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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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# Oklahoma Native Plant Record

**Volume 7, Number 1**

## Table of Contents

- Foreword .................................................. 3
- Vascular Plants of the Oklahoma Ozarks ......................... 4
  Ph.D. Dissertation  
  Dr. Charles S. Wallis
- Updated Oklahoma Ozark Flora ................................. 21  
  Dr. Bruce W. Hoagland
- The Vascular Flora of the Oklahoma Centennial Botanical Garden Site ... 54  
  Osage County, Oklahoma  
  Dr. Bruce W. Hoagland and Ms. Amy Buthod
- Vascular Plant Checklists from Oklahoma .......................... 67  
  Dr. Michael W. Palmer
- The Need for Savanna Restoration in the Cross Timbers .............. 78  
  Mr. Caleb Stotts, Dr. Michael W. Palmer, and Dr. Kelly Kindscher
- Botanizing with Larry Magrath ................................ 91  
  Editorial  
  Ms. Patricia Folley
- Five-year Index to Oklahoma Native Plant Record ............... inside back cover
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)

Wallis, C.S.
https://doi.org/10.22488/okstate.17.100051
PHYSICAL FEATURES

Location and Area

The name Oarks 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:

<table>
<thead>
<tr>
<th>County</th>
<th>Land Area</th>
<th>Lake Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adair</td>
<td>569</td>
<td>0</td>
</tr>
<tr>
<td>Cherokee</td>
<td>760</td>
<td>11</td>
</tr>
<tr>
<td>Delaware</td>
<td>657</td>
<td>15</td>
</tr>
<tr>
<td>Mayes</td>
<td>261</td>
<td>10</td>
</tr>
<tr>
<td>Muskogee</td>
<td>114</td>
<td>3</td>
</tr>
<tr>
<td>Ottawa</td>
<td>296</td>
<td>10</td>
</tr>
<tr>
<td>Sequoyah</td>
<td>694</td>
<td>3</td>
</tr>
</tbody>
</table>

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 ones.
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:

<table>
<thead>
<tr>
<th>County</th>
<th>Maximum Temperature</th>
<th>Minimum Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adair</td>
<td>114</td>
<td>-27</td>
</tr>
<tr>
<td>Cherokee</td>
<td>118</td>
<td>-23</td>
</tr>
<tr>
<td>Delaware</td>
<td>114</td>
<td>-25</td>
</tr>
<tr>
<td>Mayes</td>
<td>117</td>
<td>-21</td>
</tr>
<tr>
<td>Muskogee</td>
<td>118</td>
<td>-14</td>
</tr>
<tr>
<td>Ottawa</td>
<td>114</td>
<td>-25</td>
</tr>
<tr>
<td>Sequoyah</td>
<td>115</td>
<td>-10</td>
</tr>
</tbody>
</table>
The dates of killing frosts of last and first average appearance with number of days in growing season as follows:

<table>
<thead>
<tr>
<th>County</th>
<th>Appearance</th>
<th>Growing</th>
<th>Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adair</td>
<td>April 10</td>
<td>October 27</td>
<td>200</td>
</tr>
<tr>
<td>Cherokee</td>
<td>April 6</td>
<td>October 30</td>
<td>207</td>
</tr>
<tr>
<td>Delaware</td>
<td>March 31</td>
<td>October 31</td>
<td>214</td>
</tr>
<tr>
<td>Mayes</td>
<td>April 3</td>
<td>October 31</td>
<td>211</td>
</tr>
<tr>
<td>Muskogee</td>
<td>March 26</td>
<td>November 4</td>
<td>223</td>
</tr>
<tr>
<td>Ottawa</td>
<td>April 21</td>
<td>October 28</td>
<td>207</td>
</tr>
<tr>
<td>Sequoyah</td>
<td>March 31</td>
<td>November 3</td>
<td>217</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>County</th>
<th>Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adair</td>
<td>46.84</td>
</tr>
<tr>
<td>Cherokee</td>
<td>41.17</td>
</tr>
<tr>
<td>Delaware</td>
<td>44.39</td>
</tr>
<tr>
<td>Mayes</td>
<td>43.54</td>
</tr>
<tr>
<td>Muskogee</td>
<td>39.50</td>
</tr>
<tr>
<td>Ottawa</td>
<td>41.93</td>
</tr>
<tr>
<td>Sequoyah</td>
<td>41.79</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adair</td>
<td>43.5</td>
<td>37.6</td>
<td>36.2</td>
<td>30.3</td>
<td>39.1</td>
<td>36.3</td>
<td>62.7</td>
<td>51.6</td>
</tr>
<tr>
<td>Cherokee</td>
<td>46.8</td>
<td>30.8</td>
<td>37.4</td>
<td>25.1</td>
<td>36.9</td>
<td>33.7</td>
<td>58.6</td>
<td>46.6</td>
</tr>
<tr>
<td>Delaware</td>
<td>47.8</td>
<td>26.0</td>
<td>30.6</td>
<td>34.2</td>
<td>32.8</td>
<td>36.7</td>
<td>57.4</td>
<td>43.1</td>
</tr>
<tr>
<td>Mayes</td>
<td>47.8</td>
<td>28.3</td>
<td>40.3</td>
<td>28.5</td>
<td>33.2</td>
<td>33.5</td>
<td>60.4</td>
<td>35.4</td>
</tr>
<tr>
<td>Muskogee</td>
<td>48.4</td>
<td>32.5</td>
<td>34.1</td>
<td>22.8</td>
<td>29.2</td>
<td>26.8</td>
<td>56.3</td>
<td>45.5</td>
</tr>
<tr>
<td>Ottawa</td>
<td>----</td>
<td>30.4</td>
<td>27.6</td>
<td>32.8</td>
<td>36.9</td>
<td>32.2</td>
<td>49.6</td>
<td>52.6</td>
</tr>
<tr>
<td>Sequoyah</td>
<td>52.7</td>
<td>35.2</td>
<td>40.3</td>
<td>33.5</td>
<td>30.2</td>
<td>32.0</td>
<td>68.4</td>
<td>57.9</td>
</tr>
</tbody>
</table>

