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VASCULAR FLORA OF THE SHOAL CREEK PRESERVE FOREVER WILD TRACT, LAUDERDALE COUNTY, ALABAMA

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ABSTRACT

The Shoal Creek Preserve Forever Wild Tract (SCPFWT) is a 123 ha property acquired by Alabama's Forever Wild Land Program on February 26, 2003. The SCPFWT lies 13 km north-northeast of Florence, Alabama, 46 km southeast of Lawrenceburg, Tennessee, and is bordered for a short distance on the east by Shoal Creek. The site is managed by the Alabama Department of Conservation and Natural Resources for habitat conservation, outdoor recreation, and education. An intensive floristic study of this area was conducted from May 2009 through May 2011 and less frequently through June 2015. A total of 519 taxa from 346 genera and 121 families were collected, with 217 taxa representing county records. Asteraceae was the most collected family, with 69 species; Poaceae, Fabaceae, and Cyperaceae were the next largest families with 38, 29, and 17 species, respectively. *Carex* was the largest genus represented with 11 species. 71 non-native taxa were collected during the surveys. 42 percent of the total collections were county records and 37 exotic taxa collected during this survey were county records. Plant collections were deposited at the Alabama Natural Heritage Section Herbarium (ALNHS) with duplicates and replicates distributed to Anniston Museum of Natural History (AMAL), Jacksonville State University Herbarium (JSU), University of Alabama Herbarium (UNA), and Auburn University Herbarium (AUA).

The Forever Wild Program was established in 1992 by an Alabama constitutional amendment (Satterfield & Waddell 1993) to provide a mechanism for purchasing land from willing landowners for public recreation and conservation of vital habitat. Since its inception, the Forever Wild Program, managed by the Alabama Department of Conservation and Natural Resources (ALDCNR), has purchased more than 100,400 ha (approximately 248,100 acres) of land for general recreation, nature preserves, additions to wildlife management areas, and state parks. For each Forever Wild tract purchased, a management plan providing guidelines and recommendations for the tract must be in place within a year of acquisition. The 123 ha Shoal Creek Preserve Forever Wild Tract (SCPFWT) was acquired on February 26, 2003, in part, through a Land and Water Conservation Fund grant awarded by the Alabama Department of Economics and Community Affairs, as well as financial and in-kind contributions from the City of Florence and Lauderdale County. The SCPFWT is managed by the ALDCNR for habitat conservation, outdoor recreation, and education. This study represents the first systematic inventory of the vascular flora for the tract. The goal of this study was to perform an exhaustive survey of the tract and establish a baseline of the area's biodiversity while recording all vascular plant species and concomitantly documenting county records, introduced plants, and rare species.

STUDY AREA

The 123 ha SCPFWT is located between 34.906-34.922°N and 87.624-87.610°W in rural, central Lauderdale County, AL. The tract lies east of Lauderdale County Road 61 and west of Shoal Creek, which forms an approximately 300 m portion of the eastern boundary. Indiancamp Creek serves as the northeastern boundary of the SCPFWT and the southeastern boundary is delineated primarily by Jones Branch, both streams being tributaries of Shoal Creek (Figure 1).

The SCPFWT lies within the Western Highland Rim Level IV Ecoregion of the Interior Plateau physiographic province and is characterized by irregular plains dissected by gently to steeply sloped hills (Griffith et al. 2001). Elevation on the tract ranges from 156 m to approximately 204 m above sea level. The ultisol soils of the tract are predominated (70%) by mixed, mesophytic hardwood forests with interspersed pines (*Pinus spp.*) and eastern red-cedar (*Juniperus virginiana* L.) along the higher and somewhat drier hilltops. The remaining habitat composition of the tract is composed of fallow fields and ruderal areas (15%), floodplain forests/creek bottoms (10%), and limestone outcroppings (5%) found primarily along the streams. The climate for the area averages a July and August high of 33° C and a January low of -1° C; rainfall for the area is approximately 135 cm (53 inches) per year with December typically being the wettest month and August being the driest (weather.com 2015). The area averages 210 frost-free days per year (Griffith et al. 2001).

