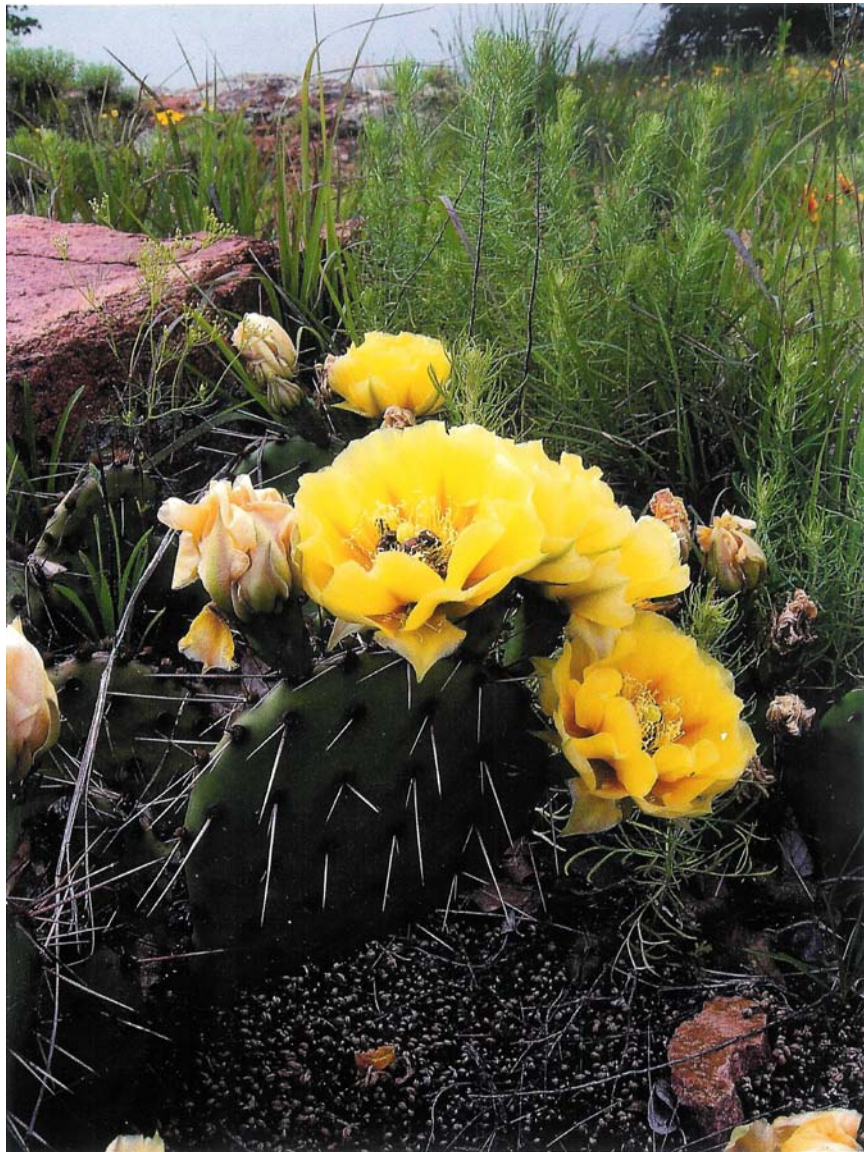


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Oklahoma Native Plant Record



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“This *Opuntia polyacantha* was blooming away on a rocky shore on Jed Johnson Lake in the Wichita Mountains Wildlife Refuge. The photo was taken with a Nikon Coolpix camera about the size of a deck of cards, and no tripod. Cactus flowers are wonderful for holding still!”

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Volume 7, Number 1

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Foreword and Forward

While I always look “forward” to preparing each volume for you, I haven’t always gotten the “Foreword” right. In fact, the wrong word is used in the table of contents of the first four volumes. It is misspelled in both the table of contents and in the section headings of the last two volumes. Ruth Boyd, who has proof-read the journal with me every year since its inception in 2001 is most likely doing summersaults in her grave because I missed the error in the title for this section for 6 years in a row. I will do better. But had it not been for Ruth’s keen eye and sharp editing pencil our journal would not have become the respected source of botanical research that it has. We remain indebted to her for correcting my many other errors.

In this foreword to Volume Seven, the Oklahoma Native Plant Record mourns the passing of Ruth Boyd and of Larry Magrath, two of the Society’s long-time members. Larry Magrath was one of our major contributors of scientific papers. Had it not been for Larry’s willingness to submit significant articles and encourage others to do so, we would have had a very thin journal for the first three years. Both Larry and Ruth experienced poor health for several years, but continued to work with the *Record*, giving me time to learn how to manage without being overwhelmed by editorial responsibilities.

With the passing of Ruth and Larry, we will all have to step up and accept more responsibility for passing on the legacy of botanical research in Oklahoma and our new staff of proof-readers will do their best to get it right. Yes, it takes more than one to replace Ruth. The *Record* will always need new authors, reviewers, proof-readers and editors. If we don’t step up and do it, no one else will. It’s time for each of us, perfect or not, to move forward, doing the most and the best that we can.

To build a larger legacy for Oklahoma botany, one that is built on the best practices of research, we need to be open to allowing others to see our work and give us advice. With that comes responsibility. We must respect ownership of ideas. That’s why *Oklahoma Native Plant Journal* does not seek to own the work of our authors. We publish the articles while authors retain ownership and decide who else can use it. We believe in open sources and encourage open research. We look forward to receiving articles submitted to us in the future.

In this volume Bruce Hoagland presents more articles based on data from the Oklahoma Natural Heritage Inventory. One gives us an updated perspective on Charles S. Wallis’ work *Vascular Plants of the Oklahoma Ozarks*, which represents our historical article this year. Wallis was born in 1911 and compiled this flora for his PhD thesis at Oklahoma State University in 1959. Hoagland’s other contribution this year was done with Amy Buthod, as an inventory of vascular plants at the new Oklahoma Centennial Botanical Garden in Osage County.

As part of our goal to encourage new authors, we enthusiastically present Caleb Stott’s *The Need for Savanna Restoration in the Cross Timbers*. It is a review of relevant literature regarding one of Oklahoma’s most endangered ecosystems. It is co-authored with Mike Palmer and Kelly Kindischer. In another article, Mike Palmer has also given us a great new research tool. It is a checklist for Oklahoma floras. He has gathered all the known published floras of Oklahoma and catalogued them in tabular form, referencing geographic, topographic, and taxonomic data to a bibliography of 85 references for Oklahoma flora.

With this volume, The *Oklahoma Native Plant Record* continues to bring you interesting and valuable scientific works which will enhance the purpose of the Society, to promote the study, protection, propagation, appreciation, and use of native plants of Oklahoma. Thank you for your support.

Sheila Strawn, Editor

Vascular Plants of the Oklahoma Ozarks

By Charles S. Wallis

Submitted to the Faculty of the Graduate School of Oklahoma State University in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY
May, 1959

After the completion of a floristic study of Cherokee County, the author saw the need for such a study of the entire Oklahoma Ozarks. Therefore, his original collection of about 1,400 sheets was expanded to about 7,000 sheets between the years of 1953 and 1958. All of these are deposited in the Herbarium of Oklahoma State University. Duplicates of many of these are in the author's private museum at Fort Gibson, Oklahoma. Also, triplicates of collections made during the last two years are deposited in the Herbarium of Southern Methodist University at Dallas, Texas.

The author has supplemented data obtained from his own collections with those derived from 497 sheets which have been deposited in the Herbarium of Oklahoma State University by earlier collectors.

A few stations were established for repeated collecting in order to study the seasonal changes of plant societies. These are discussed in Chapter IV. Prairie, hill, and valley habitats were the basis for the selection of these stations, but most of the collecting was for general distribution throughout the Ozarks.

Monographs, revisions, and other recent taxonomic literature in the Oklahoma State University Library were used whenever possible in identifying the specimens. The order of listing of the families conventionally follows the Engler-Prantl system as delineated in the eighth edition of Gray's Manual of Botany (43). Each species in the list is followed with the general habitats and counties in which one or more specimens were collected. Those specimens which were found to be new to the state and which have been reported within the last six years are relisted in Chapter V.

The author wishes to express his appreciation to each of the members of his committee for their guidance and suggestions. He is especially grateful to Dr. U.T. Waterfall for acting as chairman of his committee, for his example as a teacher of taxonomy, and for the use of his personal card index of monographic and research literature.

Editor's notes:

This is Wallis' original thesis including his chapter, "Ecology: General Distribution" that lists species in each of his study sites by seasons. However, it does not include his "List of Species and Habitats". To avoid redundancy and to make that list more useable for current biologists, its nomenclature has been updated and included in Bruce Hoagland's "A Checklist for the Vascular Flora of Ozark Plateau in Oklahoma" that immediately follows. That Checklist is marked to indicate which species Wallis listed, as well as non-native species listed in the Oklahoma Vascular Plant Database for the Oklahoma Ozarks.

Charles Sparkman Wallis' private library is currently housed in the Bebb Herbarium (OKL) at the University of Oklahoma, Norman, OK. (SS)

PHYSICAL FEATURES**Location and Area**

The name Ozarks or Ozarks was taken from the contraction of the French words aux arcs and has been applied to an uplift area occupying some 40,000 square miles of Arkansas, Missouri, and Oklahoma (79:234). This Ozark region of Oklahoma is in the northeastern corner of the state with natural boundaries formed by the Grand (Neosho) River on the west and the Arkansas River on the south.

There are approximately 3,351 square miles of land and 52 square miles of lakes in the Oklahoma Ozarks. Computation by counties in square miles from General Highway County Maps prepared by the Oklahoma Department of Highways is as follows:

<u>County</u>	<u>Land Area</u>	<u>Lake Area</u>
Adair	569	0
Cherokee	760	11
Delaware	657	15
Mayes	261	10
Muskogee	114	3
Ottawa	296	10
Sequoyah	694	3

All of the lakes, except Horseshoe Lake, are of the reservoir type. They are Fort Gibson Reservoir and Lake of the Cherokees on the Grand River; Tenkiller Ferry Reservoir on the Illinois River; Greenleaf Lake on Greenleaf Creek; and Upper and Lower Spavinaw Lakes on Spavinaw Creek.

Geology

The Ozark Uplift is a broad asymmetrical cone which consists of three physiological provinces (57). Two of these extend into northeastern Oklahoma as the Springfield Structural Plain in the northern two-thirds of the

Oklahoma Ozarks and the Boston Mountain Province in the southern one-third. The Salem Platform is entirely in Arkansas and Missouri.

The topography of the Springfield Plain is that of a deeply dissected plateau with surface cherts and limestones of the Mississippian Boone formation. In the Boston Province is a narrow belt of rugged topography formed by the northeast trending faults. The resulting fault blocks have steep escarpment faces and gentle dip slopes capped by the resistant Atoka sandstones. Deep valleys have been cut through the ridges by stream erosion, and the major drainage pattern is developed in the softer shales and limestone paralleling the faulting.

The highest elevation in the Oklahoma Ozarks is a 1,750 foot contour line three miles east of Muskrat Mountain (48). The contrasting low area, a 400 foot contour line, is found where the Arkansas River leaves Oklahoma at the southeast corner of Sequoyah County (49). Thus a 30-mile line along the Oklahoma-Arkansas border will intersect at the high and low points of the Oklahoma Ozarks.

Topography by Counties (113)

Adair County is quite hilly, but many of the hills and ridges have flat tops wide enough to produce considerable level areas. Some of the deeper valleys cut into the Chester formation and lowermost Pennsylvanian formation. Baron Fork drains the northern part of the county into the Illinois River, and Sallisaw Creek drains the southern part into the Arkansas River.

Cherokee County is well dissected into the lower Pennsylvanian formations by streams, with the largest valleys less than one mile in width. Flat-topped ridges produce the principle farming areas. Maynard Bayou, Flowers, Clear, and Ranger creeks are some of the western

streams draining into Grand River which forms part of the western boundary. The Illinois River enters the county from the northeast and flows south through the eastern half of the county.

Delaware County's surface is quite rough with many of the broad, flat-top hills having small prairies on them. Generally, the valleys are narrow and steep-sided. Grand River in the northern part of the county with its tributaries drains most of the area. The southern part is drained into the Grand River by way of Spavinaw Creek.

The eastern part of Mayes County is in the Ozarks and the western part in the Prairie Plains region. The Ozark area is quite hilly and is drained by Spavinaw Creek.

The small northeastern part of Muskogee County in the Ozarks drains into the Arkansas River. The best farming land in the Ozarks is located in the flood plains of the Grand and Arkansas rivers.

Ottawa County is also in both the Ozark and Prairie Plains regions. The southeastern part is hilly, but the northeastern part has extensive prairies east of the Grand River; a.k.a. Neosho River, the name often applied to the portion of Grand River above the junction with Spring River. Drainage is into the Grand River by way of Spring and Neosho rivers.

Soils (112)

The only formation of the region which has sufficient area of rock outcrop to greatly influence the soil is the Boone formation. Along the western edge of the uplift, the Chester formation produces a prairie of considerable extent from the town of Pryor to the northeast.

Slopes are so steep on the hillsides of the uplift that there is little or no surface soil

except that remaining between the rock crevices. However, this soil is fertile enough to support a good growth of trees. The level uplands have soils that reach a depth of ten or more feet, and where they are free from chert they are dark red sandy-loams.

The soils of the narrow valleys are generally very cherty but quite productive. The larger river valleys have the most productive soils of all. They are basically the sediments from the higher Boone areas.

CLIMATE (126)

The Oklahoma Ozarks have a continental type of weather which is characterized by a pronounced seasonal range in temperatures. Almost invariably the high summer temperature occurs with clear skies and is attended by dry, moderate winds. Severe droughts are produced when hot winds accompany these high temperatures. The summer nights are nearly always cool because the clear skies and dry atmosphere permit rapid radiation of the heat. Rain is general and most abundant in the spring to early summer and sometimes may be abundant during September and October. The prevailing wind direction is southerly, although in December, January, and February northerly winds predominate.

Prior to 1941, the available records give for the state's Ozark counties the average maximum and minimum temperatures in degrees Fahrenheit as follows:

<u>County</u>	<u>Maximum Temperature</u>	<u>Minimum Temperature</u>
Adair	114	-27
Cherokee	118	-23
Delaware	114	-25
Mayes	117	-21
Muskogee	118	-14
Ottawa	114	-25
Sequoyah	115	-10

The dates of killing frosts of last and first average appearance with number of days in growing season as follows:

County	Appearance		Growing Season
	First	Last	
Adair	April 10	October 27	200
Cherokee	April 6	October 30	207
Delaware	March 31	October 31	214
Mayes	April 3	October 31	211
Muskogee	March 26	November 4	223
Ottawa	April 21	October 28	207
Sequoyah	March 31	November 3	217

The average annual precipitation, in inches is given as follows:

County	Precipitation
Adair	46.84
Cherokee	41.17
Delaware	44.39
Mayes	43.54
Muskogee	39.50
Ottawa	41.93
Sequoyah	41.79

In late spring eastern Oklahoma and the adjoining states receive, on the average, more rainfall than any other part of the country east of the Rocky Mountains.

Some of the lowest annual precipitations ever recorded in the weather history of the state occurred during the eight-year period of the author's plant collecting experience. The following United States Weather Bureau (127) annual precipitation records start with 1951 as wet to about average, through dry to very dry years, and end with 1958 as another average to wet year. These records in inches per year by county are as follows:

County	1951	1952	1953	1954
	1955	1956	1957	1958
Adair	43.5	37.6	36.2	30.3
	39.1	36.3	62.7	51.6
Cherokee	46.8	30.8	37.4	25.1
	36.9	33.7	58.6	46.6
Delaware	47.8	26.0	30.6	34.2
	32.8	36.7	57.4	43.1

Mayes	47.8	28.3	40.3	28.5
	33.2	33.5	60.4	35.4
Muskogee	48.4	32.5	34.1	22.8
	29.2	26.8	56.3	45.5
Ottawa	----	30.4	27.6	32.8
	36.9	32.2	49.6	52.6
Sequoyah	52.7	35.2	40.3	33.5
	30.2	32.0	68.4	57.9

TAXONOMIC HISTORY

One of the earliest botanists to visit the Oklahoma and Arkansas Ozarks was Thomas Nuttall. On July 11, 1819 he passed the mouth of the Illinois River and encountered a three to four foot cascade in the Arkansas River about four miles above its confluence with the Illinois. Nuttall (83:233) records:

The variety of trees which commonly form the North American forest here begin very sensibly to diminish. We now scarcely see any other than the smooth-barked cottonwood, the elm, box-elder (*Acer Negundo*), curled maple (*Acer dasycarpon*), and ash, all of them reduced in stature. From hence the forest begins to disappear before the pervading plain.

Nuttall (83:234) reached the mouth of the Verdigris River by July 14 On the alluvial lands between the Grand and Verdigris rivers he saw "... larger trees than ... since leaving Port Smith. Among them were lofty scarlet oaks, ash, and hackberry, and whole areas of nettles (*Urtica divaricata*)... ."

By July 17, with two companions, Nuttall (83:241) started a two day trip by canoe up the Grand River to visit the Osage Saltworks on some cliffs, on the 18th, he ...recognized as new, a large shrub... a simple leaved *Rhus*, scarcely distinct from *R. cotinus* of the south of Europe and our gardens... The gravel bars were almost covered with *Amsonia salicifolia*, with which grew the *Sesbania macrocarpa* of Florida.

That evening, two miles below the Osage Saltworks (50 miles above the Arkansas River), Nuttall (83 :242) notes that ...

"In this elevated alluvion I still observed the coffee-bean tree (*Gymnocladus canadensis*), the over-cup white oak (*Quercus macrocarpa*), the pecan (*Carya olivaeformis*), the common hickory, ash, elm, and below, in places near the margin of the river, the poplar-leaved birch (*Betula populifolia*)."

Nuttall (83:244) had his first attack of an intermittent fever, so he left the nearly deserted Osage Saltworks on July 20, "...and proceeded, by compass, across the Great Osage Plain, towards the mouth of the Verdigris."

The saltworks were nearly deserted due to the murder of Mr. Campbell by Erhart, his late partner, and two accomplices. Nuttall (83:242) comments, "I could not but congratulate myself on having escaped, perhaps a similar fate. At the Cadron, I had made application to Childer's, one of these remorseless villains, as a woodsman and hunter, to accompany me for hire, only about a month before he had shot and barbarously scalped Mr. Campbell, ..."

In Nuttall's *Collections Towards a Flora the Territory of Arkansas* (84:165-168), are recorded *Amaranthus tamariscinus* and *Betula populifolia* as collected from the banks of Grand River. *Euphorbia heterantha* was listed as being found "on the sandy banks of the Arkansas from Fort Smith to Salt River." Other specimens from areas outside the Ozarks but in close proximity are: *Alisina rostrata* (84:159) "in the ponds of the Verdigris River of Arkansas," *Rivina portulacoides* (84 :167) "on the alluvial lands of the Verdigris River near its confluence with the Arkansas," and *Euphorbia obtusata* (8:172) "on the banks of the Arkansas from the Verdigris to Salt River."

Edward James was the second botanist to enter the Oklahoma Ozarks when his party crossed the Arkansas River between Muskogee and Sequoyah counties. The day (September 10, 1820) was spent in trying to work their way through "a dense and almost impenetrable cane-brake," where no vestige of a path could be found. On September 11 they resumed their trip to Fort Smith (79:236).

Fort Gibson was established by General Arbuckle in 1824, the same year that Fort Smith was abandoned by the Army (79:444). Zina Pitcher, surgeon in the United States Army, was stationed at Fort Gibson from 1831 to 1834. When his duties permitted, he collected plants for John Torrey (79:286).

Another botanist to visit Fort Gibson was Charles Joseph Latrobe in company with Washington Irving and Count Albert Pourtales (67). Neither Latrobe nor any other member of the party displayed much interest in collecting plants during their one month of hunting in the Indian Territory (79:386)

The German botanist, Heinrich Karl Beyrich, made use of army protection during his journey from St. Louis to Fort Gibson and thence to the cross timbers in 1834. Lasigue in his *Musee' botanique de M. Benjamin Delessert* (page 466) stated that, on the return trip, "Beyrich was attacked by Cholera and died at Fort Gibson in September 1834" (79:386, 583).

In 1845 J. W. Albert and party followed the Arkansas River on their way to St. Louis. On October 20th Albert observed on the way that they

"...found some of the fruit of the pawpaw, (*Ammona triloba*), and black walnuts ... had been seen... among the sylvia, the elm, and various species of the oak and hickory, among the latter, the bitternut hickory (*Juglans aurata*)... as well as the buttonwood and spicewood (79:939).

During the Civil War, Fort Gibson was reactivated and given the temporary name of Fort Blunt. Dr. Edward Palmer was stationed there during July and August of 1863. The Battle of Honey Springs was fought on July 17th some 15 miles south of Muskogee. In spite of military duties, Palmer found time to collect a few plants, one of which, (*Clitoria mariana*), is in the United States National Herbarium (82:208). Palmer again visited "Fort Gibson, Arkansas" with General Leavenworth's party in late January of 1868. They left soon after the first of February (82:35-36).

Butler (9) reported on a collection from the Oklahoma Ozarks. It included *Monarda Bradburiana* Beck from the Cherokee Nation.

The Cherokee and Creek Nations were visited by M. A. Carleton (11) early in the spring of 1891. Some of the plants which he located simply as "Muscogee" or "Muscogee, Arkansas River" may have been collected north of the Arkansas River (which is only about one and one-half miles to the northeast).

Species identified and listed by Holzinger (63) are: *Ranunculus abortivus* L., var. *micranthus* Gray, *Ilex decidua* Walt., *Lathyrus pusillus* Eli., *Crataegus arborescens* Ell., *Oenothera linifolia* Nutt., *O. speciosa* Nutt., *Polytaenia Nuttallii* DC., *Viburnum prunifolium* L., *Bellis integrifolia* Michx., *Erigeron philadeiphicus* L., *Myosotis verna* Nutt., *Gratiola virginiana* L., *Veronica arvensis* L., *Pedicularis canadensis* L., *Plantago pusilla* Nutt., *Sisyrinchium bellum* Watson, *Hypoxis erecta* L., *Carex granularis* Muhl., *C. grisea* Wahl. var. *globosa* Bailey, *Q. Muhlenbergii* Schkuhr var. *australis* Olney, *C. riparia* W. Curtis, *C. tetanica* Schkuhr var. *Meadii* Bailey, *C. triceps* Michx., and *C. varia* Muhl.

C. H. Fitch (47) in 1900 reported on woodland of the Indian Territory by township and range. The timber was simply listed as oak, ash, elm, hickory, pecan, walnut, cottonwood, etc.

C. N. Gould (55) in 1903 made a list of trees, shrubs, and vines of the Cherokee Nation.

Other collections from the Oklahoma Ozarks, now deposited in the Oklahoma State University Herbarium, are those of R. Bebb, G. W. Stevens, and U. T. Waterfall.

ECOLOGY

General Distribution

Bruner (8) recognizes two main forest areas in Oklahoma. These are the deciduous forest formation with oak-hickory associations occupying the Oklahoma Ozarks in the northeast part of the state and the Ouachita Mountains in the southeast with the oak-hickory savannah of the Arkansas valley region separating the two. An extreme northeast tip of the Andropogon associates of the prairie plains extends from the Neosho to Spring rivers in the vicinity of Miami, Pitcher, and Quapaw of Ottawa County.

The most common oak-hickory association is *Quercus velutina*, *Carya tomentosa* and *C. ovalis*. Where the tops of the hills become more xeric, *Quercus marylandica* and *stellata* replace *Q. velutina* with *Ulmus alata* as another common tree. Considerable stands of *Pinus echinacea* are occasionally found on the sides and tops of the cherty hills, especially near Salina in Mayes County, Tahlequah in Cherokee County, and Jay in Delaware County. Further down the sides of the larger hills and into the narrow valleys will be found *Quercus rubra* and *Q. Muhlenbergii* with occasional *Carya cordiformis* plus *C. ovata* and some *C. tomentosa*. The larger valleys of creeks and rivers have *Quercus*

Muhlenbergii and *Q. macrocarpa* with *Carya cordiformis* and *C. Illinoensis*. Considerable numbers of scattered *Castanea ozarkensis* are found in the wooded hills from northern Cherokee and Adair counties northward. Several *Quercus nigra* trees are found in the valleys southeast and east of Sallisaw in Sequoyah County. In the Marble City area of Sallisaw Creek in Sequoyah County are several specimens of *Carya ovalis*.

The forests in the larger valleys have many species of trees as well as undershrubs and herbs. Some of the more common trees other than those listed above are: *Populus deltoides*, *Salix nigra*, *Juglans nigra*, *Ulmus americana*, *U. rubra*, *Celtis laevigata*, *Morus rubra*, *Platanus occidentalis*, *Prunus serotina*, *Gymnocladus dioica*, *Acer saccharinum*, *A. Negundo*, *Diospyros virginiana*, and *Fraxinus pennsylvanica*. Some of the more prominent undershrubs are: *Lindera Benzoin*, *Cercis canadensis*, *Prunus mexicana*, *Ilex decidua*, *Cornus Drummondii*, and *Viburnum rufidulum*. The lianas include: *Smilax Bona-nox*, *Rhus radicans*, *Ampelopsis cordata*, *Parthenocissus quinquefolia*, and *Vitis vulpina*.

Many small prairies are located on some of the broader flat-top hills and along the southern and western borders of the forests where they meet the Arkansas valley and the prairie region. The best areas of these have been put under cultivation, and only the more irregular steep-sloped, or low portions have been left in native grasses. Even these are not suited for complete study from mid-summer through fall because they are mowed for hay. In fact, every portion of the Oklahoma Ozarks has had disturbances by man in some form or other such as: fire, cutting of timber, livestock grazing, or cultivation. The common prairie

species are listed later on in this chapter.

Where the oak-hickory woods of the hills border on the larger prairie areas, the woods are of a more open type and have such trees as: *Quercus marilandica*, *Q. stellata*, *Ulmus alata*, *U. Americana*, *Celtis tenuifolia*, *Sassafras albidum* var. *molle*, *Gleditsia triacanthos*, *Bumelia lanuginosa* var. *oblongifolia*, and *Diospyros virginiana*. The smaller trees and undershrubs are represented by: *Crataegus crus-galli*, *C. viridis*, *Prunus hortulana*, *Rosa setigera* var. *tomentosa*, *Rubus aboriginum*, *R. mollior*, *R. ozarkensis*, *Cercis canadensis*, *Rhus copallina* var. *latifolia*, *R. glabra*, *Cornus Drummondii*, and *Symphoricarpos orbiculatus*.

Several stations were selected for study, and intensive collecting was done at each one in order to show the seasonal aspect. From these seventeen stations the following were selected: a prairie station three miles east of Fort Gibson on U. S. Highway 62 in Muskogee County because of its southwest position in the Arkansas valley and its oak-hickory savannah; a prairie station one-half mile northeast of Quapaw on U.S. Highway 66 in Ottawa County because of its prairie plains location; a double station at Dripping Springs five and one-half miles west of Siloam Springs, Arkansas, on U.S. Highway 59 in Delaware County because of its canyon-like valley and hill combination; a pond station one-half mile southeast of Blackgum on State Highway 100 in Sequoyah County because of its protection from livestock for one and one-half years; and a general hill station in the Brushy Mountains twelve miles northeast of Sallisaw on U.S. Highway 59 in Sequoyah County.

Fort Gibson Prairie Station

The common vernal species are: *Vulpia octoflora*, *Carex Crawei*, *Fimbristylis Drummondii*, *Tradescantia ohiensis*, *Nothoscordum bivalve*, *Zigadenus Nuttallii*, *Hypoxis hirsuta*, *Sisyrinchium varians*, *Claytonia virginica*, *Arenaria patula* forma *media*, *Stellaria Nuttallii*, *Delphinium carolinianum* var. *Nortonianum*, *Rosa carolina* var. *villosa*, *Baptisia leucophaea* var. *leucophaea*, *Psoralea tenuiflora* var. *floribunda*, *Asclepias viridis*, *Penstemon tubaefflorus*, *Plantago aristata*, *P. virginica*, *Achillea lanulosa*, *Echinacea pallida*, *Erigeron strigosus*, *Krigia Dandelion*, *K. occidentalis*, and *Serinia oppositifolia*.

The common aestival species are: *Andropogon Gerardi* var. *Gerardi*, *A. saccharoides*, *Eragrostis capillaris*, *Manisuris cylindrica*, *Panicum virgatum*, *Paspalum ciliatifolium* var. *Muhlenbergii*, *Sporobolus asper* var. *Hookeri*, *Triodia flava*, *T. stricta*, *Cyperus filiculmis*, *Potentilla simplex* var. *simplex*, *Dalea candida*, *Desmodium sessilifolium*, *Schrankia Nuttallii*, *Croton mona anthogynus*, *Euphorbia corollata* var. *paniculata*, *Gaura biennis* var. *Pitcheri*, *Ptilimnium Nuttallii*, *Physostegia angustifolia*, *Ruellia humilis* var. *longiflora*, *Gaillardia fastigiata*, *Rudbeckia hirta* var. *pulcherrima*, and *Silphium laciniatum* var. *laciniatum*.

The common serotinal species are: *Salvia azurea* var. *grandiflora*, *Aster ericoides*, *A. praealtus*, *Solidago altissima*, and *S. missouriensis* var. *fasciculata*.

Quapaw Prairie Station

The common vernal species are: *Vulpia octoflora*, *Carex Crawei*, *Allium canadense* var. *mobile*, *Camassia scilloides*, *Erythronium albidum* var. *mesochoreum*, *Hypoxis hirsuta*,

Claytonia virginica, *Anemone caroliniana* forma *caroliniana*, *Delphinium carolinianum* var. *crispum*, *Ranunculus fascicularis* var. *apricus*, *Psoralea tenuiflora* var. *floribunda*, *Viola sagittata*, *Polytaenia Nuttallii*, *Dodecatheon Meadia* formas *album* and *Meadia*, *Asclepias hirtella*, *A. viridis*, *Castilleja coccinea coccinea*, *Penstemon tubaefflorus*, *Plantago aristata*, *Houstonia patens*, *Lobelia appendiculata*, *Antennaria campestris*, *Erigeron strigosus*, *Krigia Dandelion*, and *K. occidentalis*.

The common aestival species are: *Andropogon Gerardi* var. *Gerardi*, *Panicum capillare* var. *capillare*, *P. praecocius*, *Sorghastrum nutans*, *Triodia flava*, *T. stricta*, *Strophostyles leiosperma*, *Gaura biennis* var. *Pitcheri*, *Eryngium yuccifolium* var. *synchaetum*, *Physostegia angustifolia*, *Ruellia humilis* var. *longiflora*, *Achillea lanulosa*, *Boltonia latisquama*, *Coreopsis grandiflora* var. *grandiflora*, *Liatris pycnostachya*, and *Rudbeckia hirta* var. *pulcherrima*.

The common serotinal species are: *Salvia azurea* var. *grandiflora*, *Aster ericoides*, *A. hemisphericus*, *A. pilosus*, and *Solidago canadensis* var. *gilvocanescens*.

Dripping Springs Valley Station

The common trees and undershrubs are: *Juglans nigra*, *Ostrya virginiana* var. *lasia*, *Quercus alba*, *Ulmus americana*, *Morus rubra*, *Lindera Benzoin* var. *Benzoin*, *Hydrangea arborescens* var. *arborescens*, *Platanus occidentalis*, *Prunus serotina*, *Cercis canadensis*, *Rhus radicans*, *Cornus florida*, *Rhododendron canescens*, *Diospyros virginiana*, *Fraxinus americana* var. *americana*, and *Viburnum rufidulum*.

