in some management units of zone 2.

Until 2014, the forest edge vegetation of zones 1 (north, south, and west margins) and 2 (north, south, and east margins) were dominated by invasive woody shrub species, (e.g., common buckthorn, bush honeysuckle species, and black raspberry), which spread aggressively into the prairie habitats. During the spring, summer, and fall of 2014, Thompson spent several months cutting, stump-treating, and removing all mature invasive shrubs and young tree saplings from all of zone 1. His stump treatment using Pathfinder® II resulted in approximately 95% elimination of target shrubs. Thompson sowed seed collected at AHP over the clear-cut units of the lower south slope of zone 1 in 2014, and then over the clear-cut north units of zone 1 in 2015.

In late 2011, personnel from Conservation Corp Iowa (Conservation Corp Iowa 2013) cut and stump-treated shrubs with herbicide on the north margins of zone 2, but this treatment was mostly ineffective. In spring 2014, a TNC work crew used chainsaws and a brush mower to remove all of the extensive two-year re-growth of the invasive shrubs along the north edge of zone 2, and all mature invasive shrubs from the south and east margins of this same zone. They treated cut stumps with Element 4 (Garlon® 4 generic), which was very effective. In contrast, they allowed the rough-cut, brush-mowed shrubs to re-sprout during the summer and then foliar-treated this regrowth with Element 3A (Garlon® 3A generic) in the fall after a hard freeze. However, because leaf drop had commenced prior to the first hard freeze that fall, this foliar treatment was not as effective.

**Zone 3.** Because this zone is mostly upland dry soil, at one time it probably supported diverse native prairie taxa similar to those present in zones 1 and 2 (Fig. 4b-c). However, with a combination of past overgrowth of large, mature tree species (some nearly 1m in diameter) and the over-seeding of tall native grasses in management units 3B-3E, this zone has recovered very little of its former state despite recent management efforts. None of the native taxa listed above for zones 1 and 2 as indicative of diverse prairie were observed in zone 3. However, a small population (12 plants) of butterfly milkweed (*Asclepias tuberosa* L. ssp. *interior* Woodson)—the most for any zone at AHP—persists in unit 3A, and a small population of Hill's thistle (an Iowa special concern species) occurs here. However, invasive forb and graminoid taxa are much more conspicuous in zone 3 than in zones 1 and 2, especially common burdock, common mullein, giant foxtail grass, honeyweed, ground ivy (*Glechoma hederacea* L.), wild parsnip, and Kentucky bluegrass.

Although zone 3 was mostly open in the 1930s (Fig. 4b), by the 1970s it had filled with large, mature trees (Fig. 4d). Prior to this study, volunteers removed these trees from all regions of zone 3 except for unit 3F. All of the trees in the latter unit were girdled, but some remain standing. After years of shading by canopy trees, most of the prairie forb and grass taxa that presumably occurred here have disappeared from these areas. In the past decade, volunteers

harvested seeds of native grass species from within the preserve for reseeding of units 3B-3E, especially big bluestem (*Andropogon gerardii* Vitman) and Indiangrass (*Sorghastrum nutans* (L.) Nash) (J. Murdock, pers. comm., summer 2012). Subsequent overseeding of big bluestem and Indiangrass was done to the extent that these tall native grasses, along with several naturally occurring sedge (*Carex*) taxa, are currently the predominant prairie plants in these units.

Zone 3 is bordered by forest vegetation on both the north and east margins. Encroachment of common buckthorn and bush honeysuckle shrub taxa from these forest edges into prairie was extensive, almost completely covering the prairie in unit 3A, completely covering the prairie in 3F, and thwarting the reestablishment of prairie vegetation in these areas. However, the TNC work crew mentioned above removed and herbicide-treated a portion of the mature shrub growth in unit 3F in the spring of 2014, and Thompson removed and stump-treated the remaining mature shrubs in this unit and in unit 3A in the fall of that year. TNC's and Thompson's removal and herbicide treatments were the same as mentioned above, with the same results for each. Thompson sowed seed collected on site in clear-cut regions of units 3A and 3F in 2015.

**Zone 4.** This zone (Fig. 4f) is a low, moist-wet drainage area between hilltop prairies in zones 2 and 3. In late 2011, the Iowa Conservation Corp crew removed and stump-treated the buckthorn and bush honeysuckle blanketing the upper north and south perimeters, as well as scattered populations throughout the remainder of zone 4. The effectiveness of their herbicide treatment was minimal, and with no follow-up management, zone 4 once again became overgrown with mature, seed-producing shrubs. In 2014, the TNC crew used the same management methods as in 2011 to treat all of the invasive mature shrubs over all of zone 4, obtaining the same results. Until 2012, the remaining three quarters of this zone not in dense shrub shade (~5,000 m<sup>2</sup>) was covered by Canada thistle, supplemented by large populations of Japanese brome (*Bromus japonicus* Thunb. ex Murray) and giant foxtail, and smaller populations of reed canary grass and cup grass (*Eriochloa villosa* (Thunb.) Kunth). This zone does contain sparse native grass and sedge species, but very few native forb species. In 2012 and 2013, Thompson applied herbicide to the entire population of Canada thistle, with virtually 100% eradication, and to several smaller populations of reed canary grass, with good success. Annual follow-up work needs to be done in this zone to control buckthorn and bush honeysuckle shrub species as well as invasive, non-native annual grass species (e.g. giant foxtail, Japanese brome, and cup grass).

### Forest

Zones 5-10 are now all dense, mature forest communities (Fig. 4f) that in the 1930s were almost entirely open, with sparse, scattered trees (Fig. 4b). Zones 5, 6, and the upper area of zone 7 occur at topographic positions above the preserve's floodplain, while zones 8, 9, and 10 are located entirely in the floodplain of Squaw Creek. The drainage gully that originates northeast of the preserve (mentioned previously) flows through the center of zones 5, 6, and 8 and along the west edge of zone 9. This drainage area is dry as it passes through zones 5 and 6 except during periods of heavy rainfall. At the far north edge of zone 9, this usually dry drainage area turns into a continuously flowing stream through zones 8 and 9, and finally empties into Squaw Creek approximately 20m south of the preserve's southwest boundary. This stream develops at the above-ground outlet of a large storm sewer tile, fed by ample water from residential sump pumps and residential street storm drains to the north outside the preserve.

**Zones 5-7.** The forest in the northeast three quarters of zone 5 (Fig. 4f) today contains mostly mature trees (eastern cottonwood,

American elm (*Ulmus americana* L.), and green ash (*Fraxinus pennsylvanica* Marsh.), and until recently an almost impenetrable understory of common buckthorn. During the school years of 2014 and 2015, environmental science classes and the student ECO Club at Ames High School (supervised by Ames High School teacher Mike Todd) cleared all mature buckthorn and most small trees from a large portion of the northeast corner of this zone.

The forest in the south end of zone 5 and all of zone 6 contains a higher diversity of tree species (black walnut (*Juglans nigra* L.), American basswood (*Tilia americana* L.), American elm, red elm (*Ulmus rubra* Muhl.), black maple (*Acer nigrum* Michx.f.), black cherry (*Prunus serotina* Ehrh.), and choke cherry (*Prunus virginiana* L.)) than that described above. Native forb species characteristic of forest vegetation are also more diverse here, including Jack-in-the-pulpit (*Arisaema triphyllum* (L.) Schott), bloodroot (*Sanguinaria canadensis* L.), showy orchis (*Galearis spectabilis* (L.) Raf.), and blue phlox (*Phlox divaricata* L.). However, prior to this study the lower end of zone 5 had become nearly impenetrable with a significant growth of buckthorn and bush honeysuckle shrub species. During the winter of 2014/2015, a crew from TNC cleared most of these shrubs, but with minimal stump treatment; thus, the large amount of spring sprout regrowth needs continuing follow-up management.

Most of zone 7 is on a south-facing hillside above the Squaw Creek floodplain. It currently supports a mature forest dominated by hackberry (*Celtis occidentalis* L.), bitternut hickory (*Carya cordiformis* (Wang.) K. Koch), honey locust (*Gleditsia triacanthos* L.), and black walnut. Bush honeysuckle shrub species are beginning to encroach into the understory of this forest, but are not yet dense. Native forb and graminoid species found here include jumpseed (*Persicaria virginiana* (L.) Gaertn.), American bellflower (*Campanulastrum americanum* (L.) Small), yellow giant hyssop (*Agastache nepetoides* (L.) Kuntze), tall hairy agrimony (*Agrimonia gryposepala* Wallr.), obovate beak grass (*Diarrhena obovata* Beauv. var. *obovata* Gl.), slender wild rye (*Elymus villosus* Muhl. ex Willd.), James's sedge (*Carex jamesii* Schwein.), and glomerate sedge. The TNC crew also removed some invasive shrubs in zone 7 in the winter of 2014-2015.

**Zones 8-10.** These three zones, which formerly were nearly open landscapes containing sparse trees (Fig. 4b-c), are currently occupied by a mature floodplain forest (Fig. 4f) dominated by the following tree species: eastern cottonwood, black walnut, honey locust, American and red elm, white mulberry (*Morus alba* L.), downy hawthorn (*Crataegus mollis* (T. & G.) Scheele), and pear hawthorn (*Crataegus calpodendron* (Ehrh.) Medicus). As mentioned above, many shrub and forb species have entered these floodplain zones as the result of the many major flood events in recent years. Because common buckthorn is more of an edge species, this shrub species is sparse in the interior of these forests, but two of the invasive, non-native bush honeysuckle taxa—showy fly honeysuckle and amur honeysuckle—have proliferated throughout these floodplain zones.

Non-native (winged wahoo (*Euonymus alatus* (Thunb.) Sieb.), autumn olive (*Elaeagnus umbellata* (Thunb.) Siebold's arrowwood, and European cranberrybush (*Viburnum opulus* L.)) and native (southern arrowwood (*Viburnum dentatum* L.), nannyberry (*Viburnum lentago* L.), alternate-leaved dogwood (*Cornus alternifolia* L.f.), and American bladder nut (*Staphylea trifolia* L.)) shrub species have entered the floodplain zones. Non-native forbs found in the floodplain forest include money-plant, garden forget-me-not, Siberian geranium, Asiatic dayflower (*Commelina communis* L.), garlic mustard, bouncing bet (*Saponaria officinalis* L.), henbit deadnettle (*Lamium amplexicaule* L.), and Peruvian daisy (*Galinsoga parviflora* Cav.). However, native forb and sedge species also commonly occur in the floodplain forests of AHP. These include spearscale (*Atriplex patula* L.), spreading chervil (*Chaerophyllum procumbens* (L.) Crantz), common cowparsnip (*Heracleum maximum*