The town of St. Florian, formerly known as Wilson Stand, is the closest municipality to SCPFWT and was historically part of a large plantation owned by John and Matthew Wilson. The plantation was purchased by J.H. Heuser, who then sold parcels to German Catholics under the articles of the German Catholic Homestead Association of Cincinnati (Foscue 1989). Land use during the Wilson brothers and subsequent German Catholic ownership was primarily agricultural and the area was often referred to by many of these early settlers as the "garden spot" of the state and even the south. Many of the crops grown included potatoes (Irish and sweet), wheat, corn, cotton, rye, oats, asparagus, and various fruits such as grapes, apples, and peaches. Typically, the crops were rotated with plantings of "Japan clover" and cowpeas as a soil improvement and, in the case of cowpeas, a source of hay. Stock animals such as cattle, pigs, sheep, and poultry were raised on many of the farms (pers. comm., Carl Stumpe).

METHODS

The systematic sampling of the SCPFWT flora was intensively conducted from May 2009 through May 2011 and less frequently through June 2015. The study area was surveyed utilizing a modified meandering method similar to that of Goff et al. (1982). When possible, plants were collected in a manner that was non-destructive (top-snatched) to the populations sampled. Because of the size of the SCPFWT, the natural divisions of the property, and the frequency of survey visits, thorough sampling of the tract was possible. Voucher specimens were collected and identified by the authors. Identifications were subsequently verified by Dan Spaulding, Curator of the Anniston Museum of Natural History and were specimens deposited in the Natural Heritage Section Herbarium (ALNHS). Duplicate and replicate collections were deposited at the Anniston Museum of Natural History Herbarium (AMAL), Jacksonville State University Herbarium (JSU), University of Alabama Herbarium (UNA), and Auburn University Herbarium (AUA).

Plant identifications, comparison of related species, nativity, and county records were determined using the following: *Alabama Plant Atlas* (APA Editorial Committee 2015); *Flora of the Southern and Mid-Atlantic States* (Weakley 2015); *Manual of the Grasses of the United States*. Volumes I and II (Hitchcock 1971); *Manual of the Vascular Flora of the Carolinas* (Radford et al. 1968); *Plant Life of Alabama* (Mohr 1901); and *Floristic Synthesis of North America* (Kartesz 2015). Nesom (2015) was consulted for the *Galactia* determination. Guidelines for construction of this flora followed recommendations outlined by Palmer et al. (1995). Placement of species at the family rank and binomials follow Weakley (2015). Abbreviations for authorities and nativity of species follow Kartesz (2015).

RESULTS AND DISCUSSION

Vegetation Survey Summary

The plant specimens collected from the SCPFWT included a total of 519 taxa, 346 genera, and 121 families, with 217 taxa (42%) ascertained to be county records for Lauderdale County

(Kartesz 2015). Asteraceae was the most collected family with 69 species. Poaceae, Fabaceae, and Cyperaceae were the next most-represented families with 38, 29, and 17 species, respectively. *Carex* was the most-collected genus, represented by 11 species. Flowering plants comprised 95% of the flora, with dicots making up 75% and monocots the remaining 20% (Table 1). Ferns and fern allies followed with 4.5%, and conifers represented 0.5% of the total number of taxa sampled. Seventy-one species, or 13.5%, were introduced species (non-native to North America).

Selected Rare And Notable Plant Species

Several rare, undercollected, or regionally uncommon species were collected from SCPFWT, the most notable being *Platanthera peramoena* (Gray) Gray (purple fringeless orchid), *Pilea fontana* (Lunell) Rydb. (black-seeded clearweed), *Aplectrum hyemale* (Muhl. ex Willd.) Torr. (puttyroot), and *Aralia racemosa* L. (American spikenard). State (S) and global (G) rankings follow those from the Alabama Natural Heritage Program tracking list (Alabama Natural Heritage Program, 2015).