The common vernal species are: *Panicum Boscii*, *Carex Frankii*, *C. lurida*, *Arisaema*

atrorubens formas *viride* and *zebrinum*, *Saururus cernuus*, *Claytonia virginica*, *Dianthus Armeria*, *Stellaria media*, *Anemone virginiana*, *Anemonella thalictroides*, *Aquilegia canadensis* var. *latiuscula*, *Ranunculus recurvatus*, *Cardamine bulbosa*, *Saxifraga virginiana* var. *subintegra*, *Cercis canadensis*, *Vicia minutiflora*, *Geranium maculatum*, *Viola pensylvanica* var. *pensylvanica*, *V. triloba* var. *dilatata*, *Chaerophyllum tainturieri* var. *tainturieri*, *Cornus florida*, *Rhododendron canescens*, *Glechoma hederacea* var. *micrantha*, *Houstonia purpurea*, *Viburnum rufidulum*, *Neclo aureus*, and *S. obovatus* var. *rotundus*.

The common aestival species are: *Adiantum Capillus-Veneris*, *Asplenium platyneuron*, *Polystichum acrostichoides*, *Parietaria pensylvanica*, *Hydrangea arboreacens* var. *arborescens*, *Impatiens capensis*, and *Scutellaria ovata* var. *ovata*.

The common serotinal species are: *Boehmeria cylindrica* var. *cylindrica*, *Pilea pumila*, *Polygonum pensylvanicum* var. *laevigata*, *P. punctatum* var. *leptostachyum*, *Chenopodium Standlevanum*, *Acalypha rhomboidea*, *Perilla frutescens*, and *Erechtites hieracifolia* var. *praealta*.

Dripping Springs Hill Station

The common trees and undershrubs are: *Juniperus virginiana*, *Carya ovalis*, *C. tomentosa*, *Quercus alba*, *Q. stellata*, *Q. velutina*, *Celtis tenuifolia* var. *georgiana*, *Amelanchier arborea*, *Rubus frutifer*, *Rhus aromatica* var. *serotina*, *R. copallina* var. *latifolia*, *R. glabra*, *Vaccinium stamineum*, and *Symphoricarpos orbiculatus*.

The common vernal species are: *Danthonia spicata* var. *longipila*, *Luzula bulbosa*, *Hypoxis hirsuta*, *Comandra Richardsiana*,

Dianthus Ameria, *Anemonella thalictroides*, *Arabis missouriensis*, *Cardamine parviflora* var. *arenicola*, *Amelanchier arboea*, *Oxalis violaceae*, var. *trichophora*, *Kitabeliana* var. *Rafinesquii*, *V. pedata* var. *lineariloba*, *Vaccinium stamineum*, *Houstonia patens*, *Atennaria plantaginifolia*, *Erigeron strigosus*, *Gnaphallum purpureum*, and *Krigia virginica*.

The common aestival species are: *Panicum malacophyllum*, *P. praecocius*, *Bulbostylis capillaris*, *Carex Bushii*, *Cyperus ovularis* var. *sphaericus*, *Rhynchosia latifolia*, *Schrankia Nuttallii*, *Stylosanthes biflora* var. *hispidissima*, *Tephrosia virginiana*, *Crotonopsis elliptica*, *Ascyrum hypericoides*, *Torilis japonica*, *Asclepias verticillata*, *Monarda fistulosa* var. *fistulosa*, *Pycnanthemum tenuifolium*, *Solarium carolinense* var. *albiflorum*, *Verbascum thapsus*, *Ruellia humilis* var. *longiflora*, *Dipsacus sylvestris*, *Lobelia spicata* var. *leptostachys*, *Erigeron annuus*, *Hieracium Gronovii*, *Lactuca canadensis* var. *latifolia*, and *Rudbeckia hirta* var. *pulcherrima*.

The common serotinal species are: *Andropogon scoparius*, *Gerardia Gattingeri*, *Aster anomalus*, and *A. turbinellus*.

Blackgum Pond Station

Trees and undershrubs are: *Salix nigra* and *Cephalanthus occidentalis*.

The common vernal species are: *Potamogeton diversifolius*, *Cyperus virens*, *Scirpus koilolepis*, *Juncus brachycarpus*, *J. diffusissimus*, *J. interior*, *J. marginatus*, *J. validus*, *Ranunculus laxicaulis*, *Gratiola neglecta*, and *Lindernia anagallidea*.

The common aestival species are: *Sagittaria ambigua*, *Echinochloa crusgalli*, *Rotala ramosior* var. *interior*, *Rhexia interor*, *Ludwigia alternifolia*

var. *alternifolia*, *L. glandulosa*
var. *glandulosa*, *Hydrolea ovata*,
Verbena hastata, *Gratiola*
virginiana, *Cephalanthus*
occidentalis, and *Helenium*
flexuosum.

The common serotinal species are: *Eleocharis lanceolata*, *Polygonum hydropiperoides* var. *Bushmanum*, *P. pennsylvanicum* var. *laevigatum*, *P. punctatum* var. *leptostachyum*, *Gerardia fasciculata*, *G. heterophylla*, *Bidena polylepis*, *Boltonia diffusa* var. *interior*, and *B. latisquama*.

Brushy Mountains Station

The common trees and undershrubs are: *Carya tomentosa*, *Quercus marilandica*, *Q. stellata*, *Ulmus alata*, *Amelanchier arborea*, *Prunus americana*, *Rhus aromatica*, *R. copallina* var. *latifolia*, and *Symphoricarpos orbiculatus*.

The common vernal species are: *Vulpia octoflora*, *Hypoxis hirsuta*, *Claytonia virginica*, *Arenaria patula* forma *media*, *Anemonella thalictroides*, *Ranunculus fascicularis* var. *apricus*, *R. Harveyi*, *Viola pedata* var. *lineariloba*, *V. Kitaibeliana* var. *Rafinesguil*, *Oenothera linifolia*, *Dodecatheon Meadia* forma *album*, *Collinsia violacea*, *Ruellia humilis* var. *longiflora*, *Plantago aristata*, *Hustonia patens*, *Valerianella longiflora*, *Antennaria plantaginifolia*, *Astranthium integrifolium*, and *Erigeron strigosus*.

The common aestival species are: *Andropogon scoparius*, *Danthonia spicata* var. *longipila*, *Eragrostis capillaris*, *Manisuras cylindrica*, *Dalea candida*, *Crotonopsis elliptica*, *Hypericum Drummondii*, *H. pseudomaculatum*, *Daucus pusillus*, *Ptilimnium Nuttallii*, *Spermolepis divaricata*, *Diodi teres* var. *setifera*, *Ambrosia bidentata*, *Helenium amara*, *Heterotheca pilosa*, and *Rudbeckia hirta* var. *pulcherrima*.

The common serotinal species

are: *Desmodium paniculatum*, *Aster azureus* var. *azureus*, *A. patens*, *A. pilosus*, *A. turbinellus*, *Liatris squarrosa* var. *hirsuta*, and *Solidago petriolaria* var. *Wardii*.

Two other stations were of special interest because a few of the species found were near the extreme limit of their range. These are the Arkansas River sands three and one-half miles south of Fort Gibson in Muskogee County, because of some western species, and the Keyough Bluff station three miles north of Fort Gibson, because of some eastern and southeastern species.

Western species of the Arkansas River sands include: *Cenchrus pauciflorus*, *Cycloloma atriplicifolium*, *Dalea lanata*, *Euphorbia hexagona*, *Heliotropium convolvulaceum*, and *Lippia incisa*.

Eastern species of the Keyough Bluffs are: *Camptosorus rhizophyllus*, *Asarum canadense* var. *acuminatum*, *Rivina humilis*, *Rubus occidentalis*, *Cladrastis lutea*, *Cotinus obovatus*, and *Acer saccharum*.

ADDITIONS TO THE STATE FLORA

Those taxa preceded by an asterisk have not been reported previously as additions to the state flora. All of the others have been reported in the *Proceedings of the Oklahoma Academy of Science* (128, 135) as additions to the state flora from the Oklahoma Ozarks.

Elodea Nuttallii (Planch.) St. John; shallow pools of Illinois River and Flint Creek; Cherokee and Delaware counties.

**Arisaema atrorubens* (Ait.) Blume, forma *viride* (Engler) Fern. The following specimens are so identified because of the "spathe green, without or with only faint stripes" (43): Wallis 6595-1 from wooded base of bluffs

- on Ballard Creek, 1 mile south of Watts in Adair County, Wallis 3626 from wooded base of a hill, 14½ miles northeast of Tahlequah in Cherokee County and Wallis 3658 from Dripping Springs valley, 5½ miles west of the state line in Delaware County. Both forma *zebrinum* and forma *viride* were found growing together in Cherokee and Delaware counties.
- **Tradescantia Ernestiana* Anders. & Woodson, forma *alba* Waterfall; flint bluffs; type specimen is Walls 395 from Cherokee County (132), also collected later from Delaware and Muskogee counties.
- Aletris farinosa* L.; low areas in a prairie; Delaware County.
- Allium vineale* L., forma *compactum* (Thuill.). Aschers.; along roadsides; Adair, Delaware, Ottawa, and Sequoyah counties.
- Allium vineale* L., forma *vineale*; along roadside; Delaware County.
- Iris virginica* L., var. *Shrevei* (Small) E. Andera.; *Shallows of spring-fed creeks*; Cherokee and Ottawa counties.
- Urtica dioica* L.; wooded bank of Lost Creek; Ottawa County.
- Paronychia canadensis* (L.) Wood; in a wooded valley; Cherokee County.
- Clematis ligusticifolia* Nutt.; woods of a creek; Cherokee County.
- Clematis virginiana* L.; fence row in a creek valley; Cherokee County.
- Delphinium tricorne* Michx., forma *albiflora* Millsp.; woods of Flint Creek; Delaware County.
- Draba aprica* Beadle; woods of Falls Branch; Cherokee County.
- Rorippa islandica* (Oeder) Borbas, var. *hispida* (Desv.) Butt. & Abbe; valleys of Flint and Sallisaw creeks; Delaware and Sequoyah counties.
- Desmodium rigidum* (Ell.) DC.; woods of hills; Delaware, Mayes, and Sequoyah counties.
- Rhamnus lanceolata* Pursh, var. *glabrata* Gleason; woods of a small creek; Cherokee County.
- Hypericum gentianoides* (L.) BSP.; oak-hickory woods of a hill; Delaware County.
- Lamium amplexicaule* L., forma *albiflorum* D. M. Moore; road-side; Cherokee County.
- **Leonurus sibiricus* L. is represented by Wallis 7673 from oak-hickory woods and roadside, 23 miles northeast of Tahlequah in Adair County, and Wallis 792 and 933 from open roadsides, 8.7 miles northeast of Tahlequah in Cherokee County. The "10-nerved, scarcely angled" calyx and conspicuous bracts "half to fully as long as the calyx" (53) as well as leaves "deeply 3-7 cleft and incised" (43) separate this species from the less common *L. Cardica*.
- Melissa officinalis* L.; in valley of a spring-fed creek; Mayes County.
- **Castilleja coccinea* (L.) Spreng., forma *lutescens* Farw. was collected as Wallis 6652, 6684, and 6840. They are hairy annuals with yellow floral bracts (43) as compared to the red bracts of the abundant forma *coccinea*. Both formas were found growing together in prairie areas, ½ mile northeast of Quapaw in Ottawa County and ½ mile north and 1 mile west of Peggs in Cherokee and Mayes counties.
- Dipsacus sylvestris* Huds.; wooded hillsides; Cherokee and Delaware counties.
- Cacalia Muhlenbergii* (Sch. Bip.); wooded valleys; Adair, Delaware, and Ottawa counties.
- Liatris aspera* Michx., var. *aspera*, forma *Benkii* (Macbr.) Fern.; prairie; Cherokee County.

SUMMARY

A floristic study of Cherokee County from 1950 to 1953 encouraged the author to undertake a similar study covering the entire Oklahoma Ozarks. The Cherokee County collection of 1,400 sheets was expanded to some 7,000 sheets between the years of 1953 and 1958. In addition to these, the author reevaluated 497 sheets of plants collected by others in the Oklahoma Ozarks.

The identification of the plants involved the use of 130 monographic studies and other taxonomic literature. All of the plant collections studied by the author are deposited in the Herbarium of the Oklahoma State University, and many duplicates of these are in the author's private museum at Fort Gibson, Oklahoma.

Intensive collecting was done at 17 stations in order to study the seasonal changes of herbaceous plant societies, and extensive collecting was done throughout the Oklahoma Ozarks for a general distribution study. The order of listing of the families follows that of the Engler-Prantl system. Each species is accompanied with general habitats and locations in which one or more specimens have been collected. Whenever a citation of a collection other than that of the author's was used, notation was made as to the collector and collection number.

A total of 123 families represented by 534 genera and 1,377 species and subordinate taxa are listed. The families having the greatest numbers of species and subordinate taxa were: Compositae 192, Gramineae 150, Leguminosae 93, Cyperaceae 84, Rosaceae 46, Labiatae 43, Scrophulariaceae 34, Cruciferae 3, Euphorbiaceae 33, Ranunculaceae 32, and Liliaceae 30. These eleven families contain 56 percent of the total species and subordinate taxa.

Twenty four additions to the Oklahoma Flora were made by the author from this collection. These are listed separately as additions to the state flora and also are incorporated in the general listing without any special references.

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For convenience of listing, a few floras, manuals, and catalogues have been included in this list of cited literature. These general references are numbers 43, 53, 96, 111, 115, 118, 131, and 134.

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UPDATED OKLAHOMA OZARK FLORA
A Checklist for the Vascular Flora of Ozark Plateau in Oklahoma
based on the work of C.S. Wallis
and records from the Oklahoma Vascular Plants Database

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Charles Wallis' 1959 dissertation "Vascular Plants of the Oklahoma Ozarks" is one of the most important floristic works for state botanists and conservationists. Although a number of local and county floras for Oklahoma have been published, only Wallis and C. T. Eskew (1937) have completed regional studies. Wallis's interest in the Ozark flora began with his 1953 masters thesis, "The Spermophyta of Cherokee County Oklahoma," and subsequent studies in collaboration with U. T. Waterfall at Oklahoma A&M (Wallis 1957; Wallis and Waterfall 1953; Waterfall and Wallis 1962, 1963). This paper has two objectives, to update the taxonomy of Wallis's Ozark list (WOL) and to provide a current Ozark checklist (OC) by inclusion of records that did not appear in WOL. Since several decades have passed since the WOL was completed, there have been many changes in the taxonomy of the plants listed. These updates will enhance the utility of the WOL for modern users and not detract from Wallis's original work.

The OC was compiled by comparing the updated WOL with the Oklahoma Vascular Plants Database (OVPD; Hoagland et al. 2007). Nomenclature for the OC follows the United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS 2007). In the OC, species introduced to North America were

determined using the USDA-NRCS (2007).

The WOL and OC were summarized separately following Palmer et al. (1995) (Tables 1 and 2). The OC was also compared with the rare species tracking list of the Oklahoma Natural Heritage Inventory (2007) to determine which species of conservation interest were listed (Table 3).

The WOL consisted of 1,205 species or 1,240 when subspecies, varieties, and hybrids were added. These taxa belong to 556 genera in 131 families. In the OC, there were 303 species that did not appear in the WOL, for a total of 1,508 species. Subspecies, varieties, and hybrids accounted for 57 additional taxa, increasing the total to 1,565 taxa. (Note that the OC does not include *Castanea dentata*, *Opuntia phaeacantha*, and *Quercus coccinea* species which appeared in Wallis's original list. They have since been annotated to other taxa.) These taxa belong to 615 genera in 145 families. The most speciose families in the WOL were the Asteraceae 213, Poaceae 172, Cyperaceae 104, and Fabaceae 100. The genus *Carex* contained the most species (51) in the WOL, followed by *Dichanthelium* and *Polygonum*, each with 20 taxa.

There were 134 taxa of non-native plants or 10.8% of the total taxa in the WOL. There were an additional 54 non-native taxa in the OC for a total of 188, or 12.0% of the total taxa reported. Non-native species occurred in 45 families. The genera with the greatest number of non-native species were *Trifolium* (7 species), *Bromus* (5), and *Polygonum* (5).

Seventy-nine taxa tracked by the Oklahoma Natural Heritage Inventory were present in the OC (Table 3). Of these, 50 were reported by Wallis and 28 were added from the OVPD. Conservation ranks are assigned to taxa according to level of imperilment at the state (S) and global (G) levels on a scale of 1 – 5, where 1 represents a species that is imperiled and 5 a species that is secure (Groves et al. 1995). Fifty-one taxa or 66.4% of those in Table 3 were ranked as G5 and thus considered demonstrably secure at the global scale. No taxa were ranked G1 or G2, indicating imperilment at the global level. Thirty-one taxa (39.7%), however, were ranked as S1, 12 as S2, and 19 as S1S2. The higher percentage of state rare species indicates that many of these species are at the western margin of their ranges in eastern Oklahoma. In Oklahoma, some of species listed in Table 3 occur only in the Ozarks, such as *Clematis virginiana*, *Equisetum arvense* (one location in Adair County), *Erigenia bulbosa*, *Gentiana alba*, *Glyceria acutiflora*, *Heteranthera dubia* (one location in Cherokee County), *Physocarpus opulifolius* var. *intermedius*, *Silene regia*, and *Symphotrichum novae-angliae* (Cherokee County only). *Castanea pumila* var. *ozarkensis* and *Silene regia* are species of concern and were once candidates for federal listing as threatened.

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Table 1 Summary of Wallis's (1959) floristic list of the Oklahoma Ozarks. Numbers outside the parentheses represent the number of species reported, those within the parentheses represent the total number of taxa reported, including subspecies and varieties. The number of hybrids reported is denoted with an asterisk.

Taxonomic Group	Taxa	Native	Non-native
Equisetophyta	0 (1*)	0 (1*)	0
Lycopodiophyta	1	1	0
Pteridophyta	21	21	0
Coniferophyta	2	2	0
Magnoliophyta	1,181 (1,215)	1,047 (1,081)	134
Magnoliopsida	882 (909)	781 (808)	101
Liliopsida	299 (306)	266 (273)	33
Total	1,205 (1,240)	1,071 (1,106)	134

Table 2 Summary of all plants reported from the Oklahoma Ozarks based upon Wallis (1959) and data in the Oklahoma Vascular Plants Database. Numbers outside the parentheses represent the number of species reported, those within the parentheses represent the total number of taxa reported, including subspecies and varieties. The number of hybrids reported is denoted with an asterisk.

Taxonomic Group	Taxa	Native	Non-native
Equisetophyta	3 (3; 1*)	3 (3; 1*)	0
Lycopodiophyta	3	3	0
Pteridophyta	31 (32)	31 (32)	0
Coniferophyta	3	3	0
Magnoliophyta	1,481 (1,518; 5*)	1,280 (1,330; 5*)	188
Magnoliopsida	1,082 (1,125; 5*)	945 (983; 5*)	142
Liliopsida	381 (393)	335 (347)	46
Total	1,508 (1,565)	1,321 (1,377)	188

Table 3 Species tracked by the Oklahoma Natural Heritage Inventory in the Oklahoma Ozarks. This list is a combination of Wallis (1959) and records from the Oklahoma Vascular Plants Database. Taxa not reported in Wallis 1959 are denoted with #. Taxa are ranked according to level of imperilment at the state (S) and global (G) levels on a scale of 1 – 5, where 1 represents a species that is imperiled and 5 a species that it is secure (Groves et al. 1995).

Taxa	G-rank	S-rank
<i>Agalinis tenuifolia</i> var. <i>parviflora</i>	G5	S2S3
# <i>Agalinis viridis</i>	G4	S1
<i>Aletris farinose</i>	G5	S1S2
<i>Arabis shortii</i>	G5	S1S2
<i>Arnoglossum atriplicifolium</i>	G4	S1S2
<i>Arnoglossum reniforme</i>	G5	S1S2
<i>Aruncus dioicus</i> var. <i>pubescens</i>	G4	S1S3
<i>Asplenium bradleyi</i>	G5	S1
<i>Axonopus fissifolius</i>	G4	S1
# <i>Brachyelytrum erectum</i>	G5	S1
# <i>Brasenia schreberi</i>	G5	S1
<i>Callirhoe busbii</i>	G3	S3
# <i>Calopogon oklabomensis</i>	G4	S1
<i>Calopogon tuberosus</i> var. <i>tuberosus</i>	G5	S1
<i>Carex cephalophora</i> var. <i>cephalophora</i>	G5	S2
<i>Carex oklabomensis</i>	G4	S2
# <i>Carex oxylepis</i>	G5	S2
<i>Castanea pumila</i> var. <i>ozarkensis</i>	G5	S2
# <i>Cayaponia grandifolia</i>	G4	S1
<i>Cladrastis kentuckea</i>	G4	S2S3
<i>Clematis virginiana</i>	G5	S1S2
# <i>Collinsia verna</i>	G5	S1
# <i>Corallorrhiza odontorhiza</i>	G5	S1

<i>Cotinus obovatus</i>	G4	S3	<i>Panicum brachyanthum</i>	G5	S2S3
# <i>Croton michauxii</i>	G5	S1	# <i>Perideridia americana</i>	G4	S1S2
# <i>Cypripedium kentuckiense</i>	G3	S1	# <i>Phacelia gillioides</i>	G5	S1
<i>Desmodium pauciflorum</i>	G5	S1	<i>Phaseolus polystachios</i>	G4	S1
<i>Dicentra cucullaria</i>	G5	S1S2	<i>Philadelphus pubescens</i>	G5	S2
<i>Draba aprica</i>	G3	S1	<i>Physocarpus opulifolius</i> var. <i>intermedius</i>	G5	S1S3
# <i>Drosera brevifolia</i>	G5	S2S3	# <i>Pilularia americana</i>	G5	S1S2
# <i>Equisetum arvense</i>	G5	S1	<i>Platanthera lacera</i>	G5	S1S2
# <i>Erigenia bulbosa</i>	G5	S1S2	# <i>Podostemum ceratophyllum</i>	G5	S2
<i>Fraxinus quadrangulata</i>	G5	S2S3	<i>Rhamnus lanceolata</i> ssp. <i>glabrata</i>	G5	S1
<i>Galium arkansanum</i>	G5	S1S2	# <i>Rhus lanceolata</i>	G4 G5	S1S2
# <i>Gentiana alba</i>	G4 G4	S1	<i>Rhododendron canescens</i>	G5	S2S3
# <i>Gentiana puberulenta</i>	G5	S1	# <i>Ribes missouriense</i>	G5	S1
<i>Glyceria acutiflora</i>	G5	S1	<i>Rorippa teres</i>	G5	S1S2
<i>Hedeoma pulegioides</i>	G5	S1S3	<i>Silene regia</i>	G3	S1
<i>Heteranthera dubia</i>	G5	S2	<i>Sporobolus vaginiflorus</i> var. <i>ozarkanus</i>	G5	S1S2
<i>Hexalectris spicata</i>	G5	S1S2	<i>Symphyotrichum laeve</i> var. <i>laeve</i>	G5	S1S3
<i>Hypericum gentianoides</i>	G5	S1S2	<i>Symphyotrichum novae-angliae</i>	G5	S1
<i>Impatiens pallida</i>	G5	S2	<i>Tilia americana</i> var. <i>americana</i>	G5	S1S2
<i>Iris cristata</i>	G5	S2	<i>Tilia americana</i> var. <i>caroliniana</i>	G5	S1S2
<i>Iris virginica</i>	G5	S2	# <i>Tipularia discolor</i>	G4 G5	S1
# <i>Malaxis unifolia</i>	G5	S1	<i>Tradescantia ernestiana</i>	G3 G4	S?
# <i>Marsilea vestita</i>	G5	S1	<i>Tradescantia ozarkana</i>	G3	S1S2
# <i>Monotropa hypopithys</i>	G5	S1	<i>Ulmus serotina</i>	G4	S2
# <i>Monotropa uniflora</i>	G5	S1	<i>Urtica dioica</i>	G5	S2
# <i>Muhlenbergia bushii</i>	G5	S1S2	<i>Uvularia grandiflora</i>	G5	S2S3
<i>Neobeckia aquatica</i>	G4 G3	S1S3	<i>Valerianella ozarkana</i>	G3	S1
# <i>Panax quinquefolius</i>	G4	S1			

Appendix: a checklist for the vascular flora of Ozark Plateau in Oklahoma. This list was compiled from Wallis (1959) with additions from the Oklahoma Vascular Plant Database (Hoagland et al. 2007). # Indicates species not appearing in Wallis (1959). * Indicates species that are not native to North America are marked with an asterisk.

EQUISETOPHYTA

Equisetaceae

- #*Equisetum arvense* L.
- Equisetum* ×*ferrissii* Clute (pro sp.) [*hyemale* × *laevigatum*]. Syn. = *Equisetum hymenale* L. var. *intermedium*.
- #*Equisetum hyemale* L.
- #*Equisetum laevigatum* A. Braun

LYCOPODIOPHYTA

Isoetaceae

- #*Isoetes melanopoda* Gay & Durieu ex Durieu

Selaginellaceae

- Selaginella apoda* (L.) Fern.
- #*Selaginella rupestris* (L.) Spring

PTERIDOPHYTA

Aspleniaceae

- Asplenium bradleyi* D.C. Eat.
- Asplenium platyneuron* (L.) B.S.P.
- Asplenium resiliens* Kunze
- Asplenium rhizophyllum* L. Syn. = *Camptosorus rhizophyllum* (L.) Link.

Dryopteridaceae

- Athyrium filix-femina* (L.) Roth ssp. *asplenioides* (Michx.) Hultén. Syn. = *A. filix-femina* (L.) Roth var. *asplenioides* (Michx.) Farw.
- #*Cystopteris bulbifera* (L.) Bernh.
- Cystopteris fragilis* (L.) Bernh. var. *fragilis*. Wallis listed forma *dentata* (Dickson) Clute
- Cystopteris tennesseensis* Shaver. Syn. = *C. fragilis* (L.) Bernh. var. *simulans* (Weatherby) McGregor.
- Dryopteris marginalis* (L.) Gray
- Onoclea sensibilis* L.
- Polystichum acrostichoides* (Michx.) Schott
- Woodsia obtusa* (Spreng.) Torr.

Marsileaceae

- #*Marsilea vestita* Hook. & Grev.
- #*Pilularia americana* A. Braun

Ophioglossaceae

- #*Botrychium dissectum* Spreng.
- Botrychium virginianum* (L.) Sw.
- #*Ophioglossum crotalophoroides* Walt.
- #*Ophioglossum engelmannii* Prantl

Polypodiaceae

- #*Pleopeltis polypodioides* (L.) Andrews & Windham ssp. *michauxiana* (Weatherby) Andrews & Windham

Pteridaceae

- Adiantum capillus-veneris* L.
- Adiantum pedatum* L.
- Argyrochosma dealbata* (Pursh) Windham. Syn. = *Notholaena dealbata* (Pursh) Kunze.
- Asplenium trichomanes* L.
- Cheilanthes alabamensis* (Buckl.) Kunze
- Cheilanthes lanosa* (Michx.) D.C. Eat. Syn. = *C. vestita* (Spreng.) Sw.
- #*Cheilanthes tomentosa* Link
- Pellaea atropurpurea* (L.) Link
- #*Pellaea wrightiana* Hook.
- #*Pteridium aquilinum* (L.) Kuhn var. *latiusculum* (Desv.) Underwood ex Heller
- Pteridium aquilinum* (L.) Kuhn var. *pseudocaudatum* (Clute) Heller

Thelypteridaceae

- Phegopteris hexagonoptera* (Michx.) Fée. Syn. = *Dryopteris hexagonoptera* (Michx.) C. Christens.
- #*Thelypteris palustris* Schott var. *pubescens* (Lawson) Fern.

CONIFEROPHYTA**Cupressaceae**

#*Juniperus ashei* Buchh.
Juniperus virginiana L.

Pinaceae

Pinus echinata P. Mill.

MAGNOLIOPHYTA**MAGNOLIOPSIDA****Acanthaceae**

Dicliptera brachiata (Pursh) Spreng.
Justicia americana (L.) Vahl.
#*Ruellia caroliniensis* (J.F. Gmel.) Steud. ssp.
ciliosa (Pursh) R.W. Long var. *cinerascens*
(Fern.) Kartesz & Gandhi
Ruellia humilis Nutt. Syns. = *R. humilis* Nutt.
var. *expansa* Fern. and *R. humilis* Nutt.
var. *longiflora* (Gray) Fern.
Ruellia pedunculata Torr. ex Gray
Ruellia strepens L.

Aceraceae

Acer negundo L. var. *negundo*
Acer negundo L. var. *texanum* Pax
Acer rubrum L.
Acer saccharinum L.
Acer saccharum Marsh.

Amaranthaceae

Amaranthus albus L.
#*Amaranthus arenicola* I.M. Johnston
Amaranthus graecizans L.
Amaranthus hybridus L.
#*Amaranthus palmeri* S. Wats.
Amaranthus retroflexus L.
Amaranthus spinosus L.
Amaranthus tuberculatus (Moq.) Sauer.
Syn. = *Acnida tamariscina* auct. non
(Nutt.) Wood
Froelichia floridana (Nutt.) Moq. var.
campestris (Small) Fern.
Froelichia gracilis (Nutt.) Moq.
Iresine rhizomatosa Standl.

Anacardiaceae

Cotinus obovatus Raf.

Rhus aromatica Alt. var. *aromatica*
Rhus aromatica Alt. var. *serotina* (Greene)
Rehd.
Rhus copallinum L. var. *latifolia* Engl.
Rhus glabra L.
#*Rhus lanceolata* (Gray) Britt.
#*Rhus trilobata* Nutt.
#*Rhus trilobata* Nutt. var. *simplicifolia* (Greene)
Barkl.
Toxicodendron rydbergii (Small ex Rydb.)
Greene. Syn. = *Rhus radicans* L. var.
vulgaris (Michx.) DC. Wallis listed
formas *negundo* (Greene) Fern. and
vulgaris.
Toxicodendron pubescens P. Mill. Syn. =
Rhus toxicodendron L.

Anonaceae

Asimina triloba (L.) Dunal

Apiaceae (= Umbelliferae)

#*Ammoselinum butleri* (Engelm. ex S. Wats.)
Coul. & Rose
*#*Anethum graveolens* L.
Angelica venenosa (Greenway) Fern.
#*Bifora americana* Benth. & Hook. f. ex S.
Wats.
Chaerophyllum procumbens (L.) Crantz
#*Chaerophyllum tainturieri* Hook. var.
dasycarpum Hook. ex S. Wats.
Chaerophyllum tainturieri Hook. var. *tainturieri*.
Syn. = *C. texanum* Coul. & Rose.
Cicuta maculata L.
Cryptotaenia canadensis (L.) DC.
**Daucus carota* L. Wallis listed formas *carota*
and *epurpuratus* Farw.
Daucus pusillus Michx.
#*Erigenia bulbosa* (Michx.) Nutt.
Eryngium leavenworthii Torr. & Gray
#*Eryngium prostratum* Nutt. ex DC.
Eryngium yuccifolium Michx. var. *synchaetum*
Gray ex Coul. & Rose
Hydrocotyle verticillata Thunb.
Limnoscium pinnatum (DC.) Mathias &
Constance
Osmorhiza longistylis (Torr.) DC. Syn. =

Osmorhiza longistylis (Torr.) DC. var.
villicaulis Fern.
Oxypolis rigidior (L.) Raf.
#*Perideridia americana* (Nutt. ex DC.)
Reichenb.
Polytaenia nuttallii DC.
#*Ptilimnium capillaceum* (Michx.) Raf.
#*Ptilimnium nuttallii* (DC.) Britt.
Sanicula canadensis L. var. *canadensis*
Sanicula odorata (Raf.) K.M. Pryer & L.R.
Phillippe. Syn. = *S. gregaria* Bickn.
Spermolepis divaricata (Walt.) Raf. ex Ser.
Spermolepis echinata (Nutt. ex DC.) Heller
Taenidia integerrima (L.) Drude
Thaspium barbinode (Michx.) Nutt.
Thaspium trifoliatum (L.) Gray var. *aureum*
Britt. Syn. = *T. trifoliatum* (L.) Gray var.
flavum Blake.
*#*Torilis arvensis* (Huds.) Link
**Torilis japonica* (Houtt.) DC.
Trepocarpus aethusae Nutt. ex DC.
Zizia aptera (Gray) Fern.
Zizia aurea (L.) W.D.J. Koch

Apocynaceae

Amsonia illustris Woods.
Amsonia tabernaemontana Walt. var. *salicifolia*
(Pursh) Woods.
Amsonia tabernaemontana Walt. var.
tabernaemontana
Apocynum androsaemifolium L.
Apocynum cannabinum L. Syn. = *A.*
cannabinum L. var. *glaberrimum* A. DC.
and *Apocynum cannabinum* L. var.
pubescens (Mitchell ex R. Br.) Woods.