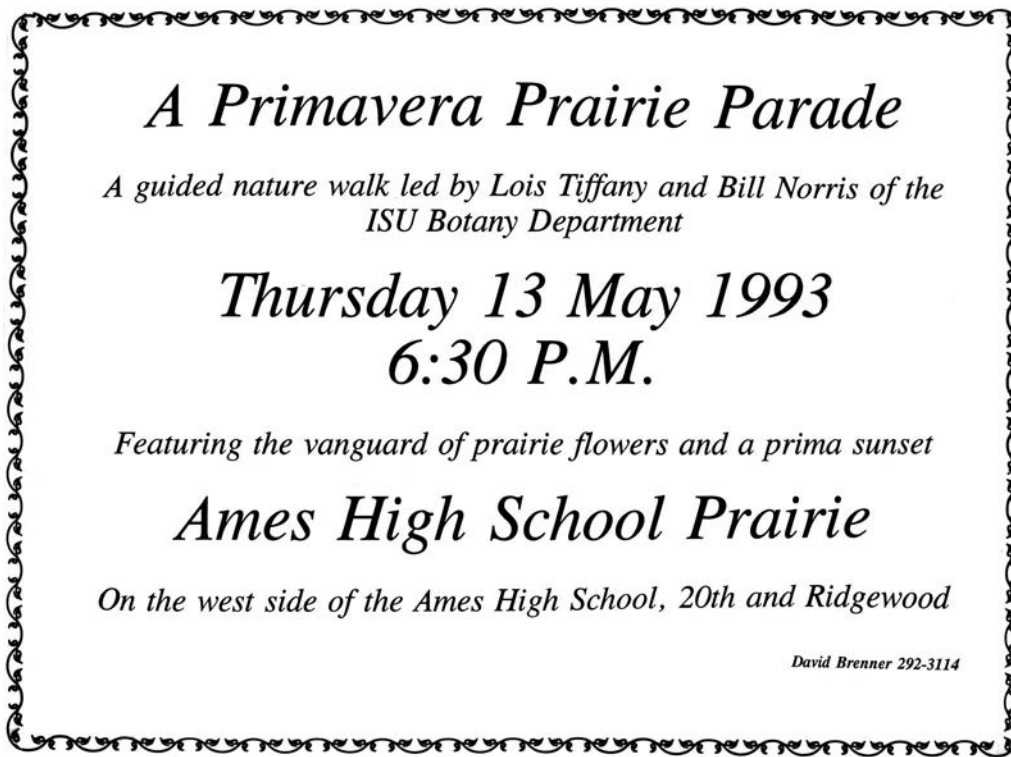


Fig. 10. Flier advertising educational field trip at AHP in 1993.

Michx.), spring beauty (*Claytonia virginica* L.), Sprengel's sedge (*Carex sprengelii* Dewey ex Sprengel), and Gray's sedge (*Carex grayi* Carey).

## DISCUSSION

### Role of Ames High Prairie as a Vegetation Remnant

Saunders et al. (1991), in a seminal paper focused on native vegetation remnants in Australia, justified their preservation with respect to four criteria. These include: a) *species-oriented reasons*, in which individual species and their gene pools are preserved; b) *example-oriented reasons*, in which remnants preserve particular ecosystems, communities, habitats, and vegetation assemblages; c) *process-oriented reasons*, by which remnants preserve important ecological and evolutionary processes; and d) *social-oriented reasons*, in which remnants provide opportunities for people to experience nature in a variety of ways. Below, we describe how the tallgrass prairie remnants at AHP fulfill each of the above criteria.

By providing a refuge for tallgrass prairie plants within an urban landscape, AHP satisfies the first criterion above. Despite being among the smallest of 27 prairies protected as Iowa state preserves, the AHP flora ranks 8<sup>th</sup> in total number of prairie plant taxa preserved, and 15<sup>th</sup> in total number of prairie plant taxa of conservation concern (Fig. 8a-b). Furthermore, the AHP flora, when considered in its entirety, protects five taxa considered to be of "special concern" by the State of Iowa.

AHP fulfills the second criterion above by protecting an example of tallgrass prairie, which was the predominant vegetation in Iowa at the time of settlement by Europeans in the early 19<sup>th</sup> century (Smith 1998). Although conservation efforts usually focus on establishing large conservation reserves, Shafer (1995) and Schwartz and van Mantgem (1997) argued that large reserves should be augmented with smaller ones because the latter may be the only available

representative of a given vegetation type. This justification for preservation of small preserves is especially germane in Iowa, where only a minuscule amount (< 0.1%) of historic tallgrass prairie vegetation remains (Smith 1998).

Ecological and evolutionary processes (third criterion above) certainly continue at AHP, highly influenced by its proximity to residential areas and the high school that gives this preserve its name. These include succession of vegetation communities in which former tallgrass prairie (Figs. 4a, 4b) has given way to forest vegetation (Fig. 4c, 4d), with fire suppression enforced by the City of Ames. The AHP flora has admitted many invasive plants in recent years, with the entry of some taxa facilitated by human landscape plantings and other activities observed by the authors.

Finally, AHP satisfies Saunders' et al. (1991) fourth criterion, justifying preservation of vegetation remnants in providing opportunities for people to experience prairie. Numerous field trips (Fig. 10) to the preserve sponsored by various environmental agencies (e.g., TNC, Iowa Prairie Network (IPN)) and educational institutions (e.g., Ames High School, ISU) have given participants the opportunity to learn about tallgrass prairie plant identification and prairie management. AHP has for many years been one of the outdoor teaching areas most utilized by ISU courses (Joens 1978, Gucciardo 1987). A late 1970s study of student use of outdoor teaching laboratories showed that AHP was utilized by 13 different ISU courses offered among 6 different academic departments, accounting for more than 2,000 student hours (Joens 1978). Since 1978, the Outdoor Teaching Laboratories Committee (OTL), composed of ISU faculty members from multiple academic departments, has served an advisory role regarding use of AHP for teaching and research (Gucciardo 1987; J.L. Pease, pers. comm., Sept. 22, 2015). More recently (since 2006), Ames High School students have spent many hours working on prairie management projects at AHP (M. Todd, pers. comm., July 8, 2015).

Citizen use of AHP is subject to state and municipal regulations (e.g., hunting, trapping) and TNC regulations that prohibit horseback riding, bicycles, off-road vehicles, and camping in the preserve (Reiners 1997). Current signs posted at the east and west main entrances/exits to the preserve declare that the latter activities, as well as off-road vehicles, pets, digging plants, and firewood cutting, are prohibited. Nonetheless, a trail passing across the original main prairie, connecting the Ames High School parking lot and ISU housing via floodplain forest, was frequently used by bikers despite the above signage. However, bikers have not used the trail as frequently in the past several years.

### SUMMARY

In a landscape in which the majority of the state's former tallgrass prairie cover is already depleted, the amount of prairie protected at AHP ranks in the lower 20% of the 27 Iowa state preserves established primarily to protect native grassland. Yet, the species richness of prairie plant taxa protected in this Iowa state preserve ranks in the top third of these same 27 state preserves. This is remarkable, given that ownership and management responsibility for AHP have so frequently changed hands, and also given the unique threats to the prairie remnants posed by their close proximity to human residences and a large high school. We thus propose that the case study presented in this paper supports Schwartz and van Mantgem's (1997) assertion, modified by us with the insertion of two italicized words: that "small *urban* preserves *can* play a critical role in conservation programs."

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### LITERATURE CITED

- AITKEN, ABRAMS AERIAL SURVEY CORPORATION. 1956. Topographic Map, City of Ames, Iowa, and Vicinity, Story County, Iowa. Lansing, MI. 1:1200. Sheet K-10.
- AMES HIGH PRAIRIE [internet]. c2011. [accessed 2015 Jun 9]. <https://ameshighprairie.wikispaces.com/Management+History>.
- ANDERSON PF. 1996. GIS research to digitize maps of Iowa 1832-1859 vegetation from Government Land Office Township Plat Maps: Phase 4. Des Moines (IA): Report to the Bureau of Preserves and Ecological Services, Iowa Department of Natural Resources and Iowa State University.
- ANDERSON RC. 1990. The historic role of fire. In: Collins SL and Wallace LW, editors. Fire in North American Tallgrass Prairies. Norman (OK): University of Oklahoma Press. p 8-10.
- BOURDAGHS M, JOHNSTON CA, REGAL RR. 2006. Properties and performance of the floristic quality index in Great Lakes coastal wetlands. *Wetlands*. 26(3):718-735.
- CONSERVATION CORPS IOWA. 2013. Retrieved 2013 May 15 from: <https://www.facebook.com/ConservationCorpsIowa>
- DROBNEY PD., WILHELM GS, HORTON D, LEOSCHKE M, LEWIS D, PEARSON J, ROOSA D, SMITH DD. 2001. Floristic quality assessment for the state of Iowa. [Retrieved 2013 Jan 15 from <http://www.public.iastate.edu/~herbarium/coeffici.html>.]
- EILERS LJ, ROOSA DM. 1994. The vascular plants of Iowa: an annotated checklist and natural history. Iowa City (IA): University of Iowa Press.
- ELLETT B, BEAL W, BAUSKE G, STERLING M, TAYLOR H, ADAMS T. 1970. Ames community school district – a history. Centennial booklet published by the Ames Public School District. Retrieved 2014 June from: [http://www.ameshistory.org/exhibits/school/ahs/ahs\\_history1.htm](http://www.ameshistory.org/exhibits/school/ahs/ahs_history1.htm)
- FILIPIAK J, FRIENDS OF AMES HIGH PRAIRIE. 2010. The Pohl Preserve at Ames High Prairie: Three year work-plan (July 1, 2010 – June 30, 2013). The Nature Conservancy. [unpublished document.]
- FLORA OF NORTH AMERICA EDITORIAL COMMITTEE (eds.) 1993+. Flora of North America north of Mexico. New York (NY): Oxford University Press.
- FRECKMANN RW. 1966. The prairie remnants of the Ames area. *Proc. Iowa Acad. Sci.* 73:126-136.
- FREESE EL, NORRIS WR. 2015. The vascular flora of Clay Prairie State Preserve (Butler County, Iowa): Recommendations to the Iowa State Preserve System. *J Iowa Acad Sci.* 120:21-34.
- GLEASON HA, CRONQUIST A. 1991. Manual of vascular plants of northeastern United States and adjacent Canada. 2<sup>nd</sup> ed. Bronx (NY): The New York Botanical Gardens.
- GUCCIARDO LS. 1987. Iowa State University Outdoor Teaching Laboratories. Iowa State University Printing Services, Ames, IA. 41 pp.
- HERZBERG R, PEARSON J. 2001. The guide to Iowa's State preserves. Iowa City (IA): University of Iowa Press.
- IOWA ADMINISTRATIVE CODE. 2002. Endangered and threatened plant and animal species. Ch 77. Iowa Natural Resources Commission. Des Moines (IA): State of Iowa.
- IOWA GEOGRAPHIC MAP SERVER. Iowa State University Geographic Information Systems Support and Research Facility. Retrieved summer 2015 from: <http://ortho.gis.iastate.edu/>
- ISU CAMPUS LANDSCAPE MAPS. The Planning Services division of FP & M maintains the Campus Landscape Maps and a Campus Plant Inventory of the plantings on Iowa State University campus. Retrieved 2011 Oct 9 from: [www.fpm.iastate.edu/landscapemaps/](http://www.fpm.iastate.edu/landscapemaps/)
- JOENS RL. 1978. Natural areas used as outdoor laboratories by Iowa State University [thesis]. [Ames (IA)]: Iowa State University.
- JUDD WS, CAMPBELL CS, KELLOGG EA, STEVENS PF, DONOGHUE MJ. 2008. Plant Systematics: a phylogenetic approach. 3<sup>rd</sup> ed. Sunderland (MA): Sinauer Associates, Inc.
- KLAAS EE, ISU 1997 RESTORATION ECOLOGY CLASS. 2003. Revised management plan for the Pohl Preserve at Ames High School Prairie. Based on an original version prepared by an ISU Restoration Ecology class (December, 1997) and submitted to The Nature Conservancy, the Iowa State Preserves Advisory Board, and other interested parties. Unpublished.
- MATTHEWS JW. 2003. Assessment of the floristic quality index for use in Illinois, USA, wetlands. *Nat Areas J.* 23:53-60.