**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 tamarisciniscus 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 portulaccoides (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, (Amomona triloba), and black walnuts … had been seen… among the sylva, 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, \textit{(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 \textit{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).


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 associes 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 \textit{Quercus velutina}, \textit{Carya tomentosa} and \textit{C. ovalis}. Where the tops of the hills become more xeric, \textit{Quercus marylandica} and \textit{stellata} replace \textit{Q. velutina} with \textit{Ulmus alata} as another common tree. Considerable stands of \textit{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 \textit{Quercus rubra} and \textit{Q. Muhlenbergii} with occasional \textit{Carya cordiformis} plus \textit{C. ovata} and some \textit{C. tomentosa}. The larger valleys of creeks and rivers have \textit{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 quinguefolia, 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 moved 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. mollis, 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. mollisor, 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 chiensis, Nothoscordum bivalve, Zigadenus Nuttallii, Hypoxis hirsuta, Sisyrinchium varians, Claytonia virginica, Arenaria patula forma media, Steilaria Nuttallii, Delphinium carolinianum var. Nortonianum, Rosa carolina var. villosa, Baptisia leucophaea var. leucophaea, Psoralea tenuiflora var. floribunda, Asclepias viridis, Penstemon tubaeflorus, 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, 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.

Quapaw Prairie Station

The common vernal species are: Vulpia octoflora, Carex Crawei, Allium canadense var. mobilense, 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, Polyaenia Nuttallii, Dodecatheon Meadia formas album and Meadia, Asclepias hirtella, A. viridis, Castilleja coccinea coccinea, Penstemon tubaeflorus, Plantago aristata, Houstonia patens, Lobelia appendiculata, Antennaria campestris, Erigeron strigosus, Krigia Dandelion, and K. occidentalis.

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 american. 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 virginiensis var. subintegra, Cercis canadensis, Vicia minutilflora, Geranium maculatum, Viola pensylvanica var. pensylvanica, V. triloba var. dilatata, Chaerophyllum tainturieri var. tainturieri, Cornus florida, Hydrangea arborescens, Glechoma hederacea var. micrantha, Houstonia purpurea, Viburnum rufidulum, Neclu aureus, and S. obovatus var. rotundus.

The common aestival species are: Adiantum Capillus-Veneris, Asplenium platyneuron, Polystichum acrostichoides, Parietaria pensylvanica, Hydrangea 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, Kitaibeliana var. Rafinesquii, V. pedata var. lineariloba, Vaccinium stamineum, Houstonia patens, Atennaria plantaginifolia, Erigeron strigosus, Gaphallium 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, Crotonus 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 kohlolepis, Juncus brachycarpus, J. diffusissimus, J. interior, J. marginatus, J. validus, Ranunculus laxicaulis, Gratiola neglecta, and Linderia anagallidea.

The common aestival species are: Sagittaria ambigua, Echinochloa crussgalli, Rotala ramosior var. interior, Rhexia interor, Ludwigia alternifolia.
var. alternifolia, L. glandulosa var. glandulosa, Hydrocle ovata, Verbena hastata, Gratiola virginiana, Cephalanthus occidentalis, and Helium flexuosum.

The common serotinal species are: Eleocharis lanceolata, Polygonum hydropiperoides var. Bushianum, P. pensylvanicum var. laevigatum, P. punctatum var. leptostachyum, Gerardia fasciculata, G. heterophylla, Bidens 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, Anemone californica, Ranunculus fascicularis var. apricus, R. Harveyi, Viola pedata var. linealoba, V. Kitaibeliana var. Rafinesquii, 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, Eradrostis capillaris, Manisuris cylindrica, Dalea candida, Crotonopsis elliptica, Hypericum Drummondii, H. pseudomaculatum, Daucus pusillus, Peplinum Nuttallii, Spermolepis divaricata, Diodi teres var. setifera, Ambrosia bidentata, Helium 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 Bluffs station three miles north of Fort Gibson, because of some eastern and southeastern species.

Western species of the Arkansas River sands include: Cenchrus pauciflous, 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.

**Aleuris 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 revaluated 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.

LITERATURE CITED

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.


20. _____. 1939. Notes from the Herbarium of the University of Wisconsin-XVIII. Rhod. 41: 525.


51. Gale, Shirley. 1944. Rhynchospora, Section Euryrhynchospora, in Canada, the United States and the West Indies. Rhod. 46: 89-134, 159-197, 207-249, 255-278.

Wallis, C.S.


95. ____. 1937. Variants in Two Species of Delphinium (D.
126. United States Department of


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 it 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), *Enigenia bulbosa, Gentiana alba, Glyceria acutiflora, Heteranthera dubia* (one location in Cherokee County), *Physocarpus opulifolius var. intermedius, Silene regia,* and *Symphyotrichum 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.

