Vascular flora of a site along the Arkansas River, Pawnee County, Oklahoma

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This article reports the results of an inventory of the vascular plants from a site in north-central Oklahoma. Three hundred thirty-eight species of vascular plants in 224 genera and 78 families were collected. The most species were collected from the families Asteraceae (56), Poaceae (50), and Fabaceae (27). One hundred fifteen species were annuals, 221 perennials, and 2 were biennials. Forty-nine species of woody plants were present. Twenty-seven exotic species were collected representing 8% of the flora. No species listed as threatened or endangered by the U.S. Fish and Wildlife Service were encountered. However, four species tracked by the Oklahoma Natural Heritage Inventory (2005); *Fraxinus quadrangulata* (G5S2S3), *Penstemon oklahomensis* (G3S3), *Symphyotrichum dumosum* (G5S1), and *Urtica chamaedryoides* (G5G4S?) were present.

INTRODUCTION

Biotic inventories are the foundation of conservation biology and biogeographic research. Botanical study of Pawnee County began on 15 July 1905, when A. H. Van Vleet collected *Oxalis stricta*. Van Vleet collected 13 additional species (*Agrimonia pubescens, Arnoglossum atriplicifolium, Astragalus carolinianus, Bidens bipinnata, Chamaecrista nictitans, Eryngium yuccifolium, Euphorbia cyathophora, Fraxinus pennsylvanica, Helenium amarum, Mimulus alatus, Pycnanthemum tenuifolium, Rudbeckia triloba,* and *Vitis vulpina*) between 25-27 July 1905 (Hoagland et al. 2005). Prior to 1998, 172 species were reported from Pawnee County (Hoagland et al. 2005). To enhance floristic data, collections were made at locales throughout the county by Hoagland and McCarty in 1998 (93 specimens) and by the current authors (Hoagland & Buthod 2003) (149 specimens). As a result, the species count for Pawnee County increased to 377. The current project was initiated on the assumption that focused collection effort at a given site would yield additional county records, thus filling a gap in floristic data for central Oklahoma.

STUDY AREA

The study area encompasses 64.7 ha in Pawnee County (Fig.) along the Arkansas River. Latitudinal extent ranges from 36.286°N to 36.296°N and longitudinal extent from 96.550°W to 96.532°W. The study area is located within the subtropical humid (Cf) climate zone (Trewartha 1968). Summers are warm (mean July temperature = 27.6°C) and humid, whereas winters are relatively short and mild (mean January temperature = 1.8°C). Mean annual precipitation is 99.6 cm, with periodic severe droughts (Oklahoma Climatological Survey 2005). Physiographically, the study area is located within the Osage Plains section of the Central Lowlands province (Hunt 1974) and the Eastern Sandstone Cuesta Plains province of

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Oklahoma (Curtis and Ham 1979). The surface geology is primarily Pennsylvanian sandstone with Quaternary silt, sand, and clay along the Arkansas River floodplain (Branson and Johnson 1979). Elevation ranges from 286.5 m to 219.4 m. The primary soil associations are the Port-Yahola-Dale-Brewer silt loam deep bottomland soils and the Darnell-Talihina-Stephenville fine sandy loams soils on rough uplands (Galloway et al. 1959). The predominant potential vegetation types are *Quercus stellata-Q. marilandica* forest and woodlands, bottomland forests, and tallgrass prairies (Duck and Fletcher 1943).

METHODS

Collections were made during monthly visits from March through October 2004. The predominant vegetation association at the site were ascribed according to Hoagland (2000) and attributed to each collection. Vouchers for species exotic to North America were made from naturalized populations only, thus excluding cultivated and ornamental plants. Specimens were processed at the Robert Bebb Herbarium of the University of Oklahoma (OKL) following standard procedures. Manuals used for specimen identification included Waterfall (1969), Great Plains Flora Association (1986), and Diggs et al. (1999). Origin, either native or introduced, was determined by using Taylor and Taylor (1991) and US Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS; 2005). Nomenclature follows the (USDA-NRCS 2005). Voucher specimens were deposited at OKL.

RESULTS AND DISCUSSION

Three hundred thirty-eight species of vascular plants in 224 genera and 78 families were collected (appendix 1). The most species were from the families Asteraceae (56), Poaceae (50), and Fabaceae (27). The largest genera were *Symphyotrichum* (8 species), *Juncus* (7), *Cyperus*, *Quercus*, and *Eragrostis* (each with 6 species). There were eight species of ferns, one gymnosperm, 85 monocots, and 245 dicots (Table). One hundred fifteen species were annuals, 221 perennials, and 2 were biennials. Forty-nine species of woody plants were present. This study contributed an additional 183 species to the flora of Pawnee County for a total of 560 species.

Twenty-seven species, non-native to North America, were collected representing 8.3% of the flora. The families with the greatest number of introduced species were Poaceae (8) and Fabaceae (3). These values are consistent with other floristic studies from Oklahoma, in which exotic species constitute 9% - 15% of the flora (Hoagland and Buthod 2003, Hoagland and Buthod 2004, Hoagland and Johnson 2001, Hoagland and Johnson 2004a, Hoagland and Johnson 2004b, Hoagland and Wallick 2003, Hoagland et al. 2004a, Hoagland et al. 2004b). An exception is Red Slough and Grassy Slough, where exotic species constituted 6.6% (Hoagland and Johnson, 2004b).