- MATTHEWS JW, TESSENE PA, WIESBROOK SM, ZERCHER BW. 2005. Effect of area and isolation on species richness and indices of floristic quality in Illinois, USA wetlands. *Wetlands*. 25:607–615.
- MAXSON, D. 2015. Ames High Prairie/Pohl Preserve: 2016-2019 Volunteer Work Plan [draft].
- NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. Data for Ames Municipal Airport, Ames, IA. c1981-2010. [accessed spring 2015 at <http://www.ncdc.noaa.gov/cdo-web/datatools/normal>.]
- NORRIS WR. 1995. A natural areas inventory of Ames, Iowa [thesis]. [Ames (IA)]: Iowa State University.
- NORRIS WR, FARRAR DR. 1999. A municipal inventory and evaluation of natural areas: history and methodology. *J Iowa Acad Sci*. 106:49–62.
- NORRIS WR, LEWIS DQ, WIDRLECHER MP, THOMPSON JD, POPE RO. 2001. Lessons from an inventory of the Ames, Iowa, flora (1859–2000). *J Iowa Acad Sci*. 108(2):34–63.
- PLANTS Database. c2011-2015. Greensboro (NC): National Plant Data Team. [accessed various dates at <http://plants.usda.gov>].
- PRIOR JC. 1991. Landforms of Iowa. Iowa City (IA): University of Iowa Press.
- PYNE SJ. 1982. *Fire in America: a cultural history of wildland and rural fire*. Princeton (NJ): Princeton University Press.
- REINERS GB. 1997. Management plan for Ames High School Prairie State Preserve, Ames, Story County, Iowa. Prepared by The Nature Conservancy and approved by the Iowa State Preserves Advisory Board. [unpublished].
- ROSBURG TR. 2001. Iowa's prairie heritage: from the past, through the present, and into the future. In: Bernstein NP, Ostrander LJ, editors. *Proceedings of the Seventeenth North American Prairie Conference: seeds for the future ~ roots of the past*; North Iowa Area Community College, Mason City, IA. p 1–14.
- SAUNDERS DA, ARNOLD GW, BURBIDGE AA, HOPKINS AJM. 1991. The role of remnants of native vegetation in nature conservation: future directions. In: Saunders DA, Arnold GW, Burbidge AA, Hopkins AM, editors. *Nature conservation: the role of remnants of native vegetation*. Chipping Norton, NSW, Australia: Surrey Beatty and Sons. p. 387–392.
- SCHWARTZ MW, VAN MANTGEM PJ. 1997. The value of small preserves. In: Warwick C, editor. *Proceedings of the Fifteenth North American Prairie Conference*. Bend (OR): Natural Areas Association. p. 213–218.
- SHAFER CL. 1995. Value and shortcomings of small reserves. *BioSci*. 45(2):80–88.
- SMITH DD. 1998. Iowa prairie: original extent and loss, preservation and recovery attempts. *J Iowa Acad Sci*. 105(3):94–108.
- SMITH DD. 2001. America's lost landscape: the tallgrass prairie. In: Bernstein NP, Ostrander LJ, editors. *Proceedings of the Seventeenth North American Prairie Conference: seeds for the future ~ roots of the past*; North Iowa Area Community College, Mason City, IA. p. 15–20.
- SWINK F, WILHELM G. 1994. *Plants of the Chicago region*. 4<sup>th</sup> ed. Indianapolis (IN): Indiana Academy of Science.
- TAFT JB, WILHELM GS, LADD DM, MASTERS LA. 1997. Floristic quality assessment for vegetation in Illinois: a method for assessing vegetation integrity. *Erigenia*. 15:3–95.
- THORNWAITE CW. 1948. An approach towards a natural classification of climate. *Geog Rev*. 38(1):55–94.
- TUCKER J. 2013. The Pohl preserve at Ames High Prairie: 3 year work plan. The Nature Conservancy. [unpublished document].
- UNITED STATES GEOLOGICAL SURVEY, The Map Viewer. United States Department of the Interior. [accessed April 2016]. <http://viewer.nationalmap.gov/viewer/>
- WEB SOIL SURVEY. Natural Resources Conservation Service, United States Department of Agriculture. [accessed 2015]. <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.
- WIDRLECHNER MP. 1998. The genus *Rubus* L. in Iowa. *Castanea*. 63(4):415–465.

#### Appendix. Checklist of the Richard W. Pohl Memorial Preserve flora (Ames, Iowa).

Voucher specimens are deposited in the Ada Hayden Herbarium at Iowa State University, Ames, Iowa (ISC).

Format: *Current Scientific Name* [Outdated Eilers and Roosa (1994) nomenclature, if different] Studies in which documented; *Voucher specimen collection number* {Management zone and unit where current voucher specimen collected}–Habitat Code(s)–Abundance Code

See Fig. 9 for map of management zones and units

See Table 1 for definitions of habitat codes

See Methods for definitions of abundance codes

#### Key

No Symbol = Taxon native to central Iowa (entry in bold = native to Iowa prairies as defined in text)

\* = Taxon not native to the United States

# = Taxon native to the United States but not Iowa

~ = Taxon native to Iowa but probably not central Iowa

F = Reported by Robert W. Freckmann

N = Observed but not vouchered by William R. Norris and/or David Brenner

C = Vouchered by Thompson during the current study; C # = *voucher specimen citation*

#### MONILOPHYTES (FERNS AND FERN ALLIES)

##### ASPLENACEAE

*Asplenium platyneuron* (L.) Britton, Sterns, & Poggenburg (ebony spleenwort) C; C 2001 {1E}–Pms–sparse

##### EQUISETACEAE

*Equisetum arvense* L. (common horsetail) F, C; C 2045 {1D}–Wrp–sparse

*Equisetum laevigatum* A. Br. (smooth scouring-rush) N, C; C 2122 {1A}–Pms–infrequent

##### OPHIOGLOSSACEAE

*Botrychium dissectum* Sprengel (dissected grapefern) C; C 2017 {1F}–Twf–sparse

*Botrychium virginianum* (L.) SW. (rattlesnake fern) C; C 2070 {1C}–T–infrequent

#### GYMNOSPERMS (CONIFERS)

##### CUPRESSACEAE

*Juniperus virginiana* L. (red cedar) F, C; C 2005 {1B}–Pdr–sparse

#### ANGIOSPERMS

##### (MAGNOLIIDS)

##### ARISTOLOCHIACEAE

*Asarum canadense* L. (wild ginger) C; C 2026 {1F}–Twf,ed–infrequent

#### (MONOCOTS)

##### ALLIACEAE [LILIACEAE, in part]

*Allium canadense* L. (wild onion) C; C 2192 {5}–Tmf–sparse

*Allium stellatum* Nutt. ex Ker-Gawl. (wild prairie onion) C; C 2574 {6}–Twf,ed–sparse

##### ARACEAE

*Arisaema triphyllum* (L.) Schott (Jack-in-the-pulpit) C; C 2141 {6}–Tmf–sparse

##### ASPARAGACEAE [LILIACEAE, in part]

\* *Asparagus officinalis* L. (garden asparagus) F, C; C 2105 {1C}–Pdr,ms–frequent

##### COMMELINACEAE

\* *Commelina communis* L. (Asiatic dayflower) C; C 2338 {9}–Twf,ed–sparse

*Tradescantia bracteata* Small (longbract spiderwort) F, N, C; C 2156 {1B}–Pms–sparse

## CONVALLARIACEAE [LILIACEAE in part]

\**Convallaria majalis* L. (lily-of-the-valley) C; C 2088 {6}–Twf–sparse  
*Maianthemum racemosum* (L.) Link [*Smilacina racemosa* (L.) Desf.]  
 (false Solomon's-seal) C; C 2140 {6}–T–common  
*Maianthemum stellatum* (L.) Link [*Smilacina stellata* (L.) Desf.] (starry  
 false Solomon's-seal) C; C 2052 {8}–T–common  
*Polygonatum biflorum* (Walters) Ell. (Solomon's seal) C; C 2050 {8}–  
 T–frequent

## CYPERACEAE

*Carex aggregata* Mack. (glomerate sedge) C; C 2167 {6}–Tmf,ed; Pms–frequent  
*Carex bicknellii* Britton (Bicknell's sedge) N, C; C 2272 {2D}–Pms–infrequent  
*Carex blanda* Dewey (eastern woodland sedge) C; C 2166 {6}–T; Pms; Wrp; O–common  
*Carex brevior* (Dewey) Mack. ex Lunell (short-beak sedge) N, C; C 2263B {3A}–Pdr,ms–common  
*Carex conjuncta* Boott (soft fox sedge) C; C 2168 {6}–Ted; Pms,wt–frequent  
*Carex davisii* Schwein. & Torrey (Davis' sedge) N, C; C 2229 {3C}–Ted; Pms–frequent  
*Carex echinodes* (Fern.) Rothr. Reznicek & Hipp (quill sedge) C; C 2194 {3A}–Tmf; Pms–infrequent  
*Carex gravida* Bailey (heavy sedge) N, C; C 2677 {1B}–Pdr–sparse  
*Carex grayi* J. Carey (Gray's sedge) C; C 2255 {8}–Tmf,wf,ed–common  
*Carex grisea* Wahlenb. [*C. amphibola* Steudel var. *turgida* Fern.] (inflated narrow-leaf sedge) C; C 2268B {7}–T; P; W; O–common  
*Carex inops* L. H. Bailey ssp. *beliophila* (Mack.) Crins (sun sedge) C; C 2095 {3D}–Pdr–sparse  
*Carex jamesii* Schwein. (James' sedge) C; C 2087 {9}–Tdf,mf; Pms–frequent  
*Carex leavenworthii* Dewey (Leavenworth's sedge) C; C 2223 {1B}–Pdr,ms; Odw–infrequent  
*Carex meadii* Dewey (Mead's sedge) F, N, C; C 2092 {3A}–Pdr,ms–common  
*Carex molesta* Mack. ex Bright (troublesome sedge) C; C 2264B {3A}–Pms–sparse  
*Carex oligocarpa* Willd. (richwoods sedge) C; C 2211 {3E}–Pms–sparse  
*Carex pellita* Muhl. ex Willd. [*C. lanuginosa* Michx.] (woolly sedge) C; C 2711 {1C}–Pms–sparse  
*Carex pennsylvanica* Lam. (Pennsylvania sedge) C; C 2119 {2C}–Pdr,ms–common  
*Carex richardsonii* R. Br. (Richardson's sedge) C; C 2022 {1E}–Pms–sparse  
*Carex sprengei* Dewey ex Sprengel (Sprengel's sedge) C; C 2059 {3A}–Twf; Pms–common  
*Carex vulpinoidea* Michx. (fox sedge) C; C 2289 {3A}–Pwt; Wrp–sparse  
*Cyperus strigosus* L. (straw-colored flatsedge) C; C 2406 {3A}–Pwt–sparse  
 \**Cyperus* cf. *papyrus* L. (papyrus) C; C 2692 {5}–Wrp–sparse  
*Scirpus pallidus* (Britton) Fernald (pale bulrush) C; C 2421 {1A}–Wrp–sparse

## HYPOXIDACEAE [LILIACEAE, in part]

*Hypoxis hirsuta* (L.) Cov. (yellow stargrass) F, N, C; C 2074 {1C}–Pms–common

## IRIDACEAE

\**Belamcanda chinensis* (L.) DC. (blackberry lily) C; C 2417 {10}–Tmf–sparse  
 \**Iris* sp. L. (iris) C; C 2483 {5}–Wrp–sparse  
*Sisyrinchium campestre* Bickn. (prairie blue-eyed grass) F, N, C; C 2039 {1B}–Pdr,ms–common