**Literature Cited**


Hoagland, B.W.
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.

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Taxa</th>
<th>Native</th>
<th>Non-native</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equisetophyta</td>
<td>0 (1*)</td>
<td>0 (1*)</td>
<td>0</td>
</tr>
<tr>
<td>Lycopodiophyta</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Pteridophyta</td>
<td>21</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>Coniferophyta</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Magnoliophyta</td>
<td>1,181</td>
<td>1,047</td>
<td>134</td>
</tr>
<tr>
<td>Magnoliopsida</td>
<td>882 (909)</td>
<td>781 (808)</td>
<td>101</td>
</tr>
<tr>
<td>Liliopsida</td>
<td>299 (306)</td>
<td>266 (273)</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>1,205</td>
<td>1,071</td>
<td>134</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Taxa</th>
<th>Native</th>
<th>Non-native</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equisetophyta</td>
<td>3 (3; 1*)</td>
<td>3 (3; 1*)</td>
<td>0</td>
</tr>
<tr>
<td>Lycopodiophyta</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Pteridophyta</td>
<td>31 (32)</td>
<td>31 (32)</td>
<td>0</td>
</tr>
<tr>
<td>Coniferophyta</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Magnoliophyta</td>
<td>1,481</td>
<td>1,280</td>
<td>188</td>
</tr>
<tr>
<td>Magnoliopsida</td>
<td>1,082 (1,125; 5*)</td>
<td>945 (983; 5*)</td>
<td>142</td>
</tr>
<tr>
<td>Liliopsida</td>
<td>381 (393)</td>
<td>335 (347)</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>1,508 (1,565)</td>
<td>1,321 (1,377)</td>
<td>188</td>
</tr>
</tbody>
</table>

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 is secure (Groves et al. 1995).

<table>
<thead>
<tr>
<th>Taxa</th>
<th>G-rank</th>
<th>S-rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agalinis tenuifolia var. parviflora</td>
<td>G5</td>
<td>S2S3</td>
</tr>
<tr>
<td>Agalinis viridis</td>
<td>G4</td>
<td>S1</td>
</tr>
<tr>
<td>Aletris farinosa</td>
<td>G5</td>
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Hoagland, B.W.
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Hoagland, B.W.
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 rhizophyllus 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
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 polydoides (L.) Andrews & Windham ssp. michauxiana (Weatherby) Andrews & Windham

Pteridaceae

Adiantum capillus-veneris L.
Adiantum pedatum L.
Argyrochosma dealbata (Pursh) Windham.
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

#Thelypteris palustris Schott var. pubescens (Lawson) Fern.

Hoagland, B.W.
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 gracizans 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
Froelicha floridana (Nutt.) Moq. var. campestris (Small) Fern.
Froelicha 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 triflora Nutt.
#Rhus triflora 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)
#Ammoserelinum 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.
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.
Limnosciadium 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  
Spermolepis divaricata (Walt.) Raf. ex Ser.  
Spermolepis echinata (Nutt. ex DC.) Heller  
Thaspium barbinode (Michx.) Nutt.  
*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.  

Aquifoliaceae  
Ilex decidua Walt.  

Araliaceae  
Panax quinquefolius 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 viridis Walt.  
Cynanchum laeve (Michx.) Pers.  
Maclea budwyaniana (Sweet) Woods.  
Maclea gonoocarpos (Walt.) Shinners  

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 villicaula Fern.  
Ambrosia artemisiifolia L. var. elatior (L.) Descourtis. 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  
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.  
Ameloglossum atriplicifolium (L.) H.E. Robins.  

Hoagland, B.W.
Syn. = Cacalia atriplicifolia L.

*Artemisia annua L.
Artemisia ludovicianu Nutt. ssp. ludovicianu.
Syn. = A. ludovicianu Nutt. var. gnaphalodes (Nutt.) Torr. & Gray
Artemisia ludovicianu Nutt. ssp. mexicana (Willd. ex Spreng.) Keck. Syn. = Artemisia ludovicianu 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.

Boltonia asteroides (L') Hér. var. latisquama (Gray) Cronq. Syn. = B. latisquama Gray

Boltonia diffusa Ell. var. interior Fern. & Grisc.

# 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 forms tinctoria and atropurpurea (Hook) Fern.
Coreopsis tripteris L. Syn. = C. tripteris L. var. dearnii 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

Eleipta alba (L.) L.

Eupatorium carolinianus Raeuschi.

Erechtites hieraciifolia (L.) Raf. ex DC. var. hieraciifolia. Syns. = E. hieraciifolia (L.) Raf. ex DC. var. intermedius Fern. and E. hieraciifolia (L.) Raf. ex DC. var. praetata (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


Hoagland, B.W.

#Gaillardia suavis (Gray & Engelm.) Britt. & Rusby

*Galinsoga parviflora Cay.
*Galinsoga quadriradiata Cav.
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.
Helenium angustifolius L.
Helenium flexuosum Raf.
Helenium flexuosum var. lanceolata. Wallis listed forma lanceolata.
Helenium ×doronicoides Lam. (pro sp.) [giganteus × mollis]. Syn. = H. doronicoides Lam.
Helenium grosseserratus Martens

#Helenium ×laetiflorus Pers. (pro sp.) [pauciflorus × tuberosus]
Helenium maximiliani Schrad.
Helenium mollis Lam.
#Helenium nuttallii Torr. & Gray

#Helenium laetiflorus Pers. var. rigidus (Cass.) Fern.
Helenium petiolaris Nutt.
Helenium salicifolius A. Dietr.
Helenium tuberosus L.
Heliopsis helianthoides (L.) Sweet var. scabra (Dunal) Fern.

