

# The Flora of Pulliam Prairie, Chickasaw County, Mississippi: a Significant Remnant of Native Vegetation in the Black Belt Region

J.J.N. Campbell<sup>1</sup> and W.R. Seymour, Jr.<sup>2</sup>

<sup>1</sup>Bluegrass Woodland Restoration Center, 3525 Willowood Road, Lexington, KY 40517; and <sup>2</sup>Roundstone Native Seed, 9764 Raider Hollow Road, Upton, KY 42784-9216

Vascular plants are reported from ca. 250 acres [100 ha] at Pulliam Prairie in Chickasaw County, Mississippi, which is a significant remnant of pre-Columbian landscape in the Black Belt of the Upper East Gulf Coastal Plain. During 14 days of field work in 2009, 448 vascular taxa were collected (435 species plus 13 additional varieties), including only 33 (7.4%) undoubted aliens plus 17 (3.8%) with adventive or uncertain status. About 286 (72%) of the clearly native taxa are typical of grassland, totaling more than all combined prior published lists from the Black Belt prairies, and including most of the rare species known from these prairies. Problems with nomenclature and taxonomy are noted in several cases. At least ten taxa have little or no prior published record from Mississippi. At least three taxa appear to be undescribed but widely scattered within the blacklands of some southeastern states: *Rudbeckia* sp. (aff. *tenax*), a glandular variety of *Symphyotrichum patens*, and a narrow-leaved variety of *Lysimachia ciliata*. Twelve taxa are considered endangered or threatened in the region, and *Agalinis auriculata* (with hundreds of plants here) is globally threatened. The most common persistent aliens are *Lespedeza cuneata* and *Sorghum halepense* in grassland, plus *Lonicera japonica* in woodland.

The Black Belt region is readily defined in terms of its largely calcareous soils (Fig. 1), original grasslands, and history of intense agricultural uses, as reviewed by Rankin (1974), Barone (2005a), Campbell and Seymour (2011a), and many others. But the general conversion of its native vegetation presents great difficulties for botanical studies and for application of this work to conservation. Although the distinctiveness of this region's grassland flora has been recognized since the earliest scientific surveys, details of the original flora and vegetation have remained elusive.

There have been several published efforts to collect and list the flora, starting with pioneering work by Mohr (1901) and Harper (1943) in Alabama, and by Harper (1913) and Lowe (1921) in Mississippi. Barone and Hill (2007) have recently conducted a broad review and floristic survey of native grassland remnants in the Black Belt and Jackson Prairie regions of these states. There have also been a few intensive floristic studies of speci-

fic sites, but mostly covering no more than 10–20 acres (e.g., Harper, 1920; Schuster and McDaniel, 1973; Morris et al., 1993; Leidolf and McDaniel, 1998; Hill and Seltzer, 2007; Hill et al., 2009). There have also been some relevant unpublished theses and dissertations (e.g., MacDonald, 1996; Schauwecker, 1996).

There are a few particularly significant sites with good remnants of the native grassland, covering 100s of acres in some cases. Yet, apart from the Osborn Prairie in Oktibbeha, Mississippi (Hill and Seltzer, 2007), there have been virtually no published reports on the flora of these larger sites. In Alabama, the locations of such sites were recently documented in detail by Schotz and Barbour (2009), and floristic data will become available with further field work (A. Schotz, pers. comm.). In Mississippi, no similar survey of remnants exist, though ongoing work by Barone and Hill (2007), H. Sullivan (pers. comm.) and others is leading to a much better picture.

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<sup>1</sup> Author for correspondence; telephone 859-271-4392; email [julian.campbell@insightbb.com](mailto:julian.campbell@insightbb.com)

The subject of this paper is Pulliam Prairie, in Chickasaw County, which was recently ‘discovered’ (in biological terms) by Daniel Coggin (Wildlife Mississippi), John Gruchy (Mississippi Dept. of Wildlife, Fisheries and Parks), Heather Sullivan (Mississippi Natural Heritage Program) and others. It is among the most significant sites for native vegetation in the Black Belt of Mississippi. Our purpose here is to document all vascular plants.

Because the flora of this region is not yet thoroughly documented, it was anticipated that there would be considerable difficulties in the taxonomy and nomenclature of some plants. A central theme of this paper is to provide notes on these problems, and to seek clarification from herbaria and the literature. Accompanying papers undertake a general review of the region’s soils and vegetation types (Campbell and Seymour, 2011a), and present a survey of the vegetation types at Pulliam Prairie (Campbell and Seymour, 2011b). The classification system for vegetation types in those two papers (sequenced there under headings with “a” to “o”) is cross-referenced to some of the information presented below, especially ecological codes for species in the Appendix.

## METHODS

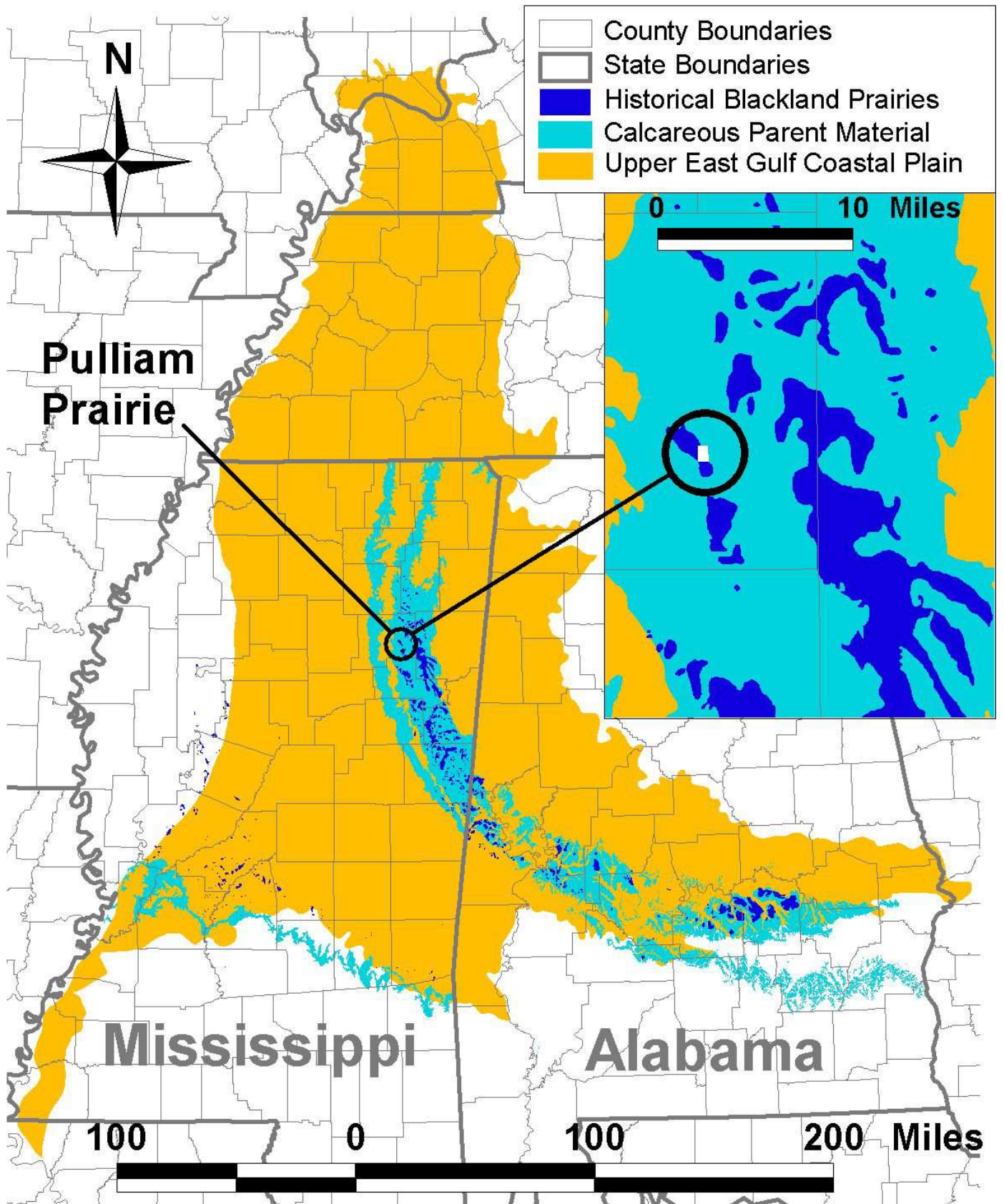
We made six trips for collection at the Pulliam Prairie in 2009, covering 14 days: April 20–21, June 6–8, July 10–12, August 22–24, September 24–25 and October 28. During each trip, except the last, we covered the study area using an electric Stealth Predator XR vehicle for transport and a platform to work on. We made herbarium collections of all vascular plant taxa—species, varieties and hybrids—that we observed at the site and along the unpaved access road, with duplicates (or more) in about 95% of cases.

One of us (RS) mounted 1,165 herbarium sheets, including 535 collections and about 449 species or varieties. The primary set of these collections is being deposited at the herbarium of the University of Mississippi in Oxford. A secondary set remains with Wildlife Mississippi, our non-profit partner in this venture.

On each trip we visited most or all sections of the study area, defined as 15 grid units of 1000 x 1000 feet [305 x 305 m]. We made notes on the presence and abundance of each plant taxon within each grid unit. We mapped populations of most rare species more precisely, using detailed aerial photographs from USDA (MARIS 2009), with an accuracy of 10–100 feet [3–30 m]. Based on our general description and mapping of vegetation types at the site (Campbell and Seymour, 2011b), we assigned five-point rankings for each species along the two major ecological gradients (see Appendix): upland versus lowland (A to E); and closed versus open vegetation (1 to 5).

Nomenclature primarily follows the list of vascular flora in Mississippi that is being developed at the Pullen Herbarium in Oxford (McCook and Kartesz, 2010), based partly on Kartesz (1999). However, for several taxa we offer alternative names based on continuing revision, especially Flora of North America (1993–2009), Weakley (2010), and ongoing research by JC at several herbaria. In the Appendix, after our preferred alternative names, those names used by McCook and Kartesz are listed in parentheses.

Standard herbarium acronyms for the herbaria visited are as follows: APSU = Austin Peay State University (Clarksburg, Tennessee); GA = University of Georgia (Athens); IBE = the Institute for Botanical Exploration (of Sidney McDaniel, near Starkville, Mississippi); MISS = University of Mississippi (the Pullen Herbarium at Oxford); MISSA = Mississippi State University (Starkville); MMNS = Mississippi Museum of Natural Science (Jackson); MO = Missouri Botanical Garden (St. Louis); MU = William Sherman Turrell Herbarium (Miami Univ., Ohio); NCU = University of North Carolina (Chapel Hill); OS = Ohio State University (Columbus); TENN = University of Tennessee (Knoxville); US = U.S. National Herbarium, Smithsonian Institution (Washington, D.C.); USCH = University of South Carolina (Columbia); WVU = West Virginia University (Morgantown).



**Figure 1 (for caption see next page).**

**Figure 1 (see previous page). Location of Pulliam Prairie in relation to the Black Belt and Upper East Gulf Coast Plain (UEGCP).** Mapping of the UEGCP comes from The Nature Conservancy (1999; based on R. Bailey of USFS); southern boundaries are somewhat arbitrary. Mapping of calcareous parent material comes from the digitization by USGS (2005) for Mississippi (Moore, 1985) and other southeastern states. The only strata included here have “carbonate” or “limestone” as the primary rocktype, and lie within the UEGCP or its southern transitions. Mapping of historical blackland prairies across the UEGCP comes from Barone (2005a,b; together with his shared shapefile). The Black Belt is often defined as the arc of Cretaceous land that includes calcareous soils, with historical prairies, in northeast Mississippi and central Alabama. Note, however, that there is also an outer calcareous arc of Paleocene age, and there are minor extensions or disjunctions of calcareous material with various ages in Tennessee and Georgia.

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## RESULTS

Collections of 448 taxa—435 species plus 13 additional varieties—were made at this site of about 250 acres [100 ha]; these taxa are listed in the Appendix. They are classified into 234 genera and 74 families. Only 33 species are clearly alien, with origins only outside North America (Table 1). Another 17 may be post-settlement adventives from southern or western regions within North America, or have uncertain status, based on general knowledge (e.g., Weakley 2010). The list includes 91 composites (Asteraceae), 83 grasses (Poaceae), 36 legumes (Fabaceae, *sensu lato*), and 28 sedges or allies (Cyperaceae). There are remarkably few Pteridophytes (with one in Aspleniaceae, one in Ophioglossaceae, and one in Polypodiaceae), Brassicales (with one native and one alien in Brassicaceae), Caryophyllales (with one alien in Caryophyllaceae), or Ericaceae (with one in nearby upland woods). The list has 73 woody species, including 30 large trees, 27 smaller trees or shrubs, and 16 vines.

**Notes on Taxonomy and Nomenclature.** The taxa listed below have been assigned names in this paper that have had little or no prior usage in Mississippi (e.g., by McCook and Kartesz, 2010), or that have had little consistent usage across southeastern states (e.g., see notes of Weakley, 2010). Most of these taxa have been somewhat controversial segregates of more broadly interpreted taxa, or there has been confusion in nomenclature that is now resolvable. However, in a few

cases distinction is clear but the appropriate name remains uncertain or the plant is undescribed. In the following list of 29 taxa, preferred names are listed first, then the usual synonyms are provided in brackets after “=” if there is reasonably clear equivalence.

*Amorpha croceolanata* Wats. [= *A. fruticosa* var. *croceolanata* (P.W. Wats.) P.W. Wats. ex Moulle; or often included with typical *fruticosa*]. Nomenclature follows Small (1933) and Gleason (1952). This taxon is centered in the lower Mississippi Valley and appears to be generally distinct from most other *fruticosa* in Mississippi, Tennessee and Kentucky. Its legumes have short stramineous hairs (versus glabrous), and tend to have fewer prominent glands or none (versus several). Its leaflets are relatively large (mostly 2.5–6 × 1–4 cm versus 1.5–4 × 0.5–1.5 cm), and less elongated ( $l/w = ca. 2–2.5$  versus 2.5–3). Lower leaf surfaces, as well as young stems, have dense to scattered, long-sinuuous spreading, pale stramineous hairs (versus usually with shorter, more appressed, greyish-white hairs or glabrate); they are not clearly glaucous (versus often glaucous), and tend to have fewer prominent glands or sometimes none (versus consistently prominent). Mature, flowering stems are generally shorter (mostly 1–2 m versus 1.5–5 m). Plants mostly occur on base-rich, clayey soils along relatively small streams or on adjacent terraces, often persisting into partial shade. In contrast, typical *fruticosa* in southeastern states mostly occurs along the open, scoured banks of larger streams and rivers, often with much sand.

*Andropogon tenuispathus* (Nash) Nash [= *A. glomeratus* (Walt.) B.S.P. var. *pumilus* (Vasey) L.H. Dewey; or often included with *glomeratus*]. Nomenclature follows Weakley (2010), who modified the revision of C. Campbell (1983). This segregate of the *glomeratus-virginicus* complex is widespread and often weedy across southern states, especially on damp base-rich soils. Typical *glomeratus* is more eastern, with concentration on damp acid soils, and in Mississippi it is known only from a few southern counties. As discussed by Weakley, the two taxa are easily confused but they can be considered distinct species.

*Andropogon virginicus* L. var. *decipiens* C. Campbell [generally included with the species in previous treatments].

Based on C. Campbell (1986; and in FNA, 2003, Vol. 25) and Weakley (2010), most or all *virginicus* at the Pulliam Prairie is referable to var. *decipiens*. In addition to their distinctively narrow inflorescences, these plants are generally less robust and more slender than typical *virginicus* of east-central states, and old stems do not develop the distinctive orange-yellowish hue of typical *virginicus* in winter. Var. *decipiens* has been documented mostly in more eastern states, from Florida to Virginia, but it may be much more widespread. It was the only variety reported by Echols and Zomlefer (2010) from the blackland prairies of central Georgia. Further revision of *Andropogon* is needed in the lower Mississippi valley.

*Carex* cf. *normalis* Mackenzie.

This is a largely northeastern species of submesic woodlands with virtually no definitive record from Mississippi (C. Bryson, pers. comm.). Pending further research, our collections are tentatively distinguished from the closely related *C. molesta* Mackenzie ex Bright, which is a largely mid-western species that has been recorded from several locations in grasslands across the Black Belt of Mississippi and Alabama (Bryson et al., 1992; USDA, 2010). The plants from Pulliam Prairie have been difficult to identify, even with the most recent treatment (FNA, 2002, Vol. 23), and there are similar, puzzling collections from southeastern states: P. Hyatt-11,068/69/70 from

Searcy Co., Arkansas; R. Kral-52,746 from Cheatham Co., Tennessee; and old sheets of Beyrich or Chapman from near Rome, Georgia (all at MO). The perigynia of these plants are relatively narrow in some cases, indicating *normalis*, but in some features they resemble *molesta*. Plants at Pulliam Prairie are locally common, but only on damp toeslopes and bottoms, transitional from grassland to relatively wet riparian woods, with some plants persisting into the shade of green ash and sugarberry. In contrast, *molesta* generally occurs in more open grassy vegetation, and often on drier soils. These plants at Pulliam Prairie were the only representatives of *Carex* section *Ovales* collected at the site. Others to be expected in Black Belt grasslands include: *C. brevior* (Dewey) Mackenzie ex Lunnell, another midwestern species typical of open, damp to dry calcareous or sandy sites; *C. festucacea* Schkuhr ex Willd., a widespread eastern species of open, wet areas on more acid soils; and *C. longii* Mackenzie, a largely southeastern species of seasonally damp acid soils (FNA, 2002; C.T. Bryson, pers. comm.).

*Dichanthelium jorii* (Vasey) Mohlenbrock [= *Panicum jorii* Vasey; *D. commutatum* (Schultes) Gould ssp. *joorii* (Vasey) Freckmann & Lelong]. Nomenclature here follows Mohlenbrock (1985), who recognized the distinct habitat of this species, in damp bottomland woods of southeastern states, and provided consistent characters that distinguish it from *D. commutatum*, which is typical of drier sites. Despite the attempts of Mohlenbrock and D. Ladd (pers. comm.) to revive interest in this taxon, there has continued to be rather incomplete treatment (e.g., FNA, 2003, Vol. 25) or neglect (e.g., Weakley, 2010) in most recent floras.