Platanthera peramoena

Inhabiting alluvial forests, stream banks and seepage slopes, floral phenology for *Platanthera peramoena* is typically from late June through early October (Brown 2004, Weakley 2015). *Platanthera peramoena*, a G5/S1 species, occurs as far north as Pennsylvania and Delaware and reaches the southern limit of its distribution in central Alabama and Mississippi (Kartesz 2015). This locally rare species is currently known from only two counties in Alabama (APA Editorial Committee 2015, Kartesz 2015; NatureServe 2015). Although the species had previously been reported from Lauderdale County (collected in 1896) another population along Little Butler Creek had recently been discovered (APA Editorial Committee 2015). This collection represents a previously unknown population and occurs on conservation land.

Pilea fontana

Occurring in wetland habitats, including floodplain forests, seepages and freshwater marshlands, *Pilea fontana* (black-seeded clearweed) G5/S1 was previously reported from only two Alabama counties (Kartesz 2015). The first collection was made in 1978 by R.K. Godfrey from Houston County with a second report from a bottomland ravine near Hurricane Creek in Jackson County (Schotz 2014). Further, *Pilea fontana* has been vouchered from only two Florida counties, one unvouchered report from a single Georgia county, and is not currently known from Mississippi or Tennessee (Kartesz 2015). *Pilea fontana* is an herbaceous annual with a wide distribution throughout the Midwest to the Northeast but is considered uncommon to rare in the southern USA. Black-seeded clearweed occurs sympatrically with *Pilea pumila* (L.) Gray and can easily be misidentified for its more common counterpart; however, when mature, black-seeded clearweed can easily be distinguished by its dark purplish-black, pebbled achenes (Weakley 2015).

Aplectrum hyemale

The solitary inflorescence of *Aplectrum hyemale* G5/S2 is often a similar color to that of the surrounding forest floor leaf litter making it difficult to locate. However, the solitary plicate leaf with its white stripes is more easily detected in the rich woodlands and bottomlands and along deciduous slopes where this species occurs (Brown 2004). Flowering typically occurs from April to mid-May when the leaves begin to senesce for the season (Brown 2004; Weakley 2015). This species occurs throughout much of eastern North America and reaches the southern limit of its distribution in Alabama (Brown 2004; Kartesz 2015; NatureServe 2015). Currently this species has been reported from five Alabama counties (APA Editorial Committee 2015; Kartesz 2015).

Aralia racemosa

Aralia racemosa is typically found in rich, mixed deciduous woodlands. Spikenard is a G4/S1 species that has been historically harvested, particularly the roots, for its medicinal properties (NatureServe 2015). It is a large herb, growing to 2m, with large compound leaves. Flowering

occurs from June to August with the small white flowers held in clustered umbels (NatureServe 2015; Weakley 2015). This eastern North American species reaches the southern limit of its distribution in northern Alabama, currently known from six counties (APA Editorial Committee 2015; Kartesz 2015).

Exotic Plant Species

Thirty-seven (52%) of the 71 non-native plant taxa collected were considered county records for Lauderdale County (Kartesz 2015). The percentage of exotics collected (13.5%) during this study is similar to that found in other floras conducted in the state (Table 2). Other Alabama floras yielded the following percentages of exotics: the 1785 ha Red Hills Forever Wild Tract yielded 11% non-natives (Barger & Holt 2015); the 1,216 ha Old Cahawba Forever Wild Tract yielded 19% non-natives (Barger et al. 2014); the 7365 ha Perdido River Forever Wild Tract yielded 11% non-natives (Barger et al. 2013); the 240 ha Indian Mountain Forever Wild Tract yielded 11% non-natives (Barger & Holt 2010); the 130 ha Coon Creek Forever Wild Tract yielded 7% non-natives (Barger & Tenaglia 2008); 2528 ha Lake Guntersville State Park yielded 17% non-natives (Spaulding 1999); the 28,329 ha Talladega Ranger District in Talladega National Forest yielded 12% non-natives (Ballard 1995); and 1101 ha Cheaha State Park yielded 10% non-natives (Bussey 1983). While this study did not focus on quantitative measurements of the exotic plant coverage, the observed land area covered by these non-native plants was restricted to primarily ruderal or disturbed areas of the tract. The most commonly encountered non-native plant species, in order of relative abundance, were *Ligustrum sinense* (Chinese privet), *Daucus carota* (Queen-Anne's-lace), *Lonicera japonica* (Japanese honeysuckle), the combined *Trifolium* spp. (clovers) and *Vicia* spp. (vetches), and *Albizia julibrissin* (silktree).