No species listed as threatened or endangered by the U.S. Fish and Wildlife Service were encountered. However, there were four species tracked by the Oklahoma Natural Heritage Inventory (2005); *Fraxinus quadrangulata* (G5S2S3), *Penstemon oklahomensis* (G3S3), *Symphyotrichum dumosum* (G5S1), and *Urtica chamaedryoides* (G5G4S?). Species are ranked by the ONHI according to level of imperilment at the global [G] and state [S] level on a scale of 1-5; with 1 representing a species that is imperiled and 5 a species that is secure [Groves et al. 1995]).

Vegetation associations at the study area with a brief list of associated species.

1. *Platanus occidentalis - Acer negundo* forest association occurred in a narrow strip along the Arkansas River floodplain. Associated species included *Apios americana, Bidens frondosa, Brickellia eupatorioides, Bromus pubescens, Cardiospermum halicacabum, Chasmanthium*

latifolium, Commelina erecta, Eupatorium rugosum, Fraxinus pennsylvanica, Impatiens capensis, Laportea canadensis, Leucospora multifida, Panicum anceps, Rorippa islandica, Sanicula canadensis, and *Teucrium canadense*.

2. *Quercus muehlenbergii - Quercus shumardii* forest association occurred along mesic slopes above the Arkansas River. The geomorphology was characterized by large sandstone boulders and shallow soils. Associated species included *Acalypha gracilens, Agrimonia rostellata, Arisaema triphyllum, Botrychium virginianum, Celastrus scandens, Desmodium glutinosum, Dichanthelium malacophyllum, Elephantopus carolinianus, Elymus canadensis, Erythronium mesochoreum, Fraxinus quadrangulata, Geum canadense, Phryma leptostachya, Quercus rubra, Scrophularia marilandica, Sicyos angulatus, Solidago nemoralis, Symphyotrichum drummondii, Urtica chamaedryoides,* and *Woodsia obtusa. Fraxinus quadrangulata, Symphyotrichum dumosum*, and *Urtica chamaedryoides* are species tracked by the ONHI found in this habitat.

3. *Quercus stellata-Q. marilandica-Carya texana* forest association occurred on uplands with sandy soils. Associated species include *Amelanchier arborea, Amphicarpaea bracteata, Antennaria parlinii, Carex albicans, Carya texana, Danthonia spicata, Helianthus hirsutus, Hieracium longipilum, Hypericum hypericoides, Juniperus virginiana, Lespedeza procumbens, Muhlenbergia sobolifera, Passiflora lutea, Smilax rotundifolia, Solidago ulmifolia, Symphoricarpos orbiculatus, Symphyotrichum patens,* and *Viburnum rufidulum*.

4. *Andropogon gerardii - Sorghastrum nutans* herbaceous association occurred on upland sandy-loam soils. Most of the grasslands were cut for hay and intergraded with old-fields. Associated species included *Achillea millefolium, Apocynum cannabinum, Aristida oligantha, Asclepias viridis, Bouteloua curtipendula, Buchnera americana, Castilleja indivisa, Chamaecrista fasciculata, Cirsium undulatum, Coreopsis grandiflora, Cyperus echinatus, Desmodium sessilifolium, Dichanthelium acuminatum, Eragrostis hirsuta, Euphorbia corollata, Fimbristylis puberula, Helianthus mollis, Lespedeza capitata, L. virginica, Liatris aspera, Lithospermum incisum, Nothoscordum bivalve, Polygala incarnata, Polytaenia nuttallii, Ptilimnium capillaceum, Ruellia humilis, Salvia azurea, Scleria ciliata, Spermolepis divaricata, Symphyotrichum ericoides, Tradescantia ohiensis, Tridens flavus*, and *Vernonia baldwinii*. *Penstemon oklahomensis* is a species tracked by the ONHI found in this habitat.

5. Wetland and aquatic vegetation was of restricted to human-made ponds. Associated species included *Amorpha fruticosa, Bidens aristosa, Cephalanthus occidentalis, Ceratophyllum demersum, Echinochloa crus-galli, Eclipta prostrata, Juncus diffusissimus, Justicia americana, Ludwigia alternifolia, Lycopus americanus, Mimulus alatus, Neeragrostis reptans, Nelumbo lutea, Penthorum sedoides, Pluchea camphorata, Polygonum hydropiperoides, P. lapathifolium, P. pensylvanicum, P. punctatum, Potamogeton nodosus, Rorippa palustris, Sagittaria calycina, S. graminea, Scirpus pendulus, Symphyotrichum subulatum*, and *Typha domingensis*

6. Disturbed areas and old-field vegetation included roadsides, and areas exhibiting signs of physical disruption. Associated species included *Amaranthus palmeri, Ambrosia artemisiifolia, A. trifida, Arenaria serpyllifolia, Bothriochloa ischaemum, Bromus catharticus, Buglossoides arvensis, Chamaesyce maculata, Conyza canadensis, Croton glandulosus, Geranium carolinianum, Helenium amarum, Hordeum pusillum, Lespedeza cuneata, Melilotus officinalis, Oenothera laciniata, Pseudognaphalium obtusifolium, Torilis arvensis,* and *Viola bicolor*.