## JUNCACEAE

*Juncus tenuis* Willd. (path rush) C; C 2327 {3A}–Pdr,ms; Odw–common

## ORCHIDACEAE

*Galearis spectabilis* (L.) Raf. (showy orchis) C; C 2091 {9}–Tmf–sparse

## POACEAE

\**Agrostis gigantea* Roth (redtop) C; C 2341 {1E}–Pms; Wrp–infrequent  
*Andropogon gerardii* Vitman (big bluestem) F, N, C; C 2396 {3D}–Pdr,ms–common  
*Bouteloua curtipendula* (Michx.) Torrey (side-oats grama) F, N, C; C 2364 {1D}–Pdr,ms–common  
*Bouteloua hirsuta* Lag. (hairy grama) F, N, C; C 2495 {1C}–Pdr–sparse  
 \**Bromus commutatus* Schrad. (hairy chess) C; C 2219 {1C}–Pms–sparse  
 \**Bromus inermis* Leysser (smooth brome) F, C; C 2150 {3D}–T; P; W; O–common  
 \**Bromus japonicus* Thunb. ex Murray (Japanese brome) F, C; C 2264 {3A}–Pms,wt–common  
 \**Bromus tectorum* L. (downy chess) C; C 2292 {10}–Twf–sparse  
*Cinna arundinacea* L. (wood reed) C; C 2453 {3A}–Pms–sparse  
 \**Dactylis glomerata* L. (orchard grass) C; C 2098 {7}–Pms; Wrp; Odw–infrequent  
*Diarrhena obovata* (Gleason) Brandenburg [*D. americana* Beauv.] (obovate beakgrass) C; C 2415 {8}–Ted–sparse  
*Dichanthelium acuminatum* (Sw.) Gould & Clark subsp. *implicatum* (Scribner) Freckmann & Lelong [*D. acuminatum* (Sw.) Gould & Clark var. *implicatum* (Scribner) Gould & Clark] (western panicgrass) F, N, C; C 2397 {3F}–P–common  
*Dichanthelium oligosanthes* (Schultes) Gould ssp. *scribnerianum* (Nash) Gould (Scribner's rosette grass) F, N, C; C 2279 {1F}–P–common  
*Dichanthelium ovale* (Ell.) Gould & C. A. Clark ssp. *praecoxius* (Hitcch. & Chase) Freckmann & Lelong [*D. acuminatum* (Sw.) Gould & Clark var. *villosum* (Gray) Gould & Clark] (eggleaf rosettegrass) F, C; C 2277 {2E}–P–common  
*Dichanthelium perlongum* (Nash) Freckmann (long-stalked panicgrass) F  
*Dichanthelium wilcoxianum* (Vasey) Freckmann [*D. oligosanthes* (Schultes) Gould var. *wilcoxianum* (Vasey) Gould & Clark] (fall rosette grass) F, C; C 2610 {2C}–Pdr–sparse  
 \**Digitaria ischaemum* (Schreber ex Schweigger) Schreber ex Muhl. (smooth crabgrass) C; C 2475 {9}–Pdr,ms; Wrp; Odw–infrequent  
 \**Digitaria sanguinalis* (L.) Scop. (common crabgrass) C; C 2434 {8}–Pdr,ms; Wrp; Odw–infrequent  
 \**Echinochloa crusgalli* (L.) Beauv. (barnyardgrass) C; C 2578 {4}–P; W–infrequent  
 \**Eleusine indica* (L.) Gaertner (goose grass) C; C 2685 {8}–Tmf; Odw–sparse  
*Elymus canadensis* L. var. *canadensis* [*E. canadensis* L.] (Canada wild rye) F, N, C; C 2416 {1B}–Pdr,ms–frequent  
 \**Elymus repens* (L.) Gould [*Agropyron repens* (L.) Beauv.] (quack grass) C; C 2293 {1A}–Pdr,ms–sparse  
*Elymus villosus* Muhl. var. *villosus* [*E. villosus* Muhl.] (slender wild rye) C; C 2321 {7}–Tmf,wf,ed; Pwt–common  
*Elymus virginicus* L. var. *virginicus* [*E. virginicus* L.] (Virginia wild rye) C; C 2384 {5}–Tmf,wf,ed; Pwt–common  
 \**Eragrostis cilianensis* (All.) Link ex E. Mosher (stinkgrass) C; C 2703 {5}–Twf,ed–sparse  
*Eragrostis pectinacea* (Michx.) Nees ex Steud. var. *pectinacea* (tufted lovegrass) C; C 2503 {8}–Orw–sparse  
 \**Eriochloa villosa* (Thunb.) Kunth (cup grass) C; C 2427 {4}–Pms,wt–sparse  
*Festuca paradoxa* Desv. (clustered fescue) C; C 2400 {3C}–Pms–sparse  
 \**Festuca rubra* L. (red fescue) C; C 2274 {2D}–Pdr–sparse  
*Festuca subverticillata* (Pers.) E. B. Alexeev [*F. obtusa* Biehler] (nodding fescue) C; C 2245 {7}–T–common

*Glyceria striata* (Lam.) A.S. Hitchc. (fowl manna grass) C; C 2712 {1D}—Pms—sparse  
*Hesperostipa spartea* Trin. [*Stipa spartea* Trin.] (porcupine grass) F, N, C; C 2169 {3D}—Pdr,ms—common  
*Hordeum jubatum* L. (squirrel-tail barley) F, C; C 2152 {3A}—Pms,wt—infrequent  
 #*Hordeum pusillum* Nutt. (little barley) C; C 2661 {3F}—Pms—sparse  
*Koeleria macrantha* (Ledeb.) Schult. (June grass) F, N, C; C 2172 {1A}—Pdr—infrequent  
*Leersia oryzoides* (L.) Sw. (rice cut-grass) C; C 2580 {1A}—T; P—common  
*Leersia virginica* Willd. (whitegrass) C; C 2439 {8}—T; P—common  
 \**Lolium perenne* L. (perennial rye grass) C; C 2215 {7}—Wrp; Odw—sparse  
*Muhlenbergia cuspidata* (Torrey) Rydb. (plains muhly) F, N, C; C 2472 {2E}—Pdr—common  
*Muhlenbergia frondosa* (Poir.) Fern. (wirestem muhly) C; C 2519 {3D}—T; P—common  
*Muhlenbergia* intermediate between *Muhlenbergia mexicana* (L.) Trin. (Mexican muhly) and *Muhlenbergia sylvatica* (Torrey) Torrey and Gray (forest muhly) C; C 2663 {10}—Twf—infrequent  
*Muhlenbergia schreberi* J. F. Gmelin (nimblewill) C; C 2394 {3D}—T; P; W; O—common  
*Panicum capillare* L. ssp. *capillare* [*P. capillare* L.] (witchgrass) C; C 2577 {4}—Ted; Pms—sparse  
*Panicum dichotomiflorum* Michx. (knee grass) C; C 2619 {8}—Wrp—sparse  
 \**Panicum miliaceum* L. ssp. *miliaceum* (proso millet) C; C 2706 {1B}—Pms—sparse  
*Panicum virgatum* L. (switchgrass) F, N, C; C 2454 {3A}—P—frequent  
*Paspalum setaceum* Michx. (bead grass) F; Freckmann 1396  
*Phalaris arundinacea* L. (reed canary grass) C; C 2175 {3A}—Twf,ed; Pms,wt; Wrp—frequent  
 \**Pbleum pratense* L. (timothy) C; C 2320 {1A}—Pdr—sparse  
 \**Poa annua* L. (annual bluegrass) F, C; C 2020 {7}—Odw—sparse  
 \**Poa compressa* L. (Canadian bluegrass) F, C; C 2239 {2C}—Pdr—frequent  
 \**Poa pratensis* L. (Kentucky bluegrass) F, C; C 2031 {3C}—T; P; W; O—common  
*Poa sylvestris* Gray (woodland bluegrass) C; C 2235 {6}—Wrp—sparse  
 \**Poa trivialis* L. (meadow grass) C; C 2296 {9}—Wrp—sparse  
*Poa wolfii* Scribner (meadow bluegrass) C; C 2671 {10}—Twf—sparse  
 \**Schedonorus arundinaceus* (Schreb.) Dumort. [*Festuca arundinacea* Schreb.] (alta fescue) C; C 2287 {7}—P—infrequent  
*Schizachyrium scoparium* (Michx.) Nash (little bluestem) F, N, C; C 2493 {1E}—Pdr—common  
 \**Setaria faberi* Herrm. (giant foxtail) C; C 2502 {4}—P—common  
 \**Setaria pumila* (Poir.) Roem. & Schult. ssp. *pumila* [*S. glauca* (L.) Beauv.] (yellow foxtail) F, C; C 2402 {5}—P—common  
 \**Setaria verticillata* (L.) Beauv. (bristly foxtail) C; C 2707 {1A}—Pms—sparse  
 \**Setaria viridis* (L.) Beauv. var. *viridis* [*S. viridis* (L.) Beauv.] (green foxtail) F, C; C 2501 {9}—P; W—sparse  
*Sorghastrum nutans* (L.) Nash (Indiangrass) F, N, C; C 2455 {3A}—P—common  
 \**Sorghum halepense* (L.) Pers. (Johnson grass) C; C 2000 {3C}—Pdr—sparse  
*Sphenopholis intermedia* Rydb. [*S. obtusata* (Michx.) Scribner var. *major* (Torrey) K. S. Erdman] (slender wedgescale) C; C 2217 {3A}—Pwt—common  
*Sphenopholis obtusata* (Michx.) Scribner (prairie wedgescale) C; C 2268 {3A}—Pdr—sparse  
*Sporobolus compositus* (Poir.) Merr. [*S. asper* (Michx.) Kunth] (dropseed) F, N, C; C 2616 {1B}—Pdr—frequent  
*Sporobolus heterolepis* (Gray) Gray (prairie dropseed) F, N, C; C 2517 {1E}—Pdr—common

*Tridens flavus* (L.) A. S. Hitchc. (purple top) C; C 2484 {2A}—P—common

#### SMILACACEAE [LILIACEAE in part]

*Smilax ecirrhata* S. Watson (carrion flower) C; C 2349 {8}—T—sparse  
*Smilax herbacea* L. (carrion flower) C; C 2205 {1F}—T—sparse  
*Smilax tammoides* L. [*S. hispida* Muhl.] (greenbrier) C; C 2082 {9}—T—common

#### TYPHACEAE

*Typha angustifolia* L. (narrow-leaved cattail) C; C 2714 {1A}—Wrp—sparse

#### (EUDICOTS)

#### ADOXACEAE [CAPRIFOLIACEAE, in part]

*Sambucus nigra* L. ssp. *canadensis* (L.) R. Bolli [*S. canadensis* L.] (elderberry) F, C; C 2303 {10}—T—common  
*Viburnum dentatum* L. (southern arrowwood) C; C 2431 {9}—Twf; Wrp—infrequent  
 \**Viburnum lantana* L. (wayfaringtree) C; C 2062 {5}—T—sparse  
*Viburnum lentago* L. (nannyberry) C; C 2639 {8}—Tmf—sparse  
 \**Viburnum opulus* L. (European cranberrybush) C; C 2064 {10}—T—frequent  
 \**Viburnum sieboldii* Miq. (Siebold's arrowwood) C; C 2063 {8}—Tmf—sparse