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.
Krigia biflora (Walt.) Blake. Wallis listed forms 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 forms angustata Wieg. and canadensis). L. canadensis L. var. latifolia Kuntze (Wallis listed forms 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 forms campestris (Greene) Fern. and ludoviciana.

*Lactuca serriola L. Syn. = L. scariola L.-wallis listed forms integrifolia (Bogenh.) G. Beck and scariola.

#Lactuca tatarica (L.) C.A. Mey. var. pulchella (Pursh) Breitung


Liatris aspera Michx. var. aspera. Wallis listed forms 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 (Ryb.) Gaiser

#Liatris squarrosa (L.) Michx. var. glabrata (Ryb.) Gaiser

#Liatris squarrosula Michx.

*Matricaria discoidea DC.


#Oligoneuron rigidum (L.) Small

Packera aurea (L.) A.& D. Löve. Syn. = Senecio aureus L.


*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 alpina L.


Pyrrophapappus carolinianus (Waltt.) DC.

#Pyrrophapappus grandiflorus (Nutt.) Nutt.

#Pyrrophapappus 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.


Solidago altissima L.

#Solidago arguta Ait. var. bootii (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. 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


*Sonchus asper (L.) Hill. Wallis listed forma glandulosus Beckh.


Hoagland, B.W.
Symphyotrichum divaricatum (Nutt.) Nesom. 
Syn. = Aster exilis Ell.
Symphyotrichum drummondii (Lindl.) Nesom var. drummondii. Syn. = Aster sagittifolius Wedemeyer ex Willd. var. drummondii (Lindl.) Shinners.
Symphyotrichum ericoides (L.) Nesom var. ericoides. Syn. = Aster ericoides L.
Symphyotrichum laeve (L.) A.& D. Löve var. laeve. Syn. = Aster laevis L.
Symphyotrichum lanceolatum (Willd.) Nesom
Symphyotrichum oolentangiense (Riddell) Nesom var. poaceum (Burgess) Nesom. Syn. = Aster azureus Lindl. var. azureus.
Symphyotrichum subulatum (Michx.) Nesom.
*Tanacetum vulgare L.
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. Syns. = 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)
Betula nigra L.
Corylus americana Walt. var. americana. Wallis listed forma americana.

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.

Hoagland, B.W.
Lithospermum canescens (Michx.) Lehm.
Lithospermum caroliniense (Walt. ex J.F. Gmel.) MacM.
Lithospermum incisum Lehm.
Myosotis macrosperma Engelm.
Myosotis verna Nutt.

Brassicaceae
*Alliaria petiolata (Bieb.) Cavara & Grande
Arabis canadensis L.
Arabis laevigata (Muhl. ex Willd.) Poir.
Arabis missouriensis Greene
Arabis shortii (Fern.) Gleason. Syn. = A. perstella (E.L. Br. var. shortii Fern.
*Barbarea vulgaris Ait. f.
*Brassica napus L.
*Brassica rapa L.
*Camelina microcarpa Andrz. 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.
Descarainia 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.
Rorippa palustris (L.) Bess. ssp. hispida (Desv.) Jonsell. Syn. = R. islandica (Oeder) Borbas var. hispida (Desv.) Butters & Abbe.
Rorippa sessiliflora (Nutt.) A.S. Hitchc.
Selenia aurea Nutt.
Sibara virginica (L.) Rollins
*#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 terestris Raf.

Campanulaceae
Lobelia appendiculata A. DC.
#Lobelia pubera 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

Hoagland, B.W.
= Specularia biflora (Ruiz & Pavón) Fisch. & C.A. Mey.
Specularia lamprosperma (McVaugh) Fern.
Specularia leptocarpa (Nutt.) Gray
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.
Symphoricarpus 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 brachypodum (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.

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 standleyanum Aellen
Cycloloma atriplicifolium (Spreng.) Coult.
Monolepis nuttalliana (J.A. Schultes) Greene

Cistaceae

Clusiaceae (= Guttiferae)
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
*Ipomoea cocinea L.
#Ipomoea purpurea (L.) Roth
#Calystegia silvatica (Kit.) Griseb. ssp. fraterniflora (Mackenzie & Bush) Brummitt
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. 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

Elaeagnaceae
*#Elaeagnus angustifolia L.

Ericaceae
Rhododendron canescens (Michx.) Sweet
#Rhododendron oblongifolium (Small) Millais
#Rhododendron prinophyllum (Small) Millais
Vaccinium pallidum Ait. Syn. = V. vacillans

Hoagland, B.W.
Torr. var. crinitum Fern.
Vaccinium stamineum L. Syn. = V. stamineum L. var. interius (Ashe) Palmer & Steyerm. and V. stamineum L. var. neglectum (Small) Deam) 
#Vaccinium virgatum Ait.