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Table Summary of floristic collections from a study site in Pawnee County, Oklahoma*

Taxonomic group	Species	Native spp.	Introduced spp.
Pteridophyta	8	8	0
Coniferophyta	1	1	0
Magnoliophyta			
Magnoliopsida	245	227	19
Liliopsida	84	76	8
Total	338	312	27

* Table format follows Palmer et al. (1995).

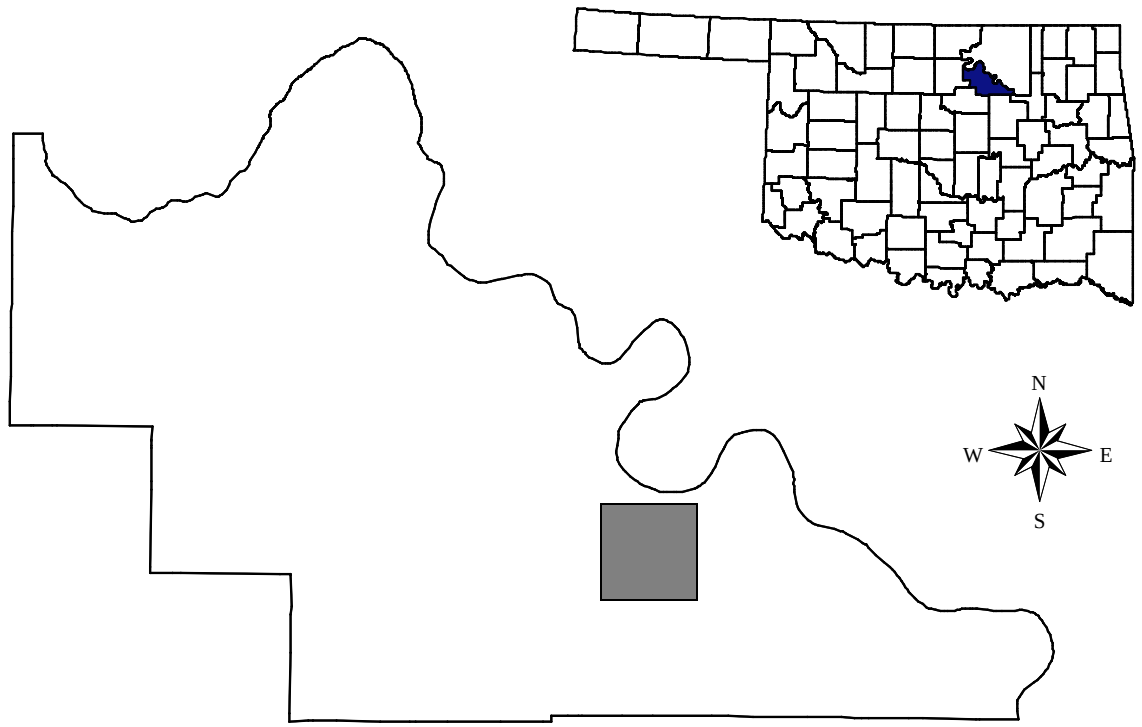

Figure Location of Pawnee County study area. Exact location withheld.

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APPENDIX 1
Annotated species list.

The first entry is habitat (PO-AN = *Platanus occidentalis - Acer negundo* forest association, QM-QS = *Quercus muehlenbergii - Quercus shumardii* forest association, QS-CT, = *Quercus stellata-Q. marilandica-Carya texana* forest association, AG-SN = *Andropogon gerardii - Sorghastrum nutans* herbaceous association, WETL = wetland and aquatic vegetation, DAOF = disturbed areas and old-field vegetation), followed by life history (A=annual, B=biennial, P=perennial), and collection number. Exotic species are denoted with an asterisk. Voucher specimens were deposited at the Robert Bebb Herbarium at the University of Oklahoma (OKL).

PTERIDOPHYTA

Aspleniaceae
Asplenium platyneuron (L.) B.S.P. - QS-CT; P; AB-4868
Aslpenium rhizophyllum L. - QM-QS; AB-4499

Dryopteridaceae
Woodsia obtusa (Spreng.) Torr. - QM-QS; P; AB-4680

Ophioglossaceae
Botrychium virginianum (L.) Sw. - QM-QS; P; AB-4688
Ophioglossum engelmannii Prantl - QS-CT; P; AB-4515

Polypodiaceae
Pleopeltis polypodioides (L.) Andrews & Windham - QM-QS; P; AB-5043

Pteridaceae
Cheilanthes lanosa (Michx.) D.C. Eat. - QS-CT; P; AB-4498
Pellaea atropurpurea (L.) Link - QS-CT; P; AB-4876