#### AMARANTHACEAE [includes CHENOPODIACEAE]

*Amaranthus albus* L. (pigweed) C; C 2588 {1D}—Oss—sparse  
 \**Amaranthus retroflexus* L. (pigweed) F, C; C 2605 {1D}—Oss—sparse  
*Amaranthus tuberculatus* (Moq.) Sauer (water hemp) C; C 2587 {5}—Ted; Oss—sparse  
*Atriplex patula* L. (sparscale) C; C 2527 {9}—Wrp—sparse  
 \**Chenopodium album* L. var. *album* (lamb's quarters) F, C; C 2611 {4}—T; P; Oss—common  
*Chenopodium berlandieri* Moq. (pitseed goosefoot) C; C 2586 {1F}—Twf,ed; Pms—frequent  
*Chenopodium simplex* (Torrey) Raf. [*C. hybridum* L.] (maple-leaved goosefoot) C; C 2379 {10}—Tmf—sparse  
*Chenopodium standleyanum* Aellen (woodland goosefoot) C; C 2469 {3B}—T; P; Wrp—common  
 \**Chenopodium strictum* Roth (lateflowering goosefoot) C; C 2538 {3A}—Twf,ed; Pms—frequent

#### ANACARDIACEAE

*Rhus aromatica* Aiton (fragrant sumac) C; C 2333 {1E}—Pms—sparse  
*Rhus glabra* L. (smooth sumac) F, C; C 2080 {1B}—Pdr,ms—frequent  
*Rhus typhina* L. (staghorn sumac) C; C 2078 {1A}—Pms—sparse  
*Toxicodendron radicans* (L.) Kuntze ssp. *negundo* (Greene) Gillis (poison ivy) C; C 2061 {5}—T; P; W; O—common

#### APIACEAE

*Chaerophyllum procumbens* (L.) Crantz (chervil) C; C 2003 {10}—Twf—frequent  
 \**Conium maculatum* L. (poison hemlock) C; C 2109 {8}—Ted—sparse  
*Cryptotaenia canadensis* (L.) DC. (honestwort) C; C 2207 {6}—Twf—frequent  
 \**Daucus carota* L. (Queen Anne's lace) C; C 2342 {3A}—P; Odw—frequent  
*Heracleum maximum* Bartram [*H. lanatum* Michx.] (cow parsnip) C; C 2049 {8}—Twf—sparse  
*Osmorhiza longistylis* (Torrey) DC. (anise root) C; C 2120 {8}—T; P—frequent  
 \**Pastinaca sativa* L. (wild parsnip) C; C 2019 {1A}—T; P; W; O—common  
*Sanicula canadensis* L. (black snakeroot) C; C 2282 {1A}—Twf—common  
*Sanicula odorata* (Raf.) K. M. Pryer & L. R. Phillippe [*S. gregaria* Bickn.] (common snakeroot) C; C 2121 {8}—Twf—common

- \**Torilis arvensis* (Hudson) Link (hedge parsley) C; C 2713 {3A}—Pms—sparse  
*Zizia aurea* (L.) Koch (golden alexanders) N, C; C 2089 {1B}—Pdr—sparse
- APOCYNACEAE [includes ASCLEPIACEAE]**  
*Apocynum cannabinum* L. [includes *A. sibiricum* Jacq.] (Indian hemp) F, C; C 2301 {1F}—Pms—common  
*Asclepias syriaca* L. (common milkweed) F, C; C 2280 {1B}—T; P; W; O—common  
*Asclepias tuberosa* L. ssp. *interior* Woodson (butterfly weed) N, C; C 2308 {3A}—Pdr,ms—infrequent  
*Asclepias verticillata* L. (whorled milkweed) F, N, C; C 2494 {1D}—Pdr,ms—infrequent  
*Asclepias viridiflora* Raf. (green milkweed) N, C; C 2300 {1E}—Pdr,ms—infrequent  
*Cynanchum laeve* (Michx.) Pers. (bluevine) C; C 2423 {3A}—Twf; Pms—sparse
- ASTERACEAE**  
*Achillea millefolium* L. [*A. millefolium* L. ssp. *lanulosa* (Nutt.) Piper] (western yarrow) F, C; C 2127 {3D}—P—frequent  
*Ageratina altissima* (L.) King & H. E. Robins. var. *altissima* [*Eupatorium rugosum* Houtt.] (white snakeroot) C; C 2408 {8}—T; P—common  
*Ambrosia artemisiifolia* L. (common ragweed) F, C; C 2492 {7}—P; Odw—frequent  
*Ambrosia psilostachya* DC. (western ragweed) F, N, C; C 2398 {2E}—P—common  
*Ambrosia trifida* L. (giant ragweed) F, C; C 2474 {8}—Twf,ed; P—frequent  
*Antennaria neglecta* Greene (pussytoes) F, C; C 2201 {1C}—Pdr—sparse  
\**Anthemis cotula* L. (dog fennel) F; *Lelong* 9 July 1961  
\**Arctium minus* Bernh. (common burdock) F, C; C 2006 {1B}—T; P; W; O—common  
*Arnoglossum plantagineum* Raf. [*Cacalia plantaginea* (Raf.) Shinners] (Indian plantain) F, N, C; C 2285 {1F}—Pms—common  
*Artemisia ludoviciana* Nutt. (white sage) F, N, C; C 2526 {3E}—P—common  
*Bidens connata* Muhl. ex Willd. (purplestem beggarticks) C; C 2512 {1A}—Wrp—sparse  
*Bidens frondosa* L. (beggar-ticks) C; C 2581 {1A}—Wrp—sparse  
*Bidens vulgata* Greene (tall beggar-ticks) C; C 2536 {1A}—Wrp—sparse  
*Brickellia eupatorioides* (L.) Shinners var. *corymbulosa* (T. & G.) Shinners (false boneset) F, N, C; C 2418 {1B}—P—common  
\**Carduus nutans* L. (musk thistle) C; C 2007 {1B}—Pms—infrequent  
*Cirsium altissimum* (L.) Sprengel (tall thistle) N; *no herbarium voucher*  
\**Cirsium arvense* (L.) Scop. (Canada thistle) C; C 2288 {4}—Ted; Pms,wt—common  
*Cirsium discolor* (Muhl. ex Willd.) Sprengel (field thistle) N, C; C 2450 {3A}—T; P—common  
*Cirsium hillii* (Canby) Fern. (Hill's thistle) F, C; C 2081 {1D}—Pdr—sparse  
\**Cirsium vulgare* (Savi) Tenore (bull thistle) C; C 2016 {4}—Pms,wt—infrequent  
*Conyza canadensis* (L.) Cronq. (horseweed) F, C; C 2407 {3B}—P—common  
*Coreopsis palmata* Nutt. (prairie coreopsis) F, N, C; C 2298 {1F}—Pms—infrequent  
*Echinacea pallida* (Nutt.) Nutt. (pale coneflower) F, N, C; C 2242 {2C}—Pdr,ms—common  
*Erechtites hieracifolius* (L.) Raf. ex DC. [*Erechtites hieracifolia* (L.) Raf. ex DC.] (fireweed) C; C 2511 {1B}—P—common  
*Erigeron annuus* (L.) Pers. (annual fleabane) C; C 2181 {3D}—P—common  
*Erigeron philadelphicus* L. (fleabane) C; C 2165 {1D}—Twf—sparse  
*Erigeron strigosus* Muhl. ex Willd. (daisy fleabane) F, N, C; C 2182 {2E}—Pdr—infrequent  
*Eupatorium altissimum* L. (tall thoroughwort) C; C 2480 {1A}—Pms—infrequent  
*Eutrochium purpureum* (L.) E. E. Lamont [*Eupatorium purpureum* L.] (purple Joe-pye-weed) C; C 2409 {7}—Twf,ed—infrequent  
\**Galinsoga parviflora* Cav. (Peruvian daisy) C; C 2528 {9}—Wrp—sparse  
*Helianthus annuus* L. (common sunflower) C; C 2697 {1A}—Pms—sparse  
*Helianthus grosseserratus* Martens (saw-tooth sunflower) F, N, C; C 2445 {1C}—Pdr,ms—frequent  
*Helianthus tuberosus* L. (Jerusalem artichoke) C; C 2479 {1A}—Pms—infrequent  
*Heliopsis helianthoides* (L.) Sweet (ox-eye) N, C; C 2248 {1E}—Pms—frequent  
*Lactuca canadensis* L. (wild lettuce) F, N, C; C 2424 {3A}—T; P—common  
*Lactuca floridana* (L.) Gaertner (blue lettuce) C; C 2457 {6}—T—frequent  
\**Lactuca serriola* L. (prickly lettuce) C; C 2419 {1B}—P—infrequent  
\**Leucanthemum vulgare* Lam. (ox-eye daisy) C; C 2058 {3A}—Pdr—sparse  
*Liatris aspera* Michx. (blazing star) F, N, C; C 2518 {1C}—Pdr—infrequent  
*Liatris pycnostachya* Michx. (prairie blazing star) F, N; *no herbarium voucher*  
\**Matricaria discoidea* DC. [*M. matricarioides* (Less.) Porter] (pineapple weed) C; C 2129 {8}—Wrp—infrequent  
*Nothocalais cuspidata* (Pursh) Greene (prairie dandelion) F, N, C; C 2032 {1B}—Pdr,ms—infrequent  
*Packera plattensis* (Nutt.) W. A. Weber & Á. Löve [*Senecio plattensis* Nutt.] (prairie ragwort) C; C 2097 {2C}—Pdr,ms—infrequent  
*Pseudognaphalium obtusifolium* (L.) Hilliard & Burt ssp. *obtusifolium* [*Gnaphalium obtusifolium* L.] (everlasting) C; C 2551 {1E}—Pms—sparse  
*Ratibida pinnata* (Vent.) Barnh. (gray-headed coneflower) F, N, C; C 2354 {1B}—P—common  
*Rudbeckia hirta* L. (black-eyed Susan) F, N, C; C 2243 {2A}—P—frequent  
*Rudbeckia triloba* L. (brown-eyed Susan) C; C 2413 {9}—Twf,ed—sparse  
*Silphium laciniatum* L. (compass plant) F, C; C 2133 {1A}—Pms—sparse  
*Solidago altissima* L. subsp. *gilvocanescens* (Rydberg) Semple [*Solidago canadensis* L., in part] (Canada goldenrod) F, N, C; C 2449 {1A}—P—common  
*Solidago gigantea* Aiton (smooth goldenrod) C; C 2444 {3B}—Pms,wt; Wrp—infrequent  
*Solidago missouriensis* Nutt. (Missouri goldenrod) C; C 2516 {1E}—Pms—sparse  
*Solidago nemoralis* Aiton (gray goldenrod) F, C; C 2514 {2C}—Pdr—sparse  
*Solidago rigida* L. (stiff goldenrod) F, N, C; C 2496 {1A}—P—common  
\**Sonchus asper* (L.) Hill (spiny-leaved sow-thistle) C; C 2462 {8}—Twf,ed—sparse  
*Symphotrichum cordifolium* (L.) G. L. Nesom [*Aster cordifolius* L.] (blue wood aster) C; C 2607 {8}—Twf,ed—sparse  
*Symphotrichum ericoides* (L.) G. L. Nesom [*Aster ericoides* L.] (heath aster) F, N, C; C 2547 {1E}—Pdr,ms—common  
*Symphotrichum laevis* (L.) Á. Löve & D. Löve [*Aster laevis* L.] (smooth blue aster) F, N; *no herbarium voucher*  
*Symphotrichum lanceolatum* (Willd.) G. L. Nesom [*Aster lanceolatus* Willd.] (white panicked aster) N; *no herbarium voucher*  
*Symphotrichum novae-angliae* (L.) G. L. Nesom [*Aster novae-angliae* L.] (New England aster) N, C; C 2615 {1E}—Pms—sparse