**Euphorbiaceae**

Acalypha rhomboidea Raf.
Acalypha virginica L.
Chamaesyce nutans (Lag.) Small Chamaesyce prostrata (Ait.) Small. Syn. = Euphorbia chamaesyce auct. non L.
Croton capitatus Michx. var. capitatus.
Croton glandulosus L. var. septentrionalis Muell.-Arg.
Croton lindheimerianus Scheele #Croton michauxii G.L. Webster
Euphorbia heterophylla L.
Euphorbia hexagona Nutt. ex Spreng.
Euphorbia marginata Pursh
#Tragia urticifolia Michx.
Tragia ramosa Torr.

**Fabaceae** (=Leguminosae)

Acacia angustissima (P. Mill.) Kuntze var. hirta (Nutt.) B.L. Robins.
*#Albizia julibrissin Durazz.
#Amorpha laevigata Nutt. Amphicarpae bracteata (L.) Fern. var. bracteata
Amphicarpae bracteata (L.) Fern. var. comosa (L.) Fern.
Apios americana Medik. Syn. = A. americana Medik. var. turrigera Fern. Astragalus canadensis L. Astragalus cassinicolor Nutt. var. trichocalyx (Nutt.) Barneby
Astragalus distortus Torr. & Gray
#Baptisia bracteata Muhr. ex Ell. var. leucophaea (Nutt.) Kartesz & Gandhi Cercis canadensis L. var. canadensis. Wallis listed formas canadensis and glabroflica Fern.
Chamaecrista fasciculata (Michx.) Greene var.

Hoagland, B.W.
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.) Shinners
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 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 (DC.) DC.
Gleditsia triacanthos L.
Gymnocladus dioicus (L.) K. Koch
Indigofera miniatia 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.
Neptunia lutea (Leavenworth) Benth.
Orbexilum pedunculatum (P. Mill.) Rydb. var. pedunculatum. Syn. = Psoralea psoralioides (Walt.) Cory var. glandulosa (Ell.) Freeman.
#Orbexilum simplex (Nutt. ex Torr. & Gray) Rydb.
#Pediomelum linearifolium (Torr. & Gray) J. Grimes
Phaseolus polystachios (L.) B.S.P.
*#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.
Strophostyles helvula (L.) Elliot
Strophostyles leiosperma (Torr. & Gray) Piper
Strophostyles umbellata (Muhl. ex Willd.) Britt.
Stylosanthes biflora (B.) B.S.P. Syn. = S. biflora (L.) B.S.P. var. hispidissima (Michx.) Pollard & Ball.

Fagaceae

Quercus stellata Wangenh. Quercus velutina Wall. Wallis listed forms dilaniata Thel., macrophylla (Dippel) Trel., and missouriensis (Sarg.) Trel.

Fumariaceae

Gentianaceae
#Gentiana alba Muhl. ex Nutt. #Gentiana puberulenta J. Pringle Sabatia angularis (L.) Pursh Sabatia campestris Nutt. Wallis listed forms 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

Hamamelidaceae

Hippocastanaceae
Aesculus glabra Willd. var. glabra. Syn. = A. glabra Willd. var. sargentii Rehd. Hoagland, B.W.
Hydrangeaceae

Hydrangea arborescens L. var. arborescens.  
Syn. = H. arborescens L. var. oblonga Torr. & Gray  
Philadelphus pubescens Loisel.

Hydrocharitaceae

*#Egeria densa Planch.  
#Elodea canadensis Michx.

Hydrophyllaceae

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

Juglandaceae

Carya cordiformis (Wangenh.) K. Koch  
#Carya glabra (P. Mill.) Sweet  
Carya illinoensis (Wangenh.) K. Koch  
#Carya laciniosa (Michx. f.) G. Don  
Carya ovata (P. Mill.) K. Koch  
Carya texana Buckl.  
Juglans nigra L.

Lamiaceae (= Labiatae)

Agastache nepetoides (L.) Kuntze  
#Blephilia ciliata (L.) Bentham.  
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 forms albiflorum D. M. Moore and amplexicaule.  
*Lamium purpureum L.  
*Leonurus cardiaca L.  
*Leonurus sibiricus L.  
Lycopus rubellus Moench.  Syn. = L. rubellus Moench. var. arkansanus (Fresn.) Benner.  
Lycopus uniflorus Michx.  
*Marrubium vulgare L.  
*Melissa officinalis L.  
*Menta x piperita L. (pro sp.) [aquatica x spicata].  Syn. = Menta 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.) Bentham.  
Monarda punctata L. ssp. punctata var. villicaulis (Pennell) Palmer & Steyermark.  
Syn. = M. punctata L. var. villicaulis (Pennell) Shinners  
*Nepeta cataria L.  
*Perilla frutescens (L.) Britton  
Physostegia angustifolia Fern.  
#Physostegia virginiana (L.) Bentham.  
Prunella vulgaris L.  Syn. = P. caroliniana Mill.  
#Prunella vulgaris L. var. lanceolata (W. Bart.) Fern.  
Pycnanthemum albenscens Torr. & Gray  
Pycnanthemum tenuifolium Schrad.  
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

Hoagland, B.W.
Scutellaria parvula Michx. var. australis Fassett
Stachys tenuifolia Willd.
Trichostema brachiatum L.

Lauraceae
Lindera benzoin (L.) Blume var. benzoin
Lindera benzoin (L.) Blume var. pubescens (Palmer & Steyerm.) 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 sulcatum Riddell

Loasaceae
Mentzelia oligosperma Nutt. ex Sims.