PINOPHYTA

Cupressaceae
Juniperus virginiana L. - QS-CT; P; AB-4843

MAGNOLIOPHYTA

MAGNOLIOPSIDA

Acanthaceae
Justicia americana (L.) Vahl - WETL; P; AB-6411
Ruellia humilis Nutt. - AG-SN; P; AB-4874

Aceraceae
Acer negundo L. - PO-AN; P; AB-5035

Amaranthaceae
Amaranthus palmeri S. Wats. - DAOF; A; AB-6439a
Amaranthus rudis Sauer - DAOF; A; AB-6385

Anacardiaceae
Rhus copallinum L. - QS-CT; P; AB-4887

Apiaceae
Chaerophyllum tainturieri Hook. - DAOF; A; AB-4685
Polytaenia nuttallii DC. - AG-SN; P; AB-4851
Ptilimnium capillaceum (Michx.) Raf. - AG-SN; A; AB-4855
Sanicula canadensis L. - PO-AN; B; AB-4866
Spermolepis echinatata (Nutt. ex DC.) Heller - AG-SN; A; AB-4849
Spermolepis divaricata (Walt.) Raf. ex Ser. - AG-SN; A; AB-4850
Torilis arvensis (Huds.) Link* - DAOF; A; AB-4880

Apocynaceae
Apocynum cannabinum L. - AG-SN; P; AB-5037

Asclepiadaceae
Asclepias stenophylla Gray - AG-SN; P; AB-5141
A. tuberosa L. - AG-SN; P; AB-4856
A. viridis Walt. - DAOF; P; AB-5142

Asteraceae
Achillea millefolium L. - AG-SN; P; AB-4675
Ambrosia artemisiifolia L. - DAOF; A; AB-6380
A. psilostachya DC. - AG-SN; P; AB-6091
A. trifida L. - DAOF; P; AB-6353
Antennaria parlinii Fern. - QS-CT; P; AB-4519
Bidens aristosa (Michx.) Britt. - WETL; A; AB-6426
B. bipinnata L. - PO-AN; A; AB-6390
B. frondosa L. - PO-AN; A; AB-6415
Brickellia eupatorioides (L.) Shinners - PO-AN; P; AB-6407

Chrysopsis pilosa Nutt. - AG-SN; A; AB-4859
Cirsium altissimum (L.) Hill- QM-QS; P; AB-6096
C. undulatum (Nutt.) Spreng. - AG-SN; P; AB-4847
Conoclinium coelestinum (L.) DC. - PO-AN; P; AB-6381
Conyza canadensis (L.) Cronq. - DAOF; A; AB-6072
Coreopsis grandiflora Hogg ex Sweet - AG-SN; P; AB-4711
C. tinctoria Nutt. - AG-SN; A; AB-5052
Eclipta prostrata (L.) L. - WETL; A; AB-5055
Elephantopus carolinianus Raeusch. - QM-QS; P; AB-6389
Erigeron annuus (L.) Pers. - QM-QS; A; AB-5147
E. strigosus Muhl. Ex Willd. - PO-AN; A; AB-4019
E. tenuis Torr. & Gray - AG-SN; P; AB-4710
Eupatorium rugosum Houtt. - PO-AN; P; AB-6372
E. serotinum Michx. - QM-QS; P; AB-6082
Euthamia gymnospermoides Greene - QS-CT; P; AB-6369
Evax verna Raf. - DAOF; A; AB-4712
Gamochaeta purpurea (L.) Cabrera - QS-CT; P; AB-5153
Grindelia papposa Nesom & Suh - AG-SN; A; AB-6093
Helenium amarum (Raf.) H. Rock - DAOF; A; AB-6068
Helianthus hirsutus Raf. - QS-CT; P; AB-5003
H. mollis Lam. - AG-SN; P; AB-5056
Hieracium longipilum Torr. - QS-CT; P; AB-5005
Krigia caespitosa (Raf.) Chambers - QS-CT; A; AB-4704
Lactuca floridana (L.) Gaertn. - DAOF; A; AB-6383
L. ludoviciana (Nutt.) Riddell - DAOF; A; AB-5020
Liatris aspera Michx. - AG-SN; P; AB-6403
L. punctata Hook. - AG-SN; P; AB-6083
Oligoneuron rigidum (L.) Small - QS-CT; P; AB-6360
Pluchea camphorata (L.) DC. - WETL; P; AB-6079
Pseudognaphalium obtusifolium (L.) Hilliard & Burtt - DAOF; A; AB-6432
Pyrrhopappus grandiflorus (Nutt.) Nutt. - QS-CT; P; AB-4686
Ratibida columnifera (Nutt.) Woot. & Standl. - AG-SN; P; AB-4857
Solidago canadensis L. - AG-SN; P; AB-6424
S. missouriensis Nutt. - AG-SN; P; AB-6103
S. nemoralis Ait. - QM-QS; P; AB-6425
S. ulmifolia Muhl. ex Willd. - QS-CT; P; AB-6102
Symphyotrichum drummondii (Lindl.) Nesom - QM-QS; P; AB-6370
S. dumosum (L.) Nesom; QM-QS; P; AB-6107
S. ericoides (L.) Nesom - AG-SN; P; AB-6365
S. lanceolatum (Willd.) Nesom - QM-QS; P; AB-6434
S. oolentangiense (Riddell) Nesom - QS-CT; P; AB-6374
S. patens (Ait.) Nesom - QS-CT; P; AB-6070
S. subulatum (Michx.) Nesom - WETL; A; AB-6106
S. turbinellum (Lindl.) Nesom - QM-QS; P; AB-6429
Taraxacum officinale G.H. Weber ex Wiggers* - DAOF; P; AB-4517
Tragopogon dubius Scop.* - DAOF; A; AB-4672
Vernonia baldwinii Torr. - AG-SN; P; AB-5021

