

An Updated Flora of the Wichita Mountains Wildlife Refuge

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The herbarium collections of the Wichita Mountains Wildlife Refuge have been transferred to the Cameron University Herbarium (CAMU) so that they could be safely curated, and electronically databased and still remain accessible to refuge personnel while for the first time becoming readily available to other interested researchers. This paper is a report on the initial inventory of the specimens. The 1784 specimen collection includes 101 families, 339 genera, and 634 species that have been physically repaired and taxonomically updated as needed, accessioned into the CAMU collections, and entered into the Specify Database.

INTRODUCTION

The Wichita Mountains are some of the oldest exposed mountains in the world and because the area was too rocky to plow, they formed a natural refugium that preserved what is arguably the largest remaining intact tract of southern mixed-grass prairie in existence. The mountains were part of the Kiowa-Comanche-Apache Reservation in the late 19th Century. When the reservation was opened to settlement in 1901, the land was set aside by the federal government. Originally administered by the Department of the Interior, jurisdiction was transferred to the Forest Service in 1905, and in 1935 management of the Wichita Mountains Wildlife Refuge (WMWR) was transferred to what is now the Fish and Wildlife Service (Morgan, 1973). In 1907 bison were reintroduced to the Refuge and in 1927 Congress issued a mandate to preserve the bloodline of Texas Longhorn Cattle. Elk, which had been extirpated by 1875 were transplanted from Jackson Hole, Wyoming, and today in addition to the buffalo, longhorn cattle, and elk that get most of the public's attention, the refuge is home to over 50 mammal species including prairie dogs, coyotes, bobcats, and mountain lions (Tyler, 2005). In addition, over 240 bird, 64 reptile and amphibian, and 36 fish species have been identified. Eight hundred and six vascular plants have been identified at the WMWR

(Eskew, 1938; Osborn and Allan, 1949; Buck, 1977).

Much of the natural history of the Refuge is recorded in herbarium collections that were housed in the basement of the headquarters building. In 2005, refuge management recognized the need to protect the specimens, and make the data available to the scientific community as well as the general public, but still keep the data accessible to Refuge biologists and technicians. The only facility that met all of the criteria was the Cameron University Herbarium (CAMU), and in 2006 the specimens were transferred to CAMU as a permanent loan. In 2008 The National Science Foundation (NSF) provided funding to procure additional cabinets and equipment and to hire student workers to enter the specimens into the Specify Database. This paper is the first report of the inventory of these specimens and will serve as a benchmark for future studies that will update the complete flora of the Refuge.

The 23,885 hectare Wichita Mountains Wildlife Refuge is located in northwestern Comanche County, Oklahoma (Fig.), ranging from 34°41'N to 34°50'N and 98°48'30"W to 98°30'30"W. Elevation ranges from 404 m (1330 ft) where Cache Creek crosses the WMWR southern boundary to 756 m (2479 ft) at the summit of Mt. Pinchot. The mountains themselves are predominantly Cambrian igneous rock and the surrounding

plains are predominantly Permian sedimentary rock (Price and Gilbert, 1996). The ecoregion is categorized as Great Plains Steppe Shrub Province (Bailey, 1995) or Central Great Plains (Woods et al., 2005) and receives on average 86.84 cm (34.19 in) of precipitation annually, with May the wettest month (mean 13.03 cm [5.13 in]) and January the driest (mean 3.50 cm [1.38 in]). Mean annual temperature is 22.22°C (72.0°F) (Oklahoma Climatological Survey, 2007).

MATERIALS AND METHODS

A total of 1784 specimens were accepted as a permanent loan from WMWR to CAMU in June 2006. NSF-Biological Research Collections funds were awarded in 2008 and were used to purchase new herbarium cabinets and begin curation during that summer. Specimens were first triaged for damage and physically repaired as necessary. Preliminary identification and taxonomic updating were the responsibility of KAC. Specimens were then entered into the Specify database by KAC and PR. All identifications and taxonomic updates were then verified by MTD before annotations were added and specimens were fumigated and curated into separate color coded genus folders. Because taxonomy for many of the specimens is ambiguous and no completed treatment of the flora of Oklahoma was broadly accepted, a combination of McGregor et al., (1986), Diggs et al (1999) and Judd et al., (2008) was used to update the taxonomy of the specimens (details available upon request).