- Symphotrichum oblongifolium* (Nutt.) G. L. Nesom [*Aster oblongifolius* Nutt.] (aromatic aster) C; C 2592 {2C}–Pms–sparse
- Symphotrichum ontarionis* (Wiegand) G. L. Nesom var. *ontarionis* [*Aster ontarionis* Wieg.] (Ontario aster) C; C 2606 {8}–Twf,ed–common
- Symphotrichum oolentangiense* (Riddell) G. L. Nesom [*Aster azureus* Lindley] (sky-blue aster) F, N, C; C 2548 {2C}–P–common
- Symphotrichum pilosum* (Willd.) G. L. Nesom [*Aster pilosus* Willd.] (hairy aster) N, C; C 2590 {1E}–Ted; P–common
- Symphotrichum praecaltum* (Poir.) G. L. Nesom [*Aster praecaltus* Poir.] (willow aster) C; C 2593 {8}–Twf,ed–sparse
- Symphotrichum sericeum* (Vent.) Nesom [*Aster sericeus* Vent.] (silky aster) F, N, C; C 2573 {1C}–Pdr–frequent
- \**Taraxacum erythrospermum* Andrzejowski ex Besser [*Taraxacum laevigatum* (Willd.) DC.] (red-seeded dandelion) C; C 2170 {3D}–Pdr–sparse
- \**Taraxacum officinale* Weber (common dandelion) C; C 2014 {3A}–T; P; W; O–common
- \**Tragopogon dubius* Scop. (goat’s beard) F, C; C 2221 {1D}–Pdr,ms–infrequent
- Vernonia baldwinii* Torrey (Baldwin’s ironweed) F, N, C; C 2382 {1C}–Pdr,ms–infrequent
- \**Xanthium strumarium* L. (cocklebur) C; C 2702 {5}–Tmf,ed–sparse

#### BALSAMINACEAE

- Impatiens capensis* Meerb. (spotted touch-me-not) C; C 2508 {8}–Twf,ed; Wrp–frequent
- Impatiens pallida* Nutt. (pale touch-me-not) C; C 2365 {9}–Twf,ed; Wrp–infrequent

#### BERBERIDACEAE

- \**Berberis* cf. *koreana* Palib. × *B. thunbergii* DC. (Korean barberry × Japanese barberry) C; C 2331 {2A}–Pms–sparse
- \**Berberis thunbergii* DC. (Japanese barberry) C; C 2035 {2A}–Pms–sparse

#### BIGNONIACEAE

- #*Catalpa speciosa* Warder (cigar tree) C; C 2247 {8}–Twf–infrequent

#### BORAGINACEAE [includes HYDROPHYLLACEAE]

- Ellisia nyctelea* L. (waterpod) C; C 2066 {10}–T–common
- Hackelia virginiana* (L.) I. M. Johnston (stickseed) C; C 2360 {4}–T; P; O–common
- Hydrophyllum virginianum* L. (Virginia waterleaf) C; C 2111 {7}–Twf–common
- \**Lappula squarrosa* (Retz.) Dumort. [*L. echinata* Gilib.] (beggar’s-lice) F; J. W. Parsons 16 July 1948
- Lithospermum canescens* (Michx.) Lehm. (hoary puccoon) F, N, C; C 2055 {2B}–Pdr–infrequent
- Lithospermum incisum* Lehm. (fringed puccoon) F, N, C; C 2079 {1E}–Pdr–infrequent
- \**Myosotis sylvestris* Hoffm. (forget-me-not) C; C 2648 {9}–Wrp–sparse
- Onosmodium bejariense* DC. ex A. DC. var. *occidentale* (Mack.) B. L. Turner [*O. molle* Michx. var. *occidentale* (Mack.) I. M. Johnston] (false gromwell) F, N, C; C 2213 {1B}–Pdr–frequent

#### BRASSICACEAE

- \**Alliaria petiolata* (Bieb.) Cavara & Grande (garlic mustard) C; C 2010 {5}–Twf; Pwt; Wrp–frequent
- Boechera dentata* (Rafinesque) Al-Shehbaz & Zarucchi [*Arabis shortii* (Fern.) Gl.] (rock cress) C; C 2085 {6}–Twf–common
- \**Barbarea vulgaris* R. Br. (yellowrocket) C; C 2027 {4}–Ted; Pdr–infrequent
- \**Capsella bursa-pastoris* (L.) Medicus (shepherd’s purse) C; C 2038 {4}–Twf; Pwt–sparse

- Descurainia pinnata* (Walter) Britton ssp. *brachycarpa* (Richardson) Detling [*Descurainia pinnata* (Walter) Britton var. *brachycarpa* (Richardson) Fern.] (tansy mustard) C; C 2106 {1B}–Twf,ed; Oss–sparse

- \**Lepidium campestre* (L.) R. Br. (field cress) F, C; C 2096 {3D}–Pdr–sparse
- Lepidium densiflorum* Schrader (peppergrass) C; C 2435 {8}–Twf; Wrp–sparse
- Lepidium virginicum* L. ssp. *virginicum* (poor-man’s pepper) C; C 2367 {8}–Twf; Wrp–sparse
- \**Lunaria annua* L. (annual honesty) C; C 2638, 2646 {8}–Twf–sparse
- Rorippa palustris* (L.) Besser (marsh cress) C; C 2346 {8}–Twf–sparse
- \**Sinapis arvensis* L. (charlock) F; *Lelong* 1961
- \**Sisymbrium loeselii* L. (small tumbleweed mustard) C; C 2116 {3C}–Pdr,ms–sparse
- \**Thlaspi arvense* L. (field pennycress) C; C 2118 {3A}–Twf,ed; Oss–sparse

#### CAMPANULACEAE

- Campanulastrum americanum* (L.) Small [*Campanula americana* L.] (tall bellflower) C; C 2388 {8}–T–common
- Lobelia siphilitica* L. (great lobelia) C; C 2513 {5}–Pms,wt; Wrp–infrequent
- Lobelia spicata* Lam. (spiked lobelia) F, N, C; C 2200 {1A}–P–common
- Triodanis perfoliata* (L.) Nieuw. (Venus’ looking-glass) C; C 2329 {2A}–Pms–sparse

#### CANNABACEAE [includes MORACEAE, in part, and ULMA-CEAE, in part]

- \**Cannabis sativa* L. (hemp) F, C; C 2281 {1B}–Pdr–sparse
- Celtis occidentalis* L. (hackberry) C; C 2110 {7}–T–frequent
- \**Humulus japonicus* Sieb. & Zucc. (Japanese hops) C; C 2642 {8}–Twf–sparse
- Humulus lupulus* L. (common hops) C; C 2623 {8}–Twf,ed–infrequent

#### CAPRIFOLIACEAE

- \**Lonicera* × *bella* Zabel (*L. tatarica* L. × *L. morrowii* A. Gray) (showy fly honeysuckle) C; C 2112 {10}–T–common
- \**Lonicera maackii* (Rupr.) Maxim. (amur honeysuckle) C; C 2136 {8}–T–common
- \**Lonicera morrowii* Gray (Morrow’s honeysuckle) C; C 2630 {10}–Tmf–sparse
- \**Lonicera* cf. *ruprechtiana* Regel (Manchurian honeysuckle) C; C 2134 {8}–T–sparse
- Symphoricarpos orbiculatus* Moench (coralberry) C; C 2441 {2E}–Pdr,ms–sparse

#### CARYOPHYLLACEAE

- \**Cerastium fontanum* Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet [*C. vulgatum* L.] (mouse-ear chickweed) C; C 2144 {1A}–Wrp; Pms–infrequent
- \**Dianthus armeria* L. (Deptford pink) C; C 2705 {3F}–Ted–sparse
- \**Saponaria officinalis* L. (bouncing bet) C; C 2684 {9}–Wrp–sparse
- Silene antirrhina* L. (sleepy catchfly) F, C; C 2266 {3A}–Pms; Oss–sparse
- \**Silene latifolia* Poir. [*S. pratensis* (Rafn) Gren. & Godron] (white campion) C; C 2196 {3C}–Pms–sparse
- Silene stellata* (L.) Aiton f. (starry campion) C; C 2356 {1A}–Ted; Pms–sparse
- \**Stellaria media* (L.) Vill. (common chickweed) C; C 2036 {4}–Twf; Pwt; Wrp–common

#### CELASTRACEAE

- Celastrus scandens* L. (bittersweet) C; C 2220 {1B}–Twf; Pms–common
- \**Euonymus alatus* (Thunb.) Sieb. (winged wahoo) C; C 2051 {8}–Twf–sparse
- Euonymus atropurpureus* Jacq. (wahoo) C; C 2339 {8}–Twf–sparse

\**Euonymus fortunei* (Turez.) Hand.-Maz. (winter creeper) C; C 2193 {5}—Twf—sparse

#### CISTACEAE

*Helianthemum bicknellii* Fern. (rockrose) F; *Michel Lelong M263*

#### CONVOLVULACEAE

*Cabystegia sepium* (L.) R. Br. (hedge false bindweed) F; *no herbarium voucher*

*Cuscuta coryli* Engelm. (hazel dodder) C; C 2463 {1A}—Pms—sparse

#### CORNACEAE

*Cornus alternifolia* L. f. (alternate-leaved dogwood) C; C 2107 {8}—Twf—sparse

*Cornus amomum* P. Miller ssp. *obliqua* (Raf.) J. S. Wilson (silky dogwood) C; C 2510 {8}—Twf—sparse

*Cornus drummondii* C. A. Meyer (rough-leaved dogwood) C; C 2250 {1A}—Twf,ed; P—common

#### ELAEAGNACEAE

\**Elaeagnus umbellata* Thunb. (autumn olive) C; C 2034 {2A}—Ted; Pms—sparse

#### EUPHORBIACEAE

*Acalypha rhomboidea* Raf. (three-seeded mercury) C; C 2422 {5}—T—common

*Chamaesyce glyptosperma* (Engelm.) Small [*Euphorbia glyptosperma* Engelm.] (ribseed sandmat) C; C 2686 {3D}—Pdr—sparse

*Chamaesyce maculata* (L.) Small [*Euphorbia maculata* L.] (carpet spurge) C; C 2691 {7}—Odw—sparse

*Chamaesyce nutans* (Lag.) Small [*Euphorbia nutans* Lag.] (nodding spurge) C; C 2701 {3D}—Pdr—sparse

#*Chamaesyce serpyllifolia* (Pers.) Small ssp. *serpyllifolia* [*Euphorbia serpyllifolia* Pers.] (thymeleaf sandmat) F; *no herbarium voucher*

*Euphorbia dentata* Michx. (toothed spurge) F, C; C 2568 {1A}—Ted—sparse

#### FABACEAE

*Amorpha canescens* Pursh (lead plant) F, N, C; C 2299 {1F}—Pdr,ms—common

*Amphicarpaea bracteata* (L.) Fern. (hog peanut) F, C; C 2521 {1A}—Twf,ed—sparse

*Astragalus canadensis* L. (milk vetch) F; *no herbarium voucher*

*Astragalus crassicaarpus* Nutt. (ground plum) F, N, C; C 2025 {1B}—Pdr,ms—infrequent