Balsaminaceae
Impatiens capensis Meerb. - PO-AN; A; AB-5034

Boraginaceae
Buglossoides arvensis (L.) I.M. Johnson - DAOF; A; AB-4696
Heliotropium indicum L.* - PO-AN; A; AB-6393
Lithospermum incisum Lehm. - AG-SN; P; AB-4499

Brassicaceae
Arabis canadensis L. - QS-CT; B; AB-5023
Cardamine parviflora L.. - DAOF; A; AB-4504
Draba brachycarpa Nutt. ex Torr. & Gray - DAOF; A; AB-4518
D. cuneifolia; Nutt. ex Torr. & Gray - DAOF; A; AB-4523
Lepidium densiflorum Schrad.* - DAOF; A; AB-4734
L. virginicum L. - DAOF; A; AB-5123
Lesquerella gracilis (Hook.) S. Wats. - AG-SN; A; AB-4726
Rorippa islandica (Oeder) Borbas - PO-AN; A; AB-5012
R. palustris (L.) Bess. - WETL; A; AB-4735

Cactaceae
Opuntia macrorhiza Engelm. - QS-CT; P; AB-5125

Campanulaceae
Triodanis perfoliata (L.) Nieuwl. - QM-QS; A; AB-4877

Caprifoliaceae
Symphoricarpos orbiculatus Moench - QS-CT; P; AB-4890
Viburnum rufidulum Raf. - QS-CT; P; AB-4865

Caryophyllaceae
Arenaria serpyllifolia L.* - DAOF; A; AB-4511
Cerastium glomeratum Thuill.* - DAOF; A; AB-5054
Stellaria media (L.) Vill.* - DAOF; A; AB-4512

Celastraceae
Celastrus scandens L. - QM-QS; P; AB-6382

Ceratophyllaceae
Ceratophyllum demersum L. - WETL; P; AB-5054

Chenopodiaceae
Chenopodium album L.* - DAOF; A; AB-6392
C. berlandieri Moq. - AG-SN; A; AB-6401
C. ambrosioides L.* - QS-CT; A; AB-6409

Cistaceae
Lechea mucronata Raf. - QS-CT; P; AB-5000
L. tenuifolia Michx. - QS-CT; P; AB-4861

Clusiaceae
Hypericum hypericoides (L.) Crantz - QS-CT; P; AB-4879
H. punctatum Lam. - AG-SN; P; AB-5010

Cornaceae
Cornus drummondii C.A. Mey. - QS-CT; P; AB-4884

Crassulaceae
Penthorum sedoides L. - WETL; P; AB-5053

Cucurbitaceae
Sicyos angulatus L. - QM-QS; A; AB-6412

Ebenaceae
Diospyros virginiana L. - QS-CT; P; AB-5149

Euphorbiaceae
Acalypha gracilens Gray - QM-QS; A; AB-5006
A. monococca (Engelm. ex Gray) L. Mill. & Gandhi - PO-AN; A; AB-5024
Chamaesyce maculata (L.) Small - DAOF; A; AB-6097
C. nutans (Lag.) Small - DAOF; A; AB-6101
Croton capitatus Michx. - AG-SN; A; AB-6076
C. glandulosus L. - DAOF; A; AB-5049
C. willdenowii G. L. Webster - AG-SN; A; AB-5016
Euphorbia corollata L. - AG-SN; P; AB-6069
E. dentata Michx. - DAOF; A; AB-6362
E. marginata Pursh - AG-SN; A; AB-6073
E. spathulata Lam. - DAOF; A; AB-4681