Aquifoliaceae

Ilex decidua Walt.

Araliaceae

#*Panax quinquefolium* L.

Aristolochiaceae

#*Aristolochia serpentaria* L.
Aristolochia tomentosa Sims
Asarum canadense L. Syn. = *A. canadense* L.
var. *acuminatum* Ashe.

Asclepiadaceae

Asclepias amplexicaulis Sm.
Asclepias hirtella (Pennell) Woods.
Asclepias incarnata L. ssp. *incarnata*
Asclepias obovata Ell.
Asclepias purpurascens L.
Asclepias quadrifolia Jacq.
Asclepias stenophylla Gray
Asclepias sullivantii Engelm. ex Gray
Asclepias tuberosa L. ssp. *interior* Woods.
#*Asclepias variegata* L.
Asclepias verticillata L.
Asclepias viridiflora Raf. Syn. = *A. viridiflora*
Raf. var. *lanceolata* (Ives) Torr. and *A.*
viridiflora Raf. var. *linearis* (Gray) Fern.
Asclepias viridis Walt.
Cynanchum laeve (Michx.) Pers.
Matelea baldwyniana (Sweet) Woods.
Matelea decipiens (Alexander) Woods.
Matelea gonocarpos (Walt.) Shinnars

Asteraceae (= Compositae)

Achillea millefolium L. var. *occidentalis* DC.
Syn. = *A. lanulosa* Nutt. Wallis listed
formas *lanulosa* and *rubicunda* Farwell.
Ageratina altissima (L.) King & H.E. Robins.
var. *altissima*. Wallis listed *villicaulis* Fern.
Ambrosia artemisiifolia L. var. *elatior* (L.)
Descourtils. Wallis listed forma *villosa*
Fern. & Griseb.
Ambrosia bidentata Michx.
Ambrosia psilostachya DC. Syn. = *A.*
psilostachya DC. var. *lindheimeriana*
(Scheele) Blank.
Ambrosia trifida L. var. *texana* Scheele
Amphiachyris dracunculoides (DC.) Nutt. Syn.
= *Gutierrezia dracunculoides* (DC.) Blake.
Antennaria neglecta Greene. Syn. = *A.*
campestris Rydb.
#*Antennaria parlinii* Fern.
#*Antennaria parlinii* Fern. ssp. *fallax* (Greene)
Bayer & Stebbins
Antennaria plantaginifolia (L.) Richards
**Anthemis cotula* L.
Aphanostephus skirrhobasis (DC.) Trel.
**Arctium minus* (Hill) Bernh.
Arnoglossum atriplicifolium (L.) H.E. Robins.

- Syn. = *Cacalia atriplicifolia* L.
Arnoglossum plantagineum Raf. Syn. =
Cacalia plantaginea (Raf.) Shinners.
Arnoglossum reniforme (Hook.) H.E. Robins.
 Syn. = *Cacalia muehlenbergii* (Schultz-
 Bip.) Fern.
 **Artemisia annua* L.
Artemisia ludoviciana Nutt. ssp. *ludoviciana*.
 Syn. = *A. ludoviciana* Nutt. var.
gnaphalodes (Nutt.) Torr. & Gray
Artemisia ludoviciana Nutt. ssp. *mexicana*
 (Willd. ex Spreng.) Keck. Syn. = *Artemisia*
ludoviciana Nutt. var. *mexicana* (Willd. ex
 Spreng.) Gray
Astranthium integrifolium (Michx.) Nutt.
 #*Baccharis halimifolia* L.
Berlandiera pumila (Michx.) Nutt. var. *pumila*.
 Syn. = *B. tomentosa* Nutt. var. *dealbata*
 Torr. & Gray.
Bidens aristosa (Michx.) Britt. Syns. = *B.*
polylepis Blake var. *polylepis* and *B.*
polylepis Blake var. *retrorsa* Sherff.
Bidens bipinnata L.
 #*Bidens cernua* L.
 #*Bidens discoidea* (Torr. & Gray) Britt.
Bidens frondosa L.
Boltonia asteroides (L.) L'Hér. var. *latisquama*
 (Gray) Cronq. Syn. = *B. latisquama* Gray.
Boltonia diffusa Ell. var. *interior* Fern. & Grisc.
Brickellia eupatorioides (L.) Shinners var.
texana (Shinners) Shinners. Syn. =
Kuhnia eupatorioides L. var. *ozarkana*
 Shinners.
 **Carduus nutans* L.
Centaurea americana Nutt.
 **Centaurea cyanus* L.
Chaetopappa asteroides Nutt. ex DC.
Chrysopsis pilosa Nutt. Syn. = *Heterotheca*
pilosa (Nutt.) Shinners
 **Cichorium intybus* L.
Cirsium altissimum (L.) Hill
 **Cirsium vulgare* (Savi) Ten.
 #*Cirsium undulatum* (Nutt.) Spreng.
Conoclinium coelestinum (L.) DC. Syn. =
Eupatorium coelestinum L.
Conyza canadensis (L.) Cronq. var.
canadensis
- Conyza canadensis* (L.) Cronq. var. *glabrata*
 (Gray) Cronq.
Coreopsis grandiflora Hogg ex Sweet var.
grandiflora
 #*Coreopsis grandiflora* Hogg ex Sweet var.
harveyana (Gray) Sherff
Coreopsis lanceolata L. Syn. = *C. lanceolata*
 L. var. *villosa* Michx.
Coreopsis palmata Nutt.
Coreopsis pubescens Ell. var. *pubescens*
Coreopsis tinctoria Nutt. Wallis listed formas
tinctoria and *atropurpurea* (Hook) Fern.
Coreopsis tripteris L. Syn. = *C. tripteris* L. var.
deamii Standl.
 *#*Cosmos sulphureus* Cav.
 *#*Crepis pulchra* L.
Dracopis amplexicaulis (Vahl) Cass.
 #*Echinacea angustifolia* DC.
 #*Echinacea atrorubens* Nutt.
Echinacea pallida (Nutt.) Nutt.
Echinacea purpurea (L.) Moench
Eclipta alba (L.) L.
Elephantopus carolinianus Raeusch.
Erechtites hieraciifolia (L.) Raf. ex DC. var.
hieraciifolia. Syns. = *E. hieraciifolia* (L.)
 Raf. ex DC. var. *intermedia* Fern. and *E.*
hieraciifolia (L.) Raf. ex DC. var. *praealta*
 (Raf.) Fern.
Erigeron annuus (L.) Pers.
Erigeron philadelphicus L. var. *philadelphicus*
Erigeron pulchellus Michx.
Erigeron strigosus Muhl. ex Willd. var. *beyrichii*
 (Fisch. & C.A. Mey.) Torr. & Gray ex Gray
Erigeron strigosus Muhl. ex Willd. var.
strigosus
 #*Erigeron tenuis* Torr. & Gray
Eupatorium altissimum L.
 #*Eupatorium hyssopifolium* L.
Eupatorium perfoliatum L.
Eupatorium purpureum L.
Eupatorium serotinum Michx.
 #*Eupatoriadelphus fistulosus* (Barratt) King &
 H.E. Robins.
Eurybia hemispherica (Alexander) Nesom.
 Syn. = *Aster hemisphericus* Alexander
Euthamia gymnospermoides Greene. Syn. =
Solidago gymnospermoides (Greene) Fern.

- Fleischmannia incarnata* (Walt.) King & H.E. Robins. Syn. = *Eupatorium incarnatum* Walt.
- Gaillardia aestivalis* (Walt.) H. Rock var. *aestivalis*. Syn. = *G. fastigiata* Greene.
- Gaillardia aestivalis* (Walt.) H. Rock var. *flavovirens* (C. Mohr) Cronq. Syn. = *G. lutea* Greene.
- #*Gaillardia suavis* (Gray & Engelm.) Britt. & Rusby
- **Galinsoga parviflora* Cay.
- *#*Galinsoga quadriradiata* Cav.
- Gamochaeta purpurea* (L.) Cabrera. Syn. = *Gnaphalium purpureum* L.
- Grindelia lanceolata* Nutt. var. *lanceolata*. Wallis listed forma *lanceolata*.
- Grindelia papposa* Nesom & Suh. Syn. = *Haplopappus ciliatus* (Nutt.) DC.
- Helenium amarum* (Raf.) H. Rock
- Helenium autumnale* L.
- Helenium flexuosum* Raf.
- Helianthus angustifolius* L.
- Helianthus annuus* L.
- #*Helianthus decapetalus* L.
- #*Helianthus divaricatus* L.
- Helianthus* ×*doronicoides* Lam. (pro sp.) [*giganteus* × *mollis*]. Syn. = *H. doronicoides* Lam.
- Helianthus grosseserratus* Martens
- Helianthus hirsutus* Raf. Syns. = *H. hirsutus* Raf. var. *stenophyllus* Torr. & Gray and *H. hirsutus* Raf. var. *trachyphyllus* Torr. & Gray.
- #*Helianthus* ×*laetiflorus* Pers. (pro sp.) [*pauciflorus* × *tuberosus*]
- Helianthus maximiliani* Schrad.
- Helianthus mollis* Lam.
- #*Helianthus nuttallii* Torr. & Gray
- #*Helianthus laetiflorus* Pers. var. *rigidus* (Cass.) Fern.
- Helianthus petiolaris* Nutt.
- Helianthus salicifolius* A. Dietr.
- Helianthus tuberosus* L.
- Heliopsis helianthoides* (L.) Sweet var. *scabra* (Dunal) Fern.
- Heterotheca subaxillaris* (Lam.) Britt. & Rusby. Syn. = *H. latifolia* Buckl.
- Hieracium gronovii* L.
- Hieracium longipilum* Torr.
- #*Hieracium scabrum* Michx.
- Hymenopappus scabiosaeus* L'Hér. var. *corymbosus* (Torr. & Gray) B.L. Turner
- Hymenopappus scabiosaeus* L'Hér. var. *scabiosaeus*
- Ionactis linariifolius* (L.) Greene. Syn. = *Aster linariifolius* L.
- Iva angustifolia* Nutt. ex DC.
- Iva annua* L. var. *annua*. Syn. = *I. ciliata* Willd.
- Krigia biflora* (Walt.) Blake. Wallis listed formas *biflora* and *glandulifera* Fern.
- Krigia dandelion* (L.) Nutt.
- Krigia caespitosa* (Raf.) Chambers. Syn. = *Serinia oppositifolia* (Rat.) Kuntze
- Krigia occidentalis* Nutt.
- Krigia virginica* (L.) Willd.
- Lactuca canadensis* L. Syn. = *L. canadensis* var. *canadensis* (Wallis listed formas *angustata* Wieg. and *canadensis*), *L. canadensis* L. var. *latifolia* Kuntze (Wallis listed formas *latifolia* and *exauriculata* Wieg.), *L. canadensis* L. var. *longifolia* (Michx.) Farw., and *L. canadensis* L. var. *obovata* Wieg. (Wallis listed forma *stenopoda* Wieg.).
- Lactuca floridana* (L.) Gaertn.
- Lactuca ludoviciana* (Nutt.) Riddell. Wallis listed formas *campestris* (Greene) Fern. and *ludoviciana*.
- **Lactuca serriola* L. Syn. = *L. scariola* L. Wallis listed formas *integrifolia* (Bogenh.) G. Beck and *scariola*.
- #*Lactuca tatarica* (L.) C.A. Mey. var. *pulchella* (Pursh) Breitung
- **Leucanthemum vulgare* Lam. Syn. = *Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte.
- Liatris aspera* Michx. var. *aspera*. Wallis listed formas *aspera* and *benkii* (Macbr.) Fern.
- Liatris aspera* Michx. var. *intermedia* (Lunell) Gaiser
- #*Liatris punctata* Hook.
- #*Liatris punctata* Hook. var. *nebraskana* Gaiser
- Liatris pycnostachya* Michx. Wallis listed forma *pycnostachya*.

- Liatris squarrosa* (L.) Michx. var. *hirsuta*
(Rydb.) Gaiser
#*Liatris squarrosa* (L.) Michx. var. *glabrata*
(Rydb.) Gaiser
#*Liatris squarrolosa* Michx.
*#*Matricaria discoidea* DC.
Oligoneuron nitidum (Torr. & Gray) Small. Syn.
= *Solidago nitida* Torr. & Gray.
#*Oligoneuron rigidum* (L.) Small
Packera aurea (L.) A. & D. Löve. Syn. =
Senecio aureus L.
Packera glabella (Poir.) C. Jeffrey. Syn. =
Senecio glabellus Poir.
Packera obovata (Muhl. ex Willd.) W.A. Weber
& A. Löve. Syn. = *Senecio obovatus* Muhl
var. *rotundus* Britt.
Packera plattensis (Nutt.) W.A. Weber & A.
Löve. Syn. = *Senecio plattensis* Nutt.
*#*Parthenium hysterophorus* L.
Parthenium integrifolium L.
Pluchea camphorata (L.) DC.
#*Pluchea odorata* (L.) Cass. var. *odorata*
Polymnia canadensis L. Wallis listed forma
radiata (Gray) Fassett.
Prenanthes aspera Michx.
#*Prenanthes altissima* L.
Pseudognaphalium obtusifolium (L.) Hilliard &
Burt ssp. *obtusifolium*. Syn. =
Gnaphalium obtusifolium L.
Pyrrhopappus carolinianus (Walt.) DC.
#*Pyrrhopappus grandiflorus* (Nutt.) Nutt.
#*Pyrrhopappus pauciflorus* (D. Don) DC.
Ratibida columnifera (Nutt.) Woot. & Standl.
Wallis listed formas *columnifera* and
pulcherrima (DC.) Fern.
Ratibida pinnata (Vent.) Barnh.
Rudbeckia grandiflora (D. Don) J.F. Gmel. ex
DC.
Rudbeckia hirta L. var. *pulcherrima* Farw.
Rudbeckia laciniata L. var. *laciniata*
Rudbeckia subtomentosa Pursh
Rudbeckia triloba L. var. *triloba*
#*Silphium asteriscus* L.
#*Silphium integrifolium* Michx. var. *integrifolium*
Silphium integrifolium Michx. var. *laeve* Torr. &
Gray. Syn. = *S. speciosum* Nutt.
Silphium laciniatum L. var. *laciniatum*
Silphium perfoliatum L.
Silphium radula Nutt. Syn. = *S. asperum*
Hook.
Smallanthus uvedalius (L.) Mackenzie ex
Small. Syn. = *Polymnia Uvedalia* L. var.
densipilis Blake
Solidago altissima L.
#*Solidago arguta* Ait. var. *boottii* (Hook.)
Palmer & Steyermark
Solidago caesia L.
Solidago canadensis L. var. *gilvocanescens*
Rydb.
Solidago gigantea Ait. Syn. = *S. gigantea* Ait.
var. *leiophylla* Fern.
Solidago hispida Muhl. ex Willd.
Solidago ludoviciana (Gray) Small
Solidago missouriensis Nutt. var. *fasciculata*
Holz.
Solidago nemoralis Ait. var. *longipetiolata*
(Mackenzie & Bush) Palmer & Steyermark.
Syn. = *S. nemoralis* Ait. var. *decemflora*
(DC.) Fern.
Solidago nemoralis Ait. var. *nemoralis*. Syn. =
S. nemoralis Ait. var. *haleana* Fern.
#*Solidago odora* Ait.
Solidago petiolaris Ait. var. *angusta* (Torr. &
Gray) Gray. Syns. = *S. lindheimeriana*
Scheele and *S. petiolaris* Ait. var. *wardii*
(Britt.) Fern.
Solidago radula Nutt. var. *radula*
Solidago rugosa P. Mill. ssp. *aspera* (Ait.)
Cronq. Syn. = *S. rugosa* Mill. var.
celtidifolia (Small) Fern.
Solidago speciosa Nutt. var. *speciosa*
#*Solidago speciosa* Nutt. var. *rigidiuscula* Torr.
& Gray
Solidago ulmifolia Muhl. ex Willd. var. *ulmifolia*
Solidago ulmifolia Muhl. ex Willd. var.
microphylla Gray. Syn. = *S. delicatula*
Small.
**Sonchus asper* (L.) Hill. Wallis listed forma
glandulosus Beckh.
Symphotrichum anomalum (Engelm.) Nesom.
Syn. = *Aster anomalus* Engelm.
Symphotrichum cordifolium (L.) Nesom. Syn.
= *Aster sagittifolius* Wedemeyer ex Willd.
var. *sagittifolius*.

Symphotrichum divaricatum (Nutt.) Nesom.
Syn. = *Aster exilis* Ell.

Symphotrichum drummondii (Lindl.) Nesom
var. *drummondii*. Syn. = *Aster sagittifolius*
Wedemeyer ex Willd. var. *drummondii*
(Lindl.) Shinnars.

Symphotrichum ericoides (L.) Nesom var.
ericoides. Syn. = *Aster ericoides* L.

Symphotrichum laeve (L.) A. & D. Löve var.
laeve. Syn. = *Aster laevis* L.

#*Symphotrichum lanceolatum* (Willd.) Nesom

Symphotrichum novae-angliae (L.) Nesom.
Syn. = *Aster novae-angliae* L.

Symphotrichum oblongifolium (Nutt.) Nesom.
Syn. = *Aster oblongifolius* Nutt.

Symphotrichum ontarionis (Wieg.) Nesom.
Syn. = *Aster ontarionis* Wieg.

Symphotrichum oolentangiense (Riddell)
Nesom var. *oolentangiense*. Syn. = *Aster*
azureus Lindl. var. *azureus*.

Symphotrichum oolentangiense (Riddell)
Nesom var. *poaceum* (Burgess) Nesom.
Syn. = *Aster azureus* Lindl. var. *poaceus*
(Burgess) Fern.

Symphotrichum patens (Ait.) Nesom var.
gracile (Hook.) Nesom. Syn. = *Aster*
patens Ait. var. *gracilis* Hook.

Symphotrichum patens (Ait.) Nesom var.
patens. Syn. = *Aster patens* Ait. var.
patens.

Symphotrichum pilosum (Willd.) Nesom. Syn.
= *Aster pilosus* Willd.

Symphotrichum praealtum (Poir.) Nesom var.
praealtum. Syn. = *Aster praealtus* Poir.
var. *praealtus*.

#*Symphotrichum subulatum* (Michx.) Nesom.

Symphotrichum turbinellum (Lindl.) Nesom.
Syn. = *Aster turbinellus* Lindl.

*#*Tanacetum vulgare* L.

**Taraxacum officinale* G.H. Weber ex Wiggers
ssp. *officinale*

#*Thelesperma ambiguum* Gray

**Tragopogon dubius* Scop. Syn. = *T. major*
Jacq.

Verbesina alternifolia (L.) Britt. ex Kearney.
Syn. = *Actinomeris alternifolia* (L.) DC.

#*Verbesina encelioides* (Cav.) Benth. & Hook.
f. ex Gray

Verbesina helianthoides Michx.

Verbesina virginica L.

Vernonia arkansana DC. Syn. = *V. crinita* Raf.

Vernonia baldwinii Torr. ssp. *baldwinii*

Vernonia gigantea (Walt.) Trel. ssp. *gigantea*.
Syn. = *V. altissima* Nutt.

Vernonia missurica Raf.

Xanthium strumarium L. var. *canadense* (P.
Mill.) Torr. & Gray. Syn. = *X. italicum*
Mor., *X. pensylvanicum* Wallr., and *X.*
speciosum Kearney.

Xanthium strumarium L. var. *glabratum* (DC.)
Cronq. Syn. = *X. chinense* Mill.

Balsaminaceae

Impatiens capensis Neerb.
Impatiens pallida Nutt.

Berberidaceae

Podophyllum peltatum L.

Betulaceae (=Corylaceae)

Alnus serrulata (Alt.) Willd. Syn. = *A. serrulata*
(Alt.) Willd. var. *vulgaris* Spach.

Betula nigra L.

Corylus americana Walt. var. *americana*.
Wallis listed forma *americana*.

Ostrya virginiana (P. Mill.) K. Koch var.
virginiana. Syn. = *Ostrya virginiana* (P.
Mill.) K. Koch var. *lasia* Fern. Wallis listed
forma *glandulosa* (Spach) Macbr.

Bignoniaceae

Campsis radicans (L.) Seem.
Catalpa bignonioides Walt.
Catalpa speciosa (Warder) Warder ex Engelm.

Boraginaceae

**Buglossoides arvensis* (L.) I.M. Johnston.
Syn. = *Lithospermum arvense* L.

#*Cynoglossum virginianum* L.

Hackelia virginiana (L.) I.M. Johnston

Heliotropium convolvulaceum (Nutt.) Gray

**Heliotropium indicum* L.

Heliotropium tenellum (Nutt.) Torr.

Lithospermum canescens (Michx.) Lehm.
Lithospermum carolinense (Walt. ex J.F. Gmel.) MacM.
Lithospermum incisum Lehm.
Myosotis macrosperma Engelm.
Myosotis verna Nutt.
Onosmodium bejariense DC. ex A. DC. var.
occidentale (Mackenzie) B.L. Turner. Syn.
= *O. occidentale* Mackenzie.
Onosmodium bejariense DC. ex A. DC. var.
subsetosum (Mackenzie & Bush) B.L.
Turner. Syn. = *O. subsetosum* Mackenzie
& Bush.

Brassicaceae

*#*Alliaria petiolata* (Bieb.) Cavara & Grande
Arabis canadensis L.
Arabis laevigata (Muhl. ex Willd.) Poir.
Arabis missouriensis Greene
Arabis shortii (Fern.) Gleason. Syn. = *A.*
perstellata E.L. Br. var. *shortii* Fern.
**Barbarea vulgaris* Ait. f.
**Brassica napus* L.
**Brassica rapa* L.
**Camelina microcarpa* Andr. ex DC.
**Capsella bursa-pastoris* (L.) Medik.
Cardamine bulbosa (Schreb. ex Muhl.) B.S.P.
Cardamine parviflora L. var. *arenicola* (Britt)
O.E. Shultz
Cardamine pensylvanica Muhl. ex Willd.
Cardamine concatenata (Michx.) Sw. Syn. =
Dentaria laciniata Muhl.
Descurainia pinnata (Walt.) Britt. ssp.
brachycarpa (Richards.) Detling
Draba aprica Beadle
Draba brachycarpa Nutt. ex Torr. & Gray
Draba cuneifolia Nutt. ex Torr. & Gray var.
cuneifolia
#*Draba reptans* (Lam.) Fern.
Iodanthus pinnatifidus (Michx.). Steud.
Lepidium campestre (L.) Ait. f.
Lepidium densiflorum Schrad.
Lepidium virginicum L. var. *virginicum*
Lesquerella gracilis (Hook.) S. Wats. var.
gracilis
**Nasturtium officinale* Ait. f.
Neobeckia aquatica (Eat.) Greene. Syn. =

Armoracia aquatica (Eat.) Wieg.
Rorippa palustris (L.) Bess. ssp. *feraldiana*
(Butters & Abbe) Jonsell. Syn. = *R.*
islandica (Oeder) Borbas var. *feraldia*
Butters & Abbe.
Rorippa palustris (L.) Bess. ssp. *hispidia*
(Desv.) Jonsell. Syn. = *R. islandica*
(Oeder) Borbas var. *hispidia* (Desv.)
Butters & Abbe.
Rorippa teres (Michx.) R. Stuckey. Syn. = *R.*
obtusa (Nutt.) Britt.
Rorippa sessiliflora (Nutt.) A.S. Hitchc.
Selenia aurea Nutt.
Sibara virginica (L.) Rollins
**Sinapis arvensis* L. Syn. = *Brassica kabera*
(DC.) L.C. Wheeler var. *pinnatifida*
(Stokes) L.C. Wheeler.
*#*Sisymbrium altissimum* L.
**Sisymbrium officinale* (L.) Scop. Syn. = *S.*
officinale (L.) Scop. var. *leiocarpum* DC.
Streptanthus maculatus Nutt.
**Thlaspi arvense* L.

Cabombaceae

#*Brasenia schreberi* J.F. Gmel.

Cactaceae

#*Opuntia humifusa* (Raf.) Raf.
Opuntia macrorhiza Engelm.

Callitrichaceae

Callitriche heterophylla Pursh
Callitriche terrestris Raf.

Campanulaceae

Campanulastrum americanum (L.) Small. Syn.
= *Campanula americana* L. var. *illinoensis*
(Fresn.) Farw.
Lobelia appendiculata A. DC.
#*Lobelia puberula* Michx.
Lobelia cardinalis L.
Lobelia inflata L.
Lobelia siphilitica L. var. *ludoviciana* A. DC.
Lobelia spicata Lam. var. *spicata*
Lobelia spicata Lam. var. *leptostachys* (A. DC.)
Mackenzie & Bush
Triodanis biflora (Ruiz & Pavón) Greene. Syn.

= *Specularia biflora* (Ruiz & Pavón) Fisch.
& C.A. Mey.

Triodanis lamprosperma McVaugh. Syn. =
Specularia lamprosperma (McVaugh) Fern.
Triodanis leptocarpa (Nutt.) Nieuwl. Syn. =
Specularia leptocarpa (Nutt.) Gray
Triodanis perfoliata (L.) Nieuwl. Syn. =
Specularia perfoliata (L.) A. DC.

Cannabinaceae

**Humulus lupulus* L.

Capparidaceae

*#*Cleome hassleriana* Chod.
#*Cleome serrulata* Pursh
#*Polanisia dodecandra* (L.) DC. ssp.
dodecandra
Polanisia dodecandra (L.) DC. ssp.
trachysperma (Torr. & Gray) Iltis

Caprifoliaceae

Lonicera flava Sims
**Lonicera japonica* Thunb.
#*Lonicera sempervirens* L.
Sambucus nigra L. ssp. *canadensis* (L.) R.
Bolli. Syn. = *S. canadensis* L. var.
canadensis and *S. canadensis* L. var.
submollis Rehd.
Symphoricarpos orbiculatus Moench.
Triosteum aurantiacum Bickn.
Triosteum perfoliatum L.
#*Viburnum molle* Michx.
#*Viburnum rafinesquianum* J.A. Schultes
Viburnum rufidulum Raf.

Caryophyllaceae

Agrostemma githago L.
**Arenaria serpyllifolia* L.
Cerastium brachypodium (Engelm. ex Gray)
B.L. Robins.
#*Cerastium brachypetalum* Desportes ex Pers.
**Cerastium fontanum* Baumg. ssp. *vulgare*
(Hartman) Greuter & Burdet. Syn. = *C.*
vulgatum L.
**Cerastium glomeratum* Thuill. Syn. = *C.*
viscosum auct. non L.
Cerastium nutans Raf.

*#*Cerastium pumilum* W. Curtis
**Dianthus armeria* L.
Minuartia drummondii (Shinners) McNeill. Syn.
= *Stellaria nuttallii* Torr. & Gray.
#*Minuartia michauxii* (Fenzl) Farw. var. *texana*
(B.L. Robins.) Mattf.
Minuartia muscorum (Fassett) Rabeler. Syn. =
Stellaria muscorum Fassett.
Minuartia patula (Michx.) Mattf. Syn. =
Arenaria patula Michx. Wallis listed formas
media Steyerm. *pitcheri* (Nutt.) Steyerm.
and *robusta* Steyerm.
Paronychia canadensis (L.) Wood
Paronychia fastigiata (Raf.) Fern. var. *fastigiata*
*#*Petrorhagia dubia* (Raf.) G. López & Romo
**Petrorhagia prolifera* (L.) P.W. Ball &
Heywood. Syn. = *Dianthus prolifer* L.
Sagina decumbens (Ell.) Torr. & Gray
**Saponaria officinalis* L.
*#*Scleranthus annuus* L.
Silene antirrhina L.
Silene regia Sims
Silene stellata (L.) Ait. f. Wallis listed forma
scabrella (Nieuwl.) Palm. & Steyerm.
Silene virginica L.
**Stellaria media* (L.) Vill.

Celastraceae

#*Celastrus scandens* L.
Euonymus atropurpureus Jacq.

Ceratophyllaceae

Ceratophyllum demersum L.

Chenopodiaceae

Chenopodium album L.
**Chenopodium ambrosioides* L. var.
ambrosioides
#*Chenopodium berlandieri* Moq.
Chenopodium leptophyllum (Moq.) Nutt. ex S.
Wats.
**Chenopodium pumilio* R. Br.
Chenopodium simplex (Torr.) Raf. Syn. = *C.*
hybridum L. var. *gigantospermum* (Aellen)
Rouleau.
Chenopodium standleyanum Aellen
Cycloloma atriplicifolium (Spreng.) Coult.

Monolepis nuttalliana (J.A. Schultes) Greene

Cistaceae

Lechea mucronata Raf. Syn. = *L. villosa* Ell.
Lechea tenuifolia Michx. Syn. = *Lechea*
tenuifolia Michx. var. *occidentalis* Hodgdon.

Clusiaceae (= Guttiferae)

Hypericum hypericoides (L.) Crantz ssp.
hypericoides. Syn. = *Ascyrum*
hypericoides L. var. *hypericoides*.
Hypericum hypericoides (L.) Crantz ssp.
multicaule (Michx. ex Willd.) Robson. Syn.
= *Ascyrum hypericoides* L. var. *multicaule*
(Michx.) Fern.
Hypericum drummondii (Grev. & Hook.) Torr. &
Gray
Hypericum gentianoides (L.) B.S.P.
Hypericum multilum L. Syn. = *H. multilum* L.
var. *parviflorum* (Willd.) Fern.
**Hypericum perforatum* L.
Hypericum pseudomaculatum Bush
Hypericum prolificum L. Syn. = *H.*
spathulatum (Spach.) Steud.
Hypericum punctatum Lam.
Hypericum sphaerocarpum Michx.

Convolvulaceae

**Calystegia sepium* (L.) R. Br. ssp. *sepium*
**Convolvulus arvensis* L. Syn. = *C. arvensis*
L. var. *fraterniflorus* Mack. & Bush.
*#*Ipomoea coccinea* L.
#*Ipomoea pandurata* (L.) G.F.W. Mey.
*#*Ipomoea purpurea* (L.) Roth
#*Calystegia silvatica* (Kit.) Griseb. ssp.
fraterniflora (Mackenzie & Bush) Brummitt
**Ipomoea hederacea* Jacq. Syn. = *I.*
hederacea (L.) Jacq. var. *integriuseula*
Gray.
Ipomoea lacunosa L.
Ipomoea pandurata (L.) G.F.W. Mey.

Cornaceae

Cornus drummondii C.A. Meyer
Cornus florida L.
Cornus obliqua Raf.

Crassulaceae

Sedum nuttallianum Raf.
Sedum pulchellum Michx.
*#*Sedum sarmentosum* Bunge

Cucurbitaceae

#*Cayaponia grandifolia* (Torr. & Gray) Small
Cucurbita foetidissima Kunth
Melothria pendula L.
Sicyos angulatus L.