RESULTS AND DISCUSSION

Three of the 1784 specimens were collected outside the WMWR proper but all three have duplicates collected on the Refuge. The collection includes 101 families, 339 genera, and 634 species (Appendix), including: 1 family of Charophyceans, 6 families of seedless vascular plants, 2 gymnosperm families, 1 basal angiosperm, 16 monocot families and 75 Eudicot families. The largest families are Asteraceae with 88 species and Poaceae with 99 species. The largest monocot genera are *Carex* and *Eragrostis* with 12 species each. The largest herbaceous and

woody eudicots are respectively *Polygonum* with nine and *Quercus* with eight species each.

Now that these preliminary data have been compiled, we hope to expand the project by updating the taxonomy of the classic Buck (1977) report on the flora of WMWR to enable direct comparison with this assemblage, quantify the percentage of exotics in the collections, and with the permission of WMWR biologists and administrators, begin surveying the Refuge for some of the rarer plants in the collection to identify those taxa in danger of extirpation.

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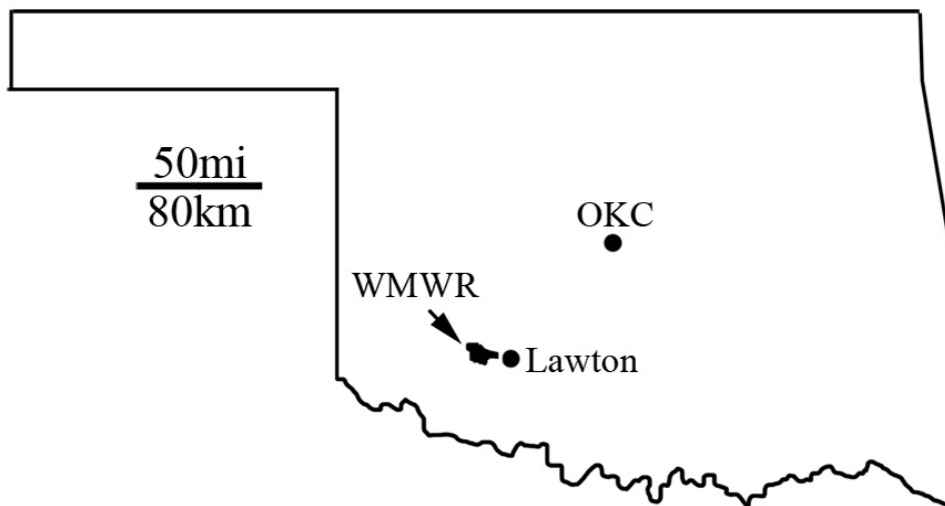


Figure Location of Wichita Mountains Wildlife Refuge, Comanche County, Oklahoma

APPENDIX

GREEN ALGAE

Characeae

Chara vulgaris L.SEEDLESS VASCULAR PLANTS

Isoetaceae

Isoetes melanopoda Gay & Dur.

Equisetaceae

Equisetum laevigatum A. Braun

Aspleneaceae

Asplenium trichomanes L.

Dryopteridaceae

Dryopteris marginalis (L.) A. Gray*Woodsia obtusa* (Spreng.) Torr.

Marsileaceae

Pilularia americana A. Braun*Marsilea vestita* Hood. and Grev.

Pteridaceae

Cheilanthes eatoni Baker*Cheilanthes lanosa* (Michx.) D.C. Eaton*Cheilanthes tomentosa* Link.*Pellaea atropurpurea* (L.) Link.*Pellaea wrightiana* Hook.GYMNOSPERMS

Cupressaceae

Juniperus virginiana L.

Pinaceae

Pinus elliotii Englm.ANGIOSPERMS

MONOCOTS

Agavaceae

Manfreda virginica (L.) Salisb. ex Rose

Alismataceae

Echinodorus berteroi (Spreng.) Fassett*Sagittaria latifolia* Willd.*Sagittaria montevidensis* Cham. & Schlecht.

Araceae

Arisaema dracontium (L.) Schott

Commelinaceae

Commelina erecta L.*Tradescantia occidentalis* (Britt.) Smyth*Tradescantia ohiensis* Raf.