Fabaceae
Albizia julibrissin Durazz.* - QM-QS; P; AB-4894
Amorpha canescens Pursh - AG-SN; P; AB-5040
A. fruticosa L. - WETL; P; AB-6416
Amphicarpaea bracteata (L.) Fern. - QS-CT; A; AB-6414
Apios americana Medik. - PO-AN; P; AB-6357
Astragalus canadensis L. - QS-CT; P; AB-5022
Cercis canadensis L. - QS-CT; P; AB-4513
Chamaecrista fasciculata (Michx.) Greene - AG-SN; A; AB-6087
C. nictitans (L.) Moench - AG-SN; A; AB-6074
Desmanthus illinoensis (Michx.) MacM. Ex B.L. Robins. & Fern. - PO-AN; P; AB-6112
Desmodium ciliare (Muhl. ex Willd.) DC. - QM-QS; P; AB-6095
D. glutinosum (Muhl. ex Willd.) Wood - QM-QS; P; AB-5122
D. paniculatum (L.) DC. - AG-SN; P; AB-5126
D. sessilifolium (Torr.) Torr. & Gray - AG-SN; P; AB-5026
Galactia volubilis (L.) Britt. - PO-AN; P; AB-6423
Gymnocladus dioicus (L.) K. Koch - QM-QS; P; AB-5046
Lespedeza capitata Michx. - AG-SN; P; AB-6065
L. cuneata (Dun.-Cours.) G. Don* - DAOF; P; AB-6076
L. procumbens Michx.- QS-CT; P; AB-5027
L. stuevei Nutt. - AG-SN; P; AB-6019
L. virginica (L.) Britt. - AG-SN; P; AB-6078
Melilotus officinalis (L.) Lam.* - DAOF; A; AB-4682
Neptunia lutea (Leavenworth) Benth. - AG-SN; P; AB-5039
Pediomelum linearifolium (Torr. & Gray) J. Grimes - AG-SN; P; AB-4867
Robinia pseudoacacia L. - DAOF; P; AB-4892
Stylosanthes biflora (L.) B.S.P. - AG-SN; P; AB-4578
Trifolium campestre Schreb.* - DAOF; A; AB-4703

Fagaceae
Quercus marilandica Muenchh. - QS-CT; P; AB-4891
Q. muehlenbergii Engelm. - QM-QS; P; AB-4684
Q. palustris Muenchh. T, P; AB-4274
Q. rubra L. - QM-QS; P; AB-4714
Q. shumardii Buckl. - QM-QS; P; AB-4713
Q. stellata Wangenh. - QS-CT; P; AB-4893

Gentianaceae
Sabatia campestris Nutt. - AG-SN; A; AB-4852

Geraniaceae
Geranium carolinianum L. - DAOF; A; AB-4736

Grossulariaceae
Ribes aureum Pursh - QS-CT; P; AB-4500

Juglandaceae
Carya cordiformis (Wangenh.) K. Koch - QM-QS; P; AB-5015
C. illinoinensis (Wangenh.) K. Koch - QM-QS; P; AB-5161
C. texana Buckl. - QS-CT; P; AB-5162

Lamiaceae
Hedeoma hispida Pursh - AG-SN; A; AB-4673
Lamium amplexicaule L.* - QM-QS; A; AB-4503
Lycopus americanus Muhl. Ex W. Bart - WETL; P; AB-5011
Prunella vulgaris L. - QM-QS; P; AB-4896
Salvia azurea Michx. ex Lam. - AG-SN; P; AB-6363
Stachys tenuifolia Willd. - QM-QS; P; AB-5025
Teucrium canadense L. - PO-AN; P; AB-4888

Linaceae
Linum pratense (J.B.S. Norton) Small - AG-SN; A; AB-4725
L. rigidum Pursh - AG-SN; A; AB-4853

Lythraceae
Rotala ramosior (L.) Koehne - WETL; A; AB-6080

Menispermaceae
Cocculus carolinus (L.) DC. - QM-QS; P; AB-4868
Menispermum canadense L. - PO-AN; P; AB-4669

Molluginaceae
Mollugo verticillata L. - DAOF; A; AB-5047

Nelumbonaceae
Nelumbo lutea Willd. - WETL; P; AB-5032

Oleaceae
Fraxinus americana L. - QM-QS; P; AB-5160
F. pennsylvanica Marsh. - PO-AN; P; AB-4715
F. quadrangulata Michx. - QM-QS; P; AB-4713

Onagraceae
Gaura longiflora Spach - AG-SN; A; AB-6104
Ludwigia alternifolia L. - WETL; P; AB-5001
L. glandulosa Walt. - WETL; P; AB-5014
Oenothera laciniata Hill - DAOF; P; AB-4694
O. linifolia Nutt. - DAOF; A; AB-4691

Oxalidaceae
Oxalis stricta L. - DAOF; P; AB-4693
O. violacea L. - QS-CT; P; AB-4692

Passifloraceae
Passiflora incarnata L. - DAOF; P; AB-4844
P. lutea L. - QS-CT; P; AB-5044

Phytolaccaceae
Phytolacca americana L. - DAOF; P; AB-5041

Plantaginaceae
Plantago aristata Michx. - DAOF; A; AB-4867
P. heterophylla Nutt. - QS-CT; A; AB-4731
P. major L. - PO-AN; P; AB-6396
P. patagonica Jacq. - AG-SN; A; AB-4846
P. virginica L. - QS-CT; A; AB-4709

Plantanaceae
Platanus occidentalis L. - PO-AN; P; AB-6364

Polygalaceae
Polygala incarnata L. - AG-SN; A; AB-4845

Polygonaceae
Polygonum hydropiperoides Michx. - WETL; P; AB-6098
P. lapathifolium L. - WETL; A; AB-6399
P. pensylvanicum L. - WETL; A; AB-6368
P. punctatum Ell. - WETL; A; AB-5004
P. virginianum L. - PO-AN; P; AB-6359