Cuscutaceae

Cuscuta compacta Juss. ex Choisy
Cuscuta cuspidata Engelm.
Cuscuta glomerata Choisy
Cuscuta gronovii Willd. ex J.A. Schultes
#*Cuscuta indecora* Choisy
#*Cuscuta obtusiflora* Kunth
Cuscuta pentagona Engelm. var. *pentagona*.
Syn. = *C. campestris* Yuncker.
Cuscuta pentagona Engelm. var. *glabrior*
(Engelm.) Gandhi, Thomas & Hatch. Syn.
= *C. glabrior* (Engelm.) Yuncker.
#*Cuscuta polygonorum* Engelm.

Dipsacaceae

**Dipsacus fullonum* L. Syn. = *Dipsacus*
sylvestris Huds.

Droseraceae

#*Drosera brevifolia* Pursh

Ebenaceae

Diospyros virginiana L. Syn. = *D. virginiana* L.
var. *pubescens* (Pursh) Dippel.

Elaeagnaceae

*#*Elaeagnus angustifolia* L.

Ericaceae

Rhododendron canescens (Michx.) Sweet
#*Rhododendron oblongifolium* (Small) Millais
#*Rhododendron prinophyllum* (Small) Millais
Vaccinium arboreum Marsh. Syn. = *Vaccinium*
arboreum Marsh. var. *glaucescens*
(Greene) Sarg.
Vaccinium pallidum Ait. Syn. = *V. vacillans*

Torr. var. *crinitum* Fern.
Vaccinium stamineum L. Syn. = *V. stamineum*
L. var. *interius* (Ashe) Palmer & Steyerl.
and *V. stamineum* L. var. *neglectum*
(Small) Deam)
#*Vaccinium virgatum* Ait.

Euphorbiaceae

Acalypha gracilens Gray. Syn. = *A. gracilens*
Gray var. *fraseri* (Muell.-Arg. Weatherby
Acalypha monococca (Engelm. ex Gray) L.
Mill. & Gandhi. Syn. = *A. gracilens* Gray
var. *monococca* Engelm. ex Gray.
Acalypha ostryifolia Riddell
Acalypha rhomboidea Raf.
Acalypha virginica L.
Argythamnia mercurialina (Nutt.) Muell.-Arg.
var. *mercurialina*. Syn. = *Ditaxis*
mercurialina (Nutt.) Coult.
Chamaesyce humistrata (Engelm. ex Gray)
Small. Syn. = *Euphorbia humistrata*
Engelm. ex Gray.
Chamaesyce maculata (L.) Small. Syn. =
Euphorbia maculata L. and *Euphorbia*
supina Raf.
Chamaesyce missurica (Raf.) Shinn. Syn.
= *Euphorbia missurica* Raf.
#*Chamaesyce nutans* (Lag.) Small
Chamaesyce prostrata (Ait.) Small. Syn. =
Euphorbia chamaesyce auct. non L.
Chamaesyce serpens (Kunth) Small. Syn. =
Euphorbia serpens Kunth.
Croton capitatus Michx. var. *capitatus*.
Croton glandulosus L. var. *septentrionalis*
Muell.-Arg.
Croton lindheimerianus Scheele
#*Croton michauxii* G.L. Webster
Croton monanthogynus Michx.
Croton willdenowii G.L. Webster. Syn. =
Crotonopsis elliptica Willd.
Euphorbia corollata L. var. *paniculata* (Ell.)
Boiss.
Euphorbia cyathophora Murr. Syn. = *E.*
heterophylla L. var. *graminifolia* (Michx.)
Engelm.
Euphorbia dentata Michx. Wallis listed formas
cuphosperma (Engelm.) Fern. and *dentata*.

Euphorbia heterophylla L.
Euphorbia hexagona Nutt. ex Spreng.
Euphorbia marginata Pursh
Euphorbia pubentissima Michx. Syn. = *E.*
corollata L. var. *mollis* Millap.
Euphorbia spathulata Lam. Syn. = *E.*
dictyosperma Fisch. & C.A. Mey.
Euphorbia obtusata (Pursh) Small
Phyllanthus caroliniensis Walt.
Stillingia sylvatica L.
Tragia betonicifolia Nutt. Syn. = *T. urticifolia*
Michx.
#*Tragia urticifolia* Michx.
Tragia ramosa Torr.

Fabaceae (=Leguminosae)

Acacia angustissima (P. Mill.) Kuntze var. *hirta*
(Nutt.) B.L. Robins.
*#*Albizia julibrissin* Durazz.
Amorpha canescens Pursh
Amorpha fruticosa L. Syn. = *A. fruticosa* L. var.
angustifolia Pursh, *A. fruticosa* L. var.
oblongifolia Palmer and *A. fruticosa* L. var.
tennesseensis (Shuttlew.) Palmer.
#*Amorpha laevigata* Nutt.
Amphicarpaea bracteata (L.) Fern. var.
bracteata
Amphicarpaea bracteata (L.) Fern. var. *comosa*
(L.) Fern.
Apios americana Medik. Syn. = *A. americana*
Medik. var. *turrigera* Fern.
Astragalus canadensis L.
Astragalus crassicaarpus Nutt. var. *trichocalyx*
(Nutt.) Barneby
Astragalus distortus Torr. & Gray
#*Astragalus nuttallianus* DC.
Baptisia alba (L.) Vent. var. *macrophylla*
(Larisey) Isely. Syn. = *Baptisia leucantha*
Torr. & Gray var. *leucantha*.
Baptisia australis (L.) R. Br. ex Ait. f. var. *minor*
(Lehm.) Fern.
#*Baptisia bracteata* Muhl. ex Ell. var.
leucophaea (Nutt.) Kartesz & Gandhi
Cercis canadensis L. var. *canadensis*. Wallis
listed formas *canadensis* and *glabrifolia*
Fern.
Chamaecrista fasciculata (Michx.) Greene var.

- fasciculata*. Syn. = *Cassia fasciculata*
Michx. var. *robusta* (Pollard) Macbr.
Chamaecrista nictitans (L.) Moench ssp.
nictitans var. *nictitans*. Syn. = *Cassia*
nictitans L.
Cladrastis kentukea (Dum.-Cours.) Rudd.
Clitoria mariana L.
Crotalaria sagittalis L.
Dalea candida Michx. ex Willd. var. *candida*
Dalea lanata Spreng
#*Dalea multiflora* (Nutt.) Shinnery
Dalea purpurea Vent.
Desmanthus illinoensis (Michx.) MacM. ex B.L.
Robins. & Fern.
Desmodium canadense (L.) DC.
Desmodium canescens (L.) DC.
Desmodium ciliare (Muhl. ex Willd.) DC.
Desmodium cuspidatum (Muhl. ex Willd.) DC.
ex Loud.
Desmodium glutinosum (Muhl. ex Willd.) Wood
#*Desmodium illinoense* Gray
Desmodium laevigatum (Nutt.) DC.
Desmodium marilandicum (L.) DC.
Desmodium nudiflorum (L.) DC. Wallis lists
formas *foliolatum* (Farwell) Fassett,
nudiflorum, and *personatum* Fassett.
#*Desmodium nuttallii* (Schindl.) Schub.
Desmodium obtusum (Muhl. ex Willd.) DC.
Syn. = *Desmodium rigidum* (Ell.) DC.
Desmodium paniculatum (L.) DC. var.
paniculatum
Desmodium pauciflorum (Nutt.) DC.
Desmodium perplexum Schub. Syn. =
Desmodium paniculatum (L.) DC. var.
dillenii (Darl.) Isely.
Desmodium rotundifolium DC.
Desmodium sessilifolium (Torr.) Torr. & Gray
#*Desmodium viridiflorum* (L.) DC.
Galactia volubilis (L.) Britt. Syn. = *G. volubilis*
(L.) Britt. var. *mississippiensis* Vail.
Gleditsia triacanthos L.
Gymnocladus dioicus (L.) K. Koch
#*Indigofera miniata* Ortega
**Kummerowia stipulacea* (Maxim.) Makino
**Kummerowia striata* (Thunb.) Schindl.
*#*Lathyrus hirsutus* L.
**Lathyrus latifolius* L.
Lathyrus pusillus Ell.
Lespedeza capitata Michx.
Lespedeza cuneata (Dum.-Cours.) G. Don
#*Lespedeza frutescens* (L.) Hornem.
Lespedeza hirta (L.) Hornem.
Lespedeza procumbens Michx.
Lespedeza repens (L.) W. Bart.
Lespedeza stuevei Nutt.
*#*Lespedeza thunbergii* (DC.) Nakai
Lespedeza violacea (L.) Pers.
Lespedeza virginica (L.) Britt.
Lotus unifoliolatus (Hook.) Benth. var.
unifoliolatus. Syn. = *L. americanus* (Mitt.)
Bisch. non Vell.
**Medicago lupulina* L.
**Medicago sativa* L.
**Mellilotus officinalis* (L.) Lam. Syn. = *M. alba*
Medikus.
Mimosa nuttallii (DC.) B.L. Turner. Syn. =
Schrankia nuttallii (DC.) Standl.
Neptunia lutea (Leavenworth) Benth.
Orbexilum pedunculatum (P. Mill.) Rydb. var.
pedunculatum. Syn. = *Psoralea*
psoraloides (Walt.) Cory var. *eglandulosa*
(Ell.) Freeman.
#*Orbexilum simplex* (Nutt. ex Torr. & Gray)
Rydb.
#*Pediomelum linearifolium* (Torr. & Gray) J.
Grimes
Phaseolus polystachios (L.) B.S.P.
Psoralidium tenuiflorum (Pursh) Rydb. Syn. =
P. tenuiflora Pursh var. *floribunda* (Nutt.)
Rydb.
*#*Pueraria montana* (Lour.) Merr.
Rhynchosia latifolia Nutt. ex Torr. & Gray
#*Robinia hispida* L.
Robinia pseudo-acacia L.
Senna marilandica (L.) Link. Syn. = *Cassia*
marilandica L.
Sesbania herbacea (P. Mill.) McVaugh. Syn. =
S. exaltata Raf.
Strophostyles helvula (L.) Elliot
Strophostyles leiosperma (Torr. & Gray) Piper
Strophostyles umbellata (Muhl. ex Willd.) Britt.
Stylosanthes biflora (L.) B.S.P. Syn. = *S.*
biflora (L.) B.S.P. var. *hispidissima* (Michx.)
Pollard & Ball.

Tephrosia virginiana (L.) Pers. Syn. = *T. virginiana* (L.) Pers. var. *holosericea* (Nutt.) Torr. & Gray.

**Trifolium arvense* L.

Trifolium carolinianum Michx.

**Trifolium dubium* Sibthorp

**Trifolium hybridum* L.

**Trifolium incarnatum* L.

**Trifolium pratense* L.

Trifolium campestre Schreb. Syn. = *T. procumbens* L.

Trifolium reflexum L.

**Trifolium repens* L.

**Trifolium resupinatum* L.

Vicia caroliniana Walt.

Vicia ludoviciana Nutt. ssp. *leavenworthii* (Torr. & Gray) Lassetter & Gunn. Syn. = *V. leavenworthii* Torr. & Gray var. *leavenworthii*.

#*Vicia ludoviciana* Nutt. ssp. *ludoviciana*

Vicia minutiflora F.G. Dietr.

**Vicia sativa* L. ssp. *nigra* (L.) Ehrh. Syn. = *V. angustifolia* L. var. *segetalis* (Thuill.) W.D.J. Koch.

**Vicia villosa* Roth

Fagaceae

Castanea pumila (L.) P. Mill. var. *ozarkensis* (Ashe) Tucker. Syn. = *C. ozarkensis* Ashe.

Quercus alba L. Wallis listed formas *alba*, *latiloba* (Sarg.) Palmer & Steyerf. and *viridis* Trel.

#*Quercus buckleyi* Nixon & Dorr

Quercus falcata Michx. var. *falcata*

Quercus lyrata Walt.

Quercus macrocarpa Michx.

Quercus marilandica (L.) Muenchh.

Quercus muehlenbergii Engelm. Wallis lists forma *alexanderi* (Britt.) Trel.

Quercus nigra L. var. *nigra*

Quercus palustris Muenchh.

Quercus rubra L. var. *ambigua* (Gray) Fern. Syn. = *Q. rubra* L. var. *borealis* (Michx. f.) Farw.

Quercus rubra L. var. *rubra*

Quercus shumardii Buckl. var. *schneckii* (Britt.) Sarg.

Quercus stellata Wangenh.

Quercus velutina Lam. Wallis listed formas *dilaniata* Thel., *macrophylla* (Dippel) Trel., and *missouriensis* (Sarg.) Trel.

Fumariaceae

#*Corydalis curvisiliqua* Engelm. ssp. *occidentalis* (Engelm. ex Gray) W.A. Weber

Corydalis crystallina Engelm.

Corydalis flavula (Raf.) DC.

Corydalis micrantha (Engelm. ex Gray) Gray

Dicentra cucullaria (L.) Bernh.

Gentianaceae

#*Gentiana alba* Muhl. ex Nutt.

#*Gentiana puberulenta* J. Pringle

Sabatia angularis (L.) Pursh

Sabatia campestris Nutt. Wallis listed formas *albiflora* D. M. Moore and *campestris*.

Geraniaceae

**Erodium cicutarium* (L.) L'Hér. ex Ait.

Geranium carolinianum L.

#*Geranium carolinianum* L. var.

sphaerospermum (Fern.) Breitung

Geranium maculatum L.

*#*Geranium molle* L.

**Geranium pusillum* L.

Grossulariaceae

#*Ribes missouriense* Nutt.

Haloragaceae

**Myriophyllum aquaticum* (Vell.) Verdc. Syn. = *M. brasiliense* Camb.

Myriophyllum heterophyllum Michx.

Myriophyllum pinnatum (Walt.) B.S.P.

Hamamelidaceae

Hamamelis vernalis Sarg. Syn. = *H. vernalis* Sarg. var. *tomentella* (Rehd.) Palmer.

Hippocastanaceae

Aesculus glabra Willd. var. *glabra*. Syn. = *A. glabra* Willd. var. *sargentii* Rehd.

Hydrangeaceae

- Hydrangea arborescens* L. var. *arborescens*.
Syn. = *H. arborescens* L. var. *oblonga* Torr.
& Gray
Hydrangea cinerea Small. Syn. = *H.*
arborescens L. var. *deamii* St. John.
Philadelphus pubescens Loisel.

Hydrocharitaceae

- *#*Egeria densa* Planch.
#*Elodea canadensis* Michx.

Hydrophyllaceae

- Ellisia nyctelea* (L.) L.
Hydrolea ovata Nutt. ex Choisy
Hydrophyllum virginianum L.
Nemophila phacelioides Nutt.
#*Phacelia gilioides* Brand
Phacelia hirsuta Nutt.
Phacelia strictiflora (Engelm. & Gray) Gray var.
robbinsii Constance

Juglandaceae

- Carya alba* (L.) Nutt. ex Ell. Syn. = *Carya*
tomentosa (Lam. ex Poir.) Nutt.
Carya cordiformis (Wangenh.) K. Koch
#*Carya glabra* (P. Mill.) Sweet
Carya illinoensis (Wangenh.) K. Koch
#*Carya laciniosa* (Michx. f.) G. Don
Carya ovalis (Wangenh.) Sarg. Syn. = *Carya*
ovalis (Wangenh.) Sarg. var. *obcordata*
(Muhl. & Willd.) Sarg.
Carya ovata (P. Mill.) K. Koch
Carya texana Buckl.
Juglans nigra L.

Lamiaceae (= Labiatae)

- Agastache nepetoides* (L.) Kuntze
#*Blephilia ciliata* (L.) Benth.
Clinopodium arkansanum (Nutt.) House. Syn.
= *Satureja arkansana* (Nutt.) Briq.
Cunila origanoides (L.) Britt.
**Glechoma hederacea* L. Syn. = *G. hederacea*
L. var. *micrantha* Moricand.
Hedeoma hispida Pursh
Hedeoma pulegioides (L.) Pers.
**Lamium amplexicaule* L. Wallis listed formas

- albiflorum* D. M. Moore and *amplexicaule*.
**Lamium purpureum* L.
**Leonurus cardiaca* L.
**Leonurus sibiricus* L.
Lycopus americanus Muhl. ex W. Bart. Syn. =
L. americanus Muhl. var. *scabrifolius* Fern.
Lycopus rubellus Moench. Syn. = *L. rubellus*
Moench. var. *arkansanus* (Fresn.) Benner.
Lycopus uniflorus Michx.
**Marrubium vulgare* L.
**Melissa officinalis* L.
* *Mentha* × *piperita* L. (pro sp.) [*aquatica* ×
spicata]. Syn. = *Mentha piperita* L.
**Mentha spicata* L.
#*Monarda bradburiana* Beck
Monarda citriodora Cerv. ex Lag.
Monarda fistulosa L. ssp. *fistulosa*
#*Monarda fistulosa* L. ssp. *fistulosa* var. *mollis*
(L.) Benth.
Monarda punctata L. ssp. *punctata* var.
villicaulis (Pennell) Palmer & Steyermark.
Syn. = *M. punctata* L. var. *villicaulis*
(Pennell) Shinnars
Monarda russeliana Nutt. ex Sims. Syn. = *M.*
virgata Raf.
**Nepeta cataria* L.
**Perilla frutescens* (L.) Britton
Physostegia angustifolia Fern.
#*Physostegia virginiana* (L.) Benth.
Prunella vulgaris L. Syn. = *P. caroliniana* Mill.
#*Prunella vulgaris* L. var. *lanceolata* (W. Bart.)
Fern.
Pycnanthemum albescens Torr. & Gray
Pycnanthemum tenuifolium Schrad.
Pycnanthemum verticillatum (Michx.) Pers. var.
pilosum (Nutt.) Cooperrider. Syn. = *P.*
pilosum Nutt.
Salvia azurea Michx. ex Lam. var. *grandiflora*
Benth.
Salvia lyrata L.
Scutellaria elliptica Muhl. ex Spreng.
Scutellaria incana Biehler
Scutellaria lateriflora L.
Scutellaria ovata Hill ssp. *bracteata* (Benth.)
Epling
Scutellaria ovata Hill ssp. *ovata*
Scutellaria parvula Michx. var. *parvula*

#*Scutellaria parvula* Michx. var. *australis*
Fassett
Stachys tenuifolia Willd.
Teucrium canadense L. var. *canadense*. Syn.
= *T. canadense* L. var. *virginicum* (L.) Eat.
Trichostema brachiatum L.

Lauraceae

Lindera benzoin (L.) Blume var. *benzoin*
Lindera benzoin (L.) Blume var. *pubescens*
(Palmer & Steyer.)
Rehd.
Sassafras albidum (Nutt.) Nees. Syn. = *S.*
albidum (Nutt.) Nees var. *molle* (Raf.) Fern.

Lentibulariaceae

Utricularia gibba L. Syn. = *U. biflora* Lam.

Linaceae

#*Linum berlandieri* Hook. var. *berlandieri* Hook.
var. *berlandieri*
Linum medium (Planch.) Britt. var. *texanum*
(Planch.) Fern.
Linum pratense (J.B.S. Norton) Small. Syn. =
L. lewisii Pursh var. *pratense* J.B.S. Norton
Linum sulcatum Riddell

Loasaceae

Mentzelia oligosperma Nutt. ex Sims.

Loganiaceae

Polypremum procumbens L.

Lythraceae

Ammannia auriculata Willd.
Ammannia coccinea Rothb.
Cuphea viscosissima Jacq. Syn. = *C. petiolata*
Koehne.
Lythrum alatum Pursh
Lythrum alatum Pursh var. *lanceolatum* (Ell.)
Torr. & Gray ex Rothrock. Syn. = *L.*
lanceolatum Ell.
Rotala ramosior (L.) Koehne. Syn. = *R.*
ramosior (L.) Koehne var. *interior* Fern. &
Grisc.

Malvaceae

**Abutilon theophrasti* Medik.

Callirhoe alcaeoides (Michx.) Gray
Callirhoe bushii Fern.
Callirhoe digitata Nutt. var. *digitata*
Callirhoe involucrata (Torr. and Gray) Gray var.
involucrata
#*Callirhoe leiocarpa* R.F. Martin
Hibiscus laevis All. Syn. = *H. militaris* Cav.
Hibiscus lasiocarpus Cav.
#*Hibiscus moscheutos* L.
*#*Hibiscus syriacus* L.
*#*Hibiscus trionum* L.
**Malva neglecta* Wallr.
Malvastrum hispidum (Pursh) Hochr. Syn. =
Sidopsis hispida (Pursh) Rydb.
Sida spinosa L.

Melastomataceae

Rhexia mariana L. var. *interior* (Pennell) Kral &
Bostick. Syn. = *R. interior* Pennell

Menispermaceae

Calyocarpum lyoni (Pursh) Gray
Cocculus carolinus (L.) DC.
Menispermum canadense L.

Molluginaceae

Glinus lotoides L.
Mollugo verticillata L.

Monotropaceae

#*Monotropa hypopithys* L.
#*Monotropa uniflora* L.

Moraceae

Maclura pomifera (Raf.) Schneider
**Morus alba* L.
Morus rubra L.

Nelumbonaceae

Nelumbo lutea Willd.

Nyctaginaceae

Mirabilis albida (Walt.) Heimerl
Mirabilis linearis (Pursh) Heimerl
**Mirabilis jalapa* L.
Mirabilis nyctaginea (Michx.) MacM.

Nymphaeaceae

- Nuphar lutea* (L.) Sm. ssp. *advena* (Ait.)
Kartesz & Gandhi. Syn. = *N. advena* (Ait.)
Alt. f.
Nymphaea odorata Ait. ssp. *tuberosa* (Paine)
Wiersma & Hellquist. Syn. = *N. tuberosa*
Ait.

Nyssaceae

- Nyssa sylvatica* Marsh. Syn. = *N. sylvatica*
Marsh. var. *dilatata* Fern.

Oleaceae

- #*Forestiera acuminata* (Michx.) Poir.
Fraxinus americana L.
Fraxinus pennsylvanica Marsh. Syn. =
Fraxinus pennsylvanica Marsh. var.
subintegerrima (Vahl) Fern.
Fraxinus quadrangulata Michx.
**Ligustrum sinense* Lour.

Onagraceae

- #*Calylophus serrulatus* (Nutt.) Raven
Circaea lutetiana L. ssp. *canadensis* (L.)
Aschers. & Magnus. Syn. = *C.*
quadrisulcata (Maxim.) Franch. & Savigny
ssp. *canadensis* (L.) A. & D. Löve.
#*Gaura biennis* L.
Gaura longiflora Spach. Syn. = *G. biennis* L.
var. *pitcheri* Torr. & Gray.
Gaura mollis James. Syn. = *G. parviflora*
Dougl. ex Lehm. var. *parviflora*. Wallis
listed forma *parviflora*.
Ludwigia alternifolia L. Syn. = *Ludwigia*
alternifolia L. var. *pubescens* Palmer &
Steyermark.
Ludwigia decurrens Walt. Syn. = *Jussiaea*
decurrens (Walt.) DC.
Ludwigia glandulosa Walt. ssp. *glandulosa*
Ludwigia palustris (L.) Ell. Syn. = *L. palustris*
(L.) Ell. var. *americana* (DC.) Fern. & Grisc.
Ludwigia peploides (Kunth) Raven ssp.
glabrescens (Kuntze) Raven. Syn. =
Jussiaea repens L. var. *glabrescens*
Kuntze.
#*Ludwigia repens* J.R. Forst.
Oenothera biennis L. var. *biennis*
Oenothera elata Kunth ssp. *hirsutissima* (Gray

ex S. Wats.) W. Dietr. Syn. = *O. biennis* L.
var. *hirsutissima* Gray.

- Oenothera fruticosa* L. ssp. *fruticosa*
#*Oenothera grandis* (Britt.) Smyth
Oenothera laciniata Hill
Oenothera linifolia Nutt.
#*Oenothera spachiana* Torr. & Gray
#*Oenothera speciosa* Nutt.
Oenothera villosa Thunb. ssp. *villosa*. Syn. =
O. biennis L. var. *canescens* Torr. & Gray.
Oenothera triloba Nutt.

Orobanchaceae

- Orobanche uniflora* L.

Oxalidaceae

- Oxalis corniculata* L. Syn. = *O. corniculata* L.
var. *langloisii* (Small) Wieg.
#*Oxalis dillenii* Jacq.
**Oxalis stricta* L. Syn. = *O. europaea* Jord.
var. *bushii* (Small) Wieg. and *O. europaea*
Jord. var. *europaea*. Wallis listed formas
europaea, *pilosella* Wieg., and *villicaulis*
Wieg.
Oxalis violacea L. Syn. = *O. violacea* L. var.
tricornophora Fasaett. .

Papaveraceae

- Argemone polyanthemom* (Fedde) G.B.
Ownbey. Syn. = *A. intermedia* auct. non
Sweet.
*#*Papaver dubium* L.
Sanguinaria canadensis L. Syn. = *S.*
canadensis L. var. *rotundifolia* (Greene)
Fedde.

Passifloraceae

- Passiflora incarnata* L. Wallis listed formas
alba Waterfall and *incarnata*.
Passiflora lutea L. Syn. = *P. lutea* L. var.
glabriflora Fern.

Phytolaccaceae

- Phytolacca americana* L.
Rivina humilis L.

Plantaginaceae

Plantago aristata Michx.
#*Plantago elongata* Pursh
#*Plantago heterophylla* Nutt.
**Plantago lanceolata* L.
#*Plantago major* L.
#*Plantago patagonica* Jacq.
Plantago pusilla Nutt.
#*Plantago rhodosperma* Dcne.
Plantago rugelii Dcne.
Plantago virginica L.
#*Plantago wrightiana* Dcne.

Platanaceae

Platanus occidentalis L.

Podostemaceae

#*Podostemum ceratophyllum* Michx.

Polemoniaceae

#*Phlox cuspidata* Scheele
Phlox divaricata L. ssp. *laphamii* (Wood)
Wherry. Syn. = *P. divaricata* L. var.
laphamii Wood.
Phlox pilosa L. ssp. *ozarkana* (Wherry) Wherry.
Syn. = *P. pilosa* L. var. *ozarkana* Wherry.
Phlox pilosa L. var. *pilosa*
Polemonium reptans L.

Polygalaceae

Polygala ambigua Nutt. Syn. = *P. verticillata* L.
var. *dolichoptera* Fern.
Polygala incarnata L.
Polygala sanguinea L.
#*Polygala verticillata* L.

Polygonaceae

Eriogonum longifolium Nutt.
*#*Fagopyrum esculentum* Moench
#*Polygonum amphibium* L.
**Polygonum aviculare* L. var. *aviculare*. Syn. =
P. aviculare L. var. *vegetum* Ledeb.
Polygonum buxiforme Small. Syn. = *P.*
aviculare L. var. *littorale* (Link) W. D. J.
Koch.
**Polygonum convolvulus* L.
*#*Polygonum cuspidatum* Sieb. & Zucc.

**Polygonum hydropiper* L.
Polygonum hydropiperoides Michx. var.
hydropiperoides. Syns. = *P.*
hydropiperoides Michx. var. *bushmanum*
Stanford and *P. hydropiperoides* Michx.
var. *opelousanum* (Riddell ex Small)
Riddell ex W. Stone.
Polygonum lapathifolium L.
*#*Polygonum orientale* L.
Polygonum pennsylvanicum L. var.
pennsylvanicum Syn. = *P. pennsylvanicum*
L. var. *laevigatum* Fern.
Polygonum persicaria L.
Polygonum punctatum Ell. var. *confertiflorum*
(Meisn.) Fassett
Polygonum punctatum Ell. var. *leptostachyum*
(Meisn.) Small
Polygonum punctatum Ell. var. *punctatum*
Polygonum ramosissimum Michx.
Polygonum sagittatum L.
Polygonum scandens L.
#*Polygonum setaceum* Baldw.
Polygonum tenue Michx.
Polygonum virginianum L. Syn. = *Tovara*
virginiana (L.) Raf.
**Rumex acetosella* L.
Rumex altissimus Wood
**Rumex crispus* L.
Rumex hastatulus Baldw.
**Rumex obtusifolius* L.
*#*Rumex patientia* L.
**Rumex pulcher* L.

Portulacaceae

Claytonia virginica L.
Phemeranthus calycinus (Engelm.) Kiger. Syn.
= *Talinum calycinum* Engelm.
Phemeranthus parviflorus (Nutt.) Kiger. Syn. =
Talinum parviflorum Nutt.
Portulaca halimoides L. Syn. = *Portulaca*
parvula Gray.
Portulaca oleracea L.
#*Portulaca pilosa* L.

Primulaceae

*#*Anagallis arvensis* L.
Androsace occidentalis Pursh

Centunculus minimus L.
Dodecatheon meadia L. ssp. *meadia*. Wallis listed formas *album* and *meadia*.
Lysimachia ciliata L.
Lysimachia lanceolata Walt.
Samolus valerandi L. ssp. *parviflorus* (Raf.) Hultén. Syn. = *S. parviflorus* Raf.

Ranunculaceae

Anemone caroliniana Walt. Wallis listed formas *caroliniana* and *violacea* Clute.
Anemone berlandieri Pritz. Syn. = *Anemone decapetala* auct. non Ard.
Anemone virginiana L.
Aquilegia canadensis L. Syn. = *A. canadensis* L. var. *latiuscula* (Greene) Munz.
Clematis ligusticifolia Nutt.
Clematis pitcheri Torr. & Gray
 *#*Clematis terniflora* DC.
Clematis versicolor Small ex Rydb.
Clematis virginiana L.
 **Consolida ajacis* (L.) Schur. Syn. = *Delphinium ajacis* L. Wallis listed formas *ajacis* and *alba* R. H. Cheney.
Delphinium carolinianum Walt. ssp. *carolinianum*. syn. = *D. carolinianum* Walt. var. *crispum* Perry and *D. carolinianum* Walt. var. *nortonianum* (Mack & Bush) Perry.
Delphinium tricornis Michx. Wallis listed formas *albiflora* Millsp. and *tricornis*.
Enemion biternatum Raf. Syn. = *Isopyrum biternatum* (Raf.) Torr. & Gray
Myosurus minimus L.
Ranunculus abortivus L. var. *abortivus*
Ranunculus fascicularis Muhl. ex Bigelow Syn. = *R. fascicularis* Muhl. ex Bigelow var. *aprica* (Greene) Fern.
Ranunculus harveyi (Gray) Britt.
Ranunculus hispidus Michx.
Ranunculus hispidus Michx. var. *nitidus* (Chapman) T. Duncan. Syn. = *R. carolinianus* DC.
Ranunculus laxicaulis (Torr. & Gray) Darby
Ranunculus longirostris Godr.
 #*Ranunculus macranthus* Scheele
Ranunculus micranthus Nutt.

**Ranunculus parviflorus* L.
Ranunculus pusillus Poir.
Ranunculus recurvatus Poir.
Ranunculus sceleratus L. var. *sceleratus*
Thalictrum dasycarpum Fisch. & Avé-Lall. Syn. = *T. dasycarpum* Fisch. & Avé-Lall. var. *hypoglaucom* (Rydb.) Boivin.
 #*Thalictrum dioicum* L.
Thalictrum thalictroides (L.) Eames & Boivin. Syn. = *Anemonella thalictroides* (L.) Eames & Boivin.

Rhamnaceae

Berchemia scandens (Hill) K. Koch
Ceanothus americanus L. Syn. = *C. americanus* L. var. *pitcheri* Torr. & Gray.
Ceanothus herbaceus Raf. Syn. = *C. herbaceus* Raf. var. *pubescens* (Torr. & Gray ex S. Wats.) Shinnery.
Frangula caroliniana (Walt.) Gray. Syn. = *Rhamnus caroliniana* Walt. var. *caroliniana* and *Rhamnus caroliniana* Walt. var. *mollis* Fern.
Rhamnus lanceolata Pursh ssp. *glabrata* (Gleason) Kartesz & Gandhi. Syn. = *Rhamnus lanceolata* Pursh var. *glabrata* Gleason.