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Table 1. Summary of vegetation surveys performed on the Shoal Creek Preserve Forever Wild Tract by Divisions, Flowering Plant Class, Family, Genus and Species. Nativity of species refers to North America.

				Total			Non-native
			Total	Taxa	Native	Non-native	Taxa
Division/Class	Families	Genera	Taxa	Composition %	Taxa	Taxa	Composition %
Lycopodiophyta	2	2	2	0.5	2	0	0.0
Polypodiophyta	12	18	21	4.0	20	1	0.1
Pinophyta	2	2	4	0.5	4	0	0.0
Magnoliophyta	105	324	492	95	424	70	13.4
Class Liliopsida	19	63	104	20	79	26	5.0
Class Magnoliopsida	86	261	388	75	345	44	8.4
TOTAL	**121**	**346**	**519**	**100**	**450**	**71**	**13.5**

Table 2. Percentage of exotic species from selected vascular floras conducted on state or federally owned land in Alabama. Study sites marked with an asterisk in the following table were conducted by the authors of this study.

Study Site	% Exotics
Coon Creek FW Tract*	7.0%
Cheaha State Park	10.0%
Indian Mtn. FW Tract*	11.0%
Perdido FW Tract*	11.0%
Red Hills FW Tract*	11.0%
Talladega Ranger District	12.0%
Solon Dixon Center	13.0%
Shoal Creek FW Tract*	13.5%
Guntersville State Park	17.0%
Old Cahawba FW Tract*	19.0%