*Elymus glabriflorus* (Vasey) Scribn. & Ball [= *E. virginicus* L. var. *glabriflorus* (Vasey) Bush; or often included with typical *virginicus*].

Nomenclature follows Campbell (2002; and in FNA, 2007, Vol. 24). *E. glabriflorus* is widespread across southeastern states, usually in thin woodlands and grasslands on seasonally dry soils. Typical *virginicus* is a much more widespread eastern taxon, usually in seasonally damp woods and thickets. Both species are common across Mississ-

ippi, and locally abundant at the Pulliam Prairie. Occasional hybrids do occur, but none were found at this site. Most or all *glabriflorus* at the site is referable to the relatively smooth var. *glabriflorus*.

*Eupatorium pubescens* Muhl. ex Willd. [= *E. rotundifolium* L. var. *ovatum* (Bigelow) Torr.; or included within *rotundifolium*].

Nomenclature follows Small (1933), Fernald (1950) and Weakley (2010). This polyploid taxon is considered to have originated from hybridization of typical *rotundifolium* and another species—perhaps *E. semiserratum* DC; but neither of those putative parents is known from the Black Belt of Mississippi. *E. pubescens* is widespread in grasslands on acid soils across southeastern states, where it has generally been known as *E. rotundifolium* var. *ovatum* (K.C. Siripun and E.C. Schilling in FNA, 2006, Vol. 21). However, it may be uncommon to absent in the longleaf pine belt from southern Mississippi to eastern North Carolina, where it is replaced by typical *rotundifolium* (Weakley, 2010; and associated mapping at NCU, Chapel Hill). Accurate range-wide mapping of these two taxa is not yet available.

*Eupatorium torreyanum* Short & Peter [= *E. hyssopifolium* L. var. *laciniatum* Gray; or included within *hyssopifolium*].

Nomenclature follows Small (1933) and Weakley (2010). This polyploid taxon is considered to have originated from hybridization of *E. hyssopifolium* and another species—perhaps *E. semiserratum* DC. or *E. altissimum* L. It is widespread in southeastern states, where it has generally been known as *E. hyssopifolium* var. *laciniatum* (K.C. Siripun and E.C. Schilling in FNA, 2006, Vol. 21). There has not yet been a definitive mapping to compare ranges of the two taxa. *E. torreyanum* may be relatively sensitive to xeric conditions (Weakley, 2010); it is much less common than typical *hyssopifolium* at the Pulliam Prairie.

*Fraxinus smallii* Beadle [generally included with *F. americana* L. by previous authors].

Nomenclature follows Nesom (2010), who updated the reasonable evidence for dividing *americana* into three taxa: *americana* ( $2n = 46$ ); *smallii* ( $2n =$

92); and *biltmoreana* ( $2n = 138$ ). *F. americana*, sensu stricto, has a relatively northern range and is generally rare to absent on the Coastal Plain of southeastern states. The other two species are widespread across southeastern states, and overlap broadly in range with *americana*.

*Gaura longiflora* Spach [= *G. biennis* L. var. *pitcheri* Torr. & Gray; or often included with *G. biennis*].

Nomenclature follows Raven and Gregory (1972). All of the *Gaura* examined at Pulliam Prairie is *longiflora*, though *G. filipes* Spach may also be expected on xeric sites in the Black Belt (Barone and Hill, 2007). There has been much confusion between the largely mid-western *longiflora* and the more northeastern *biennis*. Based largely on collections at MISS, *longiflora* is widely distributed over much of Mississippi, but *biennis* is known only from a few northern counties (including Lee, Lafayette and Marshall). Although some hybridization is suspected where ranges overlap, almost all specimens examined from Kentucky, Tennessee and Mississippi are readily assignable to one species or the other. Further south, there has also been confusion with *G. angustifolia* Michx., which is largely restricted to sandy soils within 50-100 miles of the coast.

*Gonolobus suberosus* (L.) R. Brown var. *granulatus* (Scheele) Krings & Q.-Y. Xiang [= *Matelea suberosa* (L.) Shinners, sensu lato; *G. gonocarpus* (Walt.) Perry, sensu lato].

Nomenclature follows Krings and Xiang (2005; Krings, 2006) and Weakley (2010). There has been much confusion between this taxon of the lower Mississippi Valley and Gulf Coastal Plain, versus the more southeastern var. *suberosus*. Without fruit, these plants can also be confused with *Matelea* spp. Some non-flowering plants observed at the site may be *M. obliqua* (Jacq.) Woodson, but the collections are inadequate for identification.

*Heliopsis gracilis* Nutt. [= *H. minor* (Hook.) C. Mohr of Small (1933); = *H. helianthoides* (L.) var. *gracilis* (Nutt.) Gandhi & R.D. Thomas; or often included with *helianthoides*].

Nomenclature follows A.R. Smith (in FNA, 2006,

Vol. 21). This species occurs on the Coastal Plain from Louisiana to South Carolina, plus unconfirmed records from Oklahoma, Arkansas and Texas (Small, 1933; FNA, 2006; USDA, 2010; Weakley, 2010). It appears to be uncommon or rare in all of these states, except perhaps Louisiana. There has been some confusion with typical *helianthoides*, which is rare to absent on the Coastal Plain, except perhaps in Louisiana. West of the Mississippi River, there has also been some confusion with *H. helianthoides* var. *scabra* (Dunal) Fern. Typical habitats for *gracilis* include relatively mesic woods of various types on base-rich soils (see also Weakley, 2010), but may also include “open wooded slopes, especially with pines” (FNA, 2006).

*Houstonia lanceolata* (Poir) Britt. [= *H. purpurea* L. var. *calycosa* Gray; *Hedyotis purpurea* (L.) Torr. & Gray var. *calycosa* (Shuttleworth ex Gray) Fosberg].

Nomenclature follows Small (1933) and Fernald (1950). This taxon is typical of thin woodland and rocky glades on dry calcareous soils in mid-western regions. There is some local intergradation with typical *purpurea* (Terrell, 1996), a more eastern plant typical of more shady habitats on relatively moist, acid soils. But experience in Kentucky, Tennessee and Mississippi indicates that *lanceolata* is a reasonably distinct species.

*Lysimachia* aff. *ciliata* L.

*L. ciliata* is a variable species, widespread across eastern and central North America. The only *Lysimachia* found at Pulliam Prairie was one small, deer-browsed patch in thin damp riparian woods of sugarberry and green ash. It resembles typical *ciliata*, but has distinct features shared with several other collections examined in herbaria (mostly at NCU). These collections are from scattered sites across the southeastern range of *ciliata*, especially in swampy woodlands on clayey soils of the Gulf Coastal Plain. They are relatively short plants (mostly 3–9 dm versus 7–13 dm) that tend to have narrower leaf blades (mostly 1.5–3 cm wide versus 4–6 cm, and with leaf/width ca. 3–4 versus 2–2.5), inflorescences averaging smaller and with less branching into subverticillate clusters, flowers averaging smaller, with more sharply dentate petals,

and with less conspicuous sepal venation. These plants may deserve taxonomic recognition, or perhaps just represent transitions to *lanceolata*. The potential for fertile hybrids among species of *Lysimachia* section *Seleucia* (= genus *Steironema*) is well known, but further documentation is needed from the field (Fernald, 1950; Coffey & Jones, 1980; Weakley, 2010). Also, more chromosome counts are needed. Each of these species contains diploids ( $2n = 34$ ), but *ciliata* has diploids reported only from southeastern states and it typically has much higher numbers ( $2n = 92–112$ ).

*Muhlenbergia*: cf. *frondosa* (Poir.) Fern. [including *M. commutata* (Scribn.) Bush] or cf. *bushii* R.W. Pohl [including *M. brachyphylla* Bush].

At the Pulliam Prairie, some non-flowering plants in riparian woods have completely glabrous internodes and somewhat bushy branching, indicating *frondosa* or *bushii*, as opposed to other species of the genus known from Mississippi (P.M. Peterson in FNA, 2003, Vol. 25). *M. frondosa* is widespread in riparian woods from the mid-west to northeastern states, and *bushii* is a closely related species of damp woods that occurs mostly in mid-western states. Both species are virtually unknown in Mississippi or elsewhere in southeastern coastal states: *frondosa* was mapped by FNA in one county each of Mississippi and Alabama, and *bushii* was mapped in one northern county of Georgia. However, these two species have often been confused with each other, or with two other species that were found in small numbers within woods at the Pulliam Prairie: (a) *M. sylvatica* (Torr.) Torr. ex Gray, which is a more widespread eastern species of more mesic woods that is scattered over northern Mississippi, Alabama and Georgia; and (b) *M. glabriflora* Scribn., which has a similar range to *bushii* but occurs in more seasonally xeric woods. Further complicating the situation are possible hybrids, including awned plants known as *M. frondosa* f. *commutata* (Scribn.) Fern. that appear somewhat intermediate between *frondosa* and *bushii*. In herbaria, identification of *frondosa* is confirmed here from Tunica Co. (MISS), and *commutata* is tentatively identified from Central Grove, Monroe Co. (MMNS), about 10 miles NE of the Pulliam Prairie. Also, *bushii* is confirmed

from Grenada Co. (MISS: J.R. MacDonald-7438 and -7778), about 50 miles west of Chickasaw Co. Further revision of collections from Mississippi is needed to improve taxonomic and biogeographic understanding of these taxa, which all have the same reported chromosome number ( $2n = 40$ ).

*Onosmodium hispidissimum* Mack. [= *O. molle* Michx. ssp. *hispidissimum* (Mackenzie) Boevin; *O. bejariense* DC. ssp. *hispidissimum* (Mackenzie) B.L. Turner]. Nomenclature follows Small (1933), Weakley (2010) and others (see citations of Weakley), but taxonomy within this genus has been somewhat unsettled. *O. hispidissimum* is a largely mid-western plant typical of relatively moist or fertile soils, often now in agricultural uses, and it has declined much after 1950 with the spread of tall fescue. At the Pulliam Prairie, a few dozen plants were found at scattered sites, most frequently on lower calcareous slopes. Typical *O. molle* [ssp. *molle*] and *O. occidentale* Mack. [= *O. molle* ssp. *occidentale* (Mack.) Cochrane] have also been reported from the Black Belt or nearby in western Alabama (USDA, 2010). Typical *molle* occurs mostly in the rocky cedar glades of central Tennessee; *occidentale* occurs mostly on dry sites in the Great Plains.

*Panicum gattingeri* Nash [= *P. philadelphicum* Bern. ex Trin. ssp. *gattingeri* (Nash) Freckmann & Long; = *P. capillare* L. var. *campestre* Gattinger]. Nomenclature follows Small (1933), Fernald (1950), Weakley (2010) and others. It is easy to confuse *capillare*, *gattingeri*, *philadelphicum* and *flexile* in the field, where they are often intermixed, and there may be genetic intergradation in some cases;  $2n = 18$  in all species. However, *gattingeri* is usually distinct and typically occurs on calcareous soils in intermediate habitats, between the damp cultivated soils typical of *capillare* and the seasonally dry or rocky ground typical of *flexile*. *P. philadelphicum* is typical of seasonally dry, non-calcareous soils and it is unknown in Mississippi.

*Rubus* aff. *serissimus* Bailey [= misapplied *R. bifrons* Vest or *R. discolor* Wiehe & Nees]. The correct name for this species remains uncertain, pending completion of *Rubus* for Flora

of North America and associated ongoing research by L. Alice, D. Goldman, G. Yatskievych, and especially M. Widrlechner (pers. comm.). This blackberry has thin to dense gray-brown pubescence on lower leaf surfaces; stems are erect at first but usually overarching, and sometimes trailing with rooting tips; plants are rarely more than 2 m tall. It has been often misidentified as the more robust alien, *bifrons*, using treatments of Gleason and Cronquist (1991) and others; *bifrons* itself has sometimes been broadly defined to include *R. armeniacus* Focke. *Rubus* aff. *serissimus* may have recent hybrid origin, and is probably at least partly alien in southeastern states, where it has become widely scattered and locally abundant during recent decades, especially along rights-of-way. “It can be quite aggressive, often forming impenetrable thickets” (as “*R. longii* Fern.” in draft of FNA Vol. 9). At the study area, it was found only near the paved road west of the chalk grassland.

*Rudbeckia* aff. *tenax* C.L. Boynt. & Beadle [*R. tenax* itself is often included in *R. fulgida* Ait., sensu lato, but it is probably closer to *R. speciosa* Wenderoth].

The treatment used here is developed from Small (1933) and Fernald (1950), based on extensive work in the field and herbaria (J. Campbell, in prep.). The *fulgida-speciosa* group contains diverse morphological types that have been variously named. Small and Fernald recognized 12 and 9 species, respectively, but L.E. Urbatsch and P.C. Cox (in FNA, 2006, Vol. 21) recognized only two species, with *fulgida* divided into seven varieties. Based on research at several herbaria, the taxon at Pulliam Prairie is largely restricted to swales and lowlands in blackland prairies of Mississippi and Alabama, with outlying records from Tennessee. It appears to be an undescribed species closely related to *tenax*, which occurs more widely across southeastern states, usually on drier or rockier calcareous soils. Both taxa share the following characters: paleas largely eciliate; distinct stoloniferous offsets produced; basal and lower cauline leaves ca. 2–5(–7) cm long and 1–2(–2.5) cm wide. The blackland plants differ from *tenax* as follows: heads opening mostly in early August to



mid-September (versus mid-July to mid-August), usually solitary at first but often adding 2–5+ later, on long or short peduncles mostly 10–30 cm above lowest node of inflorescence (versus usually 2–7, on long peduncles mostly 30–50 cm above lowest node of inflorescence); larger mid-stem leaves usually ascending and forming an overlapping cluster of 8–12 along 10–15 cm of stem (versus usually spreading, not distinctly clustered), mostly 2–4.5 cm wide (versus 1–2.5 cm), with l/w ca. 3–6 (versus 4–10), their distinct petiolar bases 4–8(–14) mm wide with almost parallel sides (versus less distinct, 2–4(–8) mm wide, tapering); stems and leaves rough-hirsute with spreading pustulate hairs, somewhat bluish green (versus pilose with soft hairs, usually plain green).

*Ruellia* cf. *ciliosa* Pursh [= *R. caroliniensis* (J.M. Gmelin) Steudel var. *ciliosa* (Pursh) R.W. Long; perhaps also = *R. humilis* Nutt. pro parte of Fernald (1950)].

There has been confusion among plants known as *caroliniensis*, *ciliosa* and *humilis*. The provisional usage here follows Small (1933), who applied the name *ciliosa* to plants with stems 2–6 dm tall and hirsute (versus 1–3 dm and hirsute to almost glabrous on upper internodes in *humilis*); with “leaf-blades sessile or essentially so” (as in *humilis*, not “manifestly petioled” as in other taxa that have been combined with *caroliniensis*); and with corollas tending to be longer (usually ca. 5–7 cm versus 4–5 cm in the other taxa). Treatments have varied significantly: Fernald (1950), Gleason and Cronquist (1991), Wasshausen (1998), Ward (2007), and Weakley (2010). It remains possible that the “*ciliosa*” of less calcareous soils at Pulliam Prairie is typical *humilis*, and that the shorter, sprawling, smoother plants on dry calcareous soils—here named “*humilis*”—should be considered a distinct species that includes *R. humilis* var. *calvescens* Fern. Further revision is needed.

*Schizachyrium scoparium* (Michx.) var. *divergens* (Hack.) Gould [= ssp. *divergens* (Hack.) Gandhi & Smeins, or often included with *scoparium*; ? = *S. villosissimum* (Kearney) Nash].

Nomenclature follows J.K. Wipff (in FNA, 2003, Vol. 25). This taxon occurs mostly in the lower

Mississippi River watershed and along the Gulf Coast, especially in pinelands. However, the full extent of its range remains somewhat uncertain. Wipff reported that it does intergrade with var. *scoparium*. At the Pulliam Prairie, var. *divergens* was found in just one patch, ca. 100 ft [30 m] across, on clayey soil above the chalk outcrops.

*Silphium glabrum* Eggert ex Small [probably = *S. trifoliatum* L. var. *latifolium* Gray].

Nomenclature follows Small (1933) and G.L. Nesom (pers. comm.). There has been much confusion between these plants and *trifoliatum*, both of which have both included within *S. asteriscus* L. by some authors (e.g., J.A. Clevinger in FNA, 2006, Vol. 21), and there may be some intergradation. There has also been confusion with less hairy forms of *S. integrifolium* Michx. Typical *glabrum* appears largely restricted to calcareous regions of the southern Appalachians, southern Interior Low Plateaus, and blacklands of the Coastal Plain, while typical *trifoliatum* occurs mostly in the Interior Low Plateaus and the valleys of Appalachian regions. *S. glabrum* differs primarily in having leaves all opposite (versus often trifoliate, at least below), and relatively broad (mostly 2–5 cm versus 1–3 cm). Also, lower leaf surfaces (except main veins) and stems are usually smooth to slightly scabrid (versus often scabrous-hispid), and plants are often relatively short. Other members of this complex have been reported from Black Belt grasslands, but need to be verified: *S. confertifolium* Small in Alabama and perhaps Mississippi (Leidolf and McDaniel, 1998); *S. asteriscus* L. in Alabama (Schuster and McDaniel, 1973). In their extensive survey of Alabama’s remnants, Schotz and Barbour (2009) indicated only *glabrum* (as “*asteriscus* var. *latifolium*” or “southern rosinweed”), and made no reference to *integrifolium*.

*Silphium integrifolium* Michx. aff. var. *laeve* Torr. & Gray [= *S. speciosum* Nutt., ?*S. trachopus* Raf.].

Usage here follows J.A. Clevinger (in FNA, 2006, Vol. 21), and to some extent previous authors (Fernald, 1950; Cronquist, 1980), but uncertainty remains. Typical *integrifolium* is a widespread mid-western plant that is uncommon to absent in south-

eastern states (Weakley, 2010). Segregates have been treated in varied ways, and different emphases placed on the supposed characters of var. *laeve*: glaucous stems, less hairy condition in general, heads with more ray and disc florets. G. Nesom (in prep.) considers that var. *laeve* is a species, primarily of the central Great Plains. Reports from Kentucky (Jones, 2005) and Tennessee (Cronquist, 1980) remain uncertain. Plants at Pulliam Prairie and elsewhere in Mississippi appear to be at least transitional to var. *laeve*, but further revision is needed. The situation is complicated by potential intergradation with *S. glabrum* (see above); *S. integrifolium* var. *gattingeri* Perry may represent intermediate plants. Another segregate has recently been described from the Black Belt of central Alabama—the distinctly glandular *S. perplexum* J. Allison (Allison and Stephens, 2001), but this needs further comparison with the largely mid-western var. *deamii* Perry (Fernald, 1950).