Rosaceae

Agrimonia parviflora Ait.
Agrimonia pubescens Wallr.
Agrimonia rostellata Wallr.
Amelanchier arborea (Michx. f.) Fern.
 #*Amelanchier arborea* (Michx. f.) Fern. var. *alabamensis* (Britt.) G.N. Jones
Arunca dioicus (Walt.) Fern. var. *pubescens* (Rydb.) Fern.
Crataegus coccinioides Ashe
Crataegus crus-galli L.
Crataegus engelmanni Sarg.
 #*Crataegus intricata* Lange
Crataegus mollis Scheele
 #*Crataegus pruinosa* (Wendl. f.) K. Koch
 #*Crataegus punctata* Jacq.
Crataegus reverchonii Sarg. Syn. = *C. reverchoni* Sarg. var. *discolor* (Sarg.) Palmer.

Crataegus spathulata Michx.
Crataegus viridis L.
 *#*Duchesnea indica* (Andr.) Focke
Fragaria virginiana Duchesne
Geum canadense Jacq. var. *canadense*. Syn.
 = *G. canadense* Jacq. var. *camporum*
 (Rydb.) Fern. & Weath.
Geum vernum (Raf.) Torr. & Gray
Gillenia stipulata (Muhl. ex Willd.) Baill.
Malus ioensis (Wood) Britt. var. *ioensis*. Syn. =
 Pyrus ioensis (Wood) Bailey.
 **Malus sylvestris* P. Mill. Syn. = *Pyrus malus*
 L.
Physocarpus opulifolius (L.) Maxim. var.
 intermedius (Rydb.) B.L. Robins.
Potentilla norvegica L.
 **Potentilla recta* L.
Potentilla simplex Michx. var. *simplex*
 #*Prunus americana* Marsh.
 #*Prunus angustifolia* Marsh.
 #*Prunus gracilis* Engelm. & Gray
Prunus hortulana Bailey
Prunus mexicana S. Wats. Syn. = *P.*
 americana Marsh. var. *lanata* Sudsworth.
Prunus munsoniana W. Wright & Hedrick.
 **Prunus persica* (L.) Batsch
Prunus rivularis Scheele. Syn. = *P. reverchonii*
 Sarg.
Prunus serotina Ehrh.
 #*Prunus virginiana* L.
 *#*Pyrus communis* L.
Rosa carolina L. var. *carolina*. Syn. = *R.*
 carolina var. *villosa* (Best) Rehd. Wallis
 listed forma *glandulosa* (Crepin) Fern.
Rosa foliolosa Nutt. ex Torr. & Gray
Rosa multiflora Thunb. ex Murr.
Rosa setigera Michx. var. *setigera*
Rosa setigera Michx. var. *tomentosa* Torr. &
 Gray
Rubus aboriginum Rydb.
 #*Rubus argutus* Link
Rubus allegheniensis Porter
Rubus bushii Bailey. Syn. = *R. fructifer* Bailey,
 R. ozarkensis Bailey, and *R. scibilis* Bailey.
 #*Rubus flagellaris* Willd.
Rubus frondosus Bigelow. Syn. = *R. pratensis*
 Bailey.

Rubus mollior Bailey
Rubus occidentalis L.
Rubus oklahomus Bailey
Rubus trivialis Michx.
Sanguisorba annua (Nutt. ex Hook.) Nutt. ex
 Torr. & Gray

Rubiaceae

Cephalanthus occidentalis L.
Diodia teres Walt. var. *teres*. Syn. = *D. teres*
 Walt. var. *setifera* Fern. & Grisc.
 #*Diodia virginiana* L.
Galium aparine L. var. *aparine*. Syn. = *G.*
 aparine L. var. *vaillantii* (DC.) Koch.
Galium arkansanum Gray
Galium circaezans Michx. var. *hypomalacum*
 Fern.
Galium concinnum Torr. & Gray
 #*Galium obtusum* Bigelow
 #*Galium pilosum* Ait. var. *pilosum*
Galium pilosum Ait. var. *punctulosum*
 (Michx.) Torr. & Gray
Galium tinctorium (L.) Scop.
Galium triflorum Michx. Wallis listed formas
 glabrum Leyend and *triflorum*.
Galium virgatum Nutt.
Houstonia purpurea L. var. *calycosa* Gray.
 Syn. = *Houstonia lanceolata* (Poir.) Britt.
Houstonia longifolia Gaertn.
Houstonia pusilla Schoepf. Syn. = *H. patens*
 Ell.
Houstonia purpurea L.
 #*Houstonia rosea* (Raf.) Terrell
 #*Oldenlandia boscii* (DC.) Chapman
 **Sherardia arvensis* L.
Spermacoce glabra Michx.
Stenaria nigricans (Lam.) Terrell var. *nigricans*.
 Syn. = *Houstonia nigricans* (Lam.) Fern.

Rutaceae

Ptelea trifoliata L.
 #*Zanthoxylum americanum* P. Mill.

Salicaceae

*#*Populus alba* L.
Populus deltoides Marsh.
Salix caroliniana Michx.
Salix humilis Marsh. var. *humilis*. Syn. = *S.*

humilis Marsh. var. *hyporhysa* Fern.
Salix interior Rowlee. Wallis listed forma
wheeleri (Rowlee) Rouleau.
Salix nigra Marsh.

Santalaceae

Comandra umbellata (L.) Nutt. ssp. *umbellata*.
Syn. = *C. richardsiana* Fern.

Sapindaceae

#*Cardiospermum halicacabum* L.
Sapindus saponaria L. var. *drummondii* (Hook.
& Arn.) L. Benson. Syn. = *S. drummondii*
Hook. & Arn.

Sapotaceae

Sideroxylon lanuginosum Michx. ssp.
oblongifolium (Nutt.) T.D. Pennington.
Syn. = *Bumelia lanuginosa* (Michx.) Pers.
var. *oblongifolia* (Nutt.)
R. B. Clark.

Saxifragaceae

Heuchera americana L. var. *hirsuticaulis*
(Wheelock) Rosendahl Butters & Lakela
Penthorum sedoides L.
#*Saxifraga palmeri* Bush
Saxifraga texana Buckl.
Saxifraga virginiana Michx. var. *subintegra*
Goodman

Saururaceae

Saururus cernuus L.

Scrophulariaceae

#*Agalinis densiflora* (Benth.) Blake
Agalinis fasciculata (Ell.) Raf. Syn. = *Gerardia*
fasciculata Ell.
Agalinis gattingeri (Small) Small. Syn. =
Gerardia Gattingeri Small.
Agalinis heterophylla (Nutt.) Small ex Britt.
Syn. = *Gerardia heterophylla* Nutt.
Agalinis tenuifolia (Vahl) Raf. var. *parviflora*
(Nutt.) Pennell. Syn. = *Gerardia tenuifolia*
Vahl. var. *parviflora* Nutt.
#*Agalinis viridis* (Small) Pennell
Aureolaria grandiflora (Benth.) Pennell var.

cinerea Pennell. Syn. = *Gerardia*
grandiflora Benth. var. *cinerea* (Pennell)
Cory.

#*Aureolaria pectinata* (Nutt.) Pennell
Bacopa rotundifolia (Michx.) Wettst.
Buchnera americana L.

Castilleja coccinea (L.) Spreng. Wallis listed
formas *coccinea* and *lutescens* Farwell.

#*Castilleja indivisa* Engelm.

#*Castilleja purpurea* (Nutt.) G. Don

#*Collinsia verna* Nutt.

Collinsia violacea Nutt.

Dasistoma macrophylla (Nutt.) Raf. Syn. =
Seymeria macrophylla Nutt.

Gratiola neglecta Torr.

Gratiola virginiana L.

**Kickxia elatine* (L.) Dumort.

Leucospora multifida (Michx.) Nutt. Syn. =
Conobea multifida (Michx.) Benth.

**Linaria vulgaris* P. Mill.

Lindernia dubia (L.) Pennell var. *anagallidea*
(Michx.) Cooperrider. Syn. = *L.*
anagallidea (Michx.) Pennell.

Lindernia dubia (L.) Pennell var. *dubia*

Mecardonia acuminata (Walt.) Small var.
acuminata. Syn. = *Bacopa acuminata*
(Walt.) B.L. Robins.

Mimulus alatus Ait.

Mimulus glabratus Kunth var. *oklahomensis*
Fassett

#*Mimulus ringens* L.

Nuttallanthus texanus (Scheele) D.A. Sutton.
Syn. = *Linaria canadensis* (L.) Dumont.
var. *texana* (Scheele) Pennell.

Pedicularis canadensis L. ssp. *canadensis*.

Syn. = *P. canadensis* L. var. *dobbsii* Fern.

Penstemon arkansanus Pennell

Penstemon digitalis Nutt. ex Sims

#*Penstemon laxiflorus* Pennell

Penstemon tubiflorus Nutt.

Scrophularia marilandica L. Wallis listed
forma *neglecta* (Rydb.) Pennell.

**Verbascum blattaria* L. Wallis listed formas
albiflora (Don) House and *blattaria*.

**Verbascum thapsus* L.

#*Veronica anagallis-aquatica* L.

**Veronica arvensis* L.
Veronica peregrina L. ssp. *peregrina*
Veronica peregrina L. ssp. *xalapensis* (Kunth)
 Pennell. Syn. = *V. peregrina* L. var.
xalapensis (Kunth) Pennell.
Veronicastrum virginicum (L.) Farw.

Simaroubaceae

*#*Ailanthus altissima* (P. Mill.) Swingle

Solanaceae

**Datura inoxia* P. Mill. Syn. = *D. meteloides*
 auct. p.p., non Dunal.
 **Datura stramonium* L.
Physalis angulata L. Syns. = *P. angulata* L.
 var. *lanceifolia* (Nees) Waterfall and *P.*
angulata L. var. *pendula* (Rydberg)
 Waterfall.
Physalis cordata P. Mill. Syn. = *P. pubescens*
 L. var. *glabra* (Michx.) Waterfall.
 #*Physalis hederifolia* Gray
Physalis heterophylla Nees var. *heterophylla*
Physalis longifolia Nutt. var. *longifolia*. Syn. =
Physalis virginiana Mill. var. *sonorae*
 (Torr.) Waterfall.
Physalis missouriensis Mackenzie & Bush
 #*Physalis pubescens* L. var. *pubescens*
Physalis pubescens L. var. *integrifolia* (Dunal)
 Waterfall
Physalis pumila Nutt.
Physalis virginiana P. Mill. var. *virginiana*
Solanum americanum P. Mill.
Solanum carolinense L. Wallis listed formas
albiflorum (O. Ktze.) Benke and
carolinense.
Solanum elaeagnifolium Cav.
Solanum rostratum Dunal
 **Solanum physalifolium* Rusby. Syn. =
Solanum sarachoides auct. non Sendtner.
 #*Solanum ptychanthum* Dunal
 *#*Veronica persica* Poir.
 *#*Veronica polita* Fries

Staphyleaceae

Staphylea trifolia L.

Tamaricaceae

*#*Tamarix chinensis* Lour.
 **Tamarix gallica* L.

Tiliaceae

Tilia americana L. var. *americana*. Syn. = *Tilia*
neglecta Spach.
 #*Tilia americana* L. var. *caroliniana* (P. Mill.)
 Castigl.

Ulmaceae

Celtis laevigata Willd. var. *laevigata*
 #*Celtis laevigata* Willd. var. *texana* Sarg.
Celtis occidentalis L. Syn. = *C. occidentalis* L.
 var. *pumila* (Pursh) Gray.
Celtis tenuifolia Mitt. var. *ternifolia*. Syn. =
Celtis tenuifolia Nutt. var. *georgiana*.
 (Small) Fern. & Schub.
Ulmus alata Michx.
Ulmus americana L.
Ulmus crassifolia Nutt.
 **Ulmus pumila* L.
Ulmus rubra Muhl.
 #*Ulmus serotina* Sarg.

Urticaceae

Boehmeria cylindrica (L.) Sw. var. *cylindrica*
Laportea canadensis (L.) Weddell
Parietaria pensylvanica Muhl. ex Willd.
Pilea pumila (L.) Gray var. *deamii* (Lunell)
 Fern.
Urtica chamaedryoides Pursh
Urtica dioica L.

Valerianaceae

Valerianella longiflora (Torr. & Gray) Walp.
Valerianella ozarkana Dyal. Syn. = *V. bushii*
 Dyal.
Valerianella radiata (L.) Dufr.

Verbenaceae

Callicarpa americana L.
Glandularia canadensis (L.) Nutt.
Glandularia pumila (Rydb.) Umber. Syn. =
Verbena pumila Rydb.
Phryma leptostachya L. Formerly placed in
 the Phrymaceae.

Phyla lanceolata (Michx.) Greene Syn. = *L. lanceolata* Michx. var. *recognita* Fern. & Grisc.
Phyla nodiflora (L.) Greene. Syn. = *L. incisa* (Small) Tidestrom
Verbena bracteata Cav. ex Lag. & Rodr.
Verbena halei Small
Verbena hastata L.
Verbena simplex Lehm.
Verbena stricta Vent. Wallis listed formas *albiflora* Wadmond and *stricta*.
Verbena urticifolia L. var. *urticifolia*
 #*Verbena urticifolia* L. var. *leiocarpa* Perry & Fern.

Violaceae

Hybanthus concolor (T.E. Forst.) Spreng.
Viola bicolor Pursh. Syn. = *V. kitaibeliana* R. & S. var. *rafinesquii* (Greene) Fern.
Viola missouriensis Greene
 #*Viola* × *palmata* L. (pro sp.) [*brittoniana* or *pedatifida* × *affinis* or *sororia*]
Viola pedata L. Syn. = *V. pedata* L. var. *lineariloba* DC.
Viola pedatifida G. Don
Viola pubescens Ait. Syn. = *V. pensylvanica* var. *pensylvanica*.
Viola pubescens Ait. var. *scabriuscula* Schwein. ex Torr. & Gray. Syn. = *V. pensylvanica* Michx var. *leiocarpa* (Fern. & Wieg.) Fern.
 #*Viola* × *primulifolia*
Viola sagittata Ait.
Viola sororia Willd. Syn. = *V. papilionacea* Pursh.
Viola triloba Schwein. var. *dilatata* (Ell.) Brainerd

Viscaceae (=Loranthaceae)

Phoradendron leucarpum (Raf.) Reveal & M.C. Johnston. Syn. = *P. flavescens* Nutt. ex Engelm.

Vitaceae

Ampelopsis arborea (L.) Koehne
Ampelopsis cordata Michx.
Cissus trifoliata (L.) L. Syn. = *C. incisa* (Nutt.)

Des Moulins.

Parthenocissus quinquefolia (L.) Planch.
 Wallis listed forma *hirsuta* (Donn) Fern.
 #*Vitis aestivalis* Michx. var. *aestivalis*
Vitis aestivalis Michx. var. *bicolor* Deam. Syn. = *V. aestivalis* Michx. var. *argentifolia* (Munson) Fern.
Vitis aestivalis Michx. var. *lincecumii* (Buckl.) Munson. Syn. = *V. lincecumii* Buckl. var. *glauca* Munson.
 #*Vitis cinerea* (Engelm.) Millard
 #*Vitis palmata* Vahl
 #*Vitis riparia* Michx.
 #*Vitis rupestris* Scheele
Vitis vulpina L.

Zygophyllaceae

**Tribulus terrestris* L.

Monocotyledoneae

Acoraceae

#*Acorus calamus* L.

Agavaceae

Manfreda virginica (L.) Salisb. ex Rose. Syn. = *Agave lata* Shinners.
Yucca arkansana Trel.
Yucca filamentosa L.
 #*Yucca glauca* Nutt.

Alismataceae

Alisma subcordatum Raf.
Echinodorus cordifolius (L.) Griseb.
Sagittaria ambigua J.G. Sm.
 #*Sagittaria brevirostra* Mackenzie & Bush
Sagittaria calycina Engelm.
Sagittaria graminea Michx.
Sagittaria latifolia Willd. Wallis listed formas *hastata* (Pursh) Robins. and *latifolia*. Syn. = *S. latifolia* Willd var. *obtusata* (Engelm.) Wieg.
 #*Sagittaria platyphylla* (Engelm.) J.G. Sm.

Araceae

Arisaema triphyllum (L.) Schott ssp. *triphyllum*. Syn. = *A. atropurpureum* (Ait.) Blume. Wallis formas *viride* (Engler) Fern. and *zebrinum*

(Sims) Fern.

Arisaema dracontium (L.) Schott**Commelinaceae****Commelina communis* L.*Commelina diffusa* Burm. f.*Commelina erecta* L. var. *angustifolia* (Michx.)
Fern. Wallis listed forma *crispa* (Woot.)
Fern.*Commelina erecta* L. var. *deamiana* Fern.*Commelina erecta* L. var. *erecta*. Wallis listed
formas *erecta* and *intercurva* Fern.*Commelina virginica* L.*Tradescantia ernestiana* E.S. Anderson &
Woods. Wallis listed formas *alba* Waterfall
and *ernestiana*.#*Tradescantia hirsutiflora* Bush*Tradescantia ohiensis* Raf. Wallis listed forma
ohiensis.*Tradescantia ozarkana* E.S. Anderson &
Woods.**Cyperaceae***Bulbostylis capillaris* (L.) Kunth ex C.B. Clarke
ssp. *capillaris*. Syn. = *Bulbostylis capillaris*
(L.) C. B. Clark var. *crebra* Fern.*Carex aggregata* Mackenzie#*Carex albicans* Willd. ex Spreng. var. *albicans**Carex amphibola* Steud. var. *amphibola**Carex annectens* (Bickn.) Bickn.*Carex austrina* Mackenzie*Carex bicknellii* Britt.*Carex blanda* Dewey*Carex brevior* (Dewey) Mackenzie*Carex bulbostylis* Mackenzie. Syn. = *Carex*
amphibola Steud. var. *globosa* (Bailey)
Bailey.*Carex bushii* Mackenzie#*Carex caroliniana* Schwein.*Carex cephalophora* Muhl. var. *cephalophora**Carex cherokeensis* Schwein.#*Carex complanata* Torr. & Hook.*Carex crawei* Dewey*Carex crus-corvi* Shuttlw. ex Kunze#*Carex davisii* Schwein. & Torr.#*Carex digitalis* Willd.#*Carex festucacea* Schkuhr ex Willd.#*Carex fissa* Mackenzie*Carex flaccosperma* Dewey*Carex frankii* Kunth*Carex granularis* Muhl. ex Willd. Syn. = *Carex*
haleana Olney.*Carex gravida* Bailey var. *lunelliana*
(Mackenzie) F.J. Herm.*Carex grayi* Carey. Syn. = *Carex grayi* Carey
var. *hispidula* Gray.*Carex grisea* Wahlenb. Syn. = *Carex*
amphibola Steud var. *turgida* Fern.*Carex hirsutella* Mackenzie*Carex hyalinolepis* Steud.*Carex jamesii* Schwein.*Carex leavenworthii* Dewey. Syn. = *Carex*
cephalophora Muhl. var. *leavenworthii*
(Dewey) Kükenth.*Carex laevivaginata* (Kükenth.) Mackenzie#*Carex louisianica* Bailey*Carex lupuliformis* Sartwell ex Dewey#*Carex lupulina* Muhl. ex Willd.*Carex lurida* Wahlenb.#*Carex microdonta* Torr. & Hook.#*Carex molestiformis* Reznicek & Rothrock*Carex muehlenbergii* Schkuhr ex Willd. var.
enervis Boott.*Carex muehlenbergii* Schkuhr ex Willd. var.
muehlenbergii.*Carex normalis* Mackenzie*Carex oklahomensis* Mackenzie. Syn. = *Carex*
stipata Muhl. var. *oklahomensis*
(Mackenzie) Gleason.*Carex oligocarpa* Schkuhr ex Willd.#*Carex oxylepis* Torr. & Hook.*Carex retroflexa* Muhl. ex Willd.#*Carex scoparia* Schkuhr ex Willd.#*Carex shinneryi* P. Fothr. & Reznicek*Carex shortiana* Dewey#*Carex socialis* Mohlenbrock & Schwegm.#*Carex squarrosa* L.*Carex triangularis* Boeckl.*Carex vulpinoidea* Michx.*Cyperus acuminatus* Torr. & Hook. ex Torr.*Cyperus bipartitus* Torr. Syn. = *Cyperus*
rivularis Kunth.*Cyperus echinatus* (L.) Wood. Syns. =
Cyperus ovularis (Michx.) Torr. var.

ovularis and *Cyperus ovularis* (Michx.)
Torr. var. *sphaericus* Boeckl.
Cyperus erythrorhizos Muhl.
**Cyperus esculentus* L.
Cyperus flavescens L. Syn. = *Cyperus*
flavescens L. var. *poiformis* (Pursh) Fern.
*#*Cyperus iria* L.
Cyperus lupulinus (Spreng.) Marcks ssp.
lupulinus. Syn. = *Cyperus filiculmis* Vahl.
Cyperus odoratus L.
#*Cyperus reflexus* Vahl
#*Cyperus retroflexus* Buckl. Syn. = *Cyperus*
uniflorus Torr. & Hook.
#*Cyperus setigerus* Torr. & Hook.
Cyperus strigosus L. Syn. = *Cyperus strigosus*
L. var. *robustior* Britt.
Cyperus strigosus L. var. *strigosus*
Cyperus squarrosus L. Syn. = *Cyperus*
inflexus Muhl.
Cyperus virens Michx.
Eleocharis acicularis (L.) Roemer & J.A.
Schultes var. *acicularis* Syn. = *Eleocharis*
acicularis (L.) Roemer & J.A. Schultes var.
gracilescens Svens.
Eleocharis engelmanni Steud. Wallis lists
forma *englemanni*.
#*Eleocharis erythropoda* Steud.
Eleocharis lanceolata Fern.
Eleocharis macrostachya Britt.
Eleocharis montevidensis Kunth
Eleocharis obtusa (Willd.) J.A. Schultes
#*Eleocharis palustris* (L.) Roemer & J.A.
Schultes
#*Eleocharis parvula* (Roemer & J.A. Schultes)
Link ex Bluff, Nees & Schauer
Eleocharis quadrangulata (Michx.) Roemer &
J.A. Schultes
Eleocharis radicans (A. Dietr.) Kunth.
Eleocharis tenuis (Willd.) J.A. Schultes var.
verrucosa (Svens.) Svens.
Fimbristylis annua (All.) Roemer & J.A.
Schultes. Syn. = *Fimbristylis baldwiniana*
(J.A. Schultes) Torr.
Fimbristylis autumnalis (L.) Roemer & J.A.
Schultes
Fimbristylis puberula (Michx.) Vahl var.
puberula. Syn. = *Fimbristylis drummondii*

(Torr. & Hook. ex Torr.) Boeckl.
Fimbristylis vahlii (Lam.) Link
Fuirena squarrosa Michx.
Isolepis carinata Hook. & Arn. ex Torr. Syn. =
Scirpus koilolepis (Steud.) Gleason.
Kyllinga pumila Michx. Syn. = *Cyperus*
tenuifolius (Steud.) Dandy.
Lipocarpha drummondii (Nees) G. Tucker.
Syn. = *Hemicarpha drummondii* Nees.
Lipocarpha micrantha (Vahl) G. Tucker. Syn. =
Hemicarpha micrantha (Vahl) Pax.
Rhynchospora harveyi W. Boott
Rhynchospora macrostachya Torr. ex Gray
Rhynchospora recognita (Gale) Kral. Syn. =
Rhynchospora globularis (Chapm.) Small
var. *recognita* Gale.
#*Schoenoplectus acutus* (Muhl. ex Bigelow)
A. & D. Löve var. *acutus*
Schoenoplectus americanus (Pers.) Volk. ex
Schinz & R. Keller. Syn. = *Scirpus*
americanus Pers. var. *americanus*.
Schoenoplectus californicus (C.A. Mey.) Palla.
Syn. = *Scirpus californicus* (C.A. Meyer)
Steud.
Schoenoplectus heterochaetus (Chase) Soják.
Syn. = *Scirpus heterochaetus* Chase.
Schoenoplectus tabernaemontani (K.C. Gmel.)
Palla. Syn. = *Scirpus validus* Vahl var.
creber Fern.
Scirpus atrovirens Willd.
Scirpus pendulus Muhl. Syn. = *Scirpus*
lineatus auct. non Michx.
Scleria ciliata Michx. var. *ciliata*
Scleria oligantha Michx.
Scleria pauciflora Muhl. ex Willd. var.
caroliniana (Willd.) Wood
Scleria triglomerata Michx.

Dioscoreaceae

**Dioscorea oppositifolia* L. Syn. = *Dioscorea*
batatas Dcne.
Dioscorea quaternata J.F. Gmel.
Dioscorea villosa L. Wallis listed formas
glabrifolia (Bartlett) Fern. and *villosa*.

Hydrocharitaceae

Elodea nuttallii (Planch.) St. John

Iridaceae

- **Belamcanda chinensis* (L.) DC
Iris cristata Ait.
Iris virginica L. var. *shrevei* (Small) E. Anders.
Nemastylis nuttallii Pickering ex R.C. Foster
Sisyrinchium angustifolium P. Mill.
Sisyrinchium campestre Bickn. Wallis lists
forma *kansanum* (Bickn.)
Steyerm.
Sisyrinchium langloisii Greene. Syn. =
Sisyrinchium varians Bickn.

Juncaceae

- Juncus acuminatus* Michx.
Juncus biflorus Ell.
Juncus brachycarpus Engelm.
Juncus diffusissimus Buckl.
#*Juncus dudleyi* Wieg.
Juncus effusus L. var. *solutus* Fern. & Wieg.
Juncus interior Wieg.
Juncus marginatus Rostk.
Juncus nodatus Coville. Syn. = *Juncus*
acuminatus Michx. var. *robustus* Engelm.
Juncus scirpoides Lam.
#*Juncus secundus* Beauv. ex Poir.
Juncus tenuis Willd.
Juncus torreyi Coville
Juncus validus Coville
Luzula bulbosa (Wood) Smyth & Smyth
#*Luzula echinata* (Small) F.J. Herm.

Lemnaceae

- Lemna minor* L.
Lemna valdiviana Phil.
Spirodela polyrrhiza (L.) Schleid.
#*Wolffia brasiliensis* Weddell
#*Wolffia columbiana* Karst.

Liliaceae

- Aletris farinosa* L.
Allium canadense L. var. *canadense*
Allium canadense L. var. *lavandulare* (Bates)
Ownbey & Aase
Allium canadense L. var. *mobile* (Regel)
Ownbey
*#*Allium sativum* L.

- Allium stellatum* Fraser ex Ker-Gawl.
**Allium vineale* L. Wallis listed formas
compactum (Thuill.) Aschers and *vineale*.
**Asparagus officinalis* L.
Camassia scilloides (Raf.) Cory
Cooperia drummondii Herbert
Erythronium albidum Nutt.
Erythronium americanum Ker-Gawl.
Erythronium mesochoreum Knerr. Syn. =
Erythronium albidum Nutt. var.
mesochoreum (Knerr) Rickett.
#*Erythronium rostratum* W. Wolf
**Hemerocallis fulva* (L.) L.
Hypoxis hirsuta (L.) Coville
Maianthemum racemosum (L.) Link ssp.
racemosum. Syn. = *Smilacina racemosa*
(L.) Desf. var. *cylindrata* Fern.
Nothoscordum bivalve (L.) Britt.
*#*Ornithogalum umbellatum* L.
Polygonatum biflorum (Walt.) Ell. var.
commutatum (J.A. & J.H. Schultes)
Morong. Syn. = *Polygonatum*
canaliculatum auct. non (Muhl. ex Willd.)
Pursh.
Trillium recurvatum Beck
#*Trillium sessile* L.
Trillium viridescens Nutt.
Uvularia grandiflora Sm.
Zigadenus nuttallii (Gray) S. Wats.

Najadaceae

- Najas guadalupensis* (Spreng.) Magnus

Orchidaceae

- #*Calopogon oklahomensis* D.H. Goldman
Calopogon tuberosus (L.) B.S.P. var.
tuberosus. Syn. = *Calopogon pulchellus*
R. Br. ex Ait. f.
#*Corallorrhiza odontorrhiza* (Willd.) Poir.
Corallorrhiza wisteriana Conrad
#*Cypripedium kentuckiense* C.F. Reed
#*Cypripedium parviflorum* Salisb.
Hexalectris spicata (Walt.) Barnh.
#*Malaxis unifolia* Michx.
Platanthera lacera (Michx.) G. Don. Syn. =
Habenaria lacera (Michx.) R. Br.
Spiranthes cernua (L.) L.C. Rich.

Spiranthes lacera (Raf.) Raf. var. *gracilis*
(Bigelow) Luer. Syn. = *Spiranthes gracilis*
(Bigelow) Beck.

Spiranthes tuberosa Raf. Syn. = *Spiranthes*
grayi Ames.

Spiranthes vernalis Engelm. & Gray
#*Tipularia discolor* (Pursh) Nutt.

Poaceae (= Gramineae)

**Aegilops cylindrica* Host. Syn. = *Aegilops*
cylindrica Host. var. *rubiginosa* Popova.

**Agrostis gigantea* Roth. Syn. = *Agrostis alba*
L.

Agrostis eliottiana J.A. Schultes

Agrostis hyemalis (Walt.) B.S.P.

Agrostis perennans (Walt.) Tuckerman

#*Agrostis scabra* Willd.

#*Agrostis stolonifera*

**Aira caryophyllea* L.

*#*Aira elegans* Willd. ex Kunth

Alopecurus carolinianus Walt.

Andropogon gerardi Vitman. Syn. =

Andropogon gerardi Vitman var.
chrysocomas (Nash) Fern.

Andropogon ternarius Michx.

Andropogon virginicus L. var. *virginicus*. Syn.
= *Andropogon virginicus* L. var.
tetrastachyus (Ell.) Hack.

#*Aristida basiramea* Engelm. ex Vasey

Aristida dichotoma Michx. var. *curtissii* Gray ex
S. Wats. & Coult.

Aristida dichotoma Michx. var. *dichotoma*

Aristida longespica Poir. var. *geniculata* (Raf.)
Fern. Syn. = *Aristida intermedia* Scribn. &
Ball.

Aristida longespica Poir. var. *longespica*

Aristida oligantha Michx.

Aristida purpurascens Poir.

**Arthraxon hispidus* (Thunb.) Makino. Syn. =
Arthraxon hispidus (Thunb.) Makino var.
cryptatherus (Hack) Houda.

Arundinaria gigantea (Walt.) Muhl.

*#*Avena sativa* L.

Axonopus fissifolius (Raddi) Kuhl. Syn. =
Axonopus affinis Chase.

**Bothriochloa ischaemum* (L.) Keng. Syn. =
Andropogon ischaemum L.

Bothriochloa saccharoides (Sw.) Rydb. Syn. =
Andropogon saccharoides Sw.

Bouteloua curtipendula (Michx.) Torr.

#*Brachyelytrum erectum* (Schreb. ex Spreng.)
Beauv.

**Bromus catharticus* Vahl.

**Bromus hordeaceus* L. ssp. *hordeaceus*. Syn.
= *Bromus mollis* L.

**Bromus japonicus* Thunb.

Bromus pubescens Muhl. ex Willd.

**Bromus secalinus* L.

**Bromus tectorum* L.

Cenchrus spinifex Cav. Syns. = *Cenchrus*
incertus M.A. Curtis and *Cenchrus*
pauciflorus Benth.

Chasmanthium latifolium (Michx.) Yates. Syn.
= *Uniola latifolia* Michx.

Chloris verticillata Nutt.

#*Chloris virgata* Sw.

Cinna arundinacea L. Syn. = *Cinna*
arundinacea L. var. *inexpansa* Fern. &
Grisc.

Coelorachis cylindrica (Michx.) Nash. Syn. =
Manisuris cylindrica (Michx.) Kuntze.

**Cynodon dactylon* (L.) Pers.

**Dactylis glomerata* L.

Danthonia spicata (L.) Beauv. ex Roemer &
J.A. Schultes. Syn. = *Danthonia spicata*
(L.) Beauv. ex Roemer & J.A. Schultes var.
longipila Scribn. & Merr.