Cyperaceae

Bulboschoenus maritimus (L.) Palla*Bulbostylis capillaris* (L.) Kunth ex C.B. Clarke*Carex amphibola* Steud.*Carex annectens* (Bickn.) Bickn.*Carex austrina* Mack.*Carex blanda* Dewey*Carex emoryi* Dewey*Carex festucacea* Schkuhr. ex Willd.*Carex frankii* Kunth.*Carex gravida* Bailey*Carex grisea* Wahl.*Carex microrhyncha* Mack.*Carex muehlenbergii* Schkuhr ex Willd.*Carex vulpinoidea* Michx.*Cyperus acuminatus* Torr. & Hook. ex Torr.*Cyperus echinatus* (L.) Wood*Cyperus erythrorhizos* Muhl.*Cyperus esculentus* L.*Cyperus lupulinus* (Spreng.) Marcks.*Cyperus odoratus* L.*Cyperus pseudovegetus* Steud.*Cyperus schweinitzii* Torr.*Cyperus setigerus* Torr. & Hook*Cyperus squarrosus* L.*Cyperus strigosus* L.*Eleocharis acutisquamata* Buckley*Eleocharis compressa* Sulliv.*Eleocharis engelmanni* Steud.*Eleocharis montevidensis* Kunth.*Eleocharis obtusa* (Willd.) Schult.*Eleocharis palustris* (L.) Roem. & Schult.*Eleocharis parvula* (Roemer & J.A. Schultes)

Link ex Bluff, Nees & Schaeur

Eleocharis quadrangulata Fern.*Eleocharis tenuis* (Willd.) Schult.*Eleocharis wolfii* (A.Gray) A.Gray ex Britton*Fimbristylis puberula* (Michx.) Vahl.*Fimbristylis vahlilii* (Lam.) Link.

Fuirena simplex Vahl.
Lipocarpa micrantha (Vahl.) Tucker
Schoenoplectus acutus (Muhl ex Bigelow) A.
Love & D. Love
Schoenoplectus pungens (Vahl.) Palla
Schoenoplectus tabernaemontani (K.C. Gmel.)
Palla
Scleria pauciflora Muhl.
Scirpus atrovirens Muhl.
Scirpus pendulus Muhl.

Hydrocharitaceae

Najas guadalupensis (Spreng.) Morong.

Iridaceae

Sisyrinchium angustifolium Mill.

Juncaceae

Juncus acuminatus Michx.
Juncus dudleyi Wiegand.
Juncus interior Wieg.
Juncus marginatus Rostk.
Juncus tenuis Woot. & Standl.
Juncus torreyi Coville

Lemnaceae

Lemna minor L.

Liliaceae

Allium canadense L.
Allium drummondii Regel.
Allium stellatum Ker.
Androstephium coeruleum (Scheele) Greene
Camassia scilloides (Raf.) Cory
Cooperia drummondii Herbert
Erythronium americanum Ker.
Nothoscordum bivalve Greene ex Rydb.

Orchidaceae

Spiranthes magnicamporum Sheviak.

Poaceae

Agrostis hyemalis (Walter) B.S.P.
Agrostis elliotiana Schult.
Alopecurus carolinianus Walt.
Andropogon gerardii Vitman.
Aristida dichotoma Michx
Aristida longespica Poir.
Aristida oligantha Michx.
Aristida purpurea Nutt.
Bothriochloa barbinodes (Lag.) Herter.

Bothriochloa laguroides (D.C.) Herter.
Bouteloua curtipendula (Michx) Torr.
Bouteloua gracilis (Willd ex Kunth) Lag. ex
Griffiths
Bouteloua hirsuta Lag.
Bouteloua rigidiseta (Steud.) Hitchc.
Bromus arvensis L.
Bromus catharticus Vahl
Bromus commutatus Schrad.
Bromus japonicus Thunb. ex Murray
Bromus pubescens Muhl. ex Willd.
Buchloe dactyloides (Nutt.) Engelm.
Cenchrus spiniflex Cav.
Chasmanthium latifolium (Mickx.) H.O. Yates
Chloris verticillata Nutt.
Chloris virgata Sw.
Coelorachis cylindrica (Michx.) Nash
Cynodon dactylon (L.) Pers.
Dactylis glomerata L.
Dichantherium acuminatum (Sw.) Gould & C.A.
Clark
Dichantherium depauperatum (Muhl.) Gould
Dichantherium linearifolium (Scribn. ex Nash)
Gould
Dichantherium malacophyllum (Nash) Gould
Dichantherium oligosanthes (J.A. Schultes)
Gould
Digitaria californica (Benth.) Henr.
Digitaria cognata (Schultes) Pilger
Digitaria sanguinalis (L.) Scop.
Echinochloa crus-galli (L.) Beauv.
Eleusine indica (L.) Gaertn.
Elymus canadensis L.
Elymus virginicus L.
Eragrostis capillaris (L.) Nees
Eragrostis cilianensis (All.) Vignalo ex Janch
Eragrostis curtipedicellata Buckley
Eragrostis hypnoides (Lam.) B.S.P.
Eragrostis intermedia Hitchc.
Eragrostis pectinacea (Mickx.) Nees ex Steud.
Eragrostis pilosa (L.) Beauv.
Eragrostis reptans (Michx.) Nees
Eragrostis secundiflora J. Presl.
Eragrostis sessilispica Buckley
Eragrostis spectabilis (Pursh.) Steud.
Eragrostis trichodes (Nutt.) A.W. Wood
Eriochloa contracta Hitchc.
Eriochloa sericea (Scheele) Munro ex Vasey
Erioneuron pilosum (Buckley) Nash
Festuca versuta Beal
Hordeum pusillum Nutt.