*Solidago rigida* L. var. *glabrata* E.L. Braun [= *S. jacksonii* (Kuntze) Fern.; *Oligoneuron ridigum* (L.) Small var. *glabratum* (E.L. Braun) Nesom; or included with *S. rigida*].

Nomenclature follows Gleason and Cronquist (1991) and Weakley (2010), though species status may be justified. Var. *glabrata* has often been confused with typical *rigida* in reports from Mississippi. It is widely scattered over southeastern states, but generally restricted to native grassland remnants and rocky glades. In Mississippi it may be known only from counties of the Black Belt (at least Chickasaw and Oktibbeha at MMNS) and the Jackson Prairie (at least Clarke and Jasper at MMNS). At the Pulliam Prairie, only ca. 10 plants (or clonal patches) were observed, largely restricted to dry chalk grassland. Var. *rigida* has a broader northern range, being a common plant in good remnants of the original mid-western prairies. In Mississippi, it is known only from northern counties, mostly in the Black Belt (Clay, Chickasaw, Lee and Tate at MMNS), and it is locally abundant at the Pulliam Prairie. The closely related species, *S. nitida* Torr. & Gray, has a more southwestern range, and in Mississippi it is known mostly from southern counties (Greene, Hancock, Pearl River and Stone at MMNS). But *nitida* was

also found at the Pulliam Prairie, with a few plants scattered mostly in dry grassland on clayey soils above the chalky slopes.

*Solidago speciosa* Nutt. var. *rigidiuscula* Torr. & Gray [= *S. rigidiuscula* (Torr. & Gray) Porter; or generally included with *S. speciosa*].

Nomenclature follows most recent treatments (e.g., J. Semple and R. Cook in FNA, 2006, Vol. 20), but species status deserves further consideration, following Small (1933). Var. *rigidiuscula* is a rather distinct taxon has often been overlooked. It has a broad mid-western range, and usually occurs in grassland;  $2n = 18$ . Typical *speciosa* is more eastern, from the Ozarks to the Appalachians and mid-Atlantic states, and usually occurs in thin woods, thickets and edges;  $2n = 18, 36$  and  $54$ . Although typical *speciosa* has been reported from Louisiana, Mississippi, Alabama and Georgia, there appear to be virtually no verified collections from those states (USDA, 2010).

*Sporobolus compositus* (Poir.) Merr. var. *drummondii* (Trin.) Kartesz & Gandhi [= *S. asper* (Michx.) Kunth. var. *drummondii* (Trin.) Vasey; or often included with species].

Nomenclature follows P.M. Peterson et al. (in FNA, 2003, Vol. 25). Var. *drummondii* occurs mostly on dry calcareous soils in south-central states, especially west of the Mississippi River. It may be locally abundant in Tennessee, Mississippi, Alabama and Georgia (USDA, 2010), but further verification is needed. In Mississippi, var. *drummondii* appears largely restricted to the Black Belt and Jackson Prairie; it is locally abundant at the Pulliam Prairie. Var. *compositus* [= *S. asper* var. *asper*] is much more widespread across North America but rare to absent on the Coastal Plain from Mississippi to Virginia (Kartesz, 1999, and distributed updates; USDA, 2010; Weakley, 2010). In Mississippi, var. *compositus* may be known only from the Jackson Prairie (USDA, 2010). Further review of collections is needed to separate these two taxa in southeastern states.

*Symphotrichum dumosum* (L.) G.L. Nesom var. *subulifolium* (Torr. & Gray) G.L. Nesom [= *Aster dumosus* L. var. *subulifolius* Torr. & Gray; or often

included with the species].

Nomenclature here follows Small (1933), Fernald (1950), Nesom (1997) and Weakley (2010). This taxon occurs in dry sites on the Coastal Plain from east Texas to Maine. It is common at Pulliam Prairie, especially on dry clayey soils. Typical var. *dumosum* has a more widespread southeastern range, and occurs on relatively damp, as well as dry, non-calcareous soils. At Pulliam Prairie var. *dumosum* is largely restricted to high ground around the post oak woods and nearby edges. No plants were observed with intermediate morphology, supporting future recognition of these two taxa as distinct species.

*Symphotrichum* aff. *patens* (Ait.) G.L. Nesom [*Aster patens* Ait.].

The treatment here is being developed from Jones (1980), Nesom (2006) and L. Brouillet et al. (in FNA, 2006, Vol. 20). *S. patens* has usually been treated as a complex species with two or more intergrading varieties. At the Pulliam Prairie, typical *patens* is largely restricted to thin oak woods on uplands with relatively acid soils. On more calcareous soils nearby, there are distinct plants with stems and leaves covered by minute stipitate glands, and some of these plants are much less hairy than typical *patens*. This general glandular condition has not been well-documented before in *patens*, but it is typical of most other species in Series *Patentes*. Leaves of these glandular plants also differ from typical *patens* in having a somewhat bluish-waxy sheen; moreover, larger mid-stem leaves tend to have relatively low length-to-width ratios, and tend to be more crowded. The ultimate inflorescence branches usually have leaves abruptly reduced at the base, and remaining so above; in typical *patens*, there is usually more gradual or irregular reduction, often with larger leaves above the base. Based on an initial survey of herbaria, similar plants are known from blackland prairies, calcareous glades, associated roadsides and woodland edges in Alabama, Georgia, Mississippi, North Carolina, Pennsylvania, South Carolina and Tennessee. Most records are from the Black Belt in Alabama and Mississippi, but this taxon does extend east onto strips of calcareous soil on the Piedmont and Coastal Plain as far as

North Carolina. Also, there a few records north to the southern edge of the Interior Low Plateaus in Alabama, and into the Ridge-and-Valley region as far as Pennsylvania. It seems reasonable to recognize these plants as a new variety, though in some cases collections appear transitional to typical *patens*. Based on Jones' (1980) and Nesom's (2006) initial mapping of chromosome numbers, it is possible that these plants are diploids ( $2n = 10$ ) that have retained an ancestral glandular condition; most plants currently included within var. *patens* are tetraploids ( $2n = 20$ ).

*Viola* cf. *missouriensis* Greene [= *V. sororia* Willd. var. *missouriensis* (Greene) McKinney].

This is the only taxon of *Viola* found at the Pulliam Prairie. Nomenclature here follows Fernald (1950), but is uncertain. The 'stemless blue' complex of violets has remained controversial, with varied recent treatments (e.g., McKinney, 1992; Weakley, 2010). *V. missouriensis* appears to be typical of damp alluvial woods in the central and lower Mississippi watershed. There has been virtually no published use of the name *missouriensis* in Mississippi, but there has been much confusion across east-central states with *V. affinis* Le Conte, a more eastern species that McKinney included within *V. sororia* var. *missouriensis*. Within Mississippi, plants similar to those at Pulliam Prairie have generally been called *V. affinis* in the north and locally *V. langloisii* Greene in the south (Small 1933). *V. langloisii* is most similar to *missouriensis*, and if combined the epithet *langloisii* may have priority.

***Species with little or no prior record from Mississippi.*** As listed above, several of the names employed in this paper have had little or no prior usage in Mississippi, but most of the taxa they represent are well known under synonyms. In contrast, the ten taxa listed below have little or no prior record in the state under any name. Most of them appear to be uncommon or rare, but some are common and have been confused with related species. Several of the less well-documented taxa noted in the previous section could well be added to this list of ten after further review of records: including *Andropogon virginicus* var. *decepiens*,

*Carex cf. normalis*, *Schizachyrium scoparium* var. *divergens*, *Solidago speciosa* var. *rigidiuscula*, *Symphotrichum dumosum* var. *subulifolium*, plus the suggested new taxa in *Lysimachia*, *Rudbeckia* and *Symphotrichum*.

*Carex aureolensis* Steudel

The first published record of this widespread southern species from Mississippi was the general reference by B.A. Ford and A.A. Reznicek in FNA (2002, Vol. 23). There has been virtually no further published documentation from the state, but most records of *C. frankii* Kunth on the Coastal Plain are referable to *aureolensis* (C.T. Bryson, pers. comm.). Although *aureolensis* was described in 1855, it was largely ignored for 150 years.

*Carex crawei* Dewey

This was first reported from Mississippi by T.S. Cochrane and R.F.C. Naczi in FNA (2002, Vol. 23), based on collections of C.T. Bryson (pers. comm.) from Chickasaw County and elsewhere, but it has not yet been mapped in the state by USDA (2010) or Heritage Programs (NatureServe, 2010). It is common at Pulliam Prairie, especially on seasonally damp ground that has been burned or driven over. *C. crawei* is a widespread species of seasonally damp calcareous openings across northern states and adjacent Canada, but it is rare to absent in southern states. It is a complex variable species with several isolated populations ( $2n = 38, 59, 60$ ). Not found at Pulliam Prairie was the more robust, closely related southern species, *C. microdonta* Torr. & Hook. ( $2n = 64$ ), which has been reported from the same county and elsewhere in the Black Belt (see above references). *C. microdonta* is easy to overlook in the field and potentially intermixed: “whether or not the two taxa are ecologically distinct is a matter awaiting study” (FNA, 2002).

*Dichanthelium linearifolium* (Scribn.) Gould

This was reported from Mississippi by Lowe (1921) but virtually no collections in herbaria have been documented. FNA (2003, Vol. 25) mapped only one (southern) county in the state, and few counties in adjacent parts of surrounding states. At

Pulliam Prairie, the species is locally frequent in dry grassland and thin burned woods, especially on clayey soils just above the chalk.

*Eleocharis compressa* Sullivant

This species was first reported from Mississippi by FNA (2002), based on a collection of C.T. Bryson (pers. comm.). It has not yet been mapped in the state by USDA (2010) or by Heritage Programs (NatureServe, 2010). *E. compressa* is widespread in seasonally wet calcareous openings across North America, except in some western and southeastern states. It is a variable species;  $2n = 24$  or  $26$ . At Pulliam Prairie, only one patch was discovered, and identified as var. *compressa*. The closely related species, *E. bifida* S.G. Smith, occurs on more rocky sites in Alabama, Georgia, Tennessee and Kentucky. The collection from Pulliam Prairie does have floral scales that are mostly bifid, especially in lower parts of the spike, but they are not as deeply bifid as *bifida* and they do not have the other characters of *bifida* (FNA, 2002).

*Erigeron strigosus* Muhl. ex Willd. var. *callicola* J. Allison

This taxon has not been recorded before in Mississippi. It was recently described from limestone glades in Alabama, Georgia and Tennessee (Allison and Stephens, 2001; see also FNA, 2006, Vol. 20). Var. *callicola* is a relatively short, slender perennial, with overwintering leafy tufts, as confirmed here by a transplant from the Pulliam Prairie to cultivation during 2009–2011. While typical var. *strigosus* is widely scattered at the Pulliam Prairie, var. *callicola* is restricted to the driest sites, especially on crests of eroding banks above exposed chalk.

*Erucastrum gallicum* (Willd.) O.E. Schulz

This European weed has not been recorded before in Mississippi. It is widely scattered over northern states and adjacent Canada, but uncommon to rare in southern states, and still largely unknown on the southeastern Coastal Plain (USDA, 2010; Weakley, 2010; I.A. Al-Shehbaz in FNA 2010, Vol. 7). Only one plant was found within this study area, along the dirt road into the Pulliam Prairie.

*Grindelia squarrosa* (Pursh) Dunal

This adventive species from the west has not been recorded before in Mississippi. It is widely distributed across North America, but rare (KY, VA, TN, MS) to absent (LA, AL, GA, FL, SC, NC) in southeastern states (FNA, 2006; USDA, 2010). Its original range was probably centered in the Great Plains, but it has expanded to other regions during the past 100–200 years (FNA, 2006). At the Pulliam Prairie, it was found at a few sites in the more disturbed upland fields.

*Helianthus pauciflorus* Nutt. [= *H. rigidus* (Cass.) Desf., *H. laetiflorus* Pers. var. *r.* (Cass.) Fern.]

There is no prior published record of this taxon from Mississippi. Based on E. Schilling (in FNA, 2006, Vol. 21), *pauciflorus* is a widespread variable taxon of mid-western grasslands, but with few previous records from southeastern states. It is part of a hexaploid complex that includes the more western taxon described as *H. subrhomboides* Rydb., as well as the more northern *H. laetiflorus* Pers., which has been widely cultivated and considered by some authors to result from hybridization of *pauciflorus* and *tuberosus*. Fernald (1950) treated all three taxa as varieties of *laetiflorus*, which remains reasonable. In herbaria of Mississippi, only one prior collection of this complex was found, and this is referable to typical *pauciflorus*: L.C. Temple-6870 [as “*laetiflorus*”], 29 Aug 1967 (MISS, MMNS); Yalobusha Co., dry roadside, State Highway 7 just N of Water Valley City limits. At the Pulliam Prairie, which is about 50 miles east of Temple’s locality, there are two large patches of plants that are similar, but highly variable in leaf width (ca. 1.5–5 cm), pubescence, flowering head size, and degree of redness in disc flowers. The plants are clearly native, with no evidence that they have escaped from cultivation. From ongoing review of mapping efforts (e.g., Kartesz, 1999; USDA, 2010) and search of herbaria (especially at NCU), *pauciflorus* is probably rare in other coastal states east of the Mississippi River, with collections from only a few counties in Alabama, Georgia, North Carolina, South Carolina and Virginia. Some collections appear transitional to typical *laetiflorus* or hybridized with other species.

*Liatris squarrosa* (L.) Michx. var. *glabrata* (Rydb.) Gaiser

There has been no prior record of this taxon from Mississippi or anywhere else east of the Mississippi River. Nomenclature here follows recent authors, but there is continuing uncertainty about segregates of the *squarrosa* complex. Var. *glabrata* occurs mostly in the central Great Plains, while var. *squarrosa* has been considered largely southeastern: “they might be treated as separate species” (G.L. Nesom in FNA, 2006, Vol. 21). The plants at Pulliam Prairie are abundant in native grassland, especially on more chalky soils. They are distinct from typical *squarrosa* in their completely glabrous stems, leaves and phyllaries; heads are usually fewer (mostly 1 to 5) and smaller on average, with moderately elongated, non-cuspidate phyllaries; plants are relatively tall (mostly 5–7 dm), and have relatively stiff leaves that do not twist as much as typical *squarrosa*. Typical var. *squarrosa* also occurs at the site, but it is much less common and largely restricted to upper levels with less calcareous soils. Also found at the Pulliam Prairie were three clumps of the apparent hybrid between *L. squarrosa* var. *glabrata* and *L. spicata*, which has not been previously reported, described or named. Further revision of the *squarrosa* complex is needed in this region. Other potential segregates include var. *alabamensis* (Alexander) Gaiser of the Gulf Coastal Plain, which appears somewhat intermediate between *glabrata* and typical *squarrosa* (Small, 1933; Gaiser, 1946; Correll and Johnson, 1970).

*Panicum gattingeri* Nash

There are no prior published reports from Mississippi. However, it is likely that some collections of this species have been confused with *P. flexile* or other species. See notes on nomenclature in the previous section.

**Notes on Rare Species.** Table 2 lists the 57 taxa (51 species plus 6 extra varieties) found at Pulliam Prairie that appear to be rare in the region, based on a broad floristic review. Many of these are not imperiled but do have significant interest as ‘watch-list’ or ‘conservative’ plants that can provide useful indications of ecological history. Just

over half of these taxa are composites (15), sedges and allies (9), or grasses (9); they also include five of the nine Orobanchaceae at the site. As summarized in Table 1, these rare taxa are concentrated among obligate grassland plants (17.2% of the 215 certain natives) and facultative grassland plants (15.3% of 72). Several others are typical of low riparian woods (12.5% of 64), but almost none are typical of upland oak woods (0 of 21) and thickets in general (1 of 28). Across the landscape in general (Table 1), rare plants are concentrated on chalk or lowlands (17.8% of 230) versus uplands above chalk exposures (9.4% of 170). The globally rare subset shows similar concentrations (Table 1). The following twelve plants at Pulliam Prairie appear to be truly imperiled in Mississippi, generally deserving ranks of S1 ('endangered') or S2 ('threatened').

*Agalinis auriculata* (Michx.) Blake

Occasional (5/15 grid units), but locally frequent, with 100s of plants in total. It occurs mostly in moderately tall grassland, especially at lower levels (vegetation types f or g1). Some of the densest patches occur in areas that have been farmed a few decades ago, and it is locally associated with fairly dense *Lespedeza cuneata*. In less disturbed brushy areas on moist to damp ground, it appears to be shaded out.

*Agalinis heterophylla* (Nutt.) Small ex Britt.

Rare, found at only one site, with only ca. 5-10 plants noted at the edge of a low plowed area, in transitions to wet brushy grassland (vegetation type g2, more or less).

*Ambrosia psilostachya* DC.

Widespread (10/15 grid units), and locally common, with 1000s of stems. It occurs in varied grassland types, but perhaps most common in transitions from chalk to overlying clays (vegetation types c1, e, f). This widespread perennial ragweed of western North America is infrequently reported from southeastern states, but it may have been overlooked (USDA, 2010; Weakley, 2010). Schotz and Barbour (2009) described it as a "native invasive species" in the Black Belt prairies of Alabama.

*Carex crawei* Dewey

Locally common (at least 6/15 grid units). It is largely restricted here to grassland on chalky soils, in xerohydric to moderately xeric soils (vegetation types f, e, d, g1).

*Eleocharis compressa* Sullivant

Rare, found at only one site, with a few plants covering no more than 1 m<sup>2</sup> in a damp swale draining from old fields on the uplands (vegetation type c2, more or less).

*Helianthus pauciflorus* Nutt.

Infrequent (2/15 grid units), but locally common, with 100s of stems in several clonal patches. It is largely restricted to reddish clayey soils just above more chalky slopes, at edges of post oak or black-jack oak woodland and in adjacent grassland (vegetation types h1, b, f). See notes on regional distribution above.

*Liatris squarrosa* (L.) Michx. var. *glabrata* (Rydb.) Gaiser

Locally abundant in chalk grassland (10/15 grid units). See taxonomic notes above; this paper provides the first report for Mississippi, but the plant will probably be discovered at other sites within the northern Black Belt, and in herbaria.