#*Diarrhena americana* Beauv.

Diarrhena obovata (Gleason) Brandenburg.
Syn. = *Diarrhena americana* Beauv. var.
obovata Gleason.

#*Dichantherium aciculare* (Desv. ex Poir.)
Gould & C. A. Clark

#*Dichantherium acuminatum* (Sw.) Gould &
C.A. Clark var. *acuminatum*

Dichantherium acuminatum (Sw.) Gould & C.A.
Clark var. *fasciculatum* (Torr.) Freckmann.
Syn. = *Panicum lanuginosum* Ell. var.
fasciculatum (Torr.) Fern.

#*Dichantherium acuminatum* (Sw.) Gould &
C.A. Clark var. *lindheimeri* (Nash) Gould &
C.A. Clark

Dichantherium boscii (Poir.) Gould & C.A.
Clark. Syn. = *Panicum boscii* Poir.

- #*Dichanthelium clandestinum* (L.) Gould
Dichanthelium commutatum (J.A. Schultes)
Gould. Syn. = *Panicum commutatum*
Schultes var. *commutatum*.
- #*Dichanthelium depauperatum* (Muhl.) Gould
#*Dichanthelium dichotomum* (L.) Gould var.
dichotomum
- Dichanthelium latifolium* (L.) Gould & C.A.
Clark. Syn. = *Panicum latifolium* L.
- Dichanthelium laxiflorum* (Lam.) Gould. Syn. =
Panicum laxiflorum Lam.
- Dichanthelium linearifolium* (Scribn. ex Nash)
Gould. Syns = *Panicum linearifolium*
Scribn. var. *linearifolium*, *Panicum*
linearifolium Scribn. ex Nash var. *wernerii*
(Scribn.) Fern., and *Panicum perlongum*
Nash.
- Dichanthelium malacophyllum* (Nash) Gould.
Syn. = *Panicum malacophyllum* Nash.
- #*Dichanthelium oligosanthes* (J.A. Schultes)
Gould var. *oligosanthes*
- Dichanthelium oligosanthes* (J.A. Schultes)
Gould var. *scribnerianum* (Nash) Gould.
Syns. = *Panicum oligosanthes* Schultes
var. *helleri* (Nash) Fern. and *Panicum*
oligosanthes Schultes var. *scribnerianum*
(Nash) Fern.
- Dichanthelium ravenelii* (Scribn. & Merr.)
Gould. Syn. = *Panicum ravenelii* Scribn. &
Merr.
- Dichanthelium scoparium* (Lam.) Gould. Syn.
= *Panicum scoparium* Lam.
- Dichanthelium sphaerocarpon* (Ell.) Gould.
Syn. = *Panicum sphaerocarpon* Ell.
- Dichanthelium sphaerocarpon* (Ell.) Gould var.
isophyllum (Scribn.) Gould & C.A. Clark.
Syn. = *Panicum polyanthes* Schultes.
- Dichanthelium villosissimum* (Nash)
Freckmann var. *praecocius* (A.S. Hitchc. &
Chase) Freckmann. Syn. = *Panicum*
praecocius A.S. Hitchc. & Chase.
- Digitaria cognata* (J.A. Schultes) Pilger. Syn. =
Leptoloma cognatum (Schultes) Chase.
- #*Digitaria ciliaris* (Retz.) Koel.
Digitaria filiformis (L.) Koel.
- **Digitaria ischaemum* (Schreb.) Schreb. ex
Muhl. Syn. = *Digitaria ischaemum*
(Schreb.) Muhl.
- Digitaria sanguinalis* (L.) Scop.
- #*Digitaria villosa* (Walt.) Pers.
- **Echinochloa colona* (L.) Link. Wallis listed
forma *zonalis* (Guss.) Wieg.
- **Echinochloa crus-galli* (L.) Beauv.
- **Eleusine indica* (L.) Gaertn.
- Elymus canadensis* L.
- Elymus hystrix* L. Syn. = *Hystrix patula*
Moench.
- Elymus villosus* Muhl. ex Willd.
- Elymus virginicus* L. var. *virginicus*. Syns. =
Elymus virginicus L. var. *glabriflorus*
(Vasey) Bush (Wallis listed formas
australis (Scribn. & Ball) Fern.,
hirsutiglumis (Scribn.) Fern., and
virginicus) and *Elymus virginicus* L. var.
jejunos (Ramaley) Rydb.
- *#*Eragrostis barrelieri* Daveau
Eragrostis capillaris (L.) Nees
- **Eragrostis cilianensis* (All.) Vign. ex Janchen.
Syn. = *Eragrostis megastachya* (Koel.)
Link.
- Eragrostis curtipedicellata* Buckl.
- **Eragrostis curvula* (Schrud.) Nees
- Eragrostis frankii* C.A. Mey. ex Steud.
- Eragrostis hirsuta* (Michx.) Nees
- Eragrostis hypnoides* (Lam.) B.S.P.
- Eragrostis intermedia* A.S. Hitchc.
- Eragrostis pectinacea* (Michx.) Nees ex Steud.
- Eragrostis pilosa* (L.) Beauv.
- Eragrostis spectabilis* (Pursh) Steud.
- #*Eragrostis trichodes* (Nutt.) Wood
- Festuca paradoxa* Desv.
- Festuca subverticillata* (Pers.) Alexeev. Syn. =
Festuca obtusa Biehler.
- #*Glyceria acutiflora* Torr.
- Glyceria striata* (Lam.) A.S. Hitchc.
- Gymnopogon ambiguus* (Michx.) B.S.P.
- *#*Holcus lanatus* L.
- Hordeum pusillum* Nutt.
- Koeleria macrantha* (Ledeb.) J.A. Schultes.
Syn. = *Koeleria cristata* (L.) Pers.
- Leersia oryzoides* (L.) Sw. Wallis listed formas
glabra A.A. Eat. and *oryzoides*.
- Leersia virginica* Willd.
- Leptochloa fusca* (L.) Kunth ssp. *fascicularis*

- (Lam.) N. Snow. Syn. = *Diplachne fascicularis* (Lam.) Beauv.
Leptochloa panicea (Retz.) Ohwi ssp. *brachiata* (Steudl.) N. Snow. Syn. = *Leptochloa filiformis* (Lam.) Beauv.
 **Lolium perenne* L. ssp. *multiflorum* (Lam.) Husnot. Syn. = *Lolium multiflorum* Lam.
 #*Melica mutica* Walt.
Melica nitens (Scribn.) Nutt. ex Piper
 *#*Microstegium vimineum* (Trin.) A. Camus
 #*Muhlenbergia bushii* Pohl
Muhlenbergia capillaris (Lam.) Trin.
 #*Muhlenbergia frondosa* (Poir.) Fern.
Muhlenbergia schreberi J.F. Gmel.
Muhlenbergia sobolifera (Muhl. ex Willd.) Trin.
Muhlenbergia sylvatica Torr. ex Gray
 #*Muhlenbergia tenuiflora* (Willd.) B.S.P.
Nassella leucotricha (Trin. & Rupr.) Pohl. Syn. = *Stipa leucotricha* Trin. & Rupr.
Neeragrostis reptans (Michx.) Nicora
Panicum anceps Michx.
Panicum brachyanthum Steud.
Panicum capillare L. var. *capillare*
Panicum dichotomiflorum Michx. var. *dichotomiflorum*
Panicum flexile (Gattinger) Scribn.
 #*Panicum obtusum* Kunth
 #*Panicum philadelphicum* Bernh. ex Trin.
Panicum rigidulum Bosc ex Nees var. *rigidulum*. Syn. = *Panicum agrostoides* Spreng. var. *agrostoides*.
Panicum virgatum L.
Pascopyrum smithii (Rydb.) A. Löve. Syn. = *Agropyron smithii* Rydb. var. *smithii*.
 #*Paspalidium geminatum* (Forsk.) Stapf
 **Paspalum dilatatum* Poir.
Paspalum floridanum Michx. Syn. = *Paspalum floridanum* Michx. var. *glabratum* Engelm.
Paspalum fluitans (Ell.) Kunth
Paspalum laeve Michx. Syn. = *Paspalum laeve* Michx. var. *pilosum* Scribn.
Paspalum pubiflorum Rupr. ex Fourn. Syn. = *Paspalum pubiflora* Rupr. var. *glabrum* Vasey ex Scribn.
Paspalum setaceum Michx. Syn. = *Paspalum ciliatifolium* Michx. var. *ciliatifolium* and *Paspalum ciliatifolium* Michx. var. *muehlenbergii* (Nash) Fern.
Phalaris caroliniana Walt.
 *#*Phleum pretense* L.
 **Poa annua* L.
 #*Poa champaniana* Scribn.
Poa pratensis L.
Poa sylvestris Gray
Polypogon interruptus Kunth
Schedonnardus paniculatus (Nutt.) Trel.
 *#*Schedonorus phoenix* (Scop.) Holub
 *#*Schedonorus pratensis* (Huds.) Beauv.
Schizachyrium scoparium (Michx.) Nash. Syn. = *Andropogon scoparius* Michx.
 #*Setaria leucopila* (Scribn. & Merr.) K. Schum.
Setaria parviflora (Poir.) Kerguelen. Syn. = *Setaria geniculata* auct. non (Wild.) Beauv.
 **Setaria pumila* (Poir.) Roemer & J.A. Schultes ssp. *pumila*. Syn. = *Setaria glauca* (L.) Beauv.
 **Setaria viridis* (L.) Beauv.
Sorghastrum nutans (L.) Nash
 **Sorghum halepense* (L.) Pers.
Spartina pectinata Bosc ex Link. Syn. = *Spartina pectinata* Bosc ex Link var. *suttiei* (Farw.) Fern.
Sphenopholis filiformis (Chapman) Scribn.
Sphenopholis intermedia (Rydb.) Rydb.
Sphenopholis obtusata (Michx.) Scribn. Syn. = *Sphenopholis obtusata* (Michx.) Scribn. var. *lobata* (Trin.) scribn. Wallis listed forma *lobata*.
Sporobolus clandestinus (Biehler) A.S. Hitchc. Syn. = *Sporobolus canovirens* Nash.
Sporobolus compositus (Poir.) Merr. var. *compositus*. Syn. = *Sporobolus asper* (Beauv.) Kunth var. *hookeri* (Trin.) Vasey.
 #*Sporobolus compositus* (Poir.) Merr. var. *drummondii* (Trin.) Kartesz & Gandhi
Sporobolus cryptandrus (Torr.) Gray
Sporobolus heterolepis (Gray) Gray
Sporobolus vaginiflorus (Torr. ex Gray) Wood var. *vaginiflorus*
 #*Sporobolus vaginiflorus* (Torr. ex Gray) Wood var. *ozarkanus* (Fern.) Shinnors
Steinchisma hians (Ell.) Nash. Syn. = *Panicum hians* Ell.
Tridens muticus (Torr.) Nash var. *elongatus*

(Buckl.) Shinn. Syn. = *Triodia elongata*
(Buckl.) Scribn.
Tridens flavus (L.) A.S. Hitchc. Syn. = *Triodia*
flava (L.) Smyth.
Tridens strictus (Nutt.) Nash. Syn. = *Triodia*
stricta (Nutt.) Benth. ex Vasey.
Triplasis purpurea (Walt.) Chapman
Tripsacum dactyloides (L.) L.
**Triticum aestivum* L.
#*Urochloa platyphylla* (Munro ex Wright) R.
Webster
**Vulpia myuros* (L.) K.C. Gmel.
Vulpia octoflora (Walt.) Rydb.
#*Zizaniopsis miliacea* (Michx.) Doell & Aschers.

Pontederiaceae

#*Heteranthera dubia* (Jacq.) MacM.
Heteranthera limosa (Sw.) Wild.

Potamogetonaceae (= Zosteraceae)

**Potamogeton crispus* L.
Potamogeton diversifolius Raf.
Potamogeton foliosus Raf. ssp. *foliosus*
Potamogeton nodosus Poir.

Smilacaceae

Smilax bona-nox L. Syn. = *Smilax bona-nox* L.

var. *hastata* (Willd.) A. DC. and *Smilax*
bona-nox L. var. *hederifolia* (Bey.) Fern.
#*Smilax ecirrata* (Engelm. ex Kunth) S. Wats.
Smilax glauca Walt. Syn. = *Smilax glauca*
Walt. var. *leucophylla* Blake.
#*Smilax herbacea* L.
Smilax lasioneura Hook.
Smilax pulverulenta Michx.
#*Smilax rotundifolia* L.
Smilax tamnoides L. Syn. = *Smilax tamnoides*
L. var. *hispida* (Muhl. ex Torr.) Fern.

Sparganiaceae

#*Sparganium americanum* Nutt.
Sparganium androcladum (Engelm.) Morong

Typhaceae

**Typha angustifolia* L.
Typha domingensis Pers.
Typha latifolia L. Wallis listed formas *ambigua*
(Sonder) Kronf. and *latifolia*.

Zannichelliaceae

Zannichellia palustris L. Formerly a member of
the Zosteraceae.

The Vascular Flora of the Oklahoma Centennial Botanical Garden site Osage County, Oklahoma

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This paper is a report on the results of an inventory of the vascular plants at the future site of the Oklahoma Centennial Botanical Garden in Osage County, Oklahoma. We collected a total of 293 taxa in 208 genera and 68 families. The families Poaceae and Asteraceae had the greatest number of species with 50 and 44 species respectively. Forty-one species of woody plants were present. Forty-four non-native species were present, representing 15% of the flora. No species tracked by the Oklahoma Natural Heritage Inventory were present.

INTRODUCTION

The objective of this study was to complete a floristic inventory at the future site of the Oklahoma Centennial Botanical Garden (OCBG) in southeast Osage County (36.2017°N to 36.2109°N and 96.0555°W and 96.0678°W). Construction of the OCBG is scheduled to begin in late 2007 on 87 hectares (215 acres). The master plan, developed by Marshall Tyler Rausch of Pittsburgh, Pennsylvania, includes a Mexican Garden, Oklahoma Wildflower Garden, Cross Timbers Prairie and Woodland, Folk Garden, Horticultural Therapy Garden, Children's Garden, Demonstration Gardens, and others. In addition, a 17-acre lake, an amphitheater, a visitor center, education buildings, and a conservatory will be constructed (Oklahoma Centennial Botanical Garden 2007).

The OCBG site is located in the Claremore Cuesta plains geomorphic province of southeastern Osage County (Curtis and Ham 1979). Surface geology is predominantly Pennsylvanian sandstone and shale (Branson and Johnson 1979). Soils belong to the Niotaze-Darnell Association, described as moderately deep and shallow,

gently sloping to steep, loamy soils over shale and sandstone (Bourlier et al. 1979). The climate is Subtropical Humid (Cf) (Trewartha 1968). Summers are warm and humid. Mean July temperature is 27.5°C (81.5°F). Winters are relatively short and mild with a mean January temperature of 1.5°C (34.7°F). Mean annual precipitation is 111.7 cm (43.8 in) (Oklahoma Climatological Survey, 2007). Elevation ranges from 259 to 302 m (849.5 to 990.6 ft). Potential natural vegetation at OCBG is post oak-blackjack forest and tallgrass prairie (Duck and Fletcher 1943). Historical land use of the site has included livestock grazing and oil exploration.

METHODS

Three collection sites were visited monthly for floristic sampling. The predominant vegetation association at these sites was classified according to Hoagland (2000). Additional collections were also made opportunistically throughout the OCBG. Collecting began in July of 2006 and continued through July of 2007. Vouchers for non-native species were made from naturalized populations only, thus

excluding cultivated and ornamental plants. Specimens were processed following standard procedures and deposited at the Robert Bebb Herbarium at the University of Oklahoma (OKL). Manuals used for specimen identification included Waterfall (1973) and Steyermark (1963). Origin, either native or introduced to North America, was determined using the Plants Database (USDA-NRCS, 2007). Nomenclature follows the United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS 2007).

RESULTS AND DISCUSSION

A total of 293 taxa of vascular plants in 68 families and 208 genera were collected at the OCBG (Appendix). Of the angiosperms, 92 species were Liliopsida and 199 were Magnoliopsida (Table). There was one species of Pteridophyta and one of Coniferophyta. Forty-one species were trees, shrubs, and woody vines. The Poaceae with 50 taxa, and the Asteraceae with 44 taxa, were the largest families. The genera *Symphotrichum* (formerly *Aster*) and *Cyperus* had the most species, with seven and six species respectively. One hundred and seven taxa were annuals, 2 were biennials and 184 were perennials.

Forty-four species (15% of the flora) in 25 families were non-native to Oklahoma. The percentage of non-native species at the OCBG is high when compared to other floristic surveys from Oklahoma, which range from 6.6%-15% (Hoagland and Buthod 2004; Hoagland and Johnson 2005). The greatest numbers of non-native species occurred in the Poaceae, with eleven and Fabaceae, with eight. No species tracked by the Oklahoma Natural Heritage Inventory (2007) were encountered.

Collection sites selected at OCBG occurred within four vegetation associations. A description of each vegetation category follows:

1. *Quercus stellata*-*Quercus marilandica* forest association [QSQM]

This vegetation association occupied a small percentage of the OCBG. Common associated species included *Amelanchier arborea*, *Antennaria plantaginifolia*, *Baptisia bracteata* var. *leucophaea*, *Danthonia spicata*, *Helianthus hirsutus*, *Hypericum hypericoides*, *Symphotrichum patens*, *Myosotis verna*, *Opuntia humifusa*, *Sideroxylon lanuginosum*, *Smilax rotundifolia*, *Ulmus alata*, and *Viburnum rufidulum*.

2. *Schizachyrium scoparium*-*Sorghastrum nutans* [SSN]

This herbaceous grassland vegetation association occupied the greatest area at the OCBG. Soils were typically shallow with exposed cobble. Associated species included *Amorpha canescens*, *Arnoglossum plantagineum*, *Callirhoe alcaeoides*, *Coreopsis grandiflora*, *Cyperus echinatus*, *Echinacea atrorubens*, *Krameria lanceolata*, *Lespedeza cuneata*, *Minuartia drummondii*, and *Pediomelum linearifolium*.

3. Wetland and aquatic vegetation [WETL]

Wetland vegetation was restricted to a small stream bisecting the site and its associated beaver pond. Common associates included *Alisma subcordatum*, *Ammannia auriculata*, *Callitriche heterophylla*, *Cephalanthus occidentalis*, *Eclipta prostrata*, *Fimbristylis autumnalis*, *Juncus brachycarpus*, *Ludwigia palustris*, *Nelumbo lutea*, *Polygonum pennsylvanicum*, *Sagittaria ambigua*, and *Samolus ebracteatus*.

4. Disturbed areas and old-field vegetation [DAOF]

Disturbed areas coincided with roadways and oil extraction sites. Common associated species included *Achillea millefolium*, *Aegilops cylindrica*, *Capsella bursa-pastoris*, *Carduus nutans*, *Convolvulus arvensis*, *Daucus pusillus*, *Juniperus virginiana*, *Lamium amplexicaule*, *Rhus copallinum*, *R. glabra*, and *Torilis arvensis*.

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Table Summary of floristic collections from the Oklahoma Centennial Botanical Garden site, Osage County, Oklahoma. Format follows Palmer et al. (1995).

Taxonomic Group	Taxa	Native	Non-native
Pteridophyta	1	1	0
Coniferophyta	1	1	0
Magnoliophyta	291	247	44
Magnoliopsida	199	165	34
Liliopsida	92	82	10
Total	293	249	44



Figure Oklahoma Centennial Botanical Garden site, Osage County, Oklahoma.

APPENDIX

Annotated species list for the Oklahoma Centennial Botanical Garden, Osage County, Oklahoma. The first entry is habitat (QSQM=*Quercus stellata*-*Quercus marilandica* forest association, SSSN=*Schizachyrium scoparium*-*Sorghastrum nutans* grassland association, WETL=wetland and aquatic vegetation, DAOF=disturbed areas and old-field vegetation); followed by the life history (A=annual, B=biennial, P=perennial); habit (T=tree, S=shrub, V=woody vine, H=herb, G=graminoid); and collection number. Exotic species are denoted with an asterisk. Voucher specimens were deposited at the Robert Bebb Herbarium of the University of Oklahoma (OKL).

Pteridophyta**Aspleniaceae**

Asplenium platyneuron (L.) B.S.P. (ebony spleenwort) QSQM; P; H; OBG-152

Coniferophyta**Cupressaceae**

Juniperus virginiana L. (Eastern red cedar) QSQM; P; T; OBG-231

Magnoliophyta**Magnoliopsida****Acanthaceae**

Ruellia humilis Nutt. (fringeleaf wild petunia) SSSN; P; H; OBG-285

R. strepens L. (limestone wild petunia) QSQM; P; H; OBG-153

Amaranthaceae

Amaranthus albus L. (prostrate pigweed) DAOF; A; H; OBG-012

Anacardiaceae

Rhus aromatica Ait. (fragrant sumac) QSQM; P; S; OBG-184

R. copallinum L. (flameleaf sumac) SSSN; P; S; OBG-247

R. glabra L. (smooth sumac) SSSN; P; S; OBG-255

Toxicodendron radicans L. (Kuntze) (poison ivy) QSQM; P; S; OBG-334

Apiaceae

Chaerophyllum tainturieri Hook. (hairyfruit chervil) DAOF, QSQM, SSSN; A; H; OBG-198

*Daucus carota** (Queen Anne's lace) DAOF; B; H; OBG-296

D. pusillus Michx. (American wild carrot) DAOF, SSSN; A; H; OBG-254

Ptilimnium nuttallii (DC.) Britt. (laceflower) SSSN; A; H; OBG-304

Spermolepis divaricata (Walt.) Raf. ex Ser. (roughfruit scaleseed) SSSN; A; H; OBG-305

*Torilis arvensis** (Huds.) Link (spreading hedgeparsley) DAOF; A; H; OBG-256

Aquifoliaceae

Ilex decidua Walt. (possumhaw) QSQM; P; S; OBG-144

Asclepiadaceae

Asclepias viridis Walt. (green antelopehorn) SSSN; P; H; OBG-032

Asteraceae

Achillea millefolium L. (common yarrow) DAOF, SSSN; P; H; OBG-219

Ambrosia psilostachya DC. (Cuman ragweed) DAOF; P; H; OBG-079

Amphiachyris dracunculoides (DC.) Nutt. (prairie broomweed) DAOF, SSSN; A; H; OBG-097

Antennaria plantaginifolia (L.) Richards. (woman's tobacco) QSQM; P; H; OBG-187

Arnoglossum plantagineum Raf. (groovestem Indian plantain) SSSN; P; H; OBG-221

*Carduus nutans** L. (nodding plumeless thistle) DAOF; B; H; OBG-208

Cirsium altissimum (L.) Hill (tall thistle) SSSN; P; H; OBG-114

- C. undulatum* (Nutt.) Spreng. (wavyleaf thistle)
DAOF, SSSN; P; H; OBG-279
- Conyza canadensis* (L.) Cronq. (Canadian
horseweed) DAOF; A; H; OBG-091
- C. ramosissima* Cronq. (dwarf horseweed)
DAOF; A; H; OBG-089
- Coreopsis grandiflora* Hogg ex Sweet
(largeflower tickseed) SSSN; P; H; OBG-
300
- C. tinctoria* Nutt. (golden tickseed) DAOF,
SSSN; A; H; OBG-059
- Echinacea atrorubens* Nutt. (Topeka purple
coneflower) SSSN; P; H; OBG-284
- Eclipta prostrata* (L.) L. (false daisy) WETL; A;
H; OBG-073
- Erigeron strigosus* Muhl. ex Willd. (prairie
fleabane) DAOF, SSSN; A; H; OBG-015
- Eupatorium serotinum* Michx. (lateflowering
thoroughwort) QSQM; P; H; OBG-062
- Euthamia gymnospermoides* Greene (Texas
goldentop) SSSN; P; H; OBG-148
- Gamochaeta purpurea* (L.) Cabrera (spoonleaf
purple everlasting) -QSQM; P; H; OBG-237
- Grindelia lanceolata* Nutt. (narrowleaf
gumweed) DAOF, SSSN; P; H; OBG-048
- G. papposa* Nesom & Suh (Spanish gold)
DAOF, SSSN; A; H; OBG-020
- Helenium amarum* (Raf.) H. Rock (yellowdicks)
DAOF; A; H; OBG-106
- Helianthus hirsutus* Raf. (hairy sunflower)
QSQM; P; H; OBG-121
- Iva angustifolia* Nutt. ex DC. (narrowleaf
marshelder) WETL; A; H; OBG-125
- Krigia caespitosa* (Raf.) Chambers (weedy
dwarf dandelion) QSQM; A; H; OBG-240
- Packera plattensis* (Nutt.) W.A. Weber & A.
Löve (prairie groundsel) QSQM; P; H;
OBG-192
- Pluchea camphorata* (L.) DC. (camphor
pluchea) WETL; P; H; OBG-011
- Pseudognaphalium obtusifolium* (L.) Hilliard &
Burt (rabbit tobacco) DAOF, SSSN; A; H;
OBG-002
- Pyrrhopappus carolinianus* (Walt.) DC.
(Carolina desert chicory) DAOF, SSSN; A;
H; OBG-280
- Rudbeckia hirta* L. (blackeyed Susan) SSSN;
A; H; OBG-251
- Solidago speciosa* Nutt. (showy goldenrod)
SSSN; P; H; OBG-132
- S. ulmifolia* Muhl. ex Willd. (elmleaf goldenrod)
QMQV; P; H; OBG-049
- Sonchus asper** (L.) Hill (spiny sowthistle)
DAOF; A; H; OBG-185
- Symphotrichum cordifolium* (L.) Nesom
(common blue wood aster) QSQM; P; H;
OBG-130
- S. ericoides* (L.) Nesom var. *ericoides* (white
heath aster) DAOF, SSSN; P; H; OBG-154
- S. lanceolatum* (Willd.) Nesom var.
lanceolatum (white panicle aster) QSQM,
SSSN; P; H; OBG-133
- S. oblongifolium* (Nutt.) Nesom (aromatic aster)
SSSN; P; H; OBG-129
- S. patens* (Ait.) Nesom (late purple aster)
QSQM, SSSN; P; H; OBG-100
- S. praealtum* (Poir.) Nesom var. *praealtum*
(willowleaf aster) SSSN; P; H; OBG-134
- S. subulatum* (Michx.) Nesom (Eastern annual
saltmarsh aster) DAOF, SSSN, WETL; A;
H; OBG-105
- Taraxacum officinale** G.H. Weber ex Wiggers
(common dandelion) DAOF; P; H; OBG-
180
- Verbesina virginica* L. (white crownbeard)
QSQM; P; H; OBG-096
- Vernonia arkansana* DC. (Arkansas ironweed)
QSQM; P; H; OBG-007
- V. baldwinii* Torr. (Baldwin's ironweed) DAOF,
SSSN; P; H; OBG-024
- Xanthium strumarium* L. (rough cocklebur)
WETL; A; H; OBG-064

Boraginaceae

- Myosotis verna* Nutt. (spring forget-me-not)
QSQM; A; H; OBG-267

Brassicaceae

- Brassica nigra** (L.) W.D.J. Koch (black
mustard) DAOF; A; H; OBG-195
- Capsella bursa-pastoris** (L.) Medik.
(shepherd's purse) DAOF; A; H; OBG-327

- Cardamine parviflora* L. var. *arenicola* (Britt.)
O.E. Schulz (sand bittercress) QSQM; A;
H; OBG-194
- Erysimum repandum** L. (spreading wallflower)
DAOF; A; H; OBG-197
- Lepidium densiflorum* Schrad. (common
pepperweed) DAOF, SSSN; A; H; OBG-
190

Cactaceae

- Opuntia humifusa* (Raf.) Raf. (devil's tongue)
QSQM, SSSN; P; S; OBG-169

Callitrichaceae

- Callitriche heterophylla* Pursh (twoheaded
water-starwort) WETL; A; H; OBG-216

Campanulaceae

- Triodanis biflora* (Ruiz & Pavón) Greene
(clasping Venus' looking-glass) SSSN; A;
H; OBG-241

Caprifoliaceae

- Lonicera japonica** Thunb. (Japanese
honeysuckle) QSQM; P; V; OBG-214
- Sambucus nigra* L. ssp. *canadensis* (L.) R. Bolli
(common elderberry) QSQM; P; S; OBG-
265
- Symphoricarpos orbiculatus* Moench
(coralberry) QSQM; P; S; OBG-082
- Viburnum rufidulum* Raf. (rusty blackhaw)
QSQM; P; S; OBG-189

Caryophyllaceae

- Arenaria serpyllifolia** L. (thymeleaf sandwort)-
DAOF; A; H; OBG-242
- Cerastium pumilum** W. Curtis (European
chickweed) DAOF; A; H; OBG-191
- Dianthus armeria** L. (Deptford pink) DAOF,
SSSN; A; H; OBG-235
- Minuartia drummondii* (Shinners) McNeill
(Drummond's stitchwort) SSSN; A; H;
OBG-273
- Stellaria media** (L.) Vill. (common chickweed)
DAOF; A; H; OBG-176

Clusiaceae

- Hypericum hypericoides* (L.) Crantz (St.
Andrew's cross) QSQM; P; H; OBG-098
- H. punctatum* Lam. (spotted St. Johnswort)
QSQM; P; H; OBG-295

Convolvulaceae

- Convolvulus arvensis** L. (field bindweed)
DAOF; P; H; OBG-253

Cornaceae

- Cornus drummondii* C.A. Mey. (roughleaf
dogwood) QSQM; P; T; OBG-232

Cuscutaceae

- Cuscuta cuspidata* Engelm. (cusp dodder)
DAOF; P; H; OBG-131

Ebenaceae

- Diospyros virginiana* L. (common persimmon)
QSQM; P; T; OBG-213

Euphorbiaceae

- Acalypha monococca* (Engelm. ex Gray) L.
Mill. & Gandhi (slender threeseed mercury)
SSSN; A; H; OBG-281
- A. virginica* L. (Virginia threeseed mercury)
QSQM; A; H; OBG-119
- Chamaesyce maculata* (L.) Small (spotted
sandmat) DAOF; A; H; OBG-023
- Croton capitatus* Michx. (hogwort) DAOF,
SSSN; A; H; OBG-084
- C. monanthogynus* Michx. (prairie tea) DAOF,
SSSN; A; H; OBG-146
- C. willdenowii* G. L. Webster (Willdenow's
croton) SSSN; A; H; OBG-043a
- Euphorbia dentata* Michx. (toothed spurge)
QSQM; A; H; OBG-102
- E. heterophylla* L. (Mexican fireplant) QSQM;
A; H; OBG-081
- E. spathulata* Lam. (warty spurge) SSSN; A; H;
OBG-277
- Phyllanthus caroliniensis* Walt. (Carolina leaf-
flower) DAOF; A; H; OBG-072