Leersia oryzoides (L.) Sw.
Leptochloa fascicularis (Lam.) A. Gray
Limnodea arkansana (Nutt.) L.H. Dewey
Lolium pratense (Huds.) S.J. Darbyshire
Melica nitens (Scribn) Nutt. ex Piper
Muhlenbergia capillaris (Lam.) Trin.
Muhlenbergia mexicana (L.) Trin.
Muhlenbergia racemosa (Michx) B.S.P.
Panicum anceps Michx.
Panicum capillare L.
Panicum dichotomiflorum Michx.
Panicum obtusum Kunth.
Panicum philadelphicum Bernh. ex Trin.
Panicum virgatum L.
Pascopyrum smithii (Rydb.) A. Love
Paspalum dilatatum Poir.
Paspalum pubiflorum Rupr.
Paspalum setaceum Michx.
Phalaris caroliniana Walter
Poa annua L.
Poa arachnifera Torr.
Poa compressa L.
Schedonnardus paniculatus (Nutt.) Trel.
Setaria parviflora (Poir) Kerguelen
Setaria viridis (L.) P. Beauv.
Schizachyrium scoparium (Michx.) Nash
Sorghastrum nutans (L.) Nash
Sorghum halepense (L.) Pers.
Spartina pectinata Link
Sphenopholis obtusata (Michx) Scribn.
Sporobolus airoides Torr.
Sporobolus clandestinus (Biehler) Hitchc.
Sporobolus compositus (Poir.) Merr.
Sporobolus cryptandrus (Torr) A. Gray
Sporobolus neglectus Nash
Sporobolus pyramidatus (Lam.) Hitchc.
Sporobolus vaginiflorus (Torr ex A. Gray) A.W.
 Wood
Tridens albescens (Vasey) Wooton & Standl.
Tridens flavus (L.) Hitchc.
Tridens muticus (Torr) Nash
Tridens strictus (Nutt) Nash
Tripsacum dactyloides (L.) L.
Vulpia octoflora (Walter) Rydb.

Pontederiaceae

Heteranthera limosa (Sw.) Willd

Potamogetonaceae

Potamogeton ampifolius Tuckerm.
Potamogeton diversifolius Raf.

Potamogeton nodosus Poir
Potamogeton pusillus L.

Smilacaceae

Smilax bona-nox L.
Smilax pseudochina L.
Smilax rotundifolia L.
Smilax tamnoides L.

Typhaceae

Typha domingensis L.
Typha latifolia L.

EUDICOTS**Acanthaceae**

Justicia americana (L.) Vahl
Ruellia caroliniensis (J.F. Gmel) Steud.
Ruellia humilis Nutt.

Amaranthaceae

Alternanthera caracasana Kunth
Amaranthus albus L.
Amaranthus hybridus L.
Amaranthus retroflexus L.
Amaranthus rudis Sauer
Froelichia floridana (Nutt.) Moq.
Froelichia gracilis (Hook.) Moq.
Gossypianthus lanuginosus (Poir.) Moq
Guilleminea densa (Humb. & Bonpl. ex Willd.)
 Moq.

Anacardiaceae

Rhus glabra L.
Rhus trilobata Nutt.
Toxicodendron radicans (L.) Kuntze

Apiaceae

Ammoselinum popei Torr. & Gray
Chaerophyllum tainturieri Hook.
Cicuta maculata L.
Daucus pusillus Michx.
Eryngium leavenworthii Torr. & Gray
Lomatium foeniculaceum (Nutt.) Coult. & Rose
Polytaenia nuttallii DC.
Ptilimnium nuttallii (DC.) Britt.
Sanicula canadensis L.
Spermolepis divaricata (Walt.) Raf. ex Ser.
Spermolepis echinata (Nutt. ex DC.) Heller

Apocynaceae

Apocynum cannabinum L.
Amsonia ciliata Walt.

Asclepiadaceae

Asclepias asperula (Dcne.) Woods.
Asclepias latifolia Engelm. & Gray
Asclepias pumila (Gray) Vail
Asclepias stenophylla Gray
Asclepias tuberosa L.
Asclepias verticillata L.
Asclepias viridis Walt.