Loganiaceae
Polypremum procumbens L.

Lythraceae
Ammannia auriculata Willd.
Ammannia coccinea Rothb.
Lythrum alatum Pursh

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.
Sida spinosa L.

Melastomataceae
Rhedia mariana L. var. interior (Pennell) Kral & Bostick. Syn. = R. interior Pennell

Menispermaceae
Calycocarpum 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 nystaginea (Michx.) MacM.

Hoagland, B.W.
Nymphaeaceae

*Nuphar lutea* (L.) Sm. ssp. *advena* (Ait.)

Kartesz & Gandhi. Syn. = *N. advena* (Ait.)

Alt. f.

*Nymphaea odorata* Ait. ssp. *tuberosa* (Paine)


Nyssaceae


Oleaceae

*Forestiera acuminata* (Michx.) Poir.


Fraxinus quadrangulata Michx.

*Oenothera fruticosa* L. ssp. *fruticosa*

*Oenothera grandis* (Britt.) Smyth

*Oenothera laciniana* Hill

*Oenothera linifolia* Nutt.

*Oenothera spachiana* Torr. & Gray

*Oenothera speciosa* Nutt.


*Oenothera triflora* Nutt.

Orobanchaceae

Orobanche uniflora L.

Oxalidaceae


*Oxalis dillenii* Jacq.


Papaveraceae


*Papaver dubium* L.


Passifloraceae

*Passiflora incarnata* L. Wallis listed forms *alba* Waterfall and *incarnata*.


Phytolaccaceae

*Phytolacca americana* L.

*Rivina humilis* L.

hoagland, b.w.
Plantaginaceae
*Plantago aristata* Michx.
*Plantago elongata* Pursh
*Plantago heterophylla* Nutt.
*Plantago lanceolata* L.
*Plantago major* L.
*Plantago patagonica* Jacq.
*Plantago rhodosperma* Dcne.
*Plantago virgíncia* L.
*Plantago wrightiana* Dcne.

Platanaceae
*Platanus occidentalis* L.

Podostemaceae
*Podostemum ceratophyllum* Michx.

Polemoniaceae
*Phlox cuspidata* Scheele

Polygalaceae
*Polygala incarnata* L.
*Polygala sanguinea* L.

Polygonaceae
*Eriogonum longifolium* Nutt.
*Fagopyrum esculentum* Moench
*Polygonum amphibium* L.
*Polygonum convolvulus* L.
*Polygonum cuspidatum* Sieb. & Zucc.
*Polygonum hydropiper* L.
*Polygonum hydropiperoides* Michx. var. hydropiperoides. Syns. = *P. hydropiperoides* Michx. var. bushianum Stanford and *P. hydropiperoides* Michx. var. opelousanum (Riddell ex Small) Riddell ex W. Stone.
*Polygonum lapathifolium* L.
*Polygonum orientale* L.
*Polygonum pensylvanica* L. var. pensylvanica Syn. = *P. pensylvanica* L. var. laevigatum Fern.
*Polygonum persicaria* L.
*Polygonum punctatum* Ell. var. confertiflorum (Meisn.) Fassett
*Polygonum punctatum* Ell. var. leptostachyum ((Meisn.) Small
*Polygonum ramosissimum* Michx.
*Polygonum sagittatum* L.
*Polygonum scandens* L.
*Polygonum setaceum* Baldw.
*Polygonum tenue* Michx.
*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.
*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.

Ranunculaceae
Anemone caroliniana Walt. Wallis listed formas caroliniana and violacea Clute.
Anemone virginiana L.
Aguilegia canadensis L. Syn. = A. canadensis L. var. iatiuscula (Greene) Munz.
Clematis linguistificolia Nutt.
Clematis pitcheri Torr. & Gray
*Clematis terniflora DC.
Clematis versicolor Small ex Rydb.
Clematis virginiana L.
Delphinium tricorne Michx. Wallis listed formas albiflora Millsp. and tricorne.
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 laxiculus (Torr.& Gray) Darby
Ranunculus longirostris Godr.
*Ranunculus parviflorus L.
Ranunculus pusillus Poir.
Ranunculus recurvatus Poir.
Ranunculus sceleratus L. var. sceleratus
#Thalictrum dioicum L.

Rhamnaceae
Berchemia scandens (Hill) K. Koch
Ceanothus americanus L. Syn. = C. americanus L. var. pitcheri Torr.& Gray.
Frangula caroliniana (Walt.) Gray. Syn. = Rhamnus caroliniana Walt. var. caroliniana and Rhamnus caroliniana Walt. var. mollis Fern.

Rosaceae
Agrimonia parviflora Ait.
Agrimonia pubescens Wallr.
Agrimonia rostellata Wallr.
Amelanchier arborea (Michz. f.) Fern.
#Amelanchier arborea (Michx. f.) Fern. var. alabamensis (Britt.) G.N. Jones
Aruncus dioicus (Walt.) Fern. var. pubescens (Ryd.) Fern.
Crataegus coccinooides Ashe
Crataegus crus-galli L.
Crataegus engelmannii Sarg.
#Crataegus intricata Lange
Crataegus mollis Scheele
#Crataegus pruinosa (Wendl. f.) K. Koch
#Crataegus punctata Jacq.