*Muhlenbergia glabriflora* Scribn.

Rare, found only at only one site, with less than 10 stems noted. This species is restricted to thin oak woods on reddish clayey soils above chalky slopes (vegetation type b). It is possible that *M. frondosa* or *M. bushii* should also be considered imperiled in the state; see taxonomic notes above.

*Prenanthes aspera* Michx.

Scattered widely (at least 5/15 grid squares), and locally frequent, with ca. 100–200 stems noted. It is restricted to grassland, typically on moderately deep soils and less often at dry or damp extremes, but perhaps most frequent alongside dirt roads (especially vegetation types e, f, g).

*Solidago rigida* L. var. *rigida*

Widespread (11/15 grid units) and locally common. This is the dominant forb in some of the

better remnants of moderately tall grassland on lower slopes (vegetation types f, g1).

*Solidago speciosa* Nutt. var. *rigidiuscula* Torrey & Gray

Rare, noted at only one site, with ca. 5–10 plants. It is restricted to edges of thin oak woods on reddish clay soils above chalk (vegetation types b, ?f).

*Symphotrichum ericoides* (L.) G.L. Nesom

Occasional (at least 3/15 grid units), with only ca. 10–20 plants noted, but probably overlooked earlier in the season. It is restricted to grassland and brushy edges, especially on clayey soils just above chalky slopes (vegetation types f, ?c1, ?h1).

**Notes on Alien Species.** The 33 clearly alien species, plus the 17 species with adventive or uncertain status, are concentrated in grassland or other non-woody vegetation (Table 1). Among plants largely restricted to full sun (250 taxa), 14.8% are clearly alien (28) or adventive/uncertain (9). Among plants of transitional habitats and deeper woods (198 taxa), only 6.6% are clearly alien (5) or adventive/uncertain (8). There is also some concentration of aliens plus adventives on uplands above the chalk exposures: they comprise 15.2% of typically “upland” taxa versus 8.0% of typically “chalk/lowland” taxa (Table 1). About 13 of all 50 aliens plus adventives are largely restricted to the access roads west of the main study area (coded “nea” in the Appendix). Almost half of the aliens plus adventives are grasses (14) or legumes (9). The composites include only two certain aliens but four with potential adventive status.

There is uncertainty about the native or alien status of some species, as indicated by asterisks at left margin in the Appendix. Among the most frequent of these species, Osage orange (*Maclura pomifera*) has generally been considered adventive from west of the Mississippi River. However, there is recent archaeological and entomological evidence that this tree was present in the Black Belt of Mississippi before European settlement (Brown, 2003; J.L. Seltzer and J.G. Hill, pers. comm.). The silvery bluestem grasses (*Bothriochloa* spp.) may be adventive from south-western regions, but their status remains somewhat unclear (FNA, 2003, Vol.

25; compare Weakley, 2010). They are locally frequent, especially on disturbed soil, and deserve deeper study as potential problems.

The following fourteen aliens are locally frequent at the Pulliam Prairie or present a significant invasive threat for the future. The three species indicated by asterisks (\*) are currently the most common and persistent aliens in more native vegetation at this site.

*Bromus japonicus* Thunb. ex Murr.

This annual Eurasian grass (a ‘cheat’ or ‘chess’ grass) is widespread on disturbed ground and locally abundant, especially in recently plowed areas. It is possible that the closely related European species, *B. commutatus* L., is also present or intergrades with *japonicus*.

*Cynodon dactylon* (L.) Pers.

This creeping perennial grass (Bermuda-grass) from warm regions of Eurasia was found only along the access road into the prairie. It has been widespread and locally problematic in natural areas of southeastern states for over a century, but it does not appear to be a persistent invader of drier native grassland within the Black Belt (Schotz and Barbour, 2009; Campbell and Seymour, 2011a,b).

*Festuca arundinacea* Schreb.

[= *F. elatior* L. var. *arundinacea* (Schreb.) Wimmer; = *Schedonorus phoenix* (Scop.) Holub]

This perennial European grass (tall fescue) is widely scattered at the site and locally frequent, especially on damper disturbed ground at lower levels, just above the woody riparian zones. Tall fescue does not appear to spread significantly into native grassland on drier sites at this site, but Schotz and Barbour (2009) considered it a serious problem in Alabama.

*Imperata cylindrica* (L.) Palisot

This widespread, weedy tropical grass (cogon grass) is near the northern edge of its range in Chickasaw County (FNA 2003, Vol. 25), but climatic warming is expected to push the species further north (Bradley et al., 2009). Only two clonal patches were found, each with diameter of ca. 15–30 ft [5–10 m]. Both patches were in slightly

ponded swales near the edges of areas that have been used for crops within the past decade.

*Lathyrus hirsutus* L.

This annual European vetch is widely scattered at the site, especially on roadsides and old fields. However, it is not common and may not pose a severe threat.

\**Lespedeza cuneata* (Dum.-Cours.) G. Don

This East Asian perennial (sericea lespedeza) is widespread at the site and locally dominant in some old fields, probably spreading from plantings, especially on disturbed ground. It also persists into some young thickets, where light is sufficient, including spaces between red cedar trees (Campbell and Seymour, 2011a,b). *L. cuneata* has been widely planted for reclamation of eroded soils in the region, and it has become a serious problem for restoration of native vegetation.

*Ligustrum sinense* Lour.

This East Asian shrub (Chinese privet) is scattered at the site but not generally common. It is locally frequent in a few areas of riparian woods, especially under sugarberry.

*Lolium perenne* L.

This European grass (perennial rye) has been sown for cover in some plowed areas at Pulliam Prairie, where it has remained locally abundant for a few years. However, it does not seem to persist or to invade native grassland.

\**Lonicera japonica* Thunb.

This woody vine from East Asia (Japanese honeysuckle) is widespread and locally abundant in thickets at Pulliam Prairie, especially in riparian zones. However, it is generally absent from the grasslands here, and burning is well known to keep this species from invading grasslands.

*Melilotus alba* Medik.

This tall European biennial (white sweet clover) became widely sown for hay and forage over a century ago, and it has become a common plant in the Black Belt (Campbell and Seymour, 2011a). It is widely scattered at the site and locally frequent, especially in disturbed areas at upper elevations. Although locally problematic, it does not seem to be a persistent invader of well-established grassland dominated by native species at this site or elsewhere in the Black Belt; see also Schotz and Barbour (2009).

*Paspalum dilatatum* Poir.

This South American perennial grass (Dallis grass) is common along roads near the Pulliam Prairie. It is also scattered within the site, especially in old fields at upper elevations, but it does not seem to be a serious invasive threat within native grassland at this site. It has been widely sown for forage in the Black Belt, and is considered locally problematic for restoration in Alabama (Schotz and Barbour, 2009).

*Torilis arvensis* (Huds.) Link

This European weed (hedge-parsely) is locally frequent in one recently plowed area. It is not clear if the species is increasing at the site or just a temporary problem.

*Setaria pumila* (Poir.) Roem. & Schult. [= *S. glauca* (L.) P. Beauv.]

This weedy annual grass from Europe (yellow foxtail) is widespread at the site, especially on disturbed ground at lower elevations. However, it is generally not abundant, and it does not appear to invade native grassland.

\**Sorghum halepense* (L.) Pers.

This aggressive perennial grass from the Mediterranean region (Johnson grass) is widespread at the site and locally dominant in some formerly plowed areas. It was promoted for forage across the region over a century ago, as reviewed by Campbell and Seymour (2011a).



**Table 1. Approximate division of the flora at Pulliam Prairie into typical habitat classes.**

Each taxon is assigned to one of the eight typical habitat classes below. See Appendix for details; 13 varieties or subspecies are added here to the species but hybrids are excluded. Subsets within grassland, thickets or woods are based on our provisional distinction of vegetation above chalk exposures versus on or below; there is much overlap in composition. Codes in brackets [ ] under “Typical Habitat” refer to those in the Appendix. The species enumerated under “Aliens” include those that may be adventive species from further west or south within North America, or that have uncertain status; numbers for these adventive-or-uncertain subsets are in parentheses. The 57 “rare natives” are listed in Table 2; numbers in parentheses refer to the subsets that appear to be globally rare (GL in Table 2).

Typical Habitat	Total Species	Aliens	Rare Natives
Grassland: obligate, with little or no occurrence in thickets or woods [4/5]	250	37 (9)	37 (10)
Uplands/clay-chalk transitions [A/B]	120	24 (6)	10 (2)
Chalk slopes/lowlands [C/D/E]	130	13 (3)	27 (7)
Grassland: facultative, with some occurrence in thickets or woods [3, herbaceous/low shrubby]	75	1 (0)	11 (3)
Uplands/clay-chalk transitions [A/B]	42	1 (0)	6 (1)
Chalk slopes/lowlands [C/D/E]	33	0 (0)	5 (2)
Thickets and other vegetation between grassland and woodland [3, mostly woody/vining species]	33	7 (6)	1 (1)
Uplands/clay-chalk transitions [A/B]	13	3 (3)	0 (0)
Chalk slopes/lowlands [C/D/E]	20	4 (3)	1 (1)
Woods, with more or less shady interiors but excluding denser thickets [1/2]	90	5 (2)	8 (2)
Uplands/clay-chalk transitions [A/B]	23	2 (1)	0 (0)
Chalk slopes/lowlands [C/D/E]	67	3 (1)	8 (2)
<b>Total</b>	<b>448</b>	<b>50 (17)</b>	<b>57 (15)</b>

**Table 2. Plant taxa (species, subspecies or varieties) of the study area at Pulliam Prairie (PP), including thickets and woods, that appear rare in the whole Black Belt (BB) region.**

BR = estimated rank in BB: 1 = B1; 2 = B2; 3 = B3; 34 = B3S4 (as in Natural Heritage codes).

GR = estimated global rank: 1 = G1; 2 = G2; 3 = G3; 34 = G3G4 (as in NatureServe codes).

These 57 taxa (51 species and 6 extra varieties for the site) are listed as endangered (S1) to “watch-list” (usually S3S4) by Natural Heritage Programs in Alabama or Mississippi, or deserve to be considered for such listing in the region based on our general review (see text).

Question marks after ranks (?) indicate uncertainty. Asterisks (\*) indicate that the species is officially listed for “tracking” or “watch-list” by Mississippi Natural Heritage Program (2006).

Species and Variety Names	BR	GR	Notes on occurrence at Pulliam Prairie; also range, status and name
<i>Agalinis auriculata</i>	12*	23	locally frequent
<i>Agalinis gattingeri</i>	34?		few in drier grassland; only in north part of BB?
<i>Agalinis heterophylla</i>	2?		few seen in low grassland; rare east of Miss. Rv.
<i>Agalinis oligophylla</i>	3?	34	scattered in grassland; includes <i>A. pseudaphylla</i>
<i>Ambrosia psilostachya</i>	3?	3?	locally common in grassland; but perhaps adventive in Atlantic states
<i>Amorpha croceolanata</i>	3?	34?	rare in riparian woods; poorly known taxon of lower Miss. Valley
<i>Andropogon gyrans</i> var. <i>gyrans</i>	34?		scattered in grassland; var. <i>stenophyllus</i> is more southern
<i>Anemone berlandieri</i>	3?*	34	few in grassland and woods; on more calcareous soils than <i>A. caroliniana</i> ?
<i>Campanulastrum americanum</i>	34*		local in riparian woods
<i>Carex annectans</i>	34?		local in damp to dry grassland
<i>Carex crawei</i>	2?		common in dry to damp grassland; see text for details
<i>Carex meadii</i>	34*		common in dry grassland
<i>Carex oxylepis</i>	34?*		common in riparian woods
<i>Carex texensis</i>	34?		thicket in swale
<i>Carya myristiciformis</i>	3?	34	small group in riparian woods; rare except in AR and LA
<i>Comandra umbellata</i>	3?*		one patch in open, near woods
<i>Dasystema macrophylla</i>	34*		scattered in wooded riparian zone
<i>Desmodium sessilifolium</i>	3?		scattered in taller grassland; rare in states east of Miss. Rv.
<i>Dichanthelium linearifolium</i>	3?		locally frequent in dry grassland; almost unknown/overlooked in MS?
<i>Eleocharis compressa</i>	2?		local in grassland swale
<i>Eleocharis erythropoda</i>	3?*		local in grassland swale

<i>Erigeron strigosus</i> var. <i>calcicola</i>	3?	3?	local in drier/eroded grassland; see text for details
<i>Eupatorium altissimum</i>	34?		locally frequent, grassland; rare in SE states east of Miss. Rv.
<i>Festuca paradoxa</i>	34?		common in low thickets/edges; rare in MS, AL, TN?
<i>Glandularia bipinnatifida</i>	34?		local, lower level in baked clay; rare/adventive east of Miss. Rv.?
<i>Glandularia canadensis</i>	34?		local at upper level by woods; rare east of Miss. Rv.?
<i>Helianthus pauciflorus</i>	12?		two localities, dry grass/woods; rare east of Miss. Rv.
<i>Heliopsis gracilis</i>	23?	3	one patch in riparian woods; see notes in text.
<i>Isanthus brachiatus</i>	23?		scattered in drier grassland; rare on SE Coastal Plain
<i>Liatis squarrosa</i> var. <i>glabrata</i>	2?		abundant in dry grassland; disjunct from west of Miss. Rv.
<i>Linum sulcatum</i>	23?*		common in drier grassland
<i>Lithospermum canescens</i>	34?		uncommon in drier grassland; rare on SE Coastal Plain
<i>Muhlenbergia glabriiflora</i>	12?	3	one site in dry oak woodland; wooded flats in Monroe Co.
<i>Muhlenbergia</i> cf. <i>frondosa/bushii</i>	23?		few in drier riparian woods; see text for details
<i>Muhlenbergia sylvatica</i>	3?*		few in wooded riparian zone
<i>Oenothera triloba</i>	3?		patch in low area by bean field
<i>Onosmodium hispidissimum</i> [= <i>molle</i> ssp. <i>h.</i> ]	23		scattered in moister grassland; typical <i>O. molle</i> is unknown in MS
<i>Panicum flexile</i>	34?		locally abundant in grassland; in MS just blackland prairies?
<i>Panicum gattingeri</i>	3?		locally common, especially old fields; almost unknown/overlooked in MS?
<i>Phlox</i> cf. <i>carolina</i> var. <i>carolina</i>	3?		only one site by oak woods; local in blacklands of MS and AL
<i>Polytaenia nuttallii</i>	23*		scattered in grassland; very rare in southeastern states outside BB
<i>Prenanthes aspera</i>	2*	34	locally common in grassland; rare east of Miss. Rv.
<i>Rudbeckia</i> sp. nov. aff. <i>tenax</i>	3?	3?	locally common, low grassland; blackland prairie endemic
<i>Schizachyrium scoparium</i> var. <i>divergens</i>	3?		only one patch noted; taxonomy needs more work
<i>Scirpus pendulus</i>	34?		common in damp grassland
<i>Scleria ciliata</i> var. <i>ciliata</i>	3?		one site on eroded brown clay; rare north of longleaf pine belt

<i>Solidago nitida</i>	23	3	scattered in drier grassland; mostly in west TX and LA.
<i>Solidago rigida</i> var. <i>glabrata</i>	3?	34	local in grassland; see text for details
<i>Solidago rigida</i> var. <i>rigida</i>	2?		common in moister grassland; see text for details
<i>Solidago speciosa</i> var. <i>rigidiuscula</i>	12?		rare/uncommon in grassland; has been confused with typical <i>speciosa</i>
<i>Spiranthes magnicamporum</i>	3*		frequent esp. on/near dirt road
<i>Spiranthes ovalis</i>	34?*		one plant; bitten off by deer
<i>Symphyotrichum ericoides</i>	2*		scattered in drier grassland
<i>Symphyotrichum laeve</i> var. <i>purpuratum</i>	34?	34?	common in grassland; endemic to blackland prairies
<i>Symphyotrichum patens</i> var. nov.	23?	23?	locally common in grassland; see text for details
<i>Tragia urticifolia</i>	34?		few plants in drier grass/woods; confused with <i>T. betonicifolia</i>
<i>Triosteum angustifolium</i>	34*		few, one site in wooded riparian zone

**Table 3. Native plants reported from grasslands of the Black Belt (BB) in Alabama (A) or Mississippi (M), broadly defined, but not found at the Pulliam Prairie (PP) in 2009.**

This list of 87–94 native species excludes those typical of deeper woods or wetlands; question marks at left margin indicate the six species that are adventive or have uncertain status. This is not an exhaustive list; further attention to graminoids is much needed. Most data are from Barone and Hill (2007). For other sources, see first paragraph of Discussion; most general information for the region comes from Schotz and Barbour (2009; = “SB”), USDA (2010), and Kartesz (1999, and updating releases). Species added from the somewhat anomalous site of Schuster and McDaniel (1973) are referenced to “SM” at right. Notes on ranges and habitats are also supported by Weakley (2010). Asterisks (\*) after “A” or “M” indicate species that appear to be rare in the Black Belt of each state (estimated S1, S2 or S3), or perhaps just poorly documented; double asterisks (\*\*) indicate globally rare (estimated G1, G2 or G3).