Asteraceae

Achillea millefolium L.
Ambrosia artemisiifolia L.
Ambrosia psilostachya DC.
Ambrosia trifida L.
Antennaria parlinii Fern.
Aphanostephus pilosus Buckl.
Aphanostephus ramosissimus DC.
Aphanostephus skirrhobasis (DC.) Trel.
Artemisia dracunculus L.
Artemisia filifolia Torr.
Artemisia longifolia Nutt.
Artemisia ludoviciana Nutt.
Aster ericoides L.
Aster oblongifolius Nutt.
Aster patens Ait.
Aster subulatus Michx.
Baccharis salicina Torr. & Gray
Bidens cernua L.
Bidens frondosa L.
Brickellia eupatorioides (L.) Shinnery
Centaurea americana Nutt.
Chaetopappa asteroides Nutt. ex DC.
Cirsium ochrocentrum Gray
Cirsium undulatum (Nutt.) Spreng.
Conyza canadensis (L.) Cronq.
Conyza ramosissima Cronq.
Coreopsis grandiflora Hogg ex Sweet
Coreopsis tinctoria Nutt.
Dysodiopsis tagetoides (Torr. & Gray) Rydb.
Echinacea angustifolia DC.
Eclipta prostrata (L.) L.
Engelmannia peristenia (Raf.) Goodman & C.A. Watson
Erigeron strigosus Muhl. ex Willd.
Eupatorium serotinum Michx.
Evax prolifera Nutt. ex DC.
Evax verna Raf.

Gaillardia aestivalis (Walt.) H. Rock
Gaillardia pulchella Foug.
Gaillardia suavis (Gray & Engelm.) Britt. & Rusby
Gamochaeta purpurea (L.) Cabrera
Grindelia papposa McKelvey
Grindelia squarrosa (Pursh) Dunal
Gutierrezia dracunculoides (DC.) S.F. Blake
Helenium amarum (Raf.) H. Rock
Helenium microcephalum D.C.
Helianthus annuus L.
Helianthus hirsutus Raf.
Helianthus maximiliani Schrad.
Helianthus pauciflorus Nutt.
Helianthus petiolaris Nutt.
Heterotheca canescens (DC.) Shinnery
Heterotheca stenophylla (Gray) Shinnery
Hieracium longipilum Small
Hymenopappus scabiosaeus L'Hér.
Hymenopappus tenuifolius Pursh
Iva annua L.
Krigia caespitosa (Raf.) K.L. Chambers
Krigia dandelion (L.) Nutt.
Lactuca canadensis L.
Lactuca serriola L.
Lactuca tatarica (L.) C.A. Mey
Liatris aspera Michx.
Liatris punctata Hook.
Liatris scariosa (L.) Willd.
Machaeranthera pinnatifida (Hook.) Shinnery
Nothocalais cuspidata (Pursh) Greene
Packera plattensis (Nutt) W.A. Weber & A. Love
Palafoxia sphacelata (Nutt. ex Torr.) Cory
Pluchea camphorata (L.) DC.
Polanisia dodecandra (L.) D.C.
Pseudognaphalium canescens DC.
Pseudognaphalium stramineum (Kunth) W.A. Weber
Pyrrhopappus grandiflorus (Nutt.) Nutt.
Ratibida columnifera (Nutt.) Wooton & Standl.
Rudbeckia hirta L.
Silphium asteriscus L.
Silphium laciniatum L.
Silphium radula Nutt.
Solidago arguta Ait.
Solidago gigantea Ait.
Solidago missouriensis Nutt.
Solidago petiolaris Ait.
Tetaneuris linearifolia (Hook.) Greene
Thelesperma filifolium (Hook.) Gray
Townsendia exscapa (Richards.) Potter
Vernonia baldwinii Torr.

Xanthium strumarium L.
Xanthisma texanum DC.

Boraginaceae

Buglossoides arvensis (L.) I.M. Johnston
Lithospermum incisum Lehm.
Mysotis verna Nutt.

Brassicaceae

Draba brachycarpa Nutt. ex Torr. & A. Gray
Draba cuneifolia Nutt. ex Torr. & A. Gray
Draba reptans (Lam.) Fern.
Descurainia pinnata (Walt.) Britt.
Erysimum capitatum (Dougl. ex Hook.) Greene
Lepidium oblongum Small
Lepidium virginicum L.
Lesquerella auriculata (Engelm & A. Gray) S. Watson
Lesquerella engelmannii (A. Gray) S. Watson
Lesquerella gracilis (Hook.) S. Watson
Lesquerella ovalifolia Rydb. ex Britt.
Rorippa nasturtium-aquaticum (L.) Hayek
Rorippa palustris (L.) Bess.
Rorippa sessiliflora (Nutt.) Hitchc.
Sibara virginica (L.) Rollins

Callitrichaceae

Callitriche heterophylla Pursh.