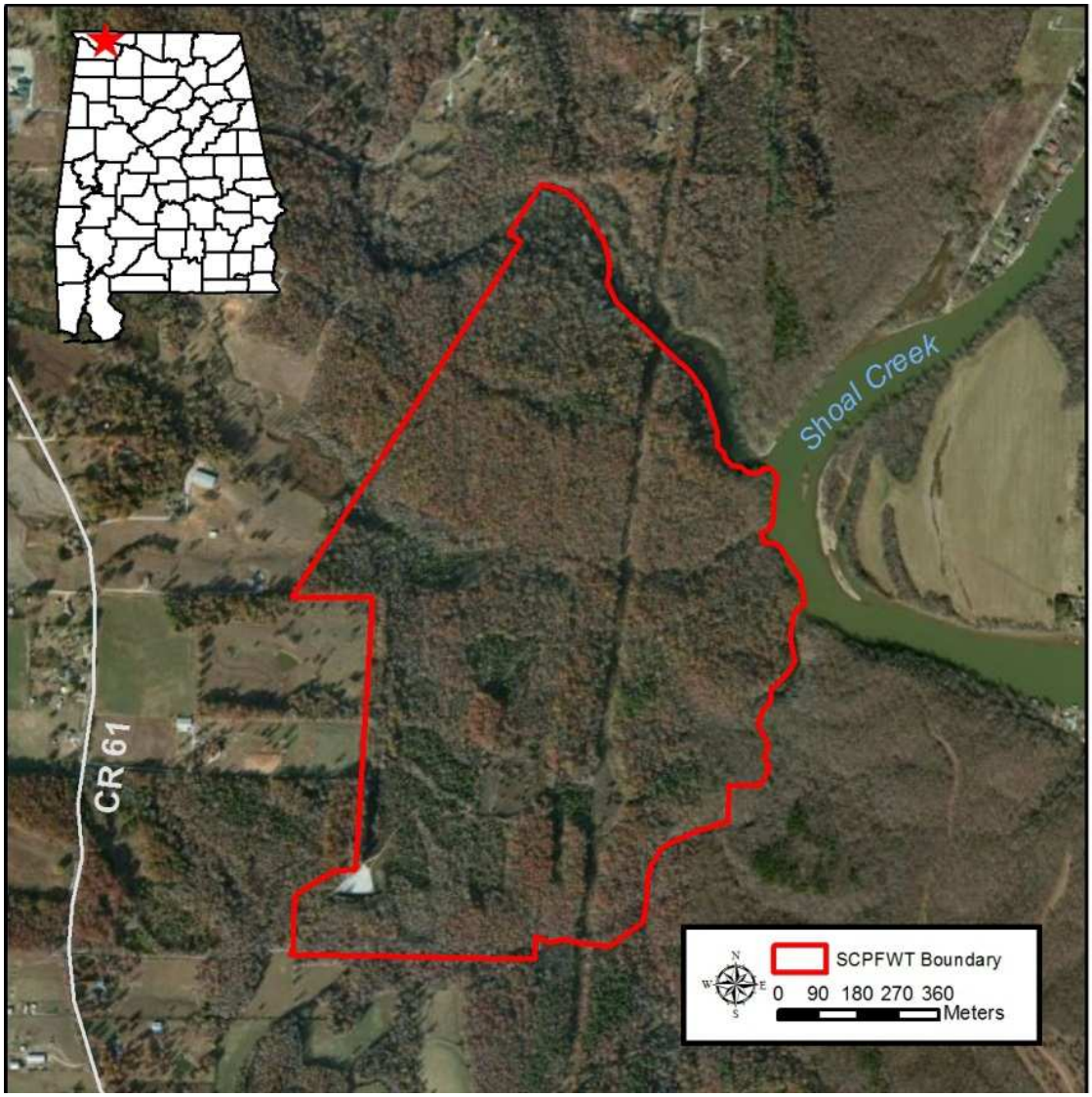

Figure 1. Location and surrounding land use of the Shoal Creek Preserve Forever Wild Tract in Lauderdale Co., Alabama.

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Appendix 1. Annotated checklist of the vascular flora of the Shoal Creek Preserve Forever Wild Tract, with breakdown of the survey by taxa level and native versus non-native species.

As previously mentioned, the nomenclature follows Weakley (2015) with abbreviations for the authorities following Kartesz (2015). The United States Department of Agriculture's Plants Database website (USDA NRCS 2015) was also referenced for additional synonyms and common names (for labels). Arrangement of the checklist is by division, then alphabetically by family, genus, and specific epithet. Species followed with a dagger (†) after the collection number are considered non-native species to the flora; those followed by an asterisk (*) are species of special concern or are considered state rare; and those followed by a double dagger (‡) were determined to be county records. Collection numbers listed are not lifetime collection numbers, but rather are specific to the current flora of the SCPFWT. The collection numbers in the list below are recorded as such on the vouchered specimens, i.e. *Asplenium trichomanes* L. subsp. *trichomanes* SC264, *Sorghastrum nutans* (L.) Nash SC516, etc.

LYCOPODIOPHYTA (Quillworts, Clubmosses, and Spikemosses)
LYCOPODIACEAE Clubmoss Family
Diphasiastrum digitatum (Dill. ex A. Braun) Holub 006

SELAGINELLACEAE Spikemoss Family
Lycopodioides apodum (L.) Kuntze 406

MONILOPHYTA (Horsetails and Ferns)
ASPLENIACEAE Spleenwort Family
Asplenium platyneuron (L.) B.S.P. 094
Asplenium rhizophyllum L. 265
Asplenium trichomanes L. subsp. *trichomanes* 264 ‡

ATHYRIACEAE Lady Fern Family
Athyrium asplenioides (Michx.) A.A. Eaton 368
Deparia acrostichoides (Swartz) M. Kato 203 ‡

CYSTOPTERIDACEAE Brittle Fern Family
Cystopteris protrusa (Weatherby) Blasdell 513 ‡

DIPLAZIOPSIDACEAE Glade Fern Family
Homalosorus pycnocarpos (Spreng.) Pichi-Sermolli 514

DRYOPTERIDACEAE Wood Fern Family
Polystichum acrostichoides (Michx.) Schott 222

ONOCLEACEAE Sensitive Fern Family
Onoclea sensibilis L. var. *sensibilis* 250

OPHIOGLOSSACEAE Adder's Tongue Fern Family
Botrypus virginianus (L.) Michx. 050
Ophioglossum pycnostichum (Fern.) A. & D. Löve 083
Sceptridium dissectum (Spreng.) Lyon 007 ‡