Species	Comment
<i>Agalinis tenuifolia</i> (Vahl) Raf.	A M: expected on acid soils
<i>Amsonia</i> sp. nov. (aff. <i>rigida</i> Shuttleworth)	AM**: lowlands, often wooded (taxonomic issues)
<i>Anemone caroliniana</i> L.	A* M*: oak woodland on damp acid clays?
<i>Apios priceana</i> B.L. Rob.	AM**: edges of low BB woods (SB)
<i>Arabis georgianus</i> R.M. Harper	A**: thin rocky woods/edges; only AL and GA.
<i>Aristida virgata</i> Trin.	A ?M*: on damp acid soils to south (SB)
<i>Asclepias obovata</i> Ell.	(?A)M**: on sandy soils to south
<i>Asclepias purpurascens</i> L.	A* M*: on lowlands, often wooded
<i>Asclepias verticillata</i> L.	A M: expected, generally on xeric sites
<i>Astragalus canadensis</i> L.	A* M*: thin BB woods on damper soils (SB)
<i>Baptisia leucantha</i> Torr. & Gray = <i>B. alba</i> var. <i>macrophylla</i> (Larisey) Isely	M*: expected on lowlands, often wooded

<i>Bouteloua curtipendula</i> (Michx.) Torr.	A* M*: on xeric sites
<i>Carex albicans</i> Willd. ex Spreng [and related taxa]	A M: expected on dry acid soils, often wooded
<i>Carex brevior</i> (Dewey) Mack. ex Lunnell	M*: expected on damp to dry ground
<i>Carex microdonta</i> Torr. & Hook.	A M: expected on xeric sites to south
<i>Carex pigra</i> Naczi	A M: expected on damp ground, often wooded
<i>Coreopsis</i> cf. <i>grandiflora</i> Hogg ex Sweet	A*: on xeric sites (taxonomic issues)
<i>Coreopsis tripteris</i> L.	A M*: expected locally on more acid soils
<i>Crotalaria rotundifolia</i> Walter	A M: on more sandy soils to south (SB)
<i>Cuscuta pentagona</i> Engelm. and other <i>Cuscuta</i> spp.	A M: curious absence of <i>Cuscuta</i> at PP in 2009
<i>Dalea gattingeri</i> (A. Heller) Barneby	A*: historical records only in BB; xeric sites
<i>Delphinium alabamicum</i> Kral	A***: historical records only in BB; xeric sites
<i>Delphinium carolinianum</i> Walt. ssp. <i>carolinianum</i>	A M: especially on dry sandy soils
<i>Desmodium obtusum</i> (Muhl. ex Willd.) DC	A M: expected on dry sandy soils
<i>Desmodium ochroleucum</i> M.A. Curtis	AM***: usually suppressed in BB woods (SB)
<i>Doellingeria</i> cf. <i>umbellata</i> (P. Mill.) Nees	?A ?M: expected on damp acid soils adjacent to BB
<i>Draba cuneifolia</i> Nutt. ex Torr. & Gray	A* M*: generally on xeric sites
<i>Echinacea pallida</i> (Nutt.) Nutt.	A*: mid-western species; on xeric sites (SB)
<i>Echinacea purpurea</i> (L.) Moench	A* M*: uncertain sight record from PP
<i>Erythrina herbacea</i> L.	A M: expected on sandy soils to south
? <i>Evax proliferata</i> Nutt. ex DC.	A M: perhaps adventive from Great Plains
? <i>Fimbristylis dichotoma</i> (L.) Vahl.	A: glade in pine-oak (SM) (uncertain status/ident.)
? <i>Gaillardia</i> cf. <i>aestivalis</i> (Walt.) H. Rock	A M: perhaps adventive, sandy soils (ident. issues)
<i>Galium virgatum</i> Nutt.	A* M*: expected on xeric sites
<i>Gaura filipes</i> Spach	A M: expected on xeric sites
<i>Gentianella quinquefolia</i> (L.) Small	M*: reported from Monroe Co.
<i>Hedeoma drummondii</i> Benth. [and/or <i>H. hispida</i> Pursh]	A M*: xeric sites; <i>hispida</i> on sandier soils but perhaps adventive (identification issues)
<i>Helenium autumnale</i> L.	A M: expected in damp weedy/grazed areas (SB)
<i>Helianthus angustifolius</i> L.	A M: more acid soils; on roadsides near PP
<i>Helianthus giganteus</i> L.	A* M*: on lowlands; southern edge of range
? <i>Helianthus silphoides</i> Nutt.	A* M*: expected on sandy soils (ident. issues)
<i>Helianthus strumosus</i> L.	A* ?M*: more acid soils (SM) (taxonomic issues)
<i>Houstonia pusilla</i> Schoepf.	A M: expected on more sandy soils
<i>Hypoxis hirsuta</i> (L.) Cov.	A M: common in glade within pine-oak (SM)
<i>Lactuca canadensis</i> L.	A M: weed but curiously uncommon in BB region
<i>Leptoloma cognatum</i> (Schult.) Chase	A* ?M*: glade within pine-oak (SM)
<i>Lindernia dubia</i> (L.) Pennell	A M: expected in ephemeral pools, shorelines
<i>Linum floridanum</i> (Planch.) Trel.	A M: expected on sandy soils
<i>Lobelia appendiculata</i> DC. [sensu lato]	A M*: xeric sites; var. <i>gattingeri</i> (Gray) McVaugh is verified from A but not M
<i>Lobelia puberula</i> Michx.	A M: expected on more acid soils
<i>Mirabilis albida</i> (Walt.) Heimerl	A* M*: expected on sandy soils?
? <i>Monarda citriodora</i> Cerv. ex Lag.	A M: perhaps adventive east of Miss. Rv.
<i>Nemastylis geminifolia</i> Nutt.	A* M*: disjunct in BB from southwest (SB)

<i>Oenothera biennis</i> L.	A M: common weed curiously absent at PP
? <i>Oenothera pilosella</i> Raf.	?A M: perhaps partly adventive east of Miss. Rv.
<i>Oxalis</i> cf. <i>priceae</i> Small	A* M*: expected with red cedar (tax. issues)
<i>Packera</i> cf. <i>paupercula</i> (Michx.) A. & D. Löve	AM**: see Uttal (1983); revision is pending
<i>Panicum rigidulum</i> Bosc ex Nees	A M: expected on marshy acid soils
<i>Penstemon</i> cf. <i>alluviorum</i> Pennell	M: expected on lowlands (taxonomic issues)
<i>Penstemon tenuiflorus</i> Pennell	A M: generally on xeric sites (identification issues)
<i>Penstemon tubiflorus</i> Nutt.	?A M: note other species expected (ident. issues)
<i>Physalis carpenteri</i> Riddell ex Rydb.	A*: expected on sandy soils to south (SB)
<i>Physostegia</i> cf. <i>virginiana</i> (L.) Benth.	A M: see also <i>P. praemorsa</i> Shinnery (tax. issues)
<i>Polygala boykinii</i> Nutt.	A* M: glade within pine-oak (SM)
<i>Polygala grandiflora</i> Walt.	A M: generally on more sandy soils to south
<i>Ponthieva racemosa</i> (Walt.) C. Mohr	A* M*: associated with red cedar thickets
<i>Prenanthes barbata</i> (T. & G.) Milstead	AM**: possible confusion with <i>P. aspera</i>
<i>Pycnanthemum albescens</i> Torr. & Gray	A* M: expected on sandy soils
<i>Pycnanthemum flexuosum</i> (Walt.) BSP	A*: glade in pine-oak (SM) (possible tax. issues)
<i>Rhynchosia tomentosa</i> (L.) Hook. & Am.	A M: expected on dry acid soils
<i>Rhynchospora caduca</i> Ell. and other <i>Rhynchospora</i> spp.	A M: expected on damp acid soils; see also NatureServe (2010; CEG 4664)
<i>Rudbeckia fulgida</i> Ait.	A: glade within pine-oak (SM) (taxonomic issues)
<i>Rudbeckia laciniata</i> L.	A: glade within pine-oak (SM) (taxonomic issues)
<i>Ruellia caroliniensis</i> (J.F. Gmel.) Steud.	A M: expected on more acid soils
<i>Sabatia brachiata</i> Ell.	A M: expected on sandy soils
<i>Salvia azurea</i> Michx. & Lam. var. <i>azurea</i>	A M: expected to south
<i>Schoenolirion croceum</i> (Michx.) Gray	A*: common in glade within pine-oak (SM)
<i>Scirpus cyperinus</i> (L.) Kunth.	A ?M: glade within pine-oak (SM) (ident. issues)
<i>Scleria pauciflora</i> Muhl. ex Willd.	A M: expected on dry acid soils
<i>Silphium asteriscus</i> L.	A ?M: glade within pine-oak (SM) (tax. issues)
<i>Silphium confertifolium</i> Small	AM**: see Leidoff & McDaniel (1999) for ?M (note taxonomic issues; close to <i>S. glabrum</i> )
<i>Silphium perplexum</i> J. Allison	A**: endemic to central AL on chalk (SM)
<i>Solidago odora</i> Ait.	A M: expected on dry acid soils
<i>Solidago puberula</i> Nutt. var. <i>pulverulenta</i> (Nutt.) Chapm.	A: glade within pine-oak (SM) (note identification issues)
<i>Solidago rugosa</i> P. Mill.	A M: expected on damp acid soils
<i>Spiranthes lacera</i> (Raf.) Raf. var. <i>gracilis</i> (Bigelow) Luer	A M: expected on medium acid soils
<i>Sporobolus junceus</i> (P. Beauv.) Kunth	A M: expected on sandy soils (SB)
<i>Strophostyles umbellata</i> (Muhl.) Britton	A M: expected on sandy soils (SB)
<i>Symphyotrichum oblongifolium</i> (Nutt.) Nesom	A M*: on xeric sites
<i>Symphyotrichum pratense</i> (Raf.) Nesom	A* M*: on xeric sites; mostly in LA, TX
<i>Thalictrum debile</i> Buckley	AM**: thin BB woods on damp soils (SB)
<i>Tragia cordata</i> Michx.	A* M*: rare across BB region; often in woods
<i>Vernonia missurica</i> Raf.	M*: reported from Chickasaw Co. near PP
<i>Veronicastrum virginicum</i> (L.) Farw.	A* M*: low areas in taller brush/grass (SB)

## DISCUSSION

**Representation of Native Grassland Flora.** Based on recent field work, Barone and Hill (2007) documented 196 plant species from 19 remnants of Black Belt Prairies in northeastern Mississippi and central Alabama, plus the Jackson Prairies in central Mississippi. Their list included only species typical of grassland, and excluded woody species other than a few small shrubs (*Ceanothus americanus*, *Rosa carolina*) and vines (*Campsis radicans*, *Rubus trivialis*, *Vitis aestivalis*) that often extend into grassland. Of these species, 28 (15%) were clearly alien; 6 (3%) had adventive or uncertain status; and 162 (83%) were clearly native. For the Black Belt Prairies alone, they documented 141 clearly native species. About 90 additional native species (Table 3) have been reported from the Black Belt prairies by Mohr (1901), Lowe (1921), Schuster and McDaniel (1973), Leidoff and McDaniel (1998), Baskin and Baskin (2003), MacDonald et al. (2008), Schotz and Barbour (2009), bringing the total reported species to ca. 220–240, depending on definitions of habitat and native status. The Osborn Prairie is one of the best known remnants and relatively extensive, with ca. 100–200 acres [40–80 ha] of restorable habitat including transitional woods and adjacent rights-of-ways. At least 130 native species have been recorded there (Leidoff and McDaniel, 1998; Hill and Seltzer, 2007; Wiygul et al., 2003).

The Pulliam Prairie overlaps in ecological conditions with other remnants of Black Belt Prairie, such as the Osborn Prairie. However, it has relatively gentle topography, supporting extensive areas of taller grassland with big bluestem (*Andropogon gerardii*) plus scattered gamagrass (*Tripsacum dactyloides*) and other associates on deeper, damper soils. At the Pulliam Prairie alone, we found 325 plant taxa—312 species plus 13 additional varieties or subspecies—that are typically found in grassland. This number includes those largely restricted to full sun (250) plus those frequent in full sun but also extending into some shade (75)—with a classification as similar as possible to the list of Barone and Hill (2007). Of these 325 taxa, only 28 (8.6%) are clearly alien; 11 have uncertain status or may be adventive (from

west or south); and 286 are clearly native (Table 1). Thus it appears that the Pulliam Prairie has the most diverse documented flora of any grassland remnant in the Black Belt, with more native grassland species at this one site than all previously documented sites in Mississippi and Alabama combined: 286–297 compared to ca. 220–240 (from Barone and Hill, 2007; plus those in Table 3). The upper numbers in these ranges include species with adventive or uncertain status.

As noted by Hill and Seltzer (2007) at the Osborn Prairie, repeated field work is needed for full coverage of the flora in these grassland remnants. Many of the additions in our list of 286 native grassland taxa reflect attention to graminoids and other plants that require more intense study for identification. Also, we did include plants typical of adjacent old fields on more acid soils above the chalk (coded A in the Appendix), and those of marshy areas below the chalk (coded E), which may extend the ecological range of previous authors. But such taxa amount to only 35 of our total (28 A + 7 E), and several of them have been recorded in previously published lists from the region's grasslands.

There are about 87–93 native species of grassland or open woodland that are on various published lists from the Black Belt, or inferred from floristic mapping of the region, that were not found at the Pulliam Prairie in 2009 (Table 3). It is likely that several more missing species will be added after deeper floristic review, but mostly from peripheral regions or habitats. Just over a third (ca. 35–40) of these missing species are typical of relatively acid or sandy soil types that have little or no representation in the primary study area at Pulliam Prairie, but that are expected in adjacent landscapes with more oaks and pines, especially to the west. Another 10–15 or so missing species are typical of relatively xeric sites well within the Black Belt, especially on the crests of steeper hills and bluffs, and often associated with more stable red cedar woodland. Slopes of the Pulliam Prairie are relatively gentle except for the eroding gullies, which may have increased after attempts at farming. About 5–10 of the missing species are typical of deeper lowland or wetland soils, with little representation in our study area. Subtracting these

three groups, there are only about 30 undocumented species at the site that are typical of grasslands in the Black Belt on largely calcareous soils, between dry, wet and acid extremes.

The relatively low percentage of aliens in the whole flora of this site is remarkable: 7.4–11.2%, the upper range here including all species with uncertain or adventive status. Most aliens are concentrated in open habitats, and several are largely restricted to access roads. Of the 14 aliens noted above as current or potential problems at the Pulliam Prairie, 8 are shared with the 17 species considered invasive or potentially invasive for the Black Belt prairies in Alabama by Schotz and Barbour (2009, their Table 22). They considered the most serious invaders, which are already disrupting some sites, to be *Festuca arundinacea*, *Imperata cylindrica*, *Paspalum dilatatum*, *P. notatum* (absent at Pulliam Prairie but common along roads in the county), *Rosa bracteata* (absent at Pulliam Prairie and rarely reported from the Black Belt in Mississippi), and *Sorghum halepense*. Curiously, they considered *Lespedeza cuneata* to be only a “potential threat” in Alabama.

**Representation of Woodland Flora; including transitions and mixtures.** Our survey covered all habitats within the Pulliam tract or nearby, including several strips of riparian woods (mostly at lower elevation), disturbance-dependant thickets of rough-leaf dogwood (*Cornus drummondii*), Chickasaw plum (*Prunus angustifolia*) and red cedar on chalky soils (mostly at intermediate elevation), plus varied patches of upland oak woods or associated thickets on more acid clayey soils (mostly at higher elevation). Many species occur in more than one of these habitat types, and several often extend into grassland. But an approximate division of species can be made (under Totals in Table 1) into those typical of riparian woods (67), upland oak woods (23), and thickets of varied composition on (33, on lowlands plus uplands).

The typical species of these three woody habitats total 123, or 27.5% of the total flora for the site (448). Only four of these species are clearly aliens, and another eight have adventive or uncertain status. The total percentage of aliens plus adventives in the flora of wooded habitats (3.3 +

6.5 = 9.8%) is similar to that in grassland (combining obligate and facultative grassland species, 8.0 + 3.4 = 11.4%). But in woody habitats, there is a notable shift away from clearly alien species to those that have more adventive or uncertain status, including the cluster of trees, shrubs and climbers in transitional thickets (Table 1).

A through analysis of woodland flora in the Black Belt region is not attempted here, but there is much complexity to unravel. The ecological conditions in these woods and thickets vary much in relation to geology, topography, soils and disturbance history. In the riparian zones, this variation can be intense at relatively small spatial scales, with several vegetation types dominated by distinct groups of species often present within an acre (Campbell and Seymour, 2011b). Several characteristic species in these riparian zones or along their sunny edges have rather poor documentation, uncertain native status, fragmented ranges or un-settled taxonomy across southeastern states: *Amorpha croceolana*, *Carex aureolensis*, *Carex* cf. *normalis*, *Carya myristiciformis*, *Dichanthelium joorii*, *Heliopsis gracilis*, *Lysimachia* aff. *ciliata* (narrow-leaved segregate), *Maclura pomifera*, *Muhlenbergia* cf. *frondosa/bushii*, *Quercus durandii*, *Rudbeckia* sp. nov., *Silphium glabrum* and *Viola* cf. *missouriensis*.

**Rare or Conservative Species at the Pulliam Prairie.** Pulliam Prairie may contain most of the regionally rare plant species known in Black Belt Prairies and adjacent woodlands (Tables 1–3). At least 70–90 species, subspecies or varieties reported from this landscape appear to be rare in Mississippi or Alabama, including those on informal ‘watch-lists’ or with the S3S4 ranking of Natural Heritage Programs. Suggested additions or changes here to current official listings are based on a general review of Kartesz (1999, and distributed updates), USDA (2010), NatureServe (2010), FNA (1993–2010), Weakley (2010), and on other ongoing synthesis. About 57 of these taxa have been found at Pulliam Prairie, including 11 that are estimated to be endangered (S1) or threatened (S2) in Mississippi (Table 2). Several of these species are also rare globally or have relatively small global ranges (deserving the G3 or G3G4 design-



ation). A few may deserve globally threatened status (G2 or G2G3): e.g. *Agalinis auriculata*, *Rudbeckia* sp. nov., and perhaps *Symphyotrichum patens* var. nov. However, none appear to deserve consideration for globally endangered status (G1 or G1G2).

Given that there are several rare species at the Pulliam Prairie that have little or no previous documentation in the region, it is clearly important for conservation to continue with intensive botanical exploration of this site and other remnants. Moreover, at present it is difficult or impossible to estimate precisely which rare species are truly imperiled, in terms of endangered, declining or threatened populations. Within the list from the Pulliam Prairie, *Agalinis auriculata* appears to be one of the most generally uncommon species in the region and across its range. It has a relatively healthy population at the Pulliam Prairie, although some of the best clusters are growing in or near large patches of the alien *Lespedeza cuneata*. Some species are less critically rare at regional or global levels, but we found less than 10 plants or clonal patches: *Anemone berlandieri*, *Comandra umbellata*, *Heliopsis gracilis*, *Phlox* cf. *carolina*, *Schizachyrium scoparium* var. *divergens*, *Solidago rigida* var. *glabrata*, *Solidago speciosa* var. *rigidiuscula*, *Spiranthes ovalis*, and *Triosteum angustifolium*.