Fabaceae

- Amorpha canescens* Pursh (leadplant) SSSN; P; S; OBG-150
A. fruticosa L. (desert false indigo) SSSN, WETL; P; S; OBG-076
Baptisia bracteata Muhl. ex Ell. var. *leucophaea* (Nutt.) Kartesz & Gandhi (longbract wild indigo) SSSN; P; H; OBG-193
Cercis canadensis L. (Eastern redbud) QSQM; P; T; OBG-208
Chamaecrista nictitans (L.) Moench (partridge pea) DAOF, SSSN; A; H; OBG-087
Crotalaria sagittalis L. (arrowhead rattlebox) SSSN; P; H; OBG-043
Dalea purpurea Vent. (violet prairie clover) SSSN; P; H; OBG-258
Galactia volubilis (L.) Britt. (downy milkpea) QSQM; P; H; OBG-103
Gleditsia triacanthos L. (honeylocust) QSQM; P; T; OBG-115
*Kummerowia stipulacea** (Maxin.) Makino (Korean clover) DAOF; A; H; OBG-090
*Lathyrus hirsutus** L. (Caley pea) DAOF; A; H; OBG-282
*Lespedeza cuneata** (Dum.-cours.) G. Don (Chinese lespedeza) DAOF, SSSN; P; H; OBG-107
L. repens (L.) W. Bart. (creeping lespedeza) QSQM; P; H; OBG-156
L. violacea (L.) Pers. (violet lespedeza) QSQM; P; H; OBG-035
L. virginica (L.) Britt. (slender lespedeza) QSQM; P; H; OBG-022
*Medicago lupulina** L. (black medick) DAOF; A; H; OBG-172
*Melilotus officinalis** (L.) Lam. (yellow sweetclover) DAOF; A; H; OBG-060
Mimosa nuttallii (DC.) B.L. Turner (Nuttall's sensitive-briar) SSSN; P; H; OBG-264
Pediomelum linearifolium (Torr. & Gray) J. Grimes (narrowleaf Indian breadfruit) SSSN; P; H; OBG-299
Stylosanthes biflora (L.) B.S.P. (sidebeak pencilflower) SSSN; P; H; OBG-252
*Trifolium dubium** Sibthorp (suckling clover) DAOF; A; H; OBG-243

*T. pratense** L. (red clover) DAOF; A; H; OBG-290

*Vicia villosa** Roth (winter vetch) DAOF; A; H; OBG-288

Fagaceae

- Quercus muehlenbergii* Engelm. (chinkapin oak) QSQM; P; T; OBG-145
Q. shumardii Buckl. (Shumard's oak) QSQM; P; T; OBG-139
Q. stellata Wangenh. (post oak) QSQM; P; T; OBG-083
Q. velutina Lam. (blackjack oak) QSQM; P; T; OBG-335

Gentianaceae

Sabatia campestris Nutt. (Texas star) SSSN; A; H; OBG-283

Geraniaceae

Geranium carolinianum L. (Carolina geranium) DAOF, SSSN; A; H; OBG-275

Haloragaceae

*Myriophyllum aquaticum** (Vell.) Verdc. (parrot feather watermilfoil) WETL; P; H; OBG-202

Juglandaceae

- Carya illinoensis* (Wangenh.) K. Koch (pecan) QSQM; P; T; OBG-135
C. texana Buckl. (black hickory) QSQM; P; T; OBG-128

Krameriaceae

Krameria lanceolata Torr. (trailing krameria) SSSN; P; H; OBG-250

Lamiaceae

- Hedeoma drummondii* Benth. (Drummond's false pennyroyal) SSSN; P; H; OBG-276
*Lamium amplexicaule** L. (henbit deadnettle) DAOF; A; H; OBG-181
*L. purpureum** L. (purple deadnettle) DAOF; A; H; OBG-182
Monarda fistulosa L. (wild bergamot) QSQM; P; H; OBG-260

Prunella vulgaris L. (common selfheal) QSQM;
P; H; OBG-257

Pycnanthemum tenuifolium Schrad.
(narrowleaf mountain mint) QSQM; P; H;
OBG-249

Salvia azurea Michx. ex Lam. (azure blue
sage) SSSN; P; H; OBG-093

Scutellaria parvula Michx. (small skullcap)
SSSN; P; H; OBG-302

Teucrium candense L. (Canada germander)
WETL; P; H; OBG-101

Linaceae

Linum medium (Planch.) Britt. (stiff yellow flax)
SSSN; A; H; OBG-031

L. sulcatum Riddell (grooved flax) SSSN; A; H;
OBG-030

Lythraceae

Ammannia auriculata Willd. (eared redstem)
WETL; A; H; OBG-013

Cuphea viscosissima Jacq. (blue waxweed)
WETL; A; H; OBG-058

Malvaceae

Callirhoe alcaeoides (Michx.) Gray (light
poppymallow) SSSN; P; H; OBG-270

Menispermaceae

Cocculus carolinus (L.) DC. (Carolina
coralbead) QSQM; P; H; OBG-226

Nelumbonaceae

Nelumbo lutea Willd. (American lotus) WETL;
P; H; OBG-287

Oleaceae

Fraxinus americana L. (white ash) QSQM; P;
T; OBG-155

*Ligustrum quihoui** Carr. (waxy leaf privet)
QSQM; P; S; OBG-143

*L. sinense** Lour. (Chinese privet) QSQM; P; S;
OBG-046

Onagraceae

Gaura villosa Torr. (wooly beeblossom) SSSN;
P; H; OBG-010

Ludwigia palustris (L.) Ell. (marsh seedbox)
WETL; P; H; OBG-001

L. peploides (Kunth) Raven (floating primrose-
willow) WETL; P; H; OBG-067

Oenothera linifolia Nutt. (threadleaf evening-
primrose) SSSN; A; H; OBG-220

Oxalidaceae

Oxalis stricta L. (common yellow oxalis) DAOF,
SSSN; P; H; OBG-095

O. violacea (violet woodsorrel) QSQM, SSSN;
P; H; OBG-199

Passifloraceae

Passiflora incarnata L. (purple passionflower)
SSSN; P; H; OBG-248

Plantaginaceae

Plantago aristata Michx. (largebraced plantain)
QSQM; A; H; OBG-225

P. virginica L. (Virginia plantain) SSSN; A; H;
OBG-271

Polygalaceae

Polygala incarnata L. (procession flower)
SSSN; A; H; OBG-274

Polygonaceae

Polygonum pensylvanicum L. (Pennsylvania
smartweed) WETL; A; H; OBG-298

P. punctatum Ell. (dotted smartweed) WETL; A;
H; OBG-071

*Rumex crispus** L. (curly dock) DAOF, WETL;
P; H; OBG-209

Portulacaceae

Phemeranthus parviflorum (Nutt.) Kiger
(sunbright) SSSN; P; H; OBG-033

*Portulaca oleracea** L. (little hogweed) DAOF;
A; H; OBG-108

Primulaceae

Samolus ebracteatus Kunth (limewater
brookweed) WETL; P; H; OBG-137

Ranunculaceae

Delphinium carolinianum Walt. (Carolina larkspur) SSSN; P; H; OBG-229

Rosaceae

- Amelanchier arborea* (Michx. f.) Fern. (common serviceberry) QSQM; P; T; OBG-183
Crataegus mollis Scheele (Arnold hawthorn) QSQM; P; S; OBG-167
C. viridis L. (green hawthorn) QSQM; P; S; OBG-186
Prunus mexicana S. Wats. (Mexican plum) QSQM; P; T; OBG-110
P. serotina Ehrh. (black cherry) QSQM; P; T; OBG-045
*Rosa multiflora** Thunb. ex Murr. (multiflora rose) QSQM; P; V; OBG-263
R. setigera Michx. (climbing rose) SSSN; P; V; OBG-292
Rubus sp. (blackberry) DAOF, QSQM; P; V; OBG-204

Rubiaceae

- Cephalanthus occidentalis* L. (common buttonbush) WETL; P; S; OBG-050
Diodia teres Walt. (poorjoe) SSSN; A; H; OBG-070
Galium aparine L. (stickywilly) DAOF, QSQM; A; H; OBG-233
G. pilosum Ait. var. *punctulosum* (Michx.) Torr. & Gray (hairy bedstraw) QSQM; P; H; OBG-061
G. virgatum Nutt. (southwestern bedstraw) SSSN; A; H; OBG-233
Houstonia pusilla Schoepf (tiny bluet) SSSN; A; H; OBG-174
*Sherardia arvensis** L. (blue fieldmadder) DAOF; A; H; OBG-177

Salicaceae

- Populus deltoides* Bartr. ex Marsh. (Eastern cottonwood) WETL; P; T; OBG-118
Salix nigra Marsh. (black willow) WETL; P; T; OBG-051

Sapotaceae

Sideroxylon lanuginosum Michx. (gum bully) QSQM; P; T; OBG-052

Scrophulariaceae

- Bacopa rotundifolia* (Michx.) Wettst. (disk waterhyssop) WETL; P; H; OBG-109
Castilleja indivisa Engelm. (entireleaf Indian paintbrush) SSSN; A; H; OBG-200
Lindernia dubia (L.) Pennell (yellowseed false pimpernel) WETL; A; H; OBG-078
Nuttallanthus canadensis (L.) D.A. Sutton (Canada toadflax) SSSN; A; H; OBG-272
*Veronica polita** Fries (gray field speedwell) DAOF; A; H; OBG-173

Solanaceae

- Physalis pubescens* L. (husk tomato) SSSN; A; H; OBG-014
Solanum americanum P. Mill. (American black nightshade) QSQM; A; H; OBG-017
S. carolinense L. (Carolina horsenettle) DAOF, SSSN; P; H; OBG-075
S. elaeagnifolium Cav. (silverleaf nightshade) DAOF, SSSN; P; H; OBG-116
S. rostratum Dunal (buffalobur nightshade) DAOF; A; H; OBG-075

Ulmaceae

- Ulmus alata* Michx. (winged elm) QSQM; P; T; OBG-245
U. rubra Muhl. (slippery elm) QSQM; P; T; OBG-246

Valerianaceae

Valerianella radiata (L.) Dufr. (beaked cornsalad) SSSN; A; H; OBG-268

Verbenaceae

- Verbena bracteata* Cav. ex Lag. & Rodr. (bigbract verbena) DAOF, SSSN; A; H; OBG-113
V. stricta Vent. (hoary verbena) DAOF; P; H; OBG-278
V. urticifolia L. (white vervain) QSQM; P; H; OBG-141

Vitaceae

- Parthenocissus quinquefolia* (L.) Planch.
(Virginia creeper) QSQM; P; V; OBG-222
Vitis cinerea (Engelm.) Millard (graybark grape)
QSQM; P; V; OBG-297

Zygophyllaceae

- Tribulus terrestris** L. (puncturevine) DAOF; A;
H; OBG-019

Liliopsida**Alismataceae**

- Alisma subcordatum* Raf. (American water
plantain) WETL; P; H; OBG-286
Sagittaria ambigua J.G. Sm. (Kansas
arrowhead) -WETL ; P; H; OBG-266
S. latifolia Willd. (broadleaf arrowhead) -WETL
; P; H; OBG-027

Commelinaceae

- Commelina erecta* L. (whitemouth dayflower)
DAOF, SSSN; P; H; OBG-028
Tradescantia ohiensis Raf. (bluejacket) SSSN;
P; H; OBG-236

Cyperaceae

- Carex aggregata* Mackenzie (glomerate sedge)
QSQM; P; G; OBG-328
C. blanda Dewey (Eastern woodland sedge)
QSQM; P; G; OBG-326
C. festucacea Schkuhr ex Willd. (fescue sedge)
QSQM; P; G; OBG-330
C. frankii Kunth (Frank's sedge) -WETL; P; G;
OBG-163
C. microdonta Torr. & Hook. (littletooth sedge)
SSSN; P; G; OBG-203
Cyperus croceus Vahl (Baldwin's flatsedge)
SSSN; P; G; OBG-166
C. echinatus (L.) Wood (globe flatsedge)
SSSN; P; G; OBG-099
C. odoratus L. (fragrant flatsedge) WETL; A; G;
OBG-164
C. squarrosus L. (bearded flatsedge) DAOF; A;
G; OBG-065
C. strigosus L. (strawcolored flatsedge) SSSN;
P; G; OBG-161

- C. virens* Michx. (green flatsedge) WETL; P; G;
OBG-147
Eleocharis lanceolata Fern. (daggerleaf
spikerush) WETL; A; G; OBG-325
E. obtusa (Willd.) J.A. Schultes (blunt
spikerush) WETL; A; G; OBG-127
E. palustris (L.) Roemer & J.A. Schultes
(common spikerush) WETL; P; G; OBG-
324
Fimbristylis autumnalis (L.) Roemer & J.A.
Schultes (slender fimbry) WETL; A; G;
OBG-069
F. puberula (Michx.) Vahl (hairy fimbry) WETL;
P; G; OBG-322
F. vahlii (Lam.) Link (Vahl's fimbry) WETL; A;
G; OBG-063
Isolepis carinata Hook. & Arn. ex. Torr. (keeled
bulrush) WETL; A; G; OBG-239
Rhynchospora globularis (Chapman) Small
(globe beaksedge) -WETL; P; G; OBG-323
Scirpus pendulus Muhl. (rufous bulrush) WETL;
P; G; OBG-244

Iridaceae

- Sisyrinchium campestre* Bickn. (prairie blue-
eyed grass) SSSN; P; H; OBG-201

Juncaceae

- Juncus brachycarpus* Engelm. (whiteroot rush)
WETL; P; G; OBG-318
J. diffusissimus Buckl. (slimpod rush) WETL; P;
G; OBG-055
J. interior Wieg. (inland rush) SSSN; P; G;
OBG-321
J. marginatus Rostk. (grassleaf rush) WETL; P;
G; OBG-319
J. tenuis Willd. (poverty rush) WETL; P; G;
OBG-168

Lemnaceae

- Lemna minor* L. (common duckweed) WETL;
P; H; OBG-332
Wolffia columbiana (Columbian watermeal)
WETL; P; H; OBG-333

Liliaceae

- Allium canadense* (meadow garlic) SSSN; P; H; OBG-188
Erythronium mesochoreum Knerr (midland fawnlily) QSQM; P; H; OBG-301
Hypoxis hirsuta (L.) Coville (common goldstar) SSSN; P; H; OBG-217
Nothoscordum bivalve (L.) Britt. (crowpoison) SSSN; P; H; OBG-179

Orchidaceae

- Spiranthes vernalis* Engelm. & Gray (spring ladies'-tresses) SSSN; P; H; OBG-291

Poaceae

- Aegilops cylindrica** Host (jointed goatgrass) DAOF; A; G; OBG-210
Agrostis hyemalis (Walt.) B.S.P. (winter bentgrass) SSSN; P; G; OBG-307
A. perennans (Walt.) Tuckerman (upland bentgrass) QSQM; P; G; OBG-306
Andropogon gerardii Vitman (big bluestem) SSSN; P; G; OBG-112
A. virginicus L. (Virginia wildrye) SSSN; P; G; OBG-117
Aristida dichotoma Michx. (churchmouse threeawn) SSSN; A; G; OBG-038
Bothriochloa laguroides (DC.) Herter (silver beardgrass) DAOF, SSSN; P; G; OBG-005
*Bromus catharticus** Vahl (rescuegrass) DAOF; A; G; OBG-206
*B. tectorum** L. (cheatgrass) DAOF; A; G; OBG-309
Buchloe dactyloides (buffalograss) SSSN; P; G; OBG-218
Danthonia spicata (L.) Beauv. ex Roemer & J.A. Schultes (poverty oatgrass) QSQM; P; G; OBG-207
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark var. *fasciculatum* (Torr.) Freckmann (Western panicgrass) QSQM; P; G; OBG-124
D. depauperatum (Muhl.) Gould (starved panicgrass) QSQM; P; G; OBG-311
D. malacophyllum (Nash) Gould (softleaf rosette grass) QSQM; P; G; OBG-120

- D. scoparium* (Lam.) Gould (velvet panicum) QSQM; P; G; OBG-317
D. villosissimum (Nash) Freckmann (whitehair rosette grass) QSQM; P; G; OBG-310
Digitaria cognata (J.A. Schultes) Pilger (Carolina crabgrass) DAOF; P; G; OBG-003
D. sanguinalis (L.) Scop. (hairy crabgrass) DAOF; A; G; OBG-004
*Echinochola crus-galli** (L.) Beauv. (barnyardgrass) WETL; A; G; OBG-025
*Eleusine indica** (L.) Gaertn. (Indian goosegrass) DAOF; A; G; OBG-068
Elymus virginicus L. (Virginia wildrye) QSQM, SSSN; P; G; OBG-312
*Eragrostis barrelieri** Daveau (Mediterranean lovegrass) DAOF; A; G; OBG-008
E. intermedia A.S. Hitchc. (plains lovegrass) QSQM; P; G; OBG-021
E. spectabilis (Pursh) Steud. (purple lovegrass) DAOF, SSSN; P; G; OBG-018
Hordeum pusillum Nutt. (little barley) SSSN; A; G; OBG-211
Leersia oryzoides (L.) Sw. (rice cutgrass) WETL; P; G; OBG-314
L. virginica Willd. (whitegrass) -WETL; P; G; OBG-140
*Lolium perenne** L. (perennial ryegrass) DAOF; P; G; OBG-230
Muhlenbergia sobolifera (Muhl. ex Willd.) Trin. (rock muhly) QSQM; P; G; OBG-029
Panicum anceps Michx. (beaked panicgrass) QSQM, SSSN; P; G; OBG-104
P. dichotomiflorum Michx. (fall panicgrass) WETL; A; G; OBG-122
P. philadelphicum Bernh. ex Trin. (Philadelphia panicgrass) SSSN; A; G; OBG-123
P. rigidulum Bosc ex Nees (redtop panicgrass) WETL; P; G; OBG-162
P. virgatum L. (switchgrass) SSSN; P; G; OBG-094
Paspalum pubiflorum Rupr. ex Fourn. (hairyseed paspalum) SSSN, WETL; P; G; OBG-053
Phalaris caroliniana Walt. (Carolina canarygrass) WETL; A; G; OBG-228

*Poa annua** L. (annual bluegrass) QSQM; A; G; OBG-178
Schedonnardus paniculatus (Nutt.) Trel. (tumblegrass) DAOF, SSSN; P; G; OBG-057
*Schedonorus phoenix** (Scop.) Holub DAOF; P; G; OBG-238
Schizachyrium scoparium (Michx.) Nash (little bluestem) SSSN; P; G; OBG-149
Setaria parviflora (Poir.) Kerguelen (marsh bristleglass) WETL; P; G; OBG-158
*S. pumila** (Poir.) Roemer & J.A. Schultes (yellow foxtail) DAOF; A; G; OBG-009
Sorghastrum nutans (L.) Nash (Indian grass) SSSN; P; G; OBG-336
*Sorghum halepense** (L.) Pers. (Johnsongrass) DAOF, SSSN; P; G; OBG-111
Sphenopholis obtusata (Michx.) Scribn. (prairie wedgescale) QSQM; P; G; OBG-308
Sporobolus cryptandrus (Torr.) Gray (sand dropseed) SSSN; P; G; OBG-016

Steinchisma hians (Ell.) Nash (gaping grass) WETL; P; G; OBG-262
Tridens strictus (Nutt.) Nash (longspike tridens) DAOF, SSSN; P; G; OBG-044
Vulpia elliothea (Raf.) Fern. (squirreltail fescue) SSSN; A; G; OBG-315
V. octoflora (Walt.) Rydb. (sixweeks fescue) SSSN; A; G; OBG-315

Potamogetonaceae

Potamogeton diversifolius Raf. (waterthread pondweed) WETL; P; H; OBG-160

Smilacaceae

Smilax rotundifolia L. (roundleaf greenbriar) QSQM; P; V; OBG-223
S. tamnoides L. (bristly greenbriar) QSQM; P; V; OBG-224

Typhaceae

Typha domingensis Pers. (southern cattail) - WETL; P; H; OBG-126

Vascular Plant Checklists from Oklahoma

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A bibliography of 85 references involving Oklahoma flora is provided, 52 of which provide a vascular plant species list from an unambiguous area. I list geographic, topographic, and taxonomic summary data for 59 floras (some references provide multiple lists). The species-area relationship for Oklahoma (with a z value of 0.15) is similar to that of North America as a whole. In the face of imminent climate change, the pace of floristic research in Oklahoma needs to accelerate.

INTRODUCTION

Vascular plant checklists are proving valuable as raw material for broad-scale analyses of biodiversity (Qian and Ricklefs 1999; Chiarucci and Bonini 2005). But they also prove a more basic (and arguable more essential) function: to guide practicing botanists in the field. For either purpose, it is useful to have access to bibliographic data to find such floras.

The Floras of North America project (not to be confused with the *Flora of North America Project*; Flora of North America Editorial Committee 1993) is an attempt to catalogue and analyze vascular floras within North America, north of Mexico. The purpose of this paper is to present a bibliography of floristic checklists within Oklahoma, and to provide basic geographic and taxonomic data for comparative purposes.

METHODS

I used standard library techniques as well as informal inquiries to gather bibliographic information on floras from throughout North America. I then extracted geographic data (with help from maps and geographic databases) and

summarized the number of taxa in the species lists. In some cases geographic data are approximate. Details about the methodology are given in Fridley et al. (2006), Palmer (1995, 2005, 2007), Qian (in press), and Withers et al. (1998) as well as <http://botany.okstate.edu/floras/index.html>

RESULTS AND DISCUSSION

I found 85 references including floristic lists, or with titles suggesting the presence of such lists (Appendix 1). Of these, I was able to gather complete data (minimum and maximum latitude and longitude, minimum and maximum elevation, and the number of families, genera, species, total taxa, and % alien species) for 51 references (Appendix 2).

The vascular plant species-area relationship for Oklahoma is remarkably similar to that of North America as a whole (Figure). The slope of the line, known in biogeography as the z coefficient, is 0.150, and is similar to that of many continental species-area relationships (Rosenzweig 1995). The fact that there is much scatter around the species-area relationship implies that there may be interesting variation in biodiversity that can be explained by environmental or biogeographic factors.

While the list of Oklahoma floras may seem impressive, a number of other states (led by California, Virginia, Iowa, Louisiana, Illinois, Texas, Arizona, Ohio, New York, and Wyoming) have surpassed us in numbers of floristic publications. Current work by Oklahoma botanists is helping to rectify the situation, with the work of Bruce Hoagland and his colleagues being most notable. Nevertheless, there are ample opportunities for new teams of botanists, including dedicated amateurs, to become involved with basic floristic research. Indeed, with extreme climate change predicted for the region (Seager et al. 2007), it may not be too long before we lose many of our vascular plant species. Thus, the time to document their existence is now.

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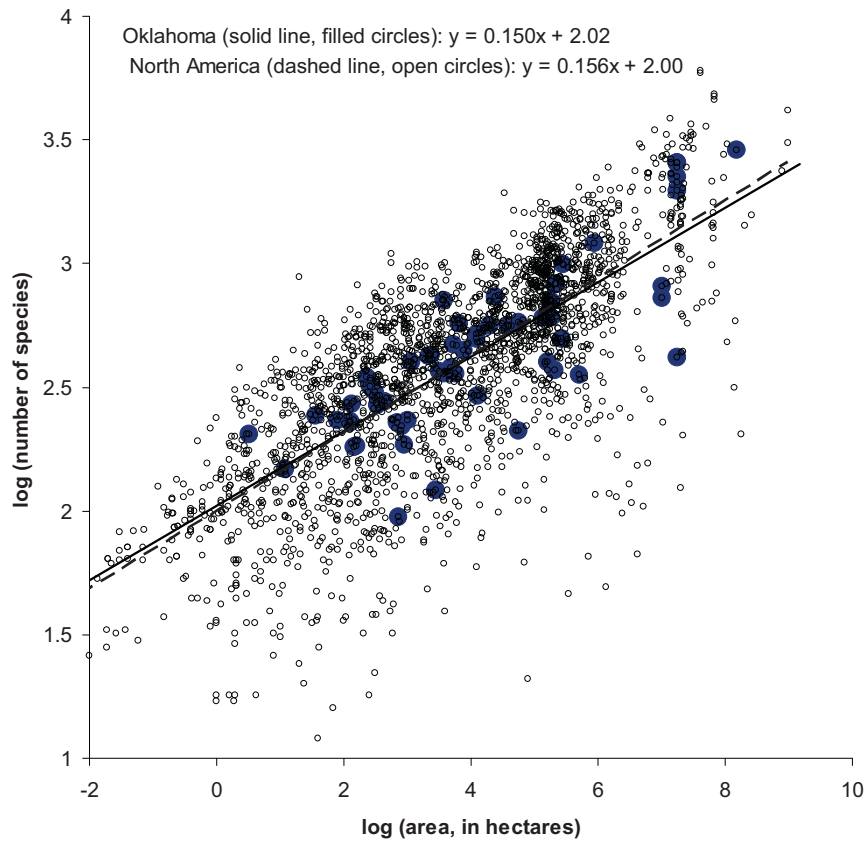


Figure Species-area relationship for 59 Oklahoma floras (data from Appendix 2) in comparison with 2283 lists from throughout North America.

Appendix 1 Vascular plant checklists written within Oklahoma. Although not conventionally included in bibliographies, first names are included, when available, to allow more ready identification of the scholars involved. The citation ends with a bracketed reference number associated with the Floras of North America project and the author reference in Appendix 2. Some citations are not floras, but are included here because their titles resemble those of floras and including them in this list avoids accidental rediscovery. Keywords follow the citations: COMPLETE = all taxonomic and geographic data have been gathered; DATA DUPLICATE = the same data are available in another source listed elsewhere; NO AREA = the geographical area is impossible to determine based on available information; NO DATA YET = the reference has either not yet been seen, or it has not been evaluated; NOT A FLORA = despite the name, the document is not a flora; OTHER STATES = data include regions outside Oklahoma; TAXA EXCLUDED = data were not gathered because some taxa (e.g. ferns, graminoids) were intentionally excluded.

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Appendix 2 Geographic data and taxonomic data from Oklahoma floras. The Reference numbers correspond to author references in Appendix 1. Multiple checklists within a reference are indicated by decimals. Note that lists for some areas (especially the state of Oklahoma as a whole) have been compiled multiple times.

Site name	Year	latitude	longitude	Min. Elev. (m)	Max. Elev. (m)	Area (hectares)	# Families	# Genera	# spp	# Tot. Taxa	% of species alien	Appendix I Author Reference
Great Plains	1986	41.5	-104.0	290	1600	152226662	160	851	2862	3189	11.5	Grea 536
Mesa de Maya Region	1953	37.3	-103.7	1524	2088	56175	75	293	577	589	8.3	Roge 2051
Black Mesa Preserve	1994	36.9	-103.0	1456	1516	36	55	172	243	244	6.6	McPh 21362
Black Mesa State Park	2004	36.9	-102.9	1298	1516	312	58	191	300	301	7.0	Foll 21363
Washita Battlefield NHP	2004	35.6	-99.7	588	610	136	62	201	271	271	11.4	Hoag 21491
Greer County	1932	34.9	-99.6	487	669	165700	65	245	401	401	6.7	Bull 94
Gypsum Hills and Redbed Plains	1975	34.7	-99.5	366	671	514892	63	230	354	359	9.6	Barb 90
Altus Air Force Base	1996	34.7	-99.3	408	425	1036	63	175	232	233	17.2	John 21373
Selman Living Laboratory	2002	36.7	-99.2	511	560	130	60	155	226	226	9.7	Buck 21259
Selman Living Laboratory	2003	36.7	-99.2	511	560	130	61	149	229	229	9.2	Buck 21316
Kiowa Co.	1937	34.8	-99.1	399	730	265475	81	269	497	527	7.6	Bald 89
Gypsum dominated site	2005	36.4	-98.9	457	508	80	61	173	233	233	9.4	Hoag 21706
Hackberry Flat	2004	34.3	-98.9	349	366	2770	33	99	121	122	17.4	Hoag 21360.2
three sites in Tillman County	2004	34.4	-98.9	332	381	3842	69	241	357	352	13.7	Hoag 21360
Suttle Creek	2004	34.2	-98.9	332	358	161	55	155	182	182	9.3	Hoag 21360.3
Little Sahara State Park	1980	36.5	-98.9	423	470	146	55	145	181	181	6.6	Sher 107
Frederick Lake	2004	34.5	-98.9	360	381	911	52	155	185	187	10.3	Hoag 21360.1
Oklahoma	1952	35.2	-98.8	87	1516	17814538	141	741	2247	2542	8.9	Wate 3064
Oklahoma	1994	35.2	-98.8	87	1516	17814538	172	850	2549	2844	14.6	Tayl 20006
Territory of Oklahoma	1900	35.3	-98.8	110	1516	10108770	97	377	724	737	6.6	Bogu 1228
Territory of Oklahoma	1902	35.3	-98.8	111	1516	10108770	103	412	811	812	6.4	Van 1232
Oklahoma	1930	35.3	-98.8	88	1516	17781645	125	661	1957	1981	7.7	Jeff 1117
Oklahoma	1991	35.2	-98.8	87	1517	17944297	159	846	2548	2830	11.9	Tayl 1964
Wichita Mountain Wildlife Refuge	1977	34.8	-98.7	387	751	23885	104	359	730	749	5.5	Buck 674
Fort Sill	1990	34.7	-98.5	329	673	38300	99	344	556	562	11.5	John 671
Salt Plain National Wildlife Refuge	1964	36.8	-98.2	343	369	12955	71	200	293	298	9.6	Baal 3248

Kegelman Auxiliary Field	1996	36.7	-98.1	345	370	431	68	187	276	277	9.1	John	21371.1
Pottawatomie County	1933	35.1	-98.0	274	345	212380	76	228	372	374	10.2	Bark	92
Oklahoma	1901	36.0	-98.0	86	1516	17781904	93	226	419	421	1.4	Whit	1234
Vance Air Force Base	1996	36.3	-97.9	388	401	740	31	77	94	94	46.8	John	21371
Cleveland County	1994	35.2	-97.9	311	386	137011	160	362	605	605	17.5	Foll	4852
Frank Tract	1998	36.2	-97.7	229	323	340	72	187	268	268	7.5	Roe	20001
Oklahoma County	2001	35.6	-97.4	267	429	186000	91	308	601	644	12.5	Hoag	20010
Deer Creek Archaeological Site	1980	36.7	-97.4	291	294	12	48	113	147	148	12.9	Tyrl	2056
Arbuckle Mountains	1908	34.4	-97.1	228	396	55943	73	162	211	221	5.7	Gage	98
Love Valley WMA	2004	33.8	-97.1	197	243	3134	86	258	368	368	8.4	Hoag	21707
Chickasaw NRA	2001	34.5	-97.0	240	352	3849	105	397	713	717	12.2	Hoag	20021
Arbuckle Mountains	1947	34.5	-96.9	229	415	222740	96	397	823	867	8.4	Dale	96
Pennington Creek	1997	34.4	-96.7	251	263	3	64	157	203	203	4.9	Shan	20003
Pontotoc County	1958	34.7	-96.7	244	396	185781	98	380	698	730	1.6	McCo	101
Pontotoc Ridge Preserve	1998	34.4	-96.6	257	340	1174	79	261	399	402	7.0	John	21372
Keystone WMA	2003	36.1	-96.5	222	237	4893	79	254	380	380	15.5	Hoag	21364
Tallgrass Prairie Preserve	1993	36.8	-96.4	256	352	12250	78	273	496	496	11.5	Palm	1975
Tallgrass Prairie Preserve	1993	36.8	-96.4	256	352	12250	81	258	517	517	8.9	The	4095
Boehler Seeps and Sandhills Preserve	1997	34.2	-95.9	155	175	235	84	225	345	346	4.3	Clar	20002
Oologah Wildlife Management Area	2003	36.7	-95.6	192	258	5226	95	305	470	470	8.3	Hoag	21315
Hugo Lake WMA	2004	34.1	-95.5	121	154	6475	113	359	573	573	8.9	Hoag	21407
Muskogee County	1938	35.5	-95.4	183	301	213934	131	424	829	842	8.9	Litt	99
Muskogee County	1929	35.6	-95.4	142	300	219240	104	423	828	842	9.1	Litt	1882
Pushmataha WMA	2003	34.5	-95.4	150	400	7690	96	287	447	447	7.2	Cran	21287
Camp Gruber	1994	35.7	-95.1	152	327	19500	101	347	561	568	8.0	John	21370
Sans Bios/Kiamichi	1969	34.8	-94.9	152	914	277482	119	457	991	1067	7.9	Mean	104
Oklahoma Ozarks	1963	36.1	-94.8	140	457	875316	125	515	1206	1318	2.8	Wate	109
Red Slough/Grassy Slough WMA	2004	33.8	-94.8	200	113	2422	106	269	426	426	6.6	Hoag	21479
Red Slough WMA	2004	33.7	-94.8	100	104	2158	106	269	422	422	6.6	Hoag	21479.1
Grassy Slough WMA	2004	33.8	-94.8	105	113	264	92	221	318	318	6.6	Hoag	21479.2
McCurtain County Wilderness	1997	34.3	-94.7	183	415	5701	95	236	359	359	5.8	Smit	20005
Sally Bull Hollow Tract	2003	34.7	-94.6	300	500	810	62	145	219	219	8.7	Haye	21266

The Need for Savanna Restoration in the Cross Timbers

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Along the prairie/forest transition zone oak savannas have been severely degraded by logging, clearing for agriculture, fire suppression, invasion of exotic plants, and excessive livestock grazing. Savanna shares equal billing with tallgrass prairie as the most threatened plant community in the Midwest. As such, there is increasing interest in restoring these communities. Conservation criteria have not been developed for the post oak (*Quercus stellata*) and blackjack oak (*Quercus marilandica*) savanna of the Cross Timbers. Oak savanna was arguably an important component of the historical Cross Timbers region. Following settlement, overgrazing in conjunction with a decrease in fire frequency and/or intensity has increased the density of oak stands to the point where they resemble closed-canopy forests rather than savanna. This is a threat to the biodiversity of the Cross Timbers. Proactive land management practices are recommended for restoring savanna communities. Such efforts may require thinning-out areas of degraded oak savanna to help re-establish the herbaceous understory. Fire is recommended to restore ecological processes that limit woody plant encroachment and promote biodiversity. Further research should investigate the ecological dynamics and functions of oak savannas, as well as provide further guidelines for its conservation.