Campanulaceae

Lobelia appendiculata A. DC.
Lobelia cardinalis L.
Triodanis leptocarpa (Nutt.) Nieuwl.
Triodanis perfoliata (L.) Nieuwl.

Capparaceae

Cleomella angustifolia Torr.

Caprifoliaceae

Viburnum rufidulum Raf.
Symphoricarpos orbiculatus Moench

Caryophyllaceae

Cerastium brachypodium (Engelm. ex Gray) B.L. Robins.
Minuartia michauxii (Fenzl.) Farw.
Minuartia patula (Michx.) Mattf.
Paronychia jamesii Torr. & A. Gray
Paronychia virginica Spreng.
Sagina decumbens (Ell.) Torr & A. Gray
Silene antirrhina L.

Ceratophyllaceae

Ceratophyllum demersum L.

Chenopodiaceae

Chenopodium album L.
Chenopodium leptophyllum (Moq.) Nutt.
Chenopodium simplex (Torr.) Raf.
Chenopodium standleyanum Aell.
Salsola tragus L.
Monolepis nuttalliana (Schult.) Greene

Cistaceae

Lechea tenuifolia Michx.

Clusiaceae

Hypericum drummondii (Grev. & Hook) Torr. & A. Gray
Hypericum mutilum L.

Convolvulaceae

Convolvulus arvensis L.
Evolvulus nuttallianus Schult.

Cornaceae

Cornus drummondii C.A. Mey

Cuscutaceae

Cuscuta gronovii Willd.
Cuscuta coryli Engelm.

Crassulaceae

Sedum nuttallianum Raf.

Cucurbitaceae

Cyclanthera dissecta (Torr. & Gray) Arn.
Cucurbita foetidissima Kunth
Ibervillea lindheimeri (Gray) Greene
Melothria pendula L.

Ebenaceae

Diospyros virginiana L.

Euphorbiaceae

Acalypha gracilens A. Gray
Acalypha ostryifolia Riddell
Chamaesyce glyptosperma (Engelm) Small
Chamaesyce maculata (L.) Small
Chamaesyce missurica (Raf.) Shinnars
Chamaesyce nutans (Lag.) Small
Chamaesyce prostrata (Aiton) Small
Croton capitatus Michx.
Croton glandulosus L.

Croton lindheimerianus Scheele.
Croton monanthogynus Michx.
Croton texensis (Klotzch.) Muell. Arg.
Euphorbia commutata Engelm.
Euphorbia corollata L.
Euphorbia dentata Michx.
Euphorbia marginata Pursh.
Euphorbia spathulata Lam.
Phyllanthus caroliniensis Walt.
Phyllanthus polygonoides Nutt. ex Spreng.
Stillingia sylvatica Garden ex L.
Tragia ramosa Torr.

Fabaceae

Acacia angustissima (Mill.) Kuntze
Amorpha canescens Pursh.
Amorpha fruticosa L.
Apios americana Medik.
Astragalus crassicaulis Nutt.
Astragalus plattensis Nutt.
Baptisia australis (L.) R. Br.
Baptisia bracteata Muhl. ex Elliot
Baptisia sphaerocarpa Nutt.
Cercis canadensis L.
Chamaecrista fasciculata (Michx.) Greene
Clitoria mariana L.
Crotalaria sagittalis L.
Dalea aurea Nutt. ex Pursh.
Dalea candida Willd.
Dalea enneandra Nutt.
Dalea multiflora (Nutt.) Shinners
Dalea purpurea Vent.
Dalea tenuis (J.M. Coult) Shinners
Desmanthus illinoensis (Michx.) MacM
Desmanthus leptolobus Torr & A. Gray
Desmodium ciliare DC.
Desmodium nudiflorum (L.) DC.
Desmodium paniculatum (L.) DC.
Desmodium sessilifolium (Torr.) Torr. & A.Gray
Galactia volubilis (L.) Britt.
Glycyrrhiza lepidota (Nutt.) Pursh.
Gymnocladus dioicus (L.) Koch.
Hoffmanseggia glauca (Ortega) Eifert
Indigofera miniata Ortega
Lespedeza capitata Michx.
Lespedeza procumbens Michx.
Lespedeza virginica (L.) Britt.
Lotus unifoliolatus (Hook.) Benth.
Melilotus albus Medik.
Neptunia lutea (Leavenw.) Benth.
Pediomelum esculentum (Pursh.) Rydb.