An integrated program is needed for recovery of imperiled species in the region and for deeper exploration of the flora. The Pulliam Prairie could act as an important site for trials. There are several areas where invasive aliens should be reduced, or where the rare natives should be promoted. In addition to continued observations of populations under management for recovery, there should be experimental plantings of selected rare species within restored areas. Ultimately, a center for botanical research in the Black Belt is needed through partnership of conservationists with Mississippi State University, perhaps extending the vision of Sidney McDaniel at his prospective site for a garden near Starkville. The herbarium there (IBE) is an invaluable base for identification and documentation of rare species, greatly extending the more historical collection at the university (MISSA).

Several additional undescribed species of Mississippi undoubtedly exist within his collection.

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## APPENDIX

Following is an annotated list of vascular taxa at Pulliam Prairie, arranged alphabetically by families, generally following Weakley (2010). Varietal names are added based on recent treatments; absence of a varietal name generally implies that only typical plants were found. In brackets, we add brief notes on names, including common synonyms used by McCook and Kartesz (2010) or others; see text above for more explanation in some cases.

At left margin, double asterisks at left margin indicate species that are clearly alien, originating from outside North America. Single asterisks indicate species that may be adventive species from southern or western regions in North America or that have uncertain status.

Collection numbers follow the names and “SC” (R. Seymour & J. Campbell), then codes for frequency and habitat. The 23 “sight” records are partly based on poor or unprocessed collections; those in brackets { } are not counted in the totals for this paper (Table 1).

For frequency: nea = nearby (at paved road parking or along access road but not seen within the main site block); rar = rare (< 5 observations); occ = occasional; sca = scattered; loc = local/locally; wid = widespread; fre = frequent; com = common; abu = abundant; dom = dominant. In parentheses are the numbers of 1000 x 1000 feet [305 x 305 m] grid units where the taxon was recorded; + indicates that the plant probably occurs in several additional grid units but was overlooked.

Final items are codes for habitat, as follows.

Codes for the elevation-related gradient are as follows.

- A = largely restricted to more acid clayey soils on ridges
- B = more frequent on upper slopes and ridges than chalk slopes and below
- C = most frequent on chalky soils between ridges and bottoms
- D = more frequent on lower slopes and bottoms than above
- E = largely restricted to riparian zones and adjacent bottoms
- + indicates that the species has a wide range, more than one class either side of the mode

Codes for the gradient from woodland to grassland are as follows.

- 1 = most frequent in woods with closed canopy
- 2 = most frequent in thin woods and on the inside of edges
- 3 = most frequent in transitions from grassland to woodland, thickets or edges
- 4 = most frequent in grassland with little or no woody cover
- 5 = most frequent on partly bare ground with little or no woody cover
- + indicates that the species has a wide range, more than one class either side of the mode

Xeric/Hydric: see vegetation notes for outline of types

- X = most frequent on distinctly xeric sites; XX = extremely xeric sites
- H = most frequent on distinctly hydric sites; HH = extremely hydric sites
- XH = xerohydric sites; puddling in spring but droughty for most of growing season
- HX = hydroxeric sites; puddling well into the growing season, but often drying out
- Lower case indicates less pronounced or less certain trends.

#### ACANTHACEAE

- Ruellia* cf. *ciliosa* Pursh [see notes in text], SC-107, 288, 289, 340: loc fre (5+); B 3 x
- Ruellia* cf. *humilis* Nutt. [short glabrate form], SC-152, 339: loc (4+); C 4 X
- Ruellia strepens* L., SC-206: loc (3); D 3

#### ADOXACEAE

- Viburnum rufidulum* Raf., SC-257: occ (3); D+ 3

#### AGAVACEAE

- Manfreda virginica* (L.) Salisb. ex Rose, SC-254: loc? (3); C 4 XX

#### ALLIACEAE

- Allium canadense* L. var. *canadense*, SC-012, 162: loc? (<7); D? 4
- Allium canadense* L. var. *mobile* (Regel.) Owenby [= *A. mutabile* Michx.], SC-228: sca-loc fre (7); C 4
- \*\**Allium vineale* L., SC-207: rar? (1); B? 3
- Nothoscordium bivalve* (L.) Britt., SC-007: wid-loc fre (10); B+ 4 x

#### ANACARDIACEAE

- Rhus copallinum* L. var. *latifolia* Engl., SC-284: occ-loc fre (3); A? 3
- Rhus glabra* L., SC-287: occ (2); D? 3
- Toxicodendron* cf. *pubescens* P. Mill., SC-230, 330: occ? (2?); A 2 X

*Toxicodendron radicans* (L.) Kuntze ssp. *pubens* (Engelm. ex S. Wats.) Gillis, SC-183: wid-loc abu (9); D+ 2

#### ANNONACEAE

*Asimina triloba* (L.) Dunal, SC-260: loc? (1); E 2

#### APIACEAE

*Chaerophyllum tainturieri* Hook., SC-028: occ-loc fre (2); D+? 2

*Cryptotaenia canadensis* (L.) DC., SC-132: occ-loc fre? (1+); E 1

\*\**Daucus carota* L., SC-sight: nea (1); B+?? 5

*Eryngium yuccifolium* Michx., SC-105: loc com (4); B+ 4

*Polytaenia nuttallii* DC., SC-038: occ (4); C 4 x

*Ptilimnium capillaceum* (Michx.) Raf., SC-123: occ-loc fre (3); D 4 H

*Sanicula canadensis* L., SC-198, 324, 329: occ? (3+); B+ 3

*Sanicula odorata* (Raf.) K.M. Pryer & L.R. Phillippe [= *S. gregaria* Bickn.], SC-025, 119, 252: sca-loc abu (8+); E 2

\*\**Torilis arvensis* (Huds.) Link, SC-180: occ-loc fre (1?); B+ 5

*Trepocarpus aethusae* Nutt. ex DC., SC-298: occ-loc fre (2); D 3 H

*Zizia aurea* (L.) W.D.J. Koch, SC-042: occ-loc com (1+); D 3

#### APOCYNACEAE

*Apocynum cannabinum* L., SC-188: sca-loc fre? (7); D+ 4

*Trachelospermum difforme* (Walt.) Gray [= *Thyrsanthella difforme* (Walter) Pichon], SC-328: rar-loc fre (1); B+ 3 HX

#### AQUIFOLIACEAE

*Ilex decidua* Walt., SC-049: occ-loc fre? (1); D+ 2 h

#### ARACEAE

*Arisaema dracontium* (L.) Schott, SC-127: rar? (1); E 5

#### ARISTOLOCHIACEAE

*Aristolochia serpentaria* L. [= *Endodeca serpentaria* (L.) Raf.], SC-466: rar (1); E 2

#### ASCLEPIADACEAE

*Asclepias tuberosa* L., SC-093: loc fre (5); D 4

*Asclepias viridiflora* Raf., SC-149: occ (2); C 4 XX

*Asclepias viridis* Walt., SC-008, 212, 268: sca (5); C 4 xh

*Gonolobus suberosus* (L.) R. Brown var. *granulatus* (Scheele) Kriang & Q.Y. Xiang [= *Matelea gonocarpos* (Walt.) Shinnery, sensu lato], SC-130, 268, 294: sca (?); D+ 3

#### ASPARAGACEAE

\*\**Asparagus officinalis* L., SC-405: rar? (1); D? 4

#### ASPLENIACEAE

*Asplenium platyneuron* (L.) B.S.P., SC-214: occ (1+); D 2

#### ASTERACEAE

*Ambrosia artemisiifolia* L., SC-397: sca-loc fre (8); C+ 5

*Ambrosia bidentata* Michx., SC-351: occ (4); D+ 5

*Ambrosia psilostachya* DC. [= *A. rugelii* Rydb.], SC-365: wid-loc com (10); B+ 4

*Ambrosia trifida* L., SC-382: occ-loc fre (5); D 5

*Arnoglossum plantagineum* Raf. [= *Cacalia tuberosa* Nutt.], SC-095, 215: wid-loc fre (9); C? 4

\**Baccharis halimifolia* L., SC-285: nea-loc fre (1); B? 3

*Bidens aristosa* (Michx.) Britt., SC-514: occ (2); B+? 5 h

*Boltonia asteroides* (L.) L'Her. var. *glastifolia* (Hill) Fern., SC-516: nea (1); B+? 5

*Boltonia diffusa* Ell., SC-414: occ (3); B+? 5

*Brickellia eupatorioides* (L.) Shinnery, SC-474: wid-loc fre (12); B? 4 x

*Cirsium discolor* (Muhl. ex Willd.) Spreng., SC-395: sca-loc (6); B+ 4

*Cirsium horridulum* Michx., SC-044: occ (5); B+ 5

\*\**Cirsium vulgare* (Savi) Tenore, SC-325: nea-rar (1); B+ 5  
*Conyza canadensis* (L.) Cronq., SC-275: occ-loc fre (1+); B+ 5

*Coreopsis lanceolata* L., SC-147: occ-loc fre (5); C 4 X

\*\**Crepis pulchra* L., SC-209: nea-occ (1+); A? 5

*Dracopsis amplexicaulis* (Vahl) Cass. [= *Rudbeckia amplexicaulis* Vahl.], SC-128: loc abu (7); D+ 5

*Erechtites hieraciifolia* (L.) Raf. ex DC., SC-462: rar (1); D+ 3

*Erigeron annuus* (L.) Pers., SC-151: occ? (1); D 5

*Erigeron philadelphicus* L., SC-027: occ-loc fre (5); D 2

*Erigeron strigosus* Muhl. ex Willd. var. *calcicola* J. Allison, SC-051: occ-loc fre (3); C 5 XX

*Erigeron strigosus* Muhl. ex Willd. var. *strigosus*, SC-099: wid-loc com (9); B+ 5

*Eupatorium altissimum* L., SC-356: wid-loc fre (12); C 4

*Eupatorium coelestinum* L. [= *Conoclinium coelestinum* (L.) DC.], SC-369: sca (9); D 4 H

*Eupatorium fistulosum* Barratt, SC-sight: rar? (1?); D? 3 H

*Eupatorium hyssopifolium* L. [sensu stricto], SC-411, 452: loc fre (5); A 4 XH

*Eupatorium incarnatum* Walt. [= *Fleischmannia incarnatum* (Walt.) King & H.E. Robins.], SC-sight: rar (1); D? 3

*Eupatorium pubescens* Muhl. ex Willd. [= *E. rotundifolium* L. var. *ovatum* (Bigelow) Torr.], SC-315, 391: occ (4); A 4

*Eupatorium serotinum* Michx., SC-357: wid-loc fre (8); B+ 4 H

*Eupatorium torreyanum* Short & Peter [= *E. hyssopifolium* L. var. *laciniatum* Gray], SC-501: rar? (1); B? 4 xh

- Eurybia hemispherica* (Alexander) Nesom, SC-408: sca-loc com (4); C 4 X
- Euthamia leptoccephala* (Torr. & Gray) Greene, SC-393: sca (6); B+? 4
- Gamochaeta argyrinea* Nesom [segregate of *Gnaphalium purpureum* L.], SC-062: occ (1); B+ 4
- \**Grindelia squarrosa* (Pursh.) Dunal, SC-520: occ-loc fre (2); B+ 4
- \**Helenium amarum* (Raf.) H. Rock, SC-470: rar (1); B+ 5
- Helenium flexuosum* Raf., SC-404: sca-loc fre (8); D+ 4 hx
- Helianthus pauciflorus* Nutt., SC-291a, 292, 389a/SC-291b, 361, 389b/SC-370, 400: loc fre (2); B 4 X
- Helianthus hirsutus* Raf., SC-280, 379, 400: loc fre (6); B 3 X
- Helianthus mollis* Lam., SC-380: occ-loc fre (2); B 4
- Helianthus resinosus* Small [= *H. tomentosus* auct.], SC-370: wid-loc abu (7); D 4
- Heliopsis gracilis* Nutt. [= *H. helianthoides* (L.) var. *gracilis* (Nutt.) Gandhi & R.D. Thomas], SC-538: rar (1); E 2
- Heterotheca camporum* (Greene) Shinnery var. *glandulissimum* Semple, SC-402, 463, 489: occ-loc fre (4); C 4
- Iva annua* L., SC-398: sca-loc abu (7); D 5
- Krigia cespitosa* (Raf.) Chambers [= *K. oppositifolia* Raf.], SC-001: sca (8); B+ 5
- Lactuca floridana* (L.) Gaertn., SC-446: occ (1); E 2
- Liatris aspera* Michx., SC-343: wid-loc abu (12); C 4
- Liatris spicata* (L.) Willd., SC-235: fre-loc com (11); D 4
- Liatris spicata* (L.) Willd. x *squarrosa* (L.) Michx., SC-234: occ (3?); D 4
- Liatris squarrosa* (L.) Michx. var. *glabrata* (Rydb.) Gaiser [see notes in text], SC-232: fre-loc abu (10); C 4 X
- Liatris squarrosa* (L.) Michx. var. *squarrosa*, SC-233: occ (2); A 4 x
- Liatris squarrosula* Michx., SC-413: occ (1); A? 3
- Packera anonyma* (Wood) W.A. Weber & Á. Löve, SC-200: rar? (1); A? 4 x
- Packera glabella* (Poir.) C. Jeffrey, SC-017: sca (5); D 3 h
- Packera obovata* (Muhl. ex Willd.) W.A. Weber & Á. Löve, SC-011: occ-loc com (4); D 2
- Pluchea camphorata* (L.) DC., SC-457: occ (2); E 3 H
- Prenanthes aspera* Michx. [= *Nabalus asper* (Michx.) Hook.], SC-423, 477: sca-loc fre (5); C 4
- Pseudognaphalium obtusifolium* (L.) Hilliard & Burt [ = *Gnaphalium obtusifolium* L.], SC-519: sca? (2); B+ 4
- Pyrrhopappus carolinianus* (Walt.) DC., SC-059, 186: occ (4); B+ 4
- Ratibida pinnata* (Vent.) Barnh., SC-244: fre-loc com (11); C+ 4
- Rudbeckia hirta* L. var. *pulcherrima* Farw. [= *R. serotina* Nutt.], SC-102: wid-loc fre (9); B+ 4
- Rudbeckia* sp. nov. [aff. *R. tenax* C.L. Boynt. & Beadle; see notes in text], SC-390, 427: sca-loc fre (10); D 3 hx
- Sericocarpus linifolius* (L.) B.S.P., SC-217: occ? (1); A? 3 x
- Silphium glabrum* Eggert ex Small [?= *S. trifoliatum* L. var. *latifolium* Gray], SC-464: occ (2); D? 2
- Silphium integrifolium* Michx. [at least tending to var. *laeve* Torr. & Gray], SC-323: occ-loc fre (1+); D 4
- Silphium laciniatum* L. var. *robinsonii* L.M. Perry, SC-250: fre-loc com (11); C 4 x
- Silphium terebinthinaceum* Jacq. [at least tending to var. *luciae-brauniae* Steyermark], SC-352: fre-loc abu (12); D 4 xh
- Solidago altissima* L. [= *S. canadensis* L. var. *scabra* Torr. & Gray], SC-476: wid-loc fre? (11); D+ 4
- Solidago gigantea* Ait., SC-378: sca-loc com (5); D 4 h
- Solidago nemoralis* Ait., SC-392: fre-loc com (9); C 4 X
- Solidago nitida* Torr. & Gray [= *Oligoneuron nitidum* (Torr. & Gray) Small], SC-338, 364: occ (1+); B 4 X
- Solidago rigida* L. var. *glabrata* E.L. Braun [= *Oligoneuron jacksonii* (Kuntze) Small], SC-433: rar? (1+); C 4 x
- Solidago rigida* L. var. *rigida* [= *Oligoneuron rigidum* (L.) Small], SC-350: fre-loc com (11); D 4
- Solidago speciosa* Nutt. var. *rigidiuscula* Torr. & Gray [= *S. rigidiuscula* (Torr. & Gray) Porter], SC-487: rar? (1); B? 3?
- Solidago ulmifolia* Muhl. ex Willd., SC-385: loc (2); D 2
- Symphiotrichum* cf. *undulatum* (L.) G.L. Nesom, SC-sight: nea? (1); A? 2
- \**Symphiotrichum divaricatum* (Nutt.) G.L. Nesom [*Aster subulatum* Michx. var. *ligulatus* Shinnery], SC-515: nea-loc (1); B? 5
- Symphiotrichum dumosum* (L.) G.L. Nesom var. *dumosum*, SC-512, 535: occ (3); A? 4 xh
- Symphiotrichum dumosum* (L.) G.L. Nesom var. *subulifolium* (Torr. & Gray) G.L. Nesom, SC-307, 480, 492, 523: sca-loc com (12); B+? 4 X
- Symphiotrichum ericoides* (L.) G.L. Nesom, SC-517, 540: occ (3); B? 4 xh
- Symphiotrichum laeve* (L.) G.L. Nesom var. *laeve*, SC-484, 526: sca (<8?); B? 3 x
- Symphiotrichum laeve* (L.) G.L. Nesom var. *purpuratum* (Nees) G.L. Nesom, SC-491, 524: loc fre (5+?); C? 4 xh
- Symphiotrichum lateriflorum* (L.) Á. & D. Löve, SC-sight: loc? (1+); D? 2
- Symphiotrichum novae-angliae* (L.) G.L. Nesom, SC-499: sca-loc fre (3); D 4
- Symphiotrichum ontarionis* (Wiegand) G.L. Nesom, SC-sight: occ? (1+); D 3
- Symphiotrichum patens* (Ait.) G.L. Nesom var. nov., SC-482a, 483: loc fre (5); C 4 X
- Symphiotrichum patens* (Ait.) G.L. Nesom var. *patens*, SC-290, 482b: loc fre (2?); A 3 X
- Symphiotrichum pilosum* (Willd.) G.L. Nesom, SC-513: occ (1); B+ 4
- Symphiotrichum praealtum* (Poir.) G.L. Nesom, SC-490, 539: occ-loc fre? (2); D? 4 hx
- Verbesina helianthoides* Michx., SC-115: loc abu (2); B 3 X
- Verbesina virginica* L., SC-445: occ (2); D 3
- Vernonia gigantea* (Walt.) Trel., SC-296: sca (5); D 3

#### BIGNONIACEAE

*Campsis radicans* (L.) Seem. ex Bureau, SC-441: loc (3); E 3

BORAGINACEAE

- Heliotropium tenellum* (Nutt.) Torr., SC-316: occ-loc fre (1); C 5 XX  
*Lithospermum canescens* (Michx.) Lehm., SC-032, 531: occ (2); C 4 X  
*Lithospermum tuberosum* Rugel ex DC., SC-121: occ (1?); D 2  
*Myosotis macrosperma* Engelm., SC-018: occ-loc fre (2); D 2  
*Onosmodium hispidissimum* Mackenzie [= *O. molle* Michx. ssp. *hispidissimum* (MacKenzie) Boevin], SC-041, 387: occ (3+); D 4

BRASSICACEAE

- Cardamine parviflora* L. var. *arenicola* (Britt.) O.E. Schulz, SC-203: rar? (1); A 3 x  
 \*\**Erucastrum gallicum* (Willd.) O.E. Schulz, SC-087: near-rar (1); B? 5

CAMPANULACEAE

- Campanulastrum americanum* (L.) Small, SC-259: loc fre (2); E 2  
*Lobelia spicata* Lam. [much at least tending to var. *leptostachya* (DC.) Mack. & Bush], SC-092, 341: wid-loc fre (7+); C 4 X  
*Triodanis perfoliata* (L.) Nieuwl., SC-sight: pre? (); D? 5?