INTRODUCTION

Along the prairie/forest transition zone, oak savanna communities have been severely degraded by logging, clearing for agriculture, fire suppression, invasion of exotic plants, and excessive livestock grazing (Abrams 1992). Oak savanna shares equal billing with tallgrass prairie as the most threatened plant community in the Midwest and among the most threatened in the world (Henderson 1995). As such, there is increasing interest in restoring these communities (Whitney and Decant 2005). In the Cross Timbers region, however, there has been little effort to evaluate the conservation status of savannas or woodlands.

COMMUNITY CLASSIFICATION

In the prairie/forest transition zone, upland communities are not always discrete entities separated by sharp lines. Instead, they often blend into each other imperceptibly. Even so, named communities are useful abstractions that help us think

and communicate about various parts of the landscape (Palmer and White 1994, Packard and Mutel 1997). Definitions adapted from Faber-Langendone (2001) and Lauver et al. (1999) provide us with an operational classification for common Midwestern upland communities: 1) prairie – areas dominated by herbaceous vegetation (grass and forbs); trees generally not exceeding 10% cover; 2) savanna – areas dominated with herbaceous vegetation and scattered trees with 10-25% cover; 3) woodland – areas dominated by an open stand of trees with 25-60% canopy cover and a herbaceous understory; and 4) forest – areas dominated by trees with 60-100% cover and little herbaceous vegetation. These communities are illustrated in Fig. 1.

Savanna is maintained by frequent fire. Along the prairie-forest transition zone, certain species of oaks are the only trees that were historically savanna. This is in a large part due to their physiological adaptations to fire, which include thick bark, prolific resprouting and resistance to rotting after scarring (Abrams 1992).

Just what the understory and ground layer vegetation of oak savanna was like historically is largely unknown (Henderson 1995). While no plant species is known to be endemic to oak savanna (Nuzzo 1985), there are species that are considered savanna specialists in the Midwest (Packard 1988). Historically, the savanna community was probably a slowly shifting mosaic of plant species associations that had varying degrees of shade and sun tolerance (Henderson 1995).

CROSS TIMBERS SAVANNAS

The Cross Timbers region is located in portions of Oklahoma, Texas, Kansas, and Arkansas (Fig. 2). It is characterized by a mosaic of upland communities including prairie, savanna, woodland and forest (Fig. 3). Post oak (*Quercus stellata*) and blackjack oak (*Quercus marilandica*) are the dominant tree species throughout in the wooded systems.

Kuchler (1964) defined the potential natural vegetation of the Cross Timbers as savanna-like, characterized by tallgrass prairie with low broadleaf deciduous trees scattered singly or in groves of varying size. These groves often occur with an open canopy cover and grassy understory (Kuchler 1974). The herbaceous understory of Cross Timbers savanna is similar in composition to the surrounding prairie (Dyksterhuis 1948; Kuchler 1964, 1974, Palmer unpublished data).

Savanna also occurs in the Cross Timbers region as a gradual transition between closed-canopy forests and grasslands, with a margin of isolated trees (Dyksterhuis 1957, Penfound 1962). This sort of edge can be tens of meters wide. Classifying some Cross Timbers sites as savanna can be problematic due to the tendency of post oak and blackjack oak to root sprout and produce groupings of trees with interlocking crowns (Hoagland et al. 1999).

In the Cross Timbers region, woodlands have a similar species composition as savanna (Palmer, unpublished data). As such, we recognize that many properties of savanna are likely to be shared with woodlands, and we treat the two as largely synonymous in this paper.

RESTORATION OF MIDWEST OAK SAVANNAS

Nuzzo (1985) estimated that oak savannas in eight states in the Midwest probably covered 11 to 13 million hectares at the time of settlement and have been reduced in extent by 99.98%. Packard (1988) found that several plants that were historically associated with savanna communities are now uncommon. Populations of these 'savanna specialists' have been successfully established through restoration efforts.

Largely because of these findings, the conservation value of savanna communities has been recognized and restoration efforts are increasing. The ultimate goal is to help replace the loss of habitat that is leading to the gradual disappearance of plant and animal species (Packard 1988).

MIDWEST OAK SAVANNA VS. CROSS TIMBERS SAVANNA

The Cross Timbers and certain areas of the Midwest occupy a transition zone between the Great Plains and the Eastern Deciduous forest. Despite this, the savannas of the Cross Timbers are considered distinct from Midwest Oak savannas to their north. (McPherson 1997). The Midwest is characterized by its former glaciation, relatively mesic soils and northern plant affinities, while the Cross Timbers region is characterized by its largely sandy soils, generally rough topography and southern plant affinities. Furthermore, the Cross Timbers has not experienced the extent of sod-busting that the Midwest has, and

includes substantial areas of native tallgrass prairie and old-growth forest.

Despite these distinctions, there is very little difference in ecosystem classification. Küchler (1964) described regions of oak savanna in the Midwest as being nearly identical to that of the Cross Timbers in vegetation type; characterized by tallgrass prairie with broadleaf deciduous trees scattered singly or in groves.

HISTORICAL AND CURRENT EXTENT OF CROSS TIMBERS SAVANNA

The extent to which we can understand the structure of pre-settlement vegetation is limited. Despite this, analysis of historical accounts, early photographs, early land surveys, and existing vegetation have provided much insight into historical vegetation. Numerous authors have described historical vegetation communities throughout the Cross Timbers region as savanna-like (Bruner 1931, Dyksterhuis 1957, 1948, Lathrop 1958, Rice and Penfound 1959, Penfound 1962, Kuchler 1974, 1964, Johnson and Risser 1975, Smiens and Diamond 1986, Hoagland et al. 1999, Francaviglia 2000). This is not to conclude that savanna was the dominant vegetation type in the Cross Timbers. It does indicate, however, that savanna was a well-represented component within a mosaic of prairie and forest during the time of settlement.

Many authors conclude that, during post-settlement, overgrazing in conjunction with a decrease in fire frequency and / or intensity has increased the density of oak stands to the point where they resemble closed-canopy forests rather than savanna (Dyksterhuis 1948, 1957, Lathrop 1958, Rice and Penfound 1959, Penfound 1962, Bell and Hulbert 1974, Johnson and Risser 1975, Smiens and Diamond 1986, Abrams 1992, Hoagland et al. 1999). This conversion has been at the expense of the

herbaceous understory and the associated biodiversity.

Unlike the Midwest Oak savannas, there are no reliable estimates as to how much Cross Timbers savanna actually existed at the time of settlement or how much has been lost since settlement. Despite this, these studies indicate that savannas were important aspects of the historical Cross Timbers region and now represent only a remnant of a vast vegetation type.

BIODIVERSITY AND NATURAL HERITAGE

The mosaic of communities in the Cross Timbers provide for a wide variety of habitat for plants and animals (Costello 1969, Oklahoma Biodiversity Plan 1993), and savannas contribute to this habitat diversity (Fig. 4). Savannas may produce an edge effect, where interfaces between community types support species from both communities, resulting in elevated species composition. As in the Midwest, there may be savanna specialists in the Cross Timbers, species that prefer the distinct habitat offered by an open stand of trees. Cross Timbers savanna should be valued in regards to their conservation status for their contribution to the natural heritage of the United States. This is especially true for post oak trees that have reached the age of 200+ years (Fig. 5).

According to the Oklahoma Biodiversity Plan (1993), foremost among the threats to plant diversity in Oklahoma is a dramatic change in the fire regime from what occurred historically. As the result of an altered fire regime, the encroachment of woody species into savannas is indeed a threat to the diversity of the Cross Timbers (Rice and Penfound 1959, Johnson and Risser 1975, Johnson 1986, Archer 1995, Hoagland et al. 1999).

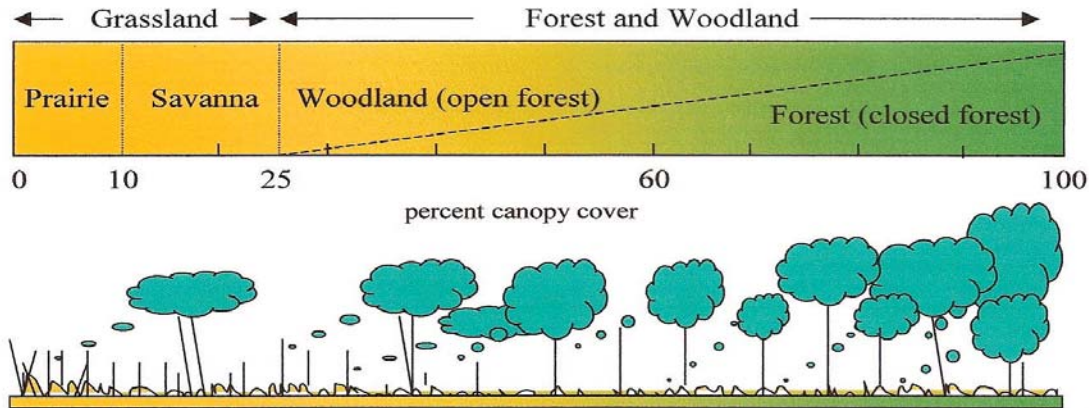


Figure 1 Schematic diagram showing the changes in structure along a gradient from prairie to forest. This structural gradient is often reflective of a fire frequency gradient, with prairies maintained by more frequent fires (Faber-Langendean 2001).

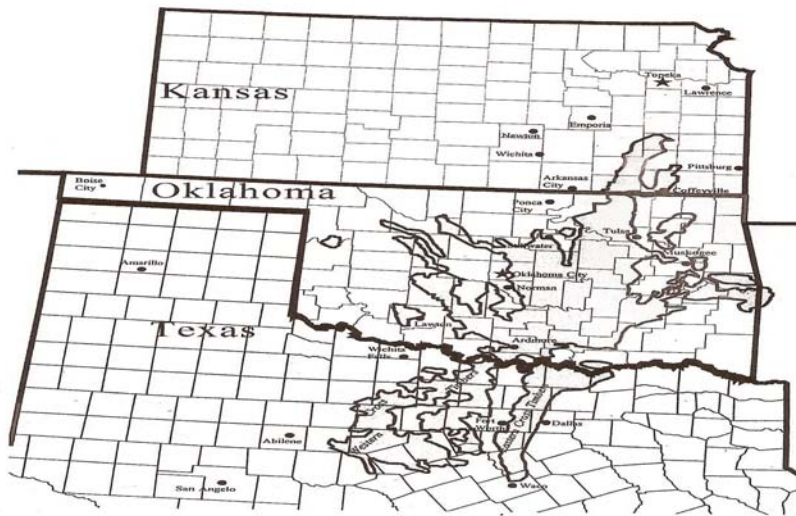


Figure 2 Location of the Cross Timbers region. (Adapted from Küchler 1964).



Figure 3 A Cross Timbers mosaic of prairie, savanna and forest communities.



Figure 4 A Blackjack oak savanna. These scattered trees provide for habitat diversity.



Figure 5 This old-growth post oak tree has low, horizontal branches. This type of architecture may be indicative of its having grown in an open-canopy environment.

RESTORATION RECOMMENDATIONS

Restoration is the work of enhancing ecological quality. High quality communities have most natural processes intact and are rich in conservative plant species; those that are restricted to intact, natural remnants. Disrupted or degraded systems (those that have been plowed, overgrazed, protected from fire, etc.) lose those conservative species. The principal challenge in remnant restoration is to reinstate or speed up the processes that allow these remnant-dependent species of plants and animals to regain their important roles in the system (Packard and Ross 1997).

Several authors have commented on the need for proactive land management to combat woody encroachment in the Cross Timbers (Dyksterhuis 1948, Smiens and Diamond 1986, Engle et al. 1996, 2006, Francaviglia 2000). Proactive land management practices are indeed recommended for restoring savanna.

In degraded savannas, a combination of treatments is recommended for restoring an open-stand of trees with a grassy understory. Mechanical removal of trees with tree-clipping devices and/or chainsaws may be used to thin dense stands. For areas thick with shrubs, mowing treatments may be used. Fire should be used as a process to re-establish native grasses and forbs, with a long-term goal of promoting plant diversity and limiting woody encroachment.

There are many acres of private land in the Cross Timbers with degraded oak savanna. A major obstacle to restoring natural diversity on private lands has been the lack of economic incentive. Savanna restorations, however, may provide increased forage and combat further loss of forage due to woody encroachment. Light to moderate grazing can be compatible with maintaining the plant structure needed by many savanna species (Henderson 1995).

In addition to providing optimum habitat for many plant and wildlife species, oak savanna was probably the optimum habitat for many game species (e.g., bobwhite quail, turkey, deer, and rabbits) (Henderson 1995). Thus, management for oak savanna is compatible with traditional wildlife management and hunter interests.

The ultimate goal should be to help restore habitats, the loss of which, has led to the gradual disappearance of plant and animal species (Packard 1988). For example, the black-capped vireo is a native to the Cross Timbers region. This federally endangered species prefers to nest in open savanna vegetation, and the decrease in open savanna vegetation has had negative impacts on the population (Hoagland et al. 1999). This is a prime example of how savanna restoration efforts could increase biodiversity by providing habitat for a target species.

Currently, savannas are not well represented throughout the Cross Timbers. Much of the Cross Timbers vegetation is now characterized by a mosaic of prairie and closed canopy forest. By restoring savanna communities, the structural diversity of the landscape is increased. These efforts will likely lead to higher compositional and functional diversity.

Mendelson et al. (1992), however, criticize what they believe is a rush to create savannas on forested sites that never supported savannas. Most crucially for the Cross Timbers, there are old-growth forests in the region that have never been savanna-like. Such forests are clearly not a target for savanna restoration.

Careful research should be used to plan and implement any particular savanna restoration project (see Packard and Mutel 1997). Managers need to understand the characteristics of the site and the potential impacts of restoration techniques. Analysis of the site's existing plant communities and

rare plant or animal populations is crucial. Inference of pre-settlement vegetation through analysis of Government Land Office (GLO) surveys, soils, and topography should help guide the process.

ENVIRONMENTAL FACTORS INFLUENCING CROSS TIMBERS SAVANNAS

Savanna represents one component of a complex and dynamic ecosystem. Within the Cross Timbers, there are several interacting environmental factors influencing vegetation for a given area. These include 1) climate; 2) soil; 3) topography; 4) grazing; and 5) fire. Understanding how all of these factors influence the relative abundance of woody and herbaceous plants is fundamental to managing for and restoring native savanna communities (McPherson 1997).

Climate

The Cross Timbers is home to a dynamic climate that is capable of supporting grassland or forest. There have been long-term 'dry' and 'moist' events, punctuated with shorter-term cyclic variations in climatic conditions (Dean et al. 1984). The climate of the Cross Timbers has varied substantially even over the last few centuries, where changes in rainfall patterns have caused east-west shifts in the ecotone (Shaw and Lee 1995). Interannual and decadal variability in precipitation and temperature have been naturally high at both local and regional scales (McPherson 1997).

As precipitation regimes shifted, so did community composition and structure (Wright 1963). Extreme climatic events may be more important than shifts in means (Katz and Brown 1992) for changes in Cross Timbers savannas. "Pulses" of tree recruitment may occur during relatively brief periods of high soil moisture (McPherson 1997). Wet fuels decrease the likelihood of fire and allow for trees to take

advantage of the higher soil moisture. Subsequent growth of woody plants, may transform prairie into savanna or savanna into forest (Jameson 1987). On the other hand, the fine fuels which accumulate during these periods of high precipitation may also dispose the system to intense fire and thereby limit tree recruitment (Scholes and Archer 1997).

Significant destruction of Cross Timbers trees during long periods of drought have been documented (Rice and Penfound 1959). While grasses are also damaged by drought, they may rapidly reestablish areas due to their propagation by rhizomes once there is sufficient soil moisture (Weaver 1968). Major droughts in the Cross Timbers region occur at unpredictable intervals. Such droughts may increase the chance of fire due to dry fuels (Axelrod 1985), however, it may decrease fire intensity due to decreased fuel production (Skarpe 1992).

Due to the effects of a variable precipitation and fire regime, Cross Timbers savannas have possibly experienced a high degree of shifting on the landscape, as well as conversions to full prairie or forest. Present vegetation may represent one phase of a continually changing assembly of communities (Wethington 1994). This information is important for predicting how a natural savanna community might respond to changes in climate.

Soils

The very existence of Cross Timbers trees is largely traceable to certain geologic units from which the sandy soils are derived (Dyksterhuis 1948). These alternating materials have formed different soil associations that are characterized by coarse-textured sandy loam soils and by fine-textured clay loam soils. These are generally associated with savanna or forest, and grassland respectively (Dyksterhuis 1948, Smeins and Diamond 1986).

Studies in the Cross Timbers have indicated that soil moisture availability is the primary factor controlling species composition (Clark 2003, Johnson and Risser 1972, Rice and Penfound 1959). The higher moisture-retaining capacity of coarse-textured soils is largely responsible for supporting the higher water demands of trees where rainfall is marginal for tree survival (Bell and Hulbert 1974). Fine-textured soils may reduce water availability to woody plants below thresholds necessary for survival in the dry summers (McAuliffe 1994).

The USDA (2007) characterizes certain soil types in the Cross Timbers as 'savanna' range site. These are the most likely locations in which to restore a degraded savanna.

Topography

Topography influences the 'fire probability pattern' (Grimm (1984) that results from frequent fires superimposed on landscape features that include fire-prone topographic regions as well as natural fire barriers. Frequency of fires for a prairie-forest ecotone in pre-settlement times was largely determined by topographic relief and the distribution of firebreaks, such as waterways (Anderson 1990).

Because fire frequency was determined by the roughness of landscape features, the density of trees on a landscape can often be viewed as a function of surface roughness (Anderson 1990). Old-growth forest in the Cross Timbers is highly related to steep and rocky slopes (Therrell and Stahle 1998). Much of the Cross Timbers forest prior to settlement was likely associated with a fire-protected landscape. As previously mentioned, old growth forests are not the place for savanna restoration.

Grazing

Native herbivores influenced the proportion of woody and herbaceous plants by disproportionately consuming or

damaging more of one vegetation type than the other (McPherson 1997). As such, herbivores may interact with competition patterns between woody and herbaceous vegetation as well as with fire regimes, and may thus be involved in large-scale physiognomic dynamics of savannas (Skarpe 1991).

Ungulates like bison, elk, deer and pronghorn antelope, among other herbivores were all present on the historical prairie/forest transition. Of these, bison may have had the greatest impact on woody plant establishment in terms of their huge numbers and their alteration of fire intensity (Shaw and Lee 1995).

High grass biomass can affect tree biomass by fueling fires. Bison grazing could have reduced the fuel load and reduced fire frequency, intensity, or continuity of spread (Baisan and Swetham 1990). However, bison herds are believed to have existed in low numbers in the Cross Timbers (Shaw and Lee 1995).

The effects of overgrazing cattle likely differed drastically from historical bison grazing in the Cross Timbers. In the absence of heavy cattle grazing, a considerable quantity of litter was produced between established trees. When fires started with these heavy fuel loadings, small trees and saplings were knocked back. The result was an open stand of timber (Penfound 1962). In managing for savanna communities, overgrazing should not be allowed to reduce the fuel loading to the point where fire cannot suppress woody plants.

Fire

Fire has influenced plant communities for millions of years. Fires are thought to be important for the origin and maintenance of grassland, savanna, and woodland community physiognomies by limiting woody plant establishment (Anderson 1990, Sullivan 1995, Dorney and Dorney 1989). Native Americans have been in the Southern Plains for more than 10,000 years

(Kay 1998), during which they set frequent fire to the tallgrass prairie landscape (Shaw and Lee 1995, Moore 1995).

Fire may promote grasses or woody plants in Cross Timbers savannas, as both vegetation types are well-adapted to fire. Fire frequency, fire intensity, and fire season interact to shape the response of vegetation to fire (Wright and Bailey 1982, Engle et al. 1996). A given fire may favor either grasses or trees depending on the nature of these interactions.

The frequency of fire plays a critical role. In savanna ecosystems, a decrease in fire frequency leads to woody encroachment, while more frequent fires may favor a relatively stable community (Scholes and Archer 1997). Frequent fires, however, do little to suppress woody plant development if they are of low intensity (Briggs et al. 2005).

Fire intensity varies as a function of weather, stage of plant development, fuel load, topography, soil type, and previous management (Bidwell et al. 2004). Generally, a well managed rangeland with plenty of fine fuels will produce a high intensity fire that may effectively control woody plant establishment. This underscores the importance of the current vegetation in not only shaping the fire environment, but also in the response of vegetation to a given fire (Engle et al. 1996).

The season of a fire is very important for the relative effect on grasses and woody plants. The way species respond to a fire depends heavily on the timing of the fire relative to their phenological development. In general, plants that are actively growing, flowering, or setting seed at the time of the fire, tend to decline over time (Davidson and Kindscher 1999). Burning at different times of the year is recommended to inhibit certain species from dominating the community and to promote biodiversity. To control woody plants, burning following bud break and full leaf-out is the most effective time (Bidwell et al. 2004).

Once a savanna is re-established, carefully prescribed burns can maintain open stands of Cross Timbers oaks for long periods of time (Engle et al. 2006). Used wisely, prescribed fire can enhance biodiversity, combat tree encroachment, reduce danger of catastrophic wildfires, and improve range conditions for livestock.

RESEARCH NEEDS

The current extent of high-quality savanna stands should be assessed throughout the Cross Timbers. Judgments must be made as to the degree to which stands of vegetation appear to be functioning under natural ecological processes. Plant identification in high-quality stands of oak savanna should be used to provide information on flora composition, richness and physiognomy. Lists of fauna that utilize and prefer these communities should be compiled. This information can be used to assess the integrity and functions of savanna communities, to analyze their contribution to the biodiversity of the Cross Timbers, and as reference information for restoration efforts.

While numerous studies indicate that savannas were important components of the historic Cross Timbers, their actual extent is uncertain. Assessing the actual past extent of savanna remains a top research priority. If savanna historically dominated the Cross Timbers region and are now very poorly represented, their conservation would be a very high priority. If savannas were originally rare and transient, they would deserve less attention than if they are the last remnant of a vast vegetation type. Unfortunately, tools for assessing past extent of savanna vegetation are limited.

GLO surveys are perhaps the best available tool. Early land survey records have contributed significantly to our understanding of the structure of North America's pre-settlement ecosystems. By

way of summary, land surveys have been used to determine: 1) species compositions of pre-settlement savannas and woodlands; 2) landscape-level disturbance processes; 3) site-specific determinants; 4) species associations and community classification, and; 5) vegetation types for mapping purposes (Egan and Howell 2005).

This information has figured prominently in the restoration of a number of historic ecosystems (Egan and Howell 2005). Schroeder (1981), for instance, created a statewide map of GLO surveys from Missouri that described a mosaic of forest, woodland, savanna, and prairie landscapes. The map serves as a foundation for the Missouri Department of Natural Resources efforts to restore savanna ecosystems in that state's parks (McCarty 1998). This information is commonly used as a reference for restoration efforts, and numerous post oak savanna restorations have occurred with success in Missouri.

The plat maps used for mapping, however, were made up solely on the basis of data written in the early surveyor's notes, which have certain biases and limitations (King 1978). Furthermore, we should view this information as but one snapshot of past vegetation patterns that were constantly shifting with an ever-changing climate, Native American activities (Batek et al. 1999), and grazing patterns. Also, early settlers may have cut down trees before the survey was completed. As such, we are forced to consider just how representative they are as a true picture of the "pre-settlement" vegetation (Noss 1985).

The dynamics of savannas are not well known because landscape-level processes have been radically, and sometimes irreversibly altered by recent human activities. (Rebertus and Burns 1997) Further research should increase our understanding of the mechanisms of the Cross Timbers ecosystem. Elucidation of the interactions, dynamics and determinants, and identification of robust generalizations

that can be broadly applied to savanna ecosystems would benefit ecological theory, modeling and land management (House et al. 2003). Fundamental questions include: What controls the relative abundance of woody and herbaceous plants for a given set of conditions at given site? How do the vegetation types interact with each other? Is a given woody-herbaceous ratio dynamically stable and persistent under a particular set of conditions (House et al. 2003).

Finally, circumstances under which restoration techniques are effective or ineffective need to be identified. As such, restoration efforts should be monitored.

CONCLUSION

Oak savannas throughout the Cross Timbers region have been degraded by woody encroachment. Savanna restoration efforts are recommended to combat this threat to biodiversity. The ultimate goal is to restore ecological processes and help replace lost habitat that is leading to the gradual disappearance of plant and animal species. There is, however, much that is unknown about the ecological dynamics and functions of savanna communities. It is hoped that with research and restoration of savanna communities, some answers will be provided.

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Editorial

Botanizing with Larry Magrath

Sunday, October 4, 1998. A field trip for two doesn't take much planning – a phone call will do: “One of my students has brought in a collection of *Scirpus ballii*. Want to go with me on Sunday to verify the site?” Well, of course! Larry was one of the state's most ardent collectors, and *S. ballii* (name since changed to *Schoenoplectus ballii*) is a sedge. That makes it a plant I need to know.

Just after 8 a.m. that Sunday I picked up Larry and his gear in Chickasha, and we headed southwest. But first – he'd thought of another lake that was “almost on the way”, and there were exposed mud flats just covered with sedges. So we went due west for maybe 10 miles, to Lake Burtschi. There were thousands of inch-tall sedges of several different species; *Cyperus surinamensis*, *C. aristatus*, *Fimbristylis autumnalis*, and *Fuirena simplex*, mostly. They lay on the damp sand like a city lawn; tiny annual species doing their best to set seed before frost. There we also collected samples of *Arundo donax*, a grass that grows in shallow water, and can reach more than two meters tall.

Then, “since we are in the neighborhood” we stopped at a private property called Williams' Wilderness, whose owner had given permission. There we found an orchid, *Hexalectris spicata* and some other goodies.

Traveling SW on SH19, we stopped along the south edge of Apache near Lakeside Village to see how Lake Ellsworth had fared. That lake was down ten feet, and had exposed acres of sandy bottom, much of it covered with the tiny annual sedges. All were in furious bloom. There we collected a sedge-like grass, *Eragrostis reptans*; as well as *Fimbristylis vablii*, *Cyperus odoratus*, *Amannia coccinea*, and a strange liverwort

called *Riccocarpus natans*. The upper edges were banked with a vigorous morning glory with small white flowers, *Ipomoea lacunosa*.

Finally we reached Jed Johnson Lake in the Wichita Mountain Wildlife Reservation. There, an expanse of mud flats some 4 meters wide and ten meters long had been exposed by the low water. The shoreline was composed of broken red-granite gravels and sand, much disturbed by fishermen. *Scirpus ballii* was there in abundance and in bloom or fruit. Larry counted 114 plants, and each of us collected a specimen for our herbarium.

Our trip had been both entertaining and successful. Think it was over? You've never been on a field trip with Larry! We were free to wander as far and wide as our strength and the day lasted. We checked Rush Lake, also on the Reserve, and found it embedded in a huge stand of *Eleocharis quadrangulata*. While I took pictures, a curious armadillo came right up and sniffed near-sightedly at my shoe.

Lunch with Larry was always a challenge: it had to be fast, and it had to be vegetarian. Veggie fast food isn't readily available along country roads. We settled for sub sandwiches at the Love's Station on SH49. Dodging traffic through Lawton, we took SH 7 east to SH 65, then went south through Temple, turned east there on SH 5, and soon arrived at Moneke Park near Lake Waurika. Hiking through an open forest community, we found the other relative of poke-weed, *Rivina humilis*, and in bloom. First time I'd ever seen that. It was a real treat.

Our day was coming to an end. The cloud bank that had hovered to the west all day long grew higher and darker. We reluctantly headed north on US 81, but soon

had to make a stop just north of Addington. There, beside the highway, is a large prairie-dog community, and we enjoyed their company until it grew too dark for photography. By the time we reached Chickasha, it was pitch-black except for the lightning that was almost intense enough to drive by. Larry unloaded his prizes in a heavy downpour, and I headed for home by SH9. Again, lightning and heavy, heavy rain accompanied the trip.

By way of the evening news, I learned that Ninnekah, just south of Chickasha, had been struck by a tornado right after we drove through, and that a swarm of them had produced the lightning that made the passage so interesting. The tornadoes had covered a large swath of central Oklahoma

that night while Larry and I were busy pressing the plants and writing up our notes.

Over the years there were many such field trips with Larry, most of them with the Oklahoma Native Plant Society or The Nature Conservancy. Each of them was “floriferous” and interesting. The photo below is from one of our trips to Round Mountain in LeFlore County with Jim Norman and Charles Lewallen, who set up the remote photo.

Patricia Folley, 1 June 2007

O N P S



Larry Magrath, botanizing with Patricia Folley, Charles Lewallen, and Jim Norman.

Editorial Policies and Practices

Oklahoma Native Plant Record is published annually by Oklahoma Native Plant Society. Submission for publication in the journal is open to all. Manuscripts will be accepted on topics related to Oklahoma's regional botany, including historical research reports, current research articles, site record species lists, and descriptions of new or important species sightings in Oklahoma. Oklahoma's environmental gradients of human impact, climate, and elevation make us a prime target for research on habitat edges, species ranges, and edge species, therefore, articles of other themes may be included as well. Research overlooked by journals of broader geographic regions will be considered for publication in the Record.

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Manuscripts will be reviewed for content and appropriateness by at least two reviewers. The title page should state the affiliation and complete addresses of all authors and telephone numbers for the corresponding author. Research and technical papers should include a one-paragraph abstract of not more than 250 words. It should concisely state the goals, principal results, and major conclusions of the paper. All references, figures, and tables should be cited in the text. Site descriptions should include latitude, longitude, total area and elevation. Common names should be referenced to a scientific name. Abbreviations of authorities for scientific names should follow Authors of Plant Names (Brummitt and Powell 1992). Titles of periodicals should be abbreviated following Botanico-Peridocum-Huntianum and its supplement except in historic publications when original format will be used.

Authors with access to PC-compatible microcomputers are encouraged to send a copy of the manuscript on CD or diskette in rtf (rich text format). If the manuscript is typed, manuscripts should be double-spaced on 8 1/2 X 11 inch paper with minimum one-inch margins and should be submitted in duplicate. Use no headers, footers, nor auto page numbering. Proof-read and verify taxa numbers before submission. Color photos may be submitted on CD or diskette. CDs, Diskettes, or hardcopy manuscripts should be sent to the managing editor at the address below by July 1.

Managing Editor, Oklahoma Native Plant Record
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