Portulacaceae
Claytonia virginica L. - AG-SN; P; AB-4527

Primulaceae
Samolus valerandi L. - WETL; P; AB-6394

Rosaceae
Agrimonia rostellata Wallr. - QM-QS; P; AB-5028
Amelanchier arborea (Michx. f.) Fern. - QS-CT; P; AB-5036
Geum canadense Jacq. - QM-QS; P; AB-5051
Rosa multiflora Thunb. Ex Murr.* - QS-CT; P; AB-4707
Potentilla recta L.* - DAOF; P; AB-4870
Prunus angustifolia Marsh. - AG-SN; P; AB-4666
Rubus aboriginum Rydb. - QM-QS; P; AB-4708

Rubiaceae
Cephalanthus occidentalis L. - WETL; P; AB-5057
Diodia teres Walt. - DAOF; A; AB-5002
Galium aparine L. - QS-CT; A; AB-4668
Galium circaezans Michx. - QM-QS; P; AB-4889
Houstonia pusilla Schoeph - DAOF; A; AB-4525
Sherardia arvensis L.* - DAOF; AB-4524

Salicaceae
Populus deltoides Bartr. ex Marsh. - PO-AN; P; AB-4674
Salix nigra Marsh. - WETL; P; AB-4883

Sapindaceae
Cardiospermum halicacabum L. - PO-AN; A; AB-6384
Sapindus saponaria L. - PO-AN; P; AB-6354

Sapotaceae
Sideroxylon lanuginosum Michx. - QS-CT; P; AB-4667

Scrophulariaceae
Buchnera americana L. - AG-SN; P; AB-4842
Castilleja indivisa Engelm. - AG-SN; A; AB-4676
Leucospora multifida (Michx.) Nutt. - PO-AN; A; AB-6377
Lindernia dubia (L.) Pennell - WETL; A; AB-6373
Mimulus alatus Ait. - WETL; P; AB-6398
Nuttallanthus texanus (Schelle) D.A. Sutton - AG-SN; A; AB-4732
Penstemon oklahomensis Pennell - AG-SN; P; AB-4689
P. tubiflorus Nutt. - AG-SN; P; AB-4862
Scrophularia marilandica L. - QM-QS; P; AB-6356
Veronica arvensis L.* - DAOF; A; AB-4526

Solanaceae
Physalis angulata L. - DAOF; A; AB-6089
Solanum ptychanthum Dunal - DAOF; A; AB-6371

Ulmaceae
Celtis laevigata Willd. - QM-QS; P; AB-5145
Ulmus rubra Muhl. - QM-QS; P; AB-4881

Urticaceae
Boehmeria cylindrica (L.) Sw. - QM-QS; P; AB-5050
Laportea canadensis (L.) Weddell - PO-AN; P; AB-6435
Parietaria pensylvanica Muhl. Ex Willd. - QM-QS; A; AB-4873
Urtica chamaedryoides Pursh - QM-QS; A; AB-5017

Valerianaceae
Valerianella radiata (L.) Dufr. - AG-SN; A; AB-4514

Verbenaceae
Glandularia canadensis (L.) Nutt. - AG-SN; P; AB-4508
Phryma leptostachya L. - QM-QS; P; AB-6367
Phyla lanceolata (Michx.) Greene - WETL; P; AB-5008
Verbena urticifolia L. - WETL; P; AB-6430

Violaceae
Viola bicolor Pursh - DAOF; A; AB-4522
V. nephrophylla Greene - PO-AN; P; AB-4520

Vitaceae
Ampelopsis cordata Michx. - PO-AN; P; AB-5045
Cissus trifoliata (L.) L. - QS-CT; P; AB-4875
Parthenocissus quinquefolia (L.) Planch. - QM-QS; P; AB-4670
Vitis cinerea (Engelm.) Millard - QS-CT; P; AB-4727
V. vulpina L. - QS-CT; P; AB-5156

LILIOPSIDA

Alismataceae
Sagittaria calycina Engelm. - WETL; P; AB-6081
S. graminea Michx. - WETL; P; AB-5007

Araceae
Arisaema triphyllum (L.) Schott - QM-QS; P; AB-4679

Commelinaceae
Commelina erecta L. - PO-AN; P; AB-5124
Tradescantia ohiensis Raf. - AG-SN; P; AB-4864

Cyperaceae
Carex albicans Willd. ex Spreng. - QS-CT; P; AB-4510
Cyperus echinatus (L.) Wood - AG-SN; P; AB-5150
C. erythrorhizos Muhl. - WETL; A; AB-6397
C. odoratus L. - PO-AN; A; AB-6400
Cyperus pseudovegetus Steud. - WETL; P; AB-5128
C. squarrosus L. - WETL; A; AB-5121
C. strigosus L. - WETL; P: AB-6105
Fimbristylis puberula (Michx.) Vahl - AG-SN; P; AB-4872
F. vahlii (Lam.) Link - PO-AN; A; AB-6437a
Isolepis carinata Hook. & Arn. Ex Torr. - DAOF; A; AB-4697
Rhynchospora harveyi W. Boott - AG-SN; P; AB-5131
Scirpus pendulus Muhl - WETL; P; AB-4700
Scleria ciliata Michx. - AG-SN; P; AB-4698