CAPRIFOLIACEAE

- \*\**Lonicera japonica* Thunb., SC-043: loc abu (6); D+ 2  
*Lonicera sempervirens* L., SC-040: occ (2); D+? 2  
*Symphoricarpos orbiculatus* Moench, SC-sight: loc (1+); D 2  
*Triosteum angustifolium* L. var. *eamesii* Wieg, SC-465: rar (1); D 2

CARYOPHYLLACEAE

- \*\**Cerastium glomeratum* Thuill., SC-052, 075: occ-loc fre? (3); D+ 5

CISTACEAE

- Lechea tenuifolia* Michx., SC-109: rar (1); A? 5 X

CLUSIACEAE

- Hypericum hypericoides* (L.) Crantz [not *H. stragalum* P. Adams & N. Robson], SC-410: occ (2?); A 3 xh  
*Hypericum punctatum* Lam., SC-193: occ (3); D+ 4  
*Hypericum sphaerocarpum* Michx., SC-122: loc fre (5); C 4 XH

CONVOLVULACEAE

- \**Ipomaea hederacea* Jacq., SC-456, 518, 537: occ (3); D+ 3

- Ipomaea lacunosa* L., SC-525: occ (3); D? 3  
*Ipomaea pandurata* (L.) G.F.W. Mey, SC-297: occ? (1); B+ 5

CORNACEAE

- Cornus drummondii* C.A. Mey., SC-046: wid-loc dom (9); C+ 3  
*Cornus florida* L., SC-311: occ (1); D+? 2

CUPRESSACEAE

- Juniperus virginiana* L., SC-143: wid-loc dom (9); C+ 3

CYPERACEAE

- Carex annectens* (Bickn.) Bickn., SC-073: occ-loc com (1); D 4 hx  
*Carex aureolensis* Steud., SC-169: occ-loc fre (4); E 2+ H  
*Carex blanda* Dewey, SC-019: occ-loc com (5); D+ 3+  
*Carex bushii* Mackenzie, SC-036: loc? (1); B? 4 xh  
*Carex caroliniana* Schwein., SC-225: occ-loc fre? (1+); D? 4 hx  
*Carex cherokeensis* Schwein., SC-002: wid-loc abu (10); D+ 3+  
*Carex crawei* Dewey, SC-003: loc com (6); C 4 XH  
*Carex glaucoidea* (Tuckerman ex Olney) Kukenth. [*C. pigra* Naczi also expected], SC-058, 080: occ (2); A? 5 xh  
*Carex granularis* Muhl. ex Willd. [including an unusually robust variant], SC-045, 078: loc abu (7+); D+ 4 HX  
*Carex hirsutella* Mackenzie, SC-069: loc fre (2+); B+ 4 X  
*Carex leavenworthii* Dewey, SC-020, 077: occ? (3+); A? 2 X  
*Carex meadii* Dewey, SC-060: loc fre (1); C 4 X  
*Carex muhlenbergii* Schkuhr ex Willd., SC-158: occ (1+); A? 2 X  
*Carex* cf. *normalis* Mackenzie [see notes in text], SC-068, 070: loc com (3); E 3 H  
*Carex oxylepis* Torr. & Hook., SC-031: occ-loc fre? (4); E 2  
*Carex* cf. *socialis* Mohlenbrock & Schwegman, SC-sight: occ? (1?); E 2 H  
*Carex texensis* (Torr.) Bailey, SC-064: occ (1); B+? 3 xh  
*Carex* cf. *umbellata* Schkuhr ex Willd., SC-035: occ (1); B? 3 X  
*Carex vulpinoidea* Michx., SC-181: occ-loc com (1); D 4 H  
*Cyperus echinatus* (L.) Wood, SC-096: sca-loc fre (3); D+? 4 hx  
*Cyperus pseudovegetus* Steud., SC-176: occ? (1); B? 4 hx  
*Eleocharis compressa* Sullivant, SC-055: loc (1); C? 4 HX  
*Eleocharis erythropoda* Steud., SC-079: occ-loc fre (1); C? 4 HX  
*Eleocharis* cf. *tenuis* (Willd.) J.A. Schultes, SC-sight: near (1?); A? 3 HX  
*Fimbristylis puberula* (Michx.) Vahl, SC-157: occ? (4); C 4 xh  
*Scirpus pendulus* Muhl., SC-024, 164: sca-loc com (7); D+ 4 HX  
*Scleria ciliata* Michx., SC-111: rar-loc fre (1); A? 4 XH  
*Scleria oligantha* Michx., SC-224: loc? (1); D+? 3

*Scleria triglomerata* Michx., SC-083: occ-loc fre (2+); B+?  
3 x

#### EBENACEAE

*Diospyros virginiana* L., SC-251: sca (8); B+ 3+ XH

#### ERICACEAE

*Vaccinium arboreum* Marsh., SC-473, 475: nea (1); A 2 X

#### EUPHORBIACEAE

*Acalypha ostryifolia* Riddell, SC-528: occ (1); D 5

*Acalypha virginica* L., SC-332: occ-loc fre (1); B 5 X

*Chamaesyce maculata* (L.) Small, SC-505: occ-loc fre? (2);  
D 5

*Chamaesyce nutans* (Lag.) Small, SC-342: occ (2); D+? 5

*Croton capitatus* Michx. [cf. var. *lindheimeri* (Engelm. &  
Gray) Müll. Arg.], SC-266: sca-loc fre (5); B? 5 x

*Croton monanthogynus* Michx., SC-306: sca-loc fre (5); C 5  
XX

*Euphorbia corollata* L., SC-163: occ-loc fre (3+); B+ 4

*Euphorbia dentata* Michx., SC-469: occ? (1); B+? 5 x

*Tragia urticifolia* Michx., SC-110: occ (3); B? 3 X

#### FABACEAE (sensu lato)

\*\**Albizia julibrissin* Durazz., SC-sight: nea-occ ((1)); A 2

*Amorpha croceolanata* P.W. Wats. [= *A. fruticosa* L. var.  
*croceolanata* (P.W. Wats.) P.W. Wats. ex Mouille], SC-  
138, 458: rar (2); E 3

*Cercis canadensis* L., SC-247: wid-loc com (11); D+ 3

*Chamaescrista fasciculata* (Michx.) Greene, SC-327: wid-loc  
fre (11); B+ 5

*Clitoria mariana* L., SC-331: occ (1); A? 3

*Crotolaria sagittalis* L., SC-416: rar-loc fre? (1); B? 3 x

*Dalea candida* Michx. ex Willd., SC-229: sca-loc fre (1+); C  
4 X

*Dalea purpurea* Vent., SC-148: wid-loc abu (7); C 4 xh

*Desmanthus illinoensis* (Michx.) MacM. ex B.L. Robbins. &  
Fern., SC-189: wid-loc abu (9); C+ 4 hx

*Desmodium canescens* (L.) DC., SC-407, 447: occ (3); B? 4

*Desmodium ciliare* (Muhl. ex Willd.) DC., SC-384: wid-loc  
fre (7); B+? 4 X

*Desmodium glabellum* (Michx.) DC., SC-364, 394, 439 [ &  
450, perhaps tending to *D. obtusum* (Muhl. ex Willd.)  
DC]: sca-loc fre? (8); B+? 3

*Desmodium laevigatum* (Nutt.) DC., SC-508: nea (1); A 3

*Desmodium marilandicum* (L.) DC., SC-468: occ (1); A? 3 X

*Desmodium paniculatum* (L.) DC., SC-437: loc (2); D? 3

*Desmodium perplexum* Schub. [probably grading into *D.*  
*glabellum* (Michx.) DC.], SC-438: loc (1?); E+ 3

*Desmodium sessilifolium* (Torr.) Torr. & Gray, SC-236: sca-  
loc fre (8); B+ 4

*Galactia regularis* (L.) B.S.P. [= *G. volubilis* auct.,  
misapplied], SC-255, 293: sca-loc com (7); B+ 4

*Gleditsia triacanthos* L., SC-246: sca (6); D 3

\*\**Kummerowia striata* (Thunb.) Schindl. [= *Lespedeza*  
*striata* Thunb.], SC-sight: occ (1+); B+ 5

\*\**Lathyrus hirsutus* L., SC-146: sca (2); B+ 4

*Lespedeza capitata* Michx., SC-371: rar? (1); B? 4 xh

\*\**Lespedeza cuneata* (Dum.-Cours.) G. Don, SC-353: wid-  
loc dom (11); C+ 4+

*Lespedeza intermedia* (S. Wats.) Britt. [= true *L. violacea*  
fide Kartesz (1999), Weakley (2010)], SC-372: occ (2);  
A 3

*Lespedeza procumbens* Michx., SC-417: occ (2); A 3+ X

*Lespedeza violacea* (L.) Pers. [sensu Fernald (1950) and  
most authors in 1950-2000; = *L. frutescens* (L.) Ell.],  
SC-373: occ-loc fre (2); B 2

*Lespedeza virginica* (L.) Britt., SC-363: sca-loc fre (5); B+ 4  
x

\*\**Medicago lupulina* L., SC-050: loc (1); B+ 4

\*\**Melilotus alba* Medikus, SC-150: loc (5); B+ 4

*Neptunia lutea* (Leavenworth) Benth., SC-129: wid-loc com  
(4+); C 5 xh

\**Robinia pseudoacacia* L., SC-312: nea-loc (1); B+? 3

*Senna marilandica* (L.) Link, SC-sight: rar? (1?); D? 3

\**Senna obtusifolia* (L.) Irwin & Barneby [= *S. tora* auct.],  
SC-300: occ-loc com (1+); B+ 5

*Stylosanthes biflora* (L.) B.S.P., SC-112: loc (2); A? 3 x

*Tephrosia virginiana* (L.) Pers., SC-113: occ-loc com (2); A  
3 X

\*\**Vicia sativa* L. ssp. *nigra* (L.) Ehrh. [= *V. angustifolia* L.],  
SC-057: occ (1); B+? 4

#### FAGACEAE

*Quercus falcata* Michx., SC-303: loc-loc com (2); A 1 xh

*Quercus marilandica* Muenchh., SC-305: sca-loc com (7);  
A? 2 X

*Quercus muehlenbergii* Engelm., SC-261: occ-loc fre (4); D  
1

*Quercus nigra* L., SC-276: occ (3); B+ 1 XH

*Quercus* cf. *pagoda* Raf., SC-sight: rar (1); E 1 hx

*Quercus phellos* L., SC-322: loc abu (1+); D+ 1 HX

*Quercus stellata* Wangenh., SC-304: sca-loc dom (6); B+ 1  
XH

#### GENTIANACEAE

*Sabatia angularis* (L.) Pursh, SC-171: wid-loc com (7); B+ 4

#### GERANIACEAE

*Geranium carolinianum* L., SC-084: occ (1+); B+ 5

#### HAMAMELIDACEAE

*Liquidambar styraciflua* L., SC-279: loc (1+); D+ 2 hx

#### IRIDACEAE

*Sisyrinchium albidum* Raf., SC-009: com (10); C 4 x



## JUGLANDACEAE

- Carya glabra* (P. Mill.) Sweet [mixed or grading into *C. caroliniae-septentrionalis* (Ashe) Engl. & Graebn.], SC-286: loc (1); A 1  
*Carya illinoensis* (Wangenh.) K. Koch, SC-262, 459: rar (2); E 1 h  
*Carya myristiciformis* (Michx. f.) Nutt. [suggesting hybrid of *illinoensis* and *ovata*], SC-401: rar (1); E 1 hx  
*Carya ovata* (P. Mill.) K. Koch, SC-sight: nea-loc fre (1); B? 1  
*Carya tomentosa* (Lam. ex Poir.) Nutt., SC-sight: nea? (1); A 1 xh  
*Juglans nigra* L., SC-443: occ-loc fre (2); E 3

## JUNCACEAE

- Juncus acuminatus* Michx., SC-154: loc fre (4); B? 4 H  
*Juncus biflorus* Ell., SC-097: loc fre (6); B? 4 H  
*Juncus dichotomus* Ell., SC-167, 218, 219: occ-loc fre (2); D? 4 hx  
*Juncus effusus* L. var. *solutus* Fern. & Wiegand, SC-199: rar? (1); A? 4 H  
*Juncus scirpioides* Lam., SC-173: loc (2); A 4 hx  
*Juncus tenuis* Willd., SC-054, 076: sca-loc fre (3?); D+ 3  
*Juncus torreyi* Coville, SC-155: wid-loc com (6); D+ 4 HX

## LAMIACEAE

- Blephilia ciliata* (L.) Benth., SC-090: wid-loc fre (8); C 4  
*Callicarpa americana* L., SC-309: occ (2); A 2  
*Isanthus brachiatus* (L.) B.S.P. [= *Trichostema brachiatum* L.], SC-267, 428: occ-loc fre (2); C 5 XX  
*Lycopus americanus* Muhl. ex W. Bart, SC-227, 412: occ (2?); E 4 H  
*Monarda fistulosa* L. var. *mollis* (L.) Benth., SC-202: loc (2+); D? 4  
*Physostegia angustifolia* Fern., SC-141: loc fre (5); C+ 4 hx  
*Prunella vulgaris* L. var. *lanceolata* (W. Bart.) Fern., SC-053: sca (4); B+ 3  
*Pycnanthemum tenuifolium* Schrad., SC-103: loc fre (4); B+ 4 XH  
*Salvia lyrata* L., SC-006: sca-loc fre (10); B+? 3  
*Scutellaria parvula* Michx. var. *australis* Fassett [= *S. australis* (Fassett) Epling], SC-010: occ-loc fre (3); C 4 x  
*Trichostema dichotomum* L., SC-507: nea (1); A 5 x

## LINACEAE

- Linum medium* (Planch.) Britt. var. *texanum* (Planch.) Fern., SC-106: sca-loc fre (4+); B+ 4 xh  
*Linum sulcatum* Riddell, SC-226: occ-loc fre (1+); C 5 xh

## LOGANIACEAE

- Spigelia marilandica* (L.) L., SC-125: rar? (1); D? 2

## LYTHRACEAE

- Lythrum alatum* Pursh var. *lanceolatum* (Ell.) Torr. & Gray ex Rothrock [= *L. lanceolatum* Ell.], SC-238: wid-loc dom (11); D 4 HX

## MALVACEAE

- Sida spinosa* L., SC-440: occ? (1); B+ 5

## MENISPERMACEAE

- Cocculus carolinus* (L.) DC., SC-302: sca (1+); B+ 3

## MORACEAE

- \**Maclura pomifera* (Raf.) Schneid., SC-243: occ-loc com (6); D+ 3  
*Morus rubra* L., SC-081: rar (1+); D 2

## OLEACEAE

- Fraxinus pennsylvanica* Marsh. [all may be var. *subintegerrima* (Vahl.) Fern.], SC-241: wid-loc abu (8); E 2 H  
*Fraxinus* cf. *smallii* Beadle [or mixed with *F. americana* L. sensu stricto; see notes in text], SC-278: occ (1+); D+ 1  
\*\**Ligustrum sinense* Lour., SC-179: occ-loc fre? (2); D+ 2

## ONAGRACEAE

- Gaura longiflora* Spach, SC-381, 396, 409, 435, 451: sca-loc fre (7+); D+ 4 hx  
*Oenothera speciosa* Nutt., SC-170: occ (3); B+ 5  
*Oenothera triloba* Nutt., SC-326: rar (1); D? 5 xh

## OPHIOGLOSSACEAE

- Botrychium virginianum* (L.) Sw., SC-072: occ (1); D 1

## ORCHIDACEAE

- Spiranthes magnicamporum* Sheviak, SC-535: occ-loc fre (2+); C 4 XH  
*Spiranthes ovalis* Lindl. [probably var. *ovalis*], SC-504: rar (2); C+? 3  
*Spiranthes vernalis* Engelm. & Gray, SC-216: occ (2); B+? 4 hx

## OROBANCHACEAE

- Agalinis auriculata* (Michx.) Blake [= *Tomanthera auriculata* (Michx.) Raf.], SC-368, 448: occ-loc fre (5); D 4  
*Agalinis* cf. *fasciculata* (Ell.) Raf. [or just transitions to *purpurea*], SC-444: occ? (2?); B? 4 xh  
*Agalinis gattingeri* (Small) Small ex Britt., SC-545: occ (1+); C? 4 X

*Agalinis heterophylla* (Nutt.) Small ex. Britt., SC-533: rar? (1); D? 4  
*Agalinis oligophylla* Pennell, SC-448: occ-loc fre? (6+); C? 4 x  
*Agalinis purpurea* (L.) Pennell, SC-510: wid-loc fre (11); D+? 4 hx  
*Buchnera americana* L., SC-126: wid-loc fre (9); B+ 4 x  
*Dasistoma macrophylla* (Nutt.) Raf., SC-265, 425: occ (4?); D 2  
*Mecardonia acuminata* (Walt.) Small, SC-506: occ (2); B+ 4 HX

#### OXALIDACEAE

*Oxalis dillenii* Jacq., SC-034, 074: occ (3); D+? 5  
*Oxalis violacea* L., SC-037, 454: occ-loc com (3); B+? 3+ x