Pediomelum linearifolium (Torr. & A. Gray) J.W.
Grimes
Psoralidium tenuiflorum (Pursh.) Rydb.
Senna marilandica (L.) Link.
Strophostyles helvula (L.) Elliott

Strophostyles leiosperma (Torr. & A.Gray) Piper
Strophostyles umbellatum (Muhl ex Willd.) Britt.
Stylosanthes biflora (L.) Britton, Sterns. & Pogg.
Vicia ludoviciana Nutt.

Fagaceae

Quercus buckleyi Nixon & Dorr.
Quercus macrocarpa Michx.
Quercus marilandica Muench.
Quercus muehlenbergii Engelm.
Quercus shumardii Buckl.
Quercus stellata Wang.
Quercus velutina Lam.
Quercus virginiana Mill.

Fumariaceae

Corydalis aurea Willd.

Gentianaceae

Sabatia campestris Nutt.

Geraniaceae

Geranium carolinianum L.

Grossulariaceae

Ribes aureum Pursh

Haloragaceae

Myriophyllum pinnatum (Walter) Britton, Stens &
Poggenb.
Myriophyllum spicatum L.

Hydrophyllaceae

Nama hispidum A. Gray

Juglandaceae

Carya illinoensis (Wang.) K. Koch
Juglans major (Torr.) Heller
Juglans microcarpa Berland
Juglans nigra L.

Krameriaceae

Krameria lanceolata Torr.

Lamiaceae

Hedeoma hispida Pursh.
Lycopus americanus Muhl.
Monarda citriodora Cerv. ex Lag.
Monarda clinopodioides A. Gray
Monarda fistulosa L.

Monarda pectinata Nutt.
Nepeta cataria L.
Salvia azurea Michx. ex Lam.
Salvia reflexa Hornem.
Scutellaria drummondii Benth.
Scutellaria wrightii A. Gray
Scutellaria resinosa Torr.
Teucrium canadense L.
Teucrium laciniatum Torr.
Trichostema brachiatum L.

Lentibulariaceae

Utricularia gibba L.

Linaceae

Linum berlandieri Hook.
Linum hudsonioides Planch.
Linum imbricatum (Raf.) Shinnery
Linum rigidum Pursh
Linum sulcatum Riddell

Loasaceae

Mentzelia oligosperma Nutt.
Mentzelia nuda (Pursh.) Torr & A. Gray

Lythraceae

Ammannia auriculata Willd.
Ammannia coccinea Rottb.
Lythrum alatum Pursh.

Malvaceae

Callirhoe involucrata (Torr. & A. Gray) A. Gray
Sphaeralcea coccinea Nutt.

Menispermaceae

Cocculus carolinus (L.) DC.

Molluginaceae

Mollugo verticillata L.

Moraceae

Morus rubra L.

Nyctaginaceae

Mirabilis nyctaginea (Michx.) MacM.
Mirabilis linearis (Gray) Greene
Mirabilis glabra (S. Wats.) Standl.
Mirabilis hirsuta A. Nels.
Mirabilis albida (Walter) Heimerl.

Oleaceae

Fraxinus pennsylvanica Marsh.

Onagraceae

Calylophus serrulatus (Nutt.) P.H. Raven
Gaura coccinea Nutt. ex Pursh.
Gaura parviflora Douglas ex Lehm.
Gaura sinuate Nutt.
Gaura suffulta Engelm. ex A. Gray
Gaura triangulata Buckley
Ludwigia alternifolia L.
Ludwigia decurrens (Walt.) DC.
Ludwigia peploides (Kunth) Raven
Ludwigia repens J.R. Forst
Oenothera biennis L.
Oenothera brachycarpa A. Gray
Oenothera grandis (Britton) Smith
Oenothera jamesii A. Gray
Oenothera laciniata Hill
Oenothera linifolia Nutt.
Oenothera macrocarpa (A. Gray) W.L. Wagner
Oenothera triloba Nutt.
Stenosiphon linifolius (Nutt. ex E. James)
 Heynh.

Oxalidaceae

Oxalis violacea Rydb.
Oxalis stricta L.

Papaveraceae

Argemone polyanthemus (Fedde) G.B. Ownbey

Pedaliaceae

Proboscidea louisianica (Mill.) Thell.

Phytolaccaceae

Phytolacca americana L.

Plantaginaceae

Plantago aristata Michx.
Plantago elongata Pursh.
Plantago patagonica Jacq.
Plantago virginica L.
Plantago wrightiana Dcne.