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Crataegus spathulata Michx.
Crataegus viridis L.
*Duchesnea indica* (Andr.) Focke
Fragaria virginiana Duchesne
Geum vernum (Ref.) Torr. & Gray
Gillenia stipulata (Muhl. ex Willd.) Baill.
Physocarpus opulifolius (L.) Maxim. var. intermedius (Ryd.) 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 munsoniana W. Wright & Hedrick.
*Prunus persica* (L.) Batsch
Prunus serotina Ehrh.
*Prunus virginiana* L.
*Prunus communis* L.
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 flagellaris* Willid.
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 virginiana* L.
Galium arkansanum Gray
Galium circæezans Michx. var. hypomalacum Fern.
Galium concinnum Torr. & Gray
#Galium obtusum Bigelow
#Galium pilosum Ait. var. pilosum
Galium pilosum Ait. var. puncticulosum (Michx.) Torr. & Gray
Galium tinctorium (L.) Scop.
Galium triflorum Michx. Wallis listed formas glabrum Leyend and triflorum.
Galium virgatum Nutt.
Houstonia longifolia Gaertn.
Houstonia purpurea L.
*Houstonia rosea* (Ref.) 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.

Population deltoides Marsh.
Salix caroliniana Michx.
Salix humilis Marsh. var. humilis. Syn. = *S.
Oklahoma Native Plant Record
Volume 7, Number 1, December 2007

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

Santalaceae
Comandra umbellata (L.) Nott. 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.
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 virginiensis 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.
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.
Seymeria macrophylla Nutt.
Gratiola neglecta Torr.
Gratiola virginiana L.
*Kickxia elatine (L.) Dumort.
Leucospora multifida (Michx.) Nott. Syn. =
Conobea multifida (Michx.) Benth.
*Linaria vulgaris P. Mill.
Lindernia dubia (L.) Pennell var. anagallidea
(Michx.) Cooper Rader. 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. dobbssii 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 forms
albiflora (Don) House and blattaria.
*Verbascum thapsus L.
#Veronica anagallis-aquatic L.

Hoagland, B.W.
*Veronica arvensis* L.
*Veronicastrum virginicum* (L.) Farw.

**Simaroubaceae**

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

**Solanaceae**

*#Datura stramonium* L.
*Physalis hederifolia* Gray
*Physalis heterophylla* Nees var. *heterophylla*
*Physalis missouriensis* Mackenzie & Bush
*Physalis pubescens* L. var. *pubescens* Waterfall
*Physalis pubescens* L. var. *integifolia* (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 ptychanthum* Dunal
*#Veronica persica* Poir.
*#Veronica polita* Fries

**Staphyleaceae**

*Staphylea trifolia* L.

**Tamaricaceae**

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

**Tiliaceae**

*#Tilia americana* L. var. *caroliniana* (P. Mill.) Castigl.

**Ulmaceae**

*Celtis laevigata* Willd. var. *laevigata*
*#Celtis laevigata* Willd. var. *texana* Sarg.

*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 radiata* (L.) Dufr.

**Verbenaceae**

*Callicarpa americana* L
*Glandularia canadensis* (L.) Nutt.
*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 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 triandra Schwein. var. dilatata (Ell.) Brainerd

Viscaceae (=Loranthaceae)

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

Parthenocissus quinguefolia (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 (Monson) 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
Yucca arkansana Trel.
Yucca filamentosa L.
#Yucca glauca Nutt.

Alismataceae
Alisma subcordatum Raf.
Echinodorus cordifolius (L) Griseb.
Sagittaria ambiguа J.G. Sm.
#Sagittaria brevirostra Mackenzie & Bush
Sagittaria calycina Engelm.
Sagittaria gramineа Michx.
#Sagittaria platyphylla (Engelm.) J.G. Sm.

Araceae
Arisaema triphyllum (L.) Schott ssp. triphyllum.
Syn. = A. atrorubens (Ait.) Blume. Wallis formas virde (Engler) Fern. and zebrinum

Hoagland, B.W.
Oklahoma Native Plant Record
Volume 7, Number 1, December 2007

Hoagland, B.W.

Commelinaceae
*Scommelina communis* L.
*Scommelina diffusa* Burm. f.
*Scommelina erecta* L. var. *angustifolia* (Michx.) Fern. Wallis listed forma *crispa* (Woot.) Fern.
*Scommelina erecta* L. var. *deamiana* Fern.
*Scommelina erecta* L. var. *erecta*. Wallis listed formas *erecta* and *intercursa* Fern.
*Scommelina virginica* L.
*Tradescantia virginica* E.S. Anderson & Woods. Wallis listed formas *alba* Waterfall and *erestiana*.
*Tradescantia hirsutiflora* Bush
*Tradescantia ohiensis* Raf. Wallis listed formas *alba* Waterfall and *ernestiana*.
*Tradescantia hirsutiflora* Wallis listed formas *erecta* and *intercursa* Fern.

Cyperaceae
*Carex aggregata* Mackenzie
#*Carex albicans* Willd. ex Spreng. var. *albicans*
*Carex amphibola* Steud. var. *amphibola*
*Carex annectens* (Bickn.) Bickn.
*Carex australis* Mackenzie
*Carex bicknelii* Britt.
*Carex blyndia* Dewey
*Carex brevior* (Dewey) Mackenzie
*Carex bushii* Mackenzie
#*Carex caroliniana* Schwein.
*Carex cephalophora* Muhl. var. *cephalophora*
*Carex cherokeeensis* Schwein.
#*Carex complanata* Torr. & Hook.
*Carex crenata* Dewey
*Carex cress-corvi* Shuttlw. ex Kunze
#*Carex davisi* Schwein. & Torr.
#*Carex digitalis* Willd.
#*Carex festucacea* Schkuhr ex Willd.