#### PASSIFLORACEAE

*Passiflora incarnata* L., SC-242: occ (3); D+ 3

#### PINACEAE

\**Pinus taeda* L., SC-240: sca-loc abu (8); A 2

#### PLANTAGINACEAE (= Veronicaceae)

*Leucospora multifida* (Michx.) Nutt., SC-319: occ-loc fre (1+); D+ 5  
*Penstemon cf. laevigatus* Ait., SC-273: rar (1); B? 3  
*Plantago aristata* Michx., SC-160: loc (3); A? 5 X  
\*\**Plantago lanceolata* L., SC-223: nea-loc (1+); B+? 5  
*Plantago rugelii* Dcne., SC-442: occ (1); E 2  
*Plantago virginica* L., SC-014: occ-loc fre (6); B+ 4 x  
\*\**Veronica arvensis* L., SC-085: nea (1); B+ 5

#### PLATANACEAE

*Platanus occidentalis* L., SC-308: sca (1+); E 2 h

#### POACEAE

*Agrostis hyemalis* (Walt.) B.S.P., SC-088: occ-loc com (1+); A? 5 X  
*Andropogon gerardii* Vitman, SC-362: wid-loc dom (11); D 4  
*Andropogon gyrans* Ashe var. *gyrans*, SC-461, 498, 502: occ? (3?); B? 4 x  
*Andropogon tenuispathus* (Nash) Nash [= *A. glomeratus* (Walt.) B.S.P. var. *pumilus* (Vasey) L.H. Dewey], SC-406, 543: sca-loc com (7); D 4 hx  
*Andropogon virginicus* L. var. *decipiens* C. Campbell, SC-486, 541, 542, 543: sca-loc abu (7); B+ 4 hx  
*Aristida longespica* Poir. var. *geniculata* (Raf.) Fern., SC-429, 511: sca-loc fre (4+); C+ 5 X  
*Aristida longespica* Poir. var. *longespica*, SC-375, 399, 494, 500: sca-loc fre (4+); C+ 5 X  
*Aristida oligantha* Michx., SC-348: occ-loc fre (5); B+ 5 X

*Aristida purpurascens* Poir., SC-366: rar (1); B? 4 X  
\**Bothriochloa ischaemum* (L.) Keng var. *songarica* (Ruprecht ex Fischer & C.A. Meyer) Celarier & Harlan, SC-118: sca-loc fre (2+); B+? 5  
\**Bothriochloa laguroides* (DC.) ssp. *torreyana* (Steud.) Allred & Gould [= *Andropogon saccharoides* auct.], SC-503: occ (2); C+? 5  
\*\**Bromus japonicus* Thunb. ex Murr., SC-131: loc abu (7); D+ 5  
*Bromus pubescens* Muhl. ex Willd., SC-140: occ (1); E 2  
*Chasmanthium latifolium* (Michx.) Yates, SC-253: loc com (9); E 2  
*Chasmanthium sessilifolium* (Poir.) Yates, SC-258: rar (1); D? 2 xh  
*Cinna arundinacea* L., SC-434: occ (2); E 2 H  
\*\**Cynodon dactylon* (L.) Pers., SC-314: nea-loc (1); B+? 5  
\*\**Dactylis glomerata* L., SC-270: occ (2); D+? 4  
*Danthonia spicata* (L.) Beauv. ex Roemer & J.A. Schultes, SC-205: occ-loc fre? (1+); A 2 X  
*Dichantherium acuminatum* (Sw.) Gould & C.A. Clark var. *acuminatum*, SC-169a, 219b, 231: sca? (2+); D+? 4 xh  
*Dichantherium acuminatum* (Sw.) Gould & C.A. Clark var. *fasciculatum* (Tuck.) Freckmann, SC-094: sca-loc fre (2+); B+? 4  
*Dichantherium cf. meridionale* (Ashe) Freckmann [perhaps grading into *acuminatum*], SC-213: sca? (2?); B? 3  
*Dichantherium dichotomum* (L.) Gould [sensu stricto], SC-219c: occ-loc fre (4); A 2  
*Dichantherium jorii* (Vasey) Mohlenbrock [= *D. commutatum* (Schultes) Gould ssp. *joorii* (Vasey) Freckmann & Lelong], SC-142: occ (1?); E 1  
*Dichantherium laxiflorum* (Lam.) Gould, SC-436: occ (1?); B? 3  
*Dichantherium linearifolium* (Scribn. ex Nash) Gould, SC-066: rar-loc fre? (1?); B+? 3 X  
*Dichantherium longiligulatum* (Nash) Freckmann, SC-175, 219a: occ? (2?); B+? 4 HX  
*Dichantherium microcarpon* (Muhl. ex Ell.) Mohlenbrock, SC-104: loc fre? (1+); B+? 3 H  
*Dichantherium oligosanthos* (J.A. Schultes) Gould var. *scribnerianum* (Nash) Gould, SC-061, 211: sca-loc fre? (2+); C 4 x  
*Dichantherium scoparium* (Lam.) Gould, SC-222: occ-loc fre (1); A 4 HX  
*Dichantherium sphaerocarpon* (Ell.) Gould, SC-168, 317: loc fre (2); A 3 X  
*Digitaria ciliaris* (Retz.) Koel., SC-467: rar? (1); B+? 5  
\*\**Digitaria ischaemum* (Schreb.) Schreb. ex Muhl., SC-999: rar? (1); D+? 5  
\**Digitaria violascens* Link, SC-318: rar? (1); A+? 5 X  
*Elymus glabriflorus* (Vasey) Scribn. & Ball [= *E. virginicus* L. var. *glabriflorus* (Vasey) Bush], SC-185: sca-loc com (5); D 3  
*Elymus virginicus* L. [sensu stricto], SC-174: loc abu (6); E 2  
*Eragrostis capillaris* (L.) Nees, SC-347: occ (2); D+? 5  
*Eragrostis hirsuta* (Michx.) Nees, SC-117: occ? (1+); B+? 4 X  
*Eragrostis pilosa* (L.) Beauv., SC-422: occ? (2); B+? 5 x

- Eragrostis spectabilis* (Pursh) Steud., SC-421: occ (2); D+? 4  
 \*\**Festuca arundinacea* Schreb. [= *Schedonorus arundinaceus* (Schreb.) Dumort.], SC-101: sca-loc fre? (6); D+? 4  
*Festuca paradoxa* Desv., SC-139: loc com (6); D 3  
*Festuca subverticillata* (Pers.) Alexeev, SC-sight: loc com (1+); E 2  
*Glyceria striata* (Lam.) A.S. Hitchc., SC-177: occ-loc fre (2); E 2 H  
*Gymnopogon ambiguus* (Michx.) B.S.P., SC-495: rar-loc fre (1); A 4 XH  
 \**Hordeum pusillum* Nutt., SC-204: occ (3); C+? 5 X  
 \*\**Imperata cylindrica* (L.) Palisot, SC-334, 522: occ (2); B? 4  
*Leersia virginica* Willd., SC-249: occ-loc fre (3); E 2  
*Leptochloa panicea* (Retz.) Ohwi ssp. *brachiata* (Steudl.) N. Snow [= *L. filiformis* (Lam.) Beauv.], SC-532: rar? (1); D+ 5  
 \*\**Lolium perenne* L., SC-190: occ-loc com (4); B+ 5  
*Muhlenbergia capillaris* (Lam.) Trin., SC-495: occ (4); B? 4 x  
*Muhlenbergia* cf. *frondosa* (Poir.) Fern. [or perhaps *M. bushii* R.W. Pohl], SC-337: occ? (1); D? 2  
*Muhlenbergia glabriflora* Scribn., SC-336: rar? (1); B? 3 xh  
*Muhlenbergia sylvatica* (Torr.) Torr. ex Gray, SC-530: rar? (1); E 1  
*Panicum anceps* Michx. var. *anceps*, SC-359: wid (12); B+ 4  
*Panicum anceps* Michx. var. *rhizomatum* (Hitchc. & Chase) Fern., SC-237: loc (6); B+? 3 hx  
*Panicum capillare* L., SC-281, 426: occ (3); D+ 5  
*Panicum flexile* (Gattinger) Scribn., SC-320, 376: sca-loc abu (9?); C+ 5 X  
*Panicum gattingeri* Nash, SC-172, 299, 346: sca (9?); B+? 5  
*Panicum virgatum* L., SC-358, 360: wid-loc fre (12); C+ 4 xh  
 \*\**Paspalum dilatatum* Poir., SC-116, 354: occ (3); B+ 5  
*Paspalum floridanum* Michx. var. *floridanum*, SC-430: occ-loc fre? (??); B+? 4  
*Paspalum floridanum* Michx. var. *glabratum* Engelm. ex Vasey, SC-355: sca-loc fre? (5); D+? 4  
*Paspalum laeve* Michx. var. *circularis* (Nash) Stone, SC-432: occ (1+); D+? 4  
*Paspalum laeve* Michx. var. *laeve*, SC-239: occ (1+); B+? 4  
*Phalaris caroliniana* Walt. [including depauperate form with spike ca. 1 cm long], SC-065: loc (1+); B+? 5  
*Poa autumnalis* Muhl. ex Ell., SC-030, 182: occ-loc fre? (2); D 2  
*Saccharum brevibarbe* (Michx.) Pers. var. *contortum* (Ell.) R. Webster [= *Erianthus contortus* Ell.], SC-472: loc? (1+); B? 4 xh  
*Saccharum giganteum* (Walt.) Pers. [= *Erianthus giganteus* (Walt.) Beauv.], SC-509: loc fre (5); D+? 4 hx  
*Schizachyrium scoparium* (Michx.) Nash var. *divergens* (Hack.) Gould, SC-460: rar (1); B? 4 X  
*Schizachyrium scoparium* (Michx.) Nash var. *scoparium*, SC-344: com-loc dom (12); C 4 X  
*Setaria parviflora* (Poir.) Kerguelen [= *S. geniculata* auct.], SC-091: sca-loc fre (3); B+ 4  
 \*\**Setaria pumila* (Poir.) Roemer & J.A. Schultes [= *S. glauca* auct.], SC-345: wid (9); D+ 5  
*Sorghastrum nutans* (L.) Nash, SC-481: wid-loc com (12); B+ 4  
 \*\**Sorghum halepense* (L.) Pers., SC-100: wid-loc abu (9); D+ 4  
*Sphenopholis intermedia* (Rydb.) Rydb., SC-029, 063: loc abu (6); D 2  
*Sphenopholis obtusata* (Michx.) Scribn., SC-056, 067, 098: loc com (2+); C+ 4 xh  
*Sporobolus clandestinus* (Biehler) A.S. Hitchc., SC-471, 485: sca-loc fre? (1+); B 4 X  
*Sporobolus compositus* (Poir.) Merr. var. *drummondii* (Trin.) Kartesz & Gandhi [= *Sporobolus asper* (Michx.) Kunth var. *drummondii* (Trin.) Vasey], SC-488: wid-loc abu (12?); C 4 xh  
*Sporobolus vaginiflorus* (Torr. ex Gray) Wood, SC-349: fre-loc abu (8); C 5 XH  
*Tridens flavus* (L.) A.S. Hitchc., SC-245: occ (1); D 4  
*Tridens strictus* (Nutt.) Nash, SC-497: loc (3); B? 4 hx  
*Tripsacum dactyloides* (L.) L., SC-208: occ-loc fre (3?); D+ 4 HX
- POLEMONIACEAE
- Phlox* cf. *carolina* L. var. *carolina* [or transition to *P. pilosa*], SC-201: occ (1); A? 3 xh  
*Phlox pilosa* L. [probably var. *pilosa*], SC-089: occ (1); B? 4 x
- POLYGALACEAE
- Polygala verticillata* L. [sensu stricto], SC-159: occ-loc fre (2); B? 5 X
- POLYPODIACEAE
- Pleioptelis polypodioides* (L.) Andrews & Windham var. *michauxiana* (Weathery) Andrews & Windham [= *Polypodium polypodioides* (L.) Watt], SC-015: rar (1); B+ 2
- POTAMOGETONACEAE
- Potamogeton diversifolius* Raf., SC-220: rar (1); B 3 HH
- PRIMULACEAE (sensu lato)
- Lysimachia* aff. *ciliata* L. [but dentate-fimbriate petals, narrow cuneate leaves; see notes in text], SC-192: rar (1); E 2  
*Samolus floribundus* Kunth, SC-166: rar (1); E 2
- RANUNCULACEAE
- Anemone berlandieri* Pritz., SC-071: rar (2); C? 3 xh  
*Anemone virginiana* L., SC-388: rar (1); E 2

*Ranunculus fascicularis* Muhl. ex Bigelow, *SC-023*: occ (2);  
C+? 3 X  
\*\**Ranunculus sardous* Crantz, *SC-033*: occ (3); D+ 5

#### RHAMNACEAE

*Berchemia scandens* (Hill) K. Koch, *SC-144*: wid-loc abu  
(8); D+ 2  
*Ceanothus americanus* L., *SC-114*: occ (3); B? 3 X  
*Frangula caroliniana* (Walter) Gray [= *Rhamnus caroliniana*  
Walt.], *SC-196*: occ (1+); D? 3

#### ROSACEAE

*Crataegus crus-galli* L. [probably var. *pyracanthifolia* Ait.],  
*SC-282*: rar (2); D+? 3  
*Crataegus engelmannii* Sarg. [= *C. berberifolia* Torr. & Gray  
var. *engelmannii* (Sarg.) Egglest.], *SC-269*, 420: rar (2);  
B+? 3 X  
*Fragaria virginiana* Duschesne, *SC-013*: sca-loc fre (8); B+5  
*Geum canadense* Jacq., *SC-165*, 0198b: occ (2?); D+ 3  
*Potentilla simplex* Michx., *SC-178*: occ? (1); B? 3  
*Prunus angustifolia* Marsh., *SC-047*: occ-loc abu (5); B+ 3  
*Prunus serotina* Ehrh., *SC-313*: sca (1+); D+ 2  
*Rosa carolina* L., *SC-sight*: occ (2); A 3 X  
\*\**Rosa multiflora* Thunb. ex Murr., *SC-086*: rar (1); D 3  
*Rubus* cf. *argutus* Link, *SC-sight*: nea (1?); B+? 3  
*Rubus* cf. *flagellaris* Willd., *SC-210*, 301: loc? (1); B+? 3 xh  
\**Rubus* cf. *serissimus* Bailey [= *R. bicolor* auct., see notes in  
text], *SC-161*: nea (1); A+? 3  
*Rubus trivialis* Michx., *SC-016*: wid-loc fre (10); B+ 3

#### RUBIACEAE

*Diodia teres* Walt., *SC-453*: rar? (1); B+ 5 XH  
\**Galium aparine* L., *SC-026*: occ (2); D 2  
*Galium circaezans* Michx., *SC-124*: sca (3); D 1  
*Galium pilosum* Ait., *SC-321*: rar (1); B? 3 xh  
*Houstonia lanceolata* (Poir.) Britt. [= *Houstonia purpurea* L.  
var. *calycosa* Gray], *SC-005*: wid-loc fre (9); C 4 X  
*Houstonia nigricans* (Lam.) Fern. [= *Hedyotis nigricans*  
(Lam.) A.S. Hitchc.], *SC-272*: loc fre (3); C 5 XX  
*Spermacoce glabra* Michx., *SC-187*: occ? (1); D? 5? h

#### SALICACEAE

*Populus deltoides* Bartr. ex Marsh., *SC-256*: occ (1); E 2  
*Salix nigra* Marsh., *SC-283*: rar (1); E 2 H

#### SANTALACEAE

*Comandra umbellata* (L.) Nutt., *SC-527*: loc fre (1); C+? 3

#### SAPINDACEAE

\**Cardiospermum halicacabum* L., *SC-403*: rar (1); D 3 h

#### SAPOTACEAE

*Sideroxylon lycioides* L. [= *Bumelia lycioides* (L.) Pers.], *SC-271*, 310: occ (1+); C+ 3

#### SMILACACEAE

*Smilax bona-nox* L., *SC-263*, 455: fre (9); B+ 3  
*Smilax hispida* Muhl. ex Torr., *SC-264*: occ (3); E 2  
[*Smilax lasioneura* Hook., added in press: rar (1); E 2]  
*Smilax rotundifolia* L., *SC-sight*: loc (1); A 2

#### SOLANACEAE

*Physalis angulata* L., *SC-529*: rar? (1); D 5  
*Physalis longifolia* Nutt. var. *subglabrata* (Mackenzie &  
Bush) Cronq. [= *Physalis subglabrata* MacKenzie &  
Bush], *SC-197*, 333: sca (2+); D+ 4  
*Physalis virginiana* P. Mill., *SC-194*: sca (4); B+ 4 X  
*Solanum carolinense* L., *SC-153*: occ (5); B+ 5

#### ULMACEAE (sensu lato)

*Celtis laevigata* Willd., *SC-248*: loc abu (9); E 2 h  
*Ulmus alata* Michx., *SC-274*: loc com (3); B+ 1 X  
*Ulmus americana* L., *SC-277*: occ (4); E 1 H  
*Ulmus rubra* Muhl., *SC-145*: occ (1); D 1

#### VALERIANACEAE

*Valerianella radiata* (L.) Dufur., *SC-004*, 021: loc com (9);  
C+ 3+ hx

#### VERBENACEAE

\**Glandularia bipinnatifida* (Nutt.) Nutt., *SC-048*: rar-loc fre  
(1); D? 4  
*Glandularia canadensis* (L.) Nutt., *SC-383*: rar? (1); B? 4  
*Phyla lanceolata* (Michx.) Greene, *SC-295*: rar (1); E 5 h  
\*\**Verbena brasiliensis* Vell., *SC-415*: nea-occ (1); B? 4  
*Verbena simplex* Lehm., *SC-120*: sca-loc fre (6+); B+ 5 x  
*Verbena urticifolia* L., *SC-sight*: occ (1); D? 3

#### VIOLACEAE

*Viola* cf. *missouriensis* Greene [see notes in text], *SC-022*:  
loc com (6); D 2 hx

#### VITACEAE

*Ampelopsis arborea* (L.) Koehne, *SC-137*: loc fre (4); D+ 3  
hx  
*Ampelopsis cordata* Michx., *SC-136*: loc (3); E 3  
*Parthenocissus quinquefolia* (L.) Planch., *sight*: loc (1); E 2  
*Vitis aestivalis* Michx., *SC-082*, 133: occ (3+); B+ 3  
*Vitis cinerea* (Engelm.) Millard, *SC-195*: occ (2); E+ 3 hx  
*Vitis palmata* Vahl., *SC-134*: rar (1); E 3 h  
*Vitis rotundifolia* Michx., *SC-419*: nea (1); A 2  
*Vitis vulpina* L., *SC-135*: occ-loc fre (1); D 3