OSMUNDACEAE Royal Fern Family
Osmunda spectabilis Willd. 354

Osmundastrum cinnamomeum (L.) K. Presl 505

POLYPODIACEAE Polypody Family
Pleopeltis michauxiana (Weatherby) Hickey & Sprunt 125

PTERIDACEAE Maidenhair Fern Family
Adiantum capillus-veneris L. 454
Adiantum pedatum L. 283

THELYPTERIDACEAE Marsh Fern Family
Macrothelypteris torresiana (Gaud.) Ching 251 †
Parathelypteris noveboracensis (L.) Ching 413
Phegopteris hexagonoptera (Michx.) Fée 328

WOODSIACEAE Woodsia Family
Woodsia obtusa (Spreng.) Torr. 366

CONIFEROPHYTA (Gymnosperms)
CUPRESSACEAE Cypress Family
Juniperus virginiana L. var. *virginiana* 022

PINACEAE Pine Family
Pinus echinata P. Mill. 450
Pinus taeda L. 200
Pinus virginiana P. Mill. 108

MAGNOLIOPHYTA (Flowering Plants)
ACANTHACEAE Acanthus Family
Justicia americana (L.) Vahl 102
Ruellia caroliniensis (J.F. Gmel.) Steud. 344

ADOXACEAE Moschatel Family
Sambucus canadensis L. 066
Viburnum rufidulum Raf. 302

ALISMATACEAE Water-plantain Family
Sagittaria latifolia Willd. var. *latifolia* 381

ALLIACEAE Onion Family
Allium canadense L. var. *canadense* 221 ‡
Allium vineale L. 427 † ‡

ALTINGIACEAE Sweet-gum Family
Liquidambar styraciflua L. 027

AMARYLLIDACEAE Amaryllis Family
Hymenocallis occidentalis (LeConte) Kunth 157 ‡
Narcissus ×*medioluteus* P. Mill. (pro sp.) 318 †
Narcissus pseudonarcissus L. 252 † ‡

ANACARDIACEAE Cashew Family
Rhus copallinum L. var. *copallinum* 084
Rhus glabra L. 059
Toxicodendron radicans (L.) Kuntze var. *radicans* 223

ANNONACEAE Custard-apple Family
Asimina triloba (L.) Dunal 154

APIACEAE Carrot Family
Chaerophyllum tainturieri Hook. 279
Cicuta maculata L. var. *maculata* 369
Cryptotaenia canadensis (L.) DC. 331
Daucus carota L. 081 †
Erigenia bulbosa (Michx.) Nutt. 267
Osmorhiza longistylis (Torr.) DC. 315
Oxypolis rigidior (L.) Raf. 197 ‡
Ptilimnium capillaceum (Michx.) Raf. 363 ‡
Sanicula canadensis L. var. *canadensis* 176
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe 324 ‡

APOCYNACEAE Dogbane Family
Amsonia tabernaemontana Walt. var. *tabernaemontana* 325 ‡
Asclepias tuberosa L. subsp. *tuberosa* 082
Gonolobus suberosus (L.) R. Brown var. *suberosus* 068

AQUIFOLIACEAE Holly Family
Ilex decidua Walt. 519
Ilex longipes Chapman ex Trel. 430 ‡
Ilex opaca Ait. var. *opaca* 085

ARACEAE Arum Family
Arisaema dracontium (L.) Schott 295
Arisaema triphyllum (L.) Schott 052
Lemna valdiviana Phil. 451

ARALIACEAE Ginseng Family
Aralia racemosa L. 153 ‡*
Aralia spinosa L. 073
Hedera helix L. var. *helix* 320 † ‡
Panax quinquefolius L. 305 ‡*

ARISTOLOCHIACEAE Birthwort Family
Asarum canadense L. 049
Endodeca serpentaria (L.) Raf. 053
Isotrema tomentosum (Sims) H. Huber 056 ‡

ASTERACEAE Aster Family
Ageratina altissima King & H.E. Robins. var. *altissima* 245 ‡
Ambrosia artemisiifolia L. 148 ‡
Ambrosia trifida L. 143 ‡
Antennaria solitaria Rydb. 260

Arnoglossum reniforme (Hook.) H.E. Robins. 339
Artemisia annua L. 362 † ‡
Bidens aristosa (Michx.) Britt. 172 ‡
Bidens bipinnata L. 147 ‡
Bidens frondosa L. 405 ‡
Brickellia eupatorioides (L.) Shinners 496 ‡
Chrysopsis mariana (L.) Ell. 416 ‡
Cirsium discolor (Muhl. ex Willd.) Spreng. 401 ‡
Cirsium vulgare (Savi) Ten. 372 † ‡
Conoclinium coelestinum (L.) DC. 167 ‡
Coreopsis lanceolata L. 448 ‡
Doellingeria infirma (Michx.) Greene 171 ‡
Elephantopus carolinianus Räusch. 168
Elephantopus tomentosus L. 093 ‡
Erechtites hieraciifolius (L.) Raf. ex DC. 371 ‡
Erigeron annuus (L.) Pers. 008 ‡
Erigeron strigosus Muhl. ex Willd. var. *strigosus* 177 ‡
Eupatorium album L. 162 ‡
Eupatorium capillifolium (Lam.) Small 187 ‡
Eupatorium hyssopifolium L. 129 ‡
Eupatorium rotundifolium L. 128 ‡
Eupatorium serotinum Michx. 199 ‡
Eutrochium fistulosum (Barratt) E.E. Lamont 390 ‡
Helenium amarum (Raf.) H. Rock var. *amarum* 099 ‡
Helenium autumnale L. 522 ‡
Helenium flexuosum Raf. 080
Helianthus hirsutus Raf. 146
Helianthus microcephalus Torr. & Gray 145 ‡
Heliopsis helianthoides (L.) Sweet 511‡
Hieracium gronovii L. 158 ‡
Hypochaeris radicata L. 333 † ‡
Krigia biflora (Walt.) Blake var. *biflora* 329 ‡
Krigia virginica (L.) Willd. 327 ‡
Lactuca floridana (L.) Gaertn. 142 ‡
Leucanthemum vulgare Lam. 020 †
Mikania scandens (L.) Willd. 389 ‡
Nabalus altissimus (L.) Hooker 189 ‡
Packera anonyma (Wood) W.A. Weber & Á. Löve 030
Packera glabella (Poir.) C. Jeffrey 319
Pluchea camphorata (L.) DC. 140 ‡
Pseudognaphalium obtusifolium (L.) Hilliard & Burtt 188 ‡
Pyrrhopappus carolinianus (Walt.) DC. 113 ‡
Rudbeckia fulgida Ait. var. *fulgida* 412 ‡
Rudbeckia hirta L. var. *hirta* 070
Rudbeckia laciniata L. var. *laciniata* 388
Senecio vulgaris L. 290 † ‡
Sericocarpus linifolius (L.) B.S.P. 385
Silphium asteriscus var. *latifolium* (Gray) J.A. Clevinger 180
Smallanthus uvedalia (L.) Mackenzie ex Small 391 ‡
Solidago altissima L. var. *altissima* 411
Solidago arguta Ait. var. *arguta* 502 ‡

Solidago caesia L. var. *caesia* 135 ‡
Solidago rugosa P. Mill. var. *rugosa* 426 ‡
Sonchus asper (L.) Hill 234 † ‡
Symphyotrichum dumosum (L.) Nesom 174 ‡
Symphyotrichum patens (Ait.) Nesom var. *patens* 184
Symphyotrichum pilosum (Willd.) Nesom var. *pilosum* 185 ‡
Symphyotrichum shortii (Lindl.) Nesom 190 ‡
Symphyotrichum urophyllum (Lindl.) Nesom 304 ‡
Taraxacum officinale G.H. Weber ex Wiggers 013 †
Verbesina helianthoides Michx. 441
Verbesina occidentalis (L.) Walt. 206 ‡
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Vernonia flaccidifolia Small 509 ‡
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