#*Carex fissa* Mackenzie
*Carex flaccosperma* Dewey
*Carex frankii* Kunth
*Carex grvida* Bailey var. *lunelliana* (Mackenzie) F.J. Herm.
*Carex hirsutella* Mackenzie
*Carex hyalinolepis* Steud.
*Carex jamesii* Schwein.
*Carex laevivaginata* (Kükenth.) Mackenzie
#*Carex louisianica* Bailey
*Carex lupuliformis* Sartwell ex Dewey
#*Carex lupulina* Muhl. ex Willd.
*Carex lura* Wahlenb.
#*Carex microdonta* Torr. & Hook.
#*Carex molestitiformis* Reznicek & Rothrock
*Carex muehlenbergii* Schkuhr ex Willd. var. *enervis* Boott.
*Carex muehlenbergii* Schkuhr ex Willd. var. *muhehbergii*.
*Carex normalis* Mackenzie
*Carex oligocarpa* Schkuhr ex Willd.
#*Carex oxylepis* Torr. & Hook.
*Carex retroflexa* Muhl. ex Willd.
#*Carex scoparia* Schkuhr ex Willd.
#*Carex shinnersii* P. Foehr. & Reznicek
*Carex shortiana* Dewey
#*Carex socialis* Mohlenbrock & Schwegm.
#*Carex squarrosa* L.
*Carex triangularis* Boeckl.
*Carex vulpinoidea* Michx.
Cyperus 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 odoratus L.


#Cyperus setigerus Torr. & Hook.

Cyperus strigosus L. Syn. = Cyperus strigosus L. var. robustior Britt.

Cyperus squarrosus L. Syn. = Cyperus inflexus Muhl.

Cyperus virens Michx.


Eleocharis engelmanni Steud. Wallis lists forma engelmanni.

#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 autumnalis (L.) Roemer & J.A. Schultes


Fimbristylis vahlii (Lam.) Link

Fuirena squarrosa Michx.


Kyllinga pumila Michx. Syn. = Cyperus tenuifolius (Steud.) Dandy.

Lipocarpha drummondii (Nees) G. Tucker.

Syn. = Hemicarpha drummondii Nees.


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


Scirpus atrovirens Willd.


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 quaternaria J.F. Gmel.

Dioscorea villosa L. Wallis listed forms glabriora (Bartlett) Fern. and villosa.

Hydrocharitaceae

Elodea nuttallii (Planch.) St. John
Iridaceae
*Belamcanda chinensis* (L.) DC
*Iris cristata* Ait.
*Iris virginica* var. *shrevei* (Small) E. Anders.
*Nemastylis nuttallii* Pickering ex R.C. Foster
*Sisyrinchium angustifolium* P. Mill.
*Sisyrinchium campestre* Bickn. Wallis lists forma *kanesanum* (Bickn.) Steyerl.

Juncaceae
*Juncus acuminatus* Michx.
*Juncus biflorus* Ell.
*Juncus brachycarpus* Engelm.
*Juncus diffusissimus* Buckl.
*Juncus dudleyi* Wieg.
*Juncus effusus* var. *solutus* Fern. & Wieg.
*Juncus interior* Wieg.
*Juncus marginatus* Rostk.
*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.
#*Wolflia brasiliensis* Weddell
#*Wolflia columbia* Karst.

Liliaceae
*Aleuris farinosa* L.
*Allium canadense* L. var. *canadense*
*Allium canadense* L. var. *lavandulare* (Bates) Owneby & Aase
*Allium canadense* L. var. *mobilense* (Regel) Owneby
*Allium sativum* L.
*Allium stellatum* Fraser ex Ker-Gawl.
*Allium vineale* L. Wallis listed forms *compactum* (Thuill.) Aschers and *vineale*.
*Asparagus officinalis* L.
*Cammisia scilloides* (Raf.) Cory
*Cooperia drummondii* Herbert
*Erythronium albidum* Nutt.
*Erythronium americanum* Ker-Gawl.
*Erythronium rostratum* W. Wolf
*Hemerocallis fulva* (L.) L.
*Hypoxis hirsuta* (L.) Coville
*Nothoscordum bivalve* (L.) Britt.
*Ornithogalum umbellatum* L.
*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
#*Corallorrhiza odontorhiza* (Willd.) Poir. Corallorrhiza *wisteriana* Conrad
#*Cypripedium kentuckiense* C.F. Reed
#*Cypripedium parviflorum* Salisb.
*Hexalectris spicata* (Walt.) Barnh.
#*Malaxis unifolia* Michx.
*Spiranthes cernua* (L.) L.C. Rich.

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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.
Agrostiselliottiana J.A. Schultes
Agrostis hyemalis (Walt.) B.S.P.
Agrostis perennans (Walt.) Tuckerman
#Agrostis scabra Willd.
#Agrostistolonifera
*Aira caryophyllea L.
**Aira elegans Willd. ex Kunth
Alopecurus carolinianus Walt.
Andropogon gerardii Vitman. Syn. =
Andropogon gerardi Vitman var.
chrysocomas (Nash) Fern.