*Baptisia alba* (L.) Vent. var. *macrophylla* (Larisey) Isely [*B. lactea* (Raf.) Thieret] (white wild indigo) F, N, C; C 2238 {2A}—P—common

*Baptisia bracteata* Muhl. ex Ell. var. *leucophaea* (Nutt.) Kartesz & Gandhi [*B. bracteata* Muhl. ex Ell. var. *glabrescens* (Larisey) Isely] (cream wild indigo) F, N, C; C 2075 {1A}—Pdr,ms—frequent

~*Cercis canadensis* L. (redbud) C; C 2084 {9}—Ted—sparse

*Chamaecrista fasciculata* (Michx.) Greene var. *fasciculata* (partridge pea) F, N, C; C 2704 {1C}—Pms—sparse

*Dalea candida* Willd. var. *candida* (white prairie clover) F, N, C; C 2324 {1B}—Pdr,ms—common

*Dalea purpurea* Vent. (purple prairie clover) F, N, C; C 2325 {1E}—Pdr,ms—common

*Desmodium canadense* (L.) DC. (showy tick-trefoil) F, N; *Lelong M353*

*Desmodium illinoense* Gray (Illinois tick-trefoil) F, N, C; C 2679 {1B}—Pdr—frequent

*Gleditsia triacanthos* L. (honey locust) F, C; C 2069 {5}—T—common

*Gymnocladus dioica* (L.) K. Koch (Kentucky coffee tree) C; C 2438 {8}—Twf,ed—sparse

*Lespedeza capitata* Michx. (round-headed lespedeza) F, N, C; C 2390 {1E}—Pdr,ms—common

\**Lotus corniculatus* L. (bird's-foot trefoil) F, C; C 2180 {3D}—T; P; W; O—common

\**Medicago lupulina* L. (black medick) F, C; C 2126 {3C}—Pdr,ms—infrequent

\**Melilotus officinalis* (L.) Pallas [includes *M. alba* Medicus] (sweet clover) F, C; C 2204 {1B}—T; P; O—common

*Pedimelum argophyllum* (Pursh) Grimes (silvery scurf-pea) F, N, C; C 2297 {1C}—Pms—sparse

\**Securigera varia* (L.) Lassen [*Coronilla varia* L.] (crown vetch) C; C 2202 {1B}—P—common

\**Trifolium pratense* L. (red clover) F, C; C 2143 {3C}—Pdr,ms; Odw—infrequent

\**Trifolium repens* L. (white clover) F, C; C 2154 {6}—T; P; W; O—common

*Vicia americana* Muhl. ex Willd. (vetch) F, C; C 2073 {1C}—Pdr,ms—infrequent

#### FAGACEAE

~*Quercus imbricaria* Michx. (shingle oak) C; C 2665 {1B}—Pdr—sparse

*Quercus macrocarpa* Michx. (bur oak) C; C 2100 {6}—T—sparse

*Quercus rubra* L. [*Q. borealis* Michx. f. var. *maxima* (Marsh.) Ashe] (northern red oak) C; C 2101 {6}—T—sparse

#### GENTIANACEAE

*Gentiana andrewsii* Griseb. (bottle gentian) F; *no herbarium voucher*

*Gentiana puberulenta* J. Pringle (downy gentian) N, C; C 2589 {1C}—Pdr,ms—frequent

#### GERANIACEAE

\**Geranium sibiricum* L. (Siberian geranium) C; C 2515 {8}—Twf—sparse

#### GROSSULARIACEAE (SAXIFRAGACEAE, in part)

*Ribes missouriense* Nutt. ex T. & G. (Missouri gooseberry) C; C 2018 {9}—T; P—frequent

#### HYPERICACEAE

*Hypericum ascyron* L. [*H. pyramidatum* Aiton] (giant St. John's wort) F, N, C; C 2326 {1C}—Tmf,ed; P—common

#### JUGLANDACEAE

*Carya cordiformis* (Wang.) K. Koch (bitternut hickory) C; C 2252 {7}—T—frequent

*Juglans nigra* L. (black walnut) C; C 2076 {1A}—T; P—common

#### LAMIACEAE

*Agastache nepetoides* (L.) Kuntze (yellow giant-hyssop) C; C 2473 {8}—T—sparse

\**Glechoma hederacea* L. (ground ivy) C; C 2626 {4}—T; P; W; O—common

*Hedeoma bispidium* Pursh (rough pennyroyal) F; *Jane Magee 1948*

\**Lamium amplexicaule* L. (dead nettle) C; C 2065 {10}—Twf—sparse

\**Leonurus cardiaca* L. (motherwort) C; C 2195 {3A}—T—common

\**Leonurus sibiricus* L. (honeyweed) C; C 2465 {3A}—Pms—sparse

*Monarda fistulosa* L. (wild bergamot) F, N, C; C 2381 {1B}—P—common

\**Nepeta cataria* L. (catnip) F, C; C 2015 {4}—T; P—frequent

*Prunella vulgaris* L. (self heal) F, C; C 2420 {1A}—Ted; Wrp—sparse

*Pycnanthemum virginianum* (L.) Dur. & Jackson (Virginia mountain mint) F, N, C; C 2359 {1A}—P—common

*Scutellaria lateriflora* L. (mad-dog skullcap) C; C 2437 {8}—Twf—sparse

*Scutellaria parvula* Michx. var. *missouriensis* (Torr.) Goodman & Lawson [*S. leonardii* Epling] (*Leonard's skullcap*) F, N, C; C 2186 {2A}—Pdr,ms—frequent

*Stachys tenuifolia* Willd. (*smooth hedgenettle*) C; C 2433 {10}—Twf,ed—frequent

*Teucrium canadense* L. var. *canadense* (germander) C; C 2387 {4}–Twf,ed; Pwt–frequent

#### LINACEAE

*Linum sulcatum* Riddell (wild flax) F, N, C; C 2313 {1E}–Pdr–infrequent

#### LINDERNIACEAE [SCROPHULARIACEAE, in part]

*Lindernia dubia* (L.) Pennell (*false pimpernel*) C; C 2708 {1A}–Pwt–sparse

#### LYTHRACEAE

*Ammannia coccinea* Rottb. (toothcup) C; C 2709 {1A}–Pwt–sparse  
\**Lythrum salicaria* L. (purple loosestrife) C; C 2481 {1A}–Wrp–sparse

#### MALVACEAE [includes TILIACEAE]

\**Abutilon theophrasti* Medicus (velvet leaf) F, C; C 2680 {2A}–Pms–sparse  
\**Hibiscus trionum* L. (flower-of-an-hour) C; C 2682 {1A}–Pms–sparse  
*Tilia americana* L. (basswood) C; C 2053 {8}–Tmf,wf–sparse

#### MENISPERMACEAE

*Menispermum canadense* L. (moonseed) C; C 2203 {1B}–Ted–infrequent

#### MOLLUGINACEAE [AIZOACEAE]

*Mollugo verticillata* L. (carpetweed) C; C 2550 {1D}–Oss–sparse

#### MORACEAE

\**Morus alba* L. (white mulberry) C; C 2102 {1C}–T; P–common

#### MYRSINACEAE

*Lysimachia ciliata* L. (fringed loosestrife) F, N, C; C 2309 {1C}–Pms,wt; Wrp–infrequent

#### OLEACEAE

*Fraxinus americana* L. (white ash) C; C 2614 {3A}–Ted–sparse  
*Fraxinus pennsylvanica* Marsh. var. *lanceolata* (Borkh.) Sarg. (green ash) C; C 2190 {6}–T; P–common  
\**Ligustrum obtusifolium* Sieb. & Zucc. (border privet) C; C 2237 {6}–T–frequent  
\**Ligustrum vulgare* L. (European privet) C; C 2662 {1F}–Ted–sparse  
\**Syringa reticulata* (Blume) H. Hara (Japanese tree lilac) C; C 2304 {10}–Ted–sparse

#### ONAGRACEAE

*Calylophus serrulatus* (Nutt.) Raven (toothed evening primrose) F, N, C; C 2232 {1E}–Pdr,ms–common  
*Circaea lutetiana* L. ssp. *canadensis* (L.) Ascherson & Magnus (enchanter's nightshade) C; C 2358 {5}–T–infrequent  
*Epilobium coloratum* Biehler (cinnamon willowherb) C; C 2564 {6}–Pwt; Wrp–sparse  
*Oenothera biennis* L. (common evening-primrose) [*Oenothera biennis* L. ssp. *centralis* Munz] N, C; C 2432 {1B}–P–frequent  
*Oenothera villosa* Thunb. (gray evening-primrose) C; C 2509 {2B}–P–sparse

#### OXALIDACEAE

*Oxalis dillenii* Jacq. (yellow wood sorrel) C; C 2179 {3B}–T; P–frequent  
*Oxalis stricta* L. (yellow wood sorrel) C; C 2412 {7}–T; P–frequent  
*Oxalis violacea* L. (violet wood sorrel) F, N, C; C 2044 {1B}–Pdr,ms–frequent

#### PAPAVERACEAE [includes FUMARIACEAE]

*Sanguinaria canadensis* L. (bloodroot) C; C 2024 {6}–Tmf–sparse

#### PHRYMACEAE [includes SCROPHULARIACEAE, in part]

*Phryma leptostachya* L. (lopseed) C; C 2372 {1C}–T–infrequent

#### PHYTOLACCACEAE

*Phytolacca americana* L. (pokeweed) C; C 2254 {8}–Twf,ed–sparse

#### PLANTAGINACEAE [includes CALLITRICHACEAE; SCROPHULARIACEAE, in part]

\**Plantago lanceolata* L. (buckhorn plantain) C; C 2188 {1F}–Pms–sparse  
\**Plantago major* L. (common plantain) F, C; C 2368 {1B}–Twf; Oss–sparse  
*Plantago rugelii* Dcne. (common plantain) F, C; C 2332 {1F}–T; P; W; O–common  
\**Veronica arvensis* L. (corn speedwell) C; C 2042 {10}–Twf; Wrp–infrequent  
*Veronica peregrina* L. (neckweed) C; C 2131 {10}–Twf; Wrp–sparse  
\**Veronica polita* Fr. (gray field speedwell) C; C 2690, 2694, 2695 {1F}–Ted; Pms–sparse  
*Veronicastrum virginicum* (L.) Farw. (Culver's root) N, C; C 2383 {1A}–Pms,wt; Wrp–infrequent

#### PLATANACEAE

*Platanus occidentalis* L. (sycamore) C; C 2011 {1F}–T–sparse

#### POLEMONIACEAE

*Phlox divaricata* L. (blue phlox) C; C 2028 {5}–T–infrequent  
#*Phlox paniculata* L. (garden phlox) C; C 2683 {9}–Wrp–sparse  
*Phlox pilosa* L. (prairie phlox) N, C; C 2149 {1A}–Pms–sparse