Polemoniaceae

Ipomopsis rubra Fern.

Polygalaceae

Polygala alba Nutt.

Polygala verticillata L.

Polygonaceae

Eriogonum annuum Nutt.

Eriogonum longifolium Nutt.

Polygonum amphibium L.

Polygonum convolvulus L.

Polygonum hydropiperoides Michx.

Polygonum lapathifolium L.

Polygonum pensylvanicum L.

Polygonum punctatum Ell.

Polygonum ramosissimum Michx.

Polygonum scandens L.

Polygonum tenue Michx.

Rumex altissimus Wood

Rumex crispus L.

Portulacaceae

Claytonia virginica L.

Portulaca pilosa L.

Portulaca umbraticola Kunth.

Portulaca oleracea L.

Talinum calycinum Engelm.

Talinum parviflorum Nutt.

Primulaceae

Adrosace occidentalis L.

Dodecatheon meadia L.

Samolus valerandi L.

Ranunculaceae

Anemone berlandieri Pritz

Delphinium carolinianum Walt.

Myosurus minimus L.

Rhamnaceae

Ceanothus herbaceus Raf.

Rosaceae

Agrimonia parviflora Aiton

Crataegus reverchonii Sarg.

Crataegus viridis L.

Geum aleppicum Jacq.

Geum canadense Jacq.

Potentilla arguta Pursh

Prunus angustifolia Marsh.

Prunus gracilis Engelm. & A. Gray

Prunus mexicana S. Watson

Prunus virginiana L.

Rubus aboriginum Rydb.

Rubus occidentalis L.

Rubiaceae

Cephalanthus occidentalis L.

Diodia teres Walt.

Galium aparine L.

Galium pilosum Aiton

Galium texense A. Gray

Galium virgatum Nutt.

Hedyotis nigricans (Lam.) Fosberg

Houstonia caerulea L.

Houstonia pusilla Schoepf

Rutaceae

Ptelea trifoliata L.

Salicaceae

Populus alba L.

Populus deltoides Marsh

Salix caroliniana Michx.

Salix nigra Marsh.

Santalacaceae

Comandra umbellata (L.) Nutt.

Sapindaceae

Aesculus glabra Willd.

Acer grandidentatum Nutt.

Acer saccharinum L.

Acer saccharum Marsh.

Sapindus saponaria L.

Sapotaceae

Sideroxylon lanuginosum Michx.

Scrophulariaceae

Agalinis fasciculata Pennell

Bacopa rotundifolia (Michx.) Wettst.

Castilleja purpurea (Nutt.) G. Don.

Castilleja sessiliflora Pursh.

Collinsia violacea Nutt.

Griatiola virginiana L.

Leucospora multifida (Michx) Nutt.

Linaria canadensis (L.) Dumont.

Lindernia dubia (L.) Pennell

Penstemon cobaea Nutt
Penstemon oklahomensis Pennell
Scrophularia lanceolata Pursh.
Veronica arvensis L.
Veronica peregrine L.

Simaroubaceae

Ailanthus altissima (P. Mill.) Swingle

Solanaceae

Physalis cinerascens (Dunal) Hitchc.
Physalis longifolia Nutt.
Quincula lobata (Torr.) Raf.
Solanum dimidiatum Raf.
Solanum elaeagnifolium Cav.
Solanum ptycanthum Dunal
Solanum rostratum Dunal

Ulmaceae

Celtis laevigata Willd.
Ulmus americana L.
Ulmus rubra Muhl

Urticaceae

Boehmeria cylindrica (L.) Sw.
Parietaria pensylvanica Muhl. ex Willd.

Valerianaceae

Valerianella radiata (L.) Dufur.

Verbenaceae

Glandularia canadensis (L.) Nutt.
Glandularia pumila (Rydb.) Umber
Lippia cuneifolia (Torr.) Steud
Lippia nodiflora (L.) Michx.
Verbena bracteata Lag. & Rodr.
Verbena stricta Vent.
Verbena urticifolia L.

Violaceae

Hybanthus verticillatus (Ortega) Baill
Viola bicolor Pursh
Viola missouriensis Greene
Viola sororia Willd.

Vitaceae

Ampelopsis cordata Michx.
Cissus incisa Des Moul.
Parthenocissus quinquefolia (Buckley) Britton ex
 Small
Vitis cinerea (Englm.) Millardet.
Vitis riparia Michx.
Vitis rupestris Scheele

Zygophyllaceae

Kallstroemia californica (S. Wats.) Vail
Tribulus terrestris L.