Iridaceae
Sisyrinchium angustifolium P. Mill - AG-SN; P; AB-4690

Juncaceae
Juncus acuminatus Michx. - WETL; P; AB-6431
J. brachycarpus Engelm. - WETL; P; AB-5132
J. bufonius L. - WETL; A; AB-5127
J. diffusissimus Buckl. - WETL; P; AB-5157
J. interior Wieg. - AG-SN; P; AB-4701
J. marginatus Rostk. - WETL; P; AB-5129
J. nodatus Coville - WETL; P; AB-5133

Liliaceae
Erythronium mesochoreum Knerr - QM-QS; P; AB-4516
Nothoscordum bivalve (L.) Britt - AG-SN; P; AB-4506
Polygonatum biflorum (Walt.) Ell. - QM-QS; P; AB-5013

Poaceae
Andropogon gerardii Vitman - AG-SN; P; AB-6063
A. ternarius Michx. - AG-SN; P; AB-6142
A. virginicus L. - AG-SN; P; AB-6422
Agrostis elliottiana J.A. Schultes - QM-QS; P; AB-4722
Aira elegans Willd. ex Kunth* - AG-SN; A; AB-4705
Aristida oligantha Michx. - AG-SN; A; AB-6100
Bothriochloa ischaemum (L.) Keng - DAOF; AB-5154
B. saccharoides (Sw.) Rydb. - AG-SN; P; AB-6428
Bouteloua curtipendula (Michx.) Torr. - AG-SN; P; AB-5033
B. hirsuta Lag. - AG-SN; P; AB-6110
Bromus catharticus Vahl.* - DAOF; A; AB-4671
B. japonicus Thunb. Ex Murr.* - AG-SN; A; AB-4723
B. pubescens Muhl. ex Willd. - PO-AN; P; AB-5042
B. secalinus L.* - DAOF; A; AB-4858
Buchloe dactyloides (Nutt.) Engelm. - AG-SN; P; AB-4683
Cenchrus longispinus (Hack.) Fern. - DAOF; A; AB-6084
Chasmanthium latifolium (Michx.) Yates - PO-AN; P; AB-6379
Danthonia spicata (L.) Veauv. Ex Roemer & J.A. Schultes - QS-CT; P; AB-4871
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark - AG-SN; P; AB-6378
D. linerifolium (Scribn. Ex Nash) Gould - QS-CT; P; AB-4706
D. malacophyllum (Nash) Gould - QM-QS; P; AB-5143
D. oligosanthes (J.S. Schultes) Gould - AG-SN; P; AB-4719
D. villosissimum (Nash) Greckmann - PO-AN; P; AB-4848
Digitaria cognata (J.A. Schultes) Pilger - PO-AN; P; AB-6417
D. ischaemum (Schreb.) Schreb. ex Muhl.* - DAOF; A; AB-6419
Echinochloa crus-galli (L.) Beauv.* - WETL; A; AB-5135
Elymus canadensis L. - QM-QS; P; AB-4860
E. virginicus L. - QS-CT; P; AB-4863
Eragrostis barrelieri Daveau* - DAOF; A; AB-4816
E. hirusta (Michx.) Nees - AG-SN; P; AB-6111
E. intermedia A.S. Hitchc. - AG-SN; P; AB-6440a
E. secundiflora J. Presl - AG-SN; P; AB-5134
E. spectabilis (Pursh) Steud. - AG-SN; P; AB-6018
E. trichodes (Nutt.) Wood - AG-SN; P; AB-6433
Hordeum pusillum Nutt. - DAOF; A; AB-4695
Leptochloa panicea (Retz.) Ohwi - WETL; A; AB-6440a
Muhlenbergia racemosa (Michx.) B.S.P. - QM-QS; P; AB-5139
M. sobolifera (Muhl. Ex Willd.) Trin. - QS-CT; P; AB-6402
Neeragrostis reptans (Michx.) Nicora - WETL; A; AB-6404
Panicum anceps Michx. - PO-AN; P; AB-6067
P. dichotomiflorum Michx. - QM-QS; A; AB-6413
P. virgatum L. - WETL; P; AB-6391
Pasplaum floridanum Michx. - WETL; P; AB-6088
P. leave Michx. - AG-SN; P; AB-6099
P. setaceum Michx. - AG-SN; P; AB-5138
Poa annua L.* - QM-QS; A; AB-4505
Setaria parviflora (Poir.) Kerguelen - DAOF; P; AB-5151
Sorghastrum nutans (L.) Nash - AG-SN; P; AB-6075
Tridens flavus (L.) A.S. Hitchc. - AG-SN; P; AB-5137
Vulpia octoflora (Walt.) Rydb. - QS-CT; A; AB-4737

Potamogetonaceae
Potamogeton nodosus Poir. - WETL; P; AB-5159

Smilacaceae
Smilax rotundifolia L. - QS-CT; P; AB-5146
Smilax tamnoides L. - QS-CT; P; AB-4882

Typhaceae
Typha domingensis Pers. - WETL; P; AB-4886
T. latifolia L. - WETL; P; AB-4885