#### POLYGONACEAE

\**Fallopia convolvulus* (L.) Á. Löve [*Polygonum convolvulus* L.] (black bindweed) C; C 2352 {1D}–Twf,ed; Pms–frequent  
*Fallopia scandens* (L.) Holub [*Polygonum scandens* L.] (climbing false-buckwheat) C; C 2563 {8}–Twf,ed–frequent  
*Persicaria amphibium* (L.) Gray [*Polygonum amphibium* L. var. *emersum* Michx.–*Polygonum amphibium* L. var. *stipulaceum* (Coleman) Fern.] (water smartweed) C; C 2440 {8}–Twf,ed–sparse  
*Persicaria hydropiper* (L.) Spach (water-pepper) C; C 2597 {8}–Pms,wt–sparse  
\**Persicaria maculosa* Gray [*Polygonum persicaria* L.] (lady's-thumb) F, C; C 2458 {9}–Pms,wt–frequent  
*Persicaria pensylvanica* (L.) M. Gómez [*Polygonum pensylvanicum* L. var. *laevigatum* Fern.] (Pennsylvania smartweed) F, C; C 2594 {3C}–Pms,wt–sparse  
*Persicaria punctata* (Elliott) Small [*Polygonum punctatum* Ell.] (water smartweed) C; C 2596 {3C}–Pms,wt–infrequent  
*Persicaria virginiana* (L.) Gaertner [*Polygonum virginianum* L.] (jumpseed) C; C 2414 {7}–T–common  
\**Polygonum aviculare* L. ssp. *aviculare* (knotweed) C; C 2430 {9}–Wrp–sparse  
\**Polygonum aviculare* L. ssp. *neglectum* (Besser) Arcangeli (narrowleaf knotweed) C; C 2459 {9}, 2504 {8}–Wrp; Odw–sparse  
*Polygonum ramosissimum* Michx. (bushy knotweed) C; C 2565 {3A}–Pms–sparse  
\**Rumex crispus* L. (curly dock) F, C; C 2269 {3A}–T; P; Odw–frequent

#### PORTULACACEAE

*Claytonia virginica* L. (spring beauty) C; C 2004 {8}–Twf–sparse  
\**Portulaca oleracea* L. (common purslane) C; C 2549 {1D}–Oss–sparse

#### RANUNCULACEAE

*Anemone canadensis* L. (Canada anemone) F, C; C 2123 {1A}–Pms–infrequent  
*Anemone cylindrica* Gray (thimbleweed) F, N, C; C 2231 {1C}–Pdr,ms–infrequent  
*Anemone virginiana* L. (tall anemone) C; C 2302 {1F}–Tmf,ed–infrequent  
\**Clematis* cf. *terniflora* de Candolle (sweet autumn virginsbower) C; C 2617 {8}, 2618 {8}–Twf–sparse  
*Delphinium carolinianum* Walter ssp. *virescens* (Nutt.) R. E. Brooks [*D. virescens* Nutt.] (prairie larkspur) F, N, C; C 2241 {2E}–Pdr,ms–infrequent  
*Ranunculus abortivus* L. (small-flowered buttercup) C; C 2021 {5}–Twf; Wrp–common

- Ranunculus hispidus* Michx. var. *nitidus* (Chapman) T. Duncan [*R. septentrionalis* Poiret] (swamp buttercup) C; C 2041 {10}–Twf–common
- Thalictrum dasycarpum* Fischer & Ave-Lall. (purple meadow-rue) C; C 2233 {6}–Ted–sparse
- RHAMNACEAE**
- Ceanothus americanus* L. var. *pitcheri* T. & G. (New Jersey tea) N, C; C 2139 {1B}–Pms–sparse
- \**Rhamnus cathartica* L. (common buckthorn) C; C 2159 {1F}–T; P; W; O–common
- ROSACEAE**
- Agrimonia gryposepala* Wallr. (tall agrimony) C; C 2520 {2A}–T–infrequent
- Agrimonia parviflora* Aiton (swamp agrimony) C; C 2403 {1B}–Pms–sparse
- Agrimonia pubescens* Wallr. (soft agrimony) C; C 2429 {9}–T; Pms,wt–infrequent
- Crataegus calpodendron* (Ehrh.) Medicus (pear hawthorn) C; C 2157 {8}–Twf–sparse
- Crataegus mollis* (T. & G.) Scheele (downy hawthorn) F, C; C 2056 {3C}–T; P–common
- Crataegus punctata* Jacq. (dotted hawthorn) C; C 2142 {6}–Ted–sparse
- \**Duchesnea indica* (Andrew) Focke (Indian strawberry) C; C 2178 {3A}–Pms–sparse
- Fragaria virginiana* Duchesne (wild strawberry) F, N, C; C 2117 {3B}–Pms–sparse
- Geum canadense* Jacq. (white avens) C; C 2259 {10}–T–common
- Malus ioensis* (Wood) Britton (wild crab) F, N, C; C 2048 {1A}–Ted; P–common
- \**Malus sylvestris* (L.) P. Miller (apple) C; C 2047 {10}–T–sparse
- \**Potentilla argentea* L. var. *argentea* (silver cinquefoil) C; C 2644 {1D}–Oss–sparse
- Potentilla arguta* Pursh (tall cinquefoil) F, N, C; C 2373 {1E}–Pdr,ms–sparse
- Potentilla norvegica* L. (Norwegian cinquefoil) F, C; C 2311 {1B}–Wrp; Oss–sparse
- \**Potentilla recta* L. (sulphur cinquefoil) F, C; C 2263 {3C}–Pdr–sparse
- Potentilla simplex* Michx. (common cinquefoil) F; *Lelong* 1961
- Prunus americana* Marsh. (wild plum) C; C 2148 {1C}–Pdr,ms–frequent
- \**Prunus* cf. *cerasifera* Ehrh. (cherry plum) C; C 2093 {3D}–Pdr,ms–sparse
- Prunus serotina* Ehrh. (wild black cherry) C; C 2262 {1D}–T–common
- Prunus virginiana* L. (choke cherry) C; C 2057 {8}–T–common
- Rosa arkansana* Porter var. *suffulta* (Greene) Cockerell (sunshine rose) F, N; *no herbarium voucher*
- \**Rosa multiflora* Thunb. ex Murray (multiflora rose) C; C 2216 {3C}–Ted; P–sparse
- Rosa* × *rudiusscula* Greene (*R. arkansana* × *R. carolina*) (hybrid rose) C; C 2489 {2E}–P–common
- Rubus occidentalis* L. (black raspberry) C; C 2132 {10}–T; P; W; O–common
- Rubus parvifolius* L. (Japanese raspberry) C; C 2197 {3D}–Ted; Pdr–sparse
- RUBIACEAE**
- Galium aparine* L. (cleavers) C; C 2094 {3D}–T–common
- Galium triflorum* Michx. (sweet-scented bedstraw) C; C 2466 {3A}–T–common
- RUTACEAE**
- \**Phellodendron* sp. (corktree) C; C 2177 {3C}–Ted; Pdr–infrequent
- Zanthoxylum americanum* P. Miller (prickly ash) C; C 2086 {6}–Ted; Pms–sparse
- SALICACEAE**
- Populus deltoides* Bartram ex Marsh. ssp. *monilifera* (Aiton) Eckenwalder (plains cottonwood) C; C 2068 {5}–T–common
- \**Salix fragilis* L. (crack willow) C; C 2037 {1C}–Wrp–sparse
- \**Salix* × *rubens* Schrank (*S. alba* × *S. fragilis*) (hybrid crack willow) C; C 2337 {6}–Wrp–sparse
- SANTALACEAE**
- Comandra umbellata* (L.) Nutt. (bastard toadflax) F, N, C; C 2054 {2B}–Pdr,ms–common
- SAPINDACEAE** [includes ACERACEAE, HIPPOCASTANACEAE]
- \**Acer ginnala* Maxim. (amur maple) C; C 2046 {1A}–Ted; P–infrequent
- Acer negundo* L. (box elder) C; C 2030 {8}–T–common
- Acer nigrum* Michx. f. (black maple) C; C 2153 {6}–T–sparse
- Acer saccharinum* L. (silver maple) C; C 2108 {8}–T–common
- Acer saccharum* Marsh. (sugar maple) C; C 2164 {10}–T–sparse
- ~*Aesculus glabra* Willd. (Ohio buckeye) C; C 2710 {1A}–Pms–sparse
- SAXIFRAGACEAE**
- Heuchera richardsonii* R. Br. (alumroot) F, N, C; C 2147 {1E}–Pms–sparse
- SCROPHULARIACEAE**
- Scrophularia marilandica* L. (carpenter's square) C; C 2361 {4}–Tmf,wf–infrequent
- \**Verbascum blattaria* L. (moth mullein) C; C 2698 {3D}–Pdr–sparse
- \**Verbascum thapsus* L. (common mullein) C; C 2625 {2D}–P–frequent
- SIMAROUBACEAE**
- \**Ailanthus altissima* (Mill.) Swingle (tree of heaven) C; C 2477 {8}–Ted–sparse
- SOLANACEAE**
- Physalis heterophylla* Nees (ground cherry) F, N, C; C 2249 {1B}–Pdr,ms–infrequent
- Physalis virginiana* Mill. (ground cherry) F, N, C; C 2187 {2C}–Pdr,ms–frequent
- Solanum carolinense* L. (horse nettle) F, C; C 2267 {3C}–P–common
- \**Solanum dulcamara* L. (European bitter-sweet) C; C 2328 {2A}–Ted; Pms–sparse
- Solanum ptycanthum* Dunal [*S. americanum* P. Miller] (black nightshade) F, C; C 2569 {5}–Ted; Pms,wt–frequent
- STAPHYLEACEAE**
- Staphylea trifolia* L. (American bladder-nut) C; C 2130 {8}–Twf–sparse
- ULMACEAE**
- Ulmus americana* L. (American elm) C; C 2128 {7}–T; P–common
- \**Ulmus pumila* L. (Siberian elm) C; C 2067 {1B}–Pdr–sparse
- Ulmus rubra* Muhl. (slippery elm) C; C 2099 {6}–T–sparse
- URTICACEAE**
- Laportea canadensis* (L.) Wedd. (wood nettle) C; C 2347 {8}–Twf–common
- Parietaria pensylvanica* Muhl. ex Willd. (pellitory) C; C 2176 {1A}–T; P–infrequent
- Pilea pumila* (L.) Gray (clearweed) C; C 2598 {8}–Tmf,wf–common
- Urtica dioica* L. (stinging nettle) C; C 2348 {8}–T–common
- VERBENACEAE**
- Verbena bracteata* Cav. ex Lag. & Rodr. (creeping vervain) C; C 2369 {9}–Wrp–sparse
- Verbena hastata* L. (blue vervain) C; C 2442 {4}–Pwt–sparse
- Verbena stricta* Vent. (hoary vervain) F, N, C; C 2310 {1A}–Pdr,ms–infrequent
- Verbena urticifolia* L. (white vervain) C; C 2362 {1E}–T; P–common
- VIOLACEAE**
- Viola* × *bernardii* Greene (*V. pedatifida* × *V. sororia*) (Bernard violet) C; C 2013 {3E}–Pdr,ms–infrequent



*Viola pedatifida* G. Don (prairie violet) F, N, C; C 2029 {1B}–  
**Pdr,ms–frequent**  
*Viola pubescens* Aiton (downy yellow violet) C; C 2008 {9}–T; P–  
 common  
*Viola sororia* Willd. (hairy blue violet) C; C 2009 {9}–T; P; W; O–  
 common

**VITACEAE**

*Parthenocissus quinquefolia* (L.) Planchon (Virginia creeper) C; C 2060  
 {5}–T; P–common  
*Parthenocissus vitacea* (Knerr) A. S. Hitchc. (woodbine) C; C 2040  
 {10}–T–common  
*Vitis riparia* Michx. (riverbank grape) C; C 2077 {1A}–T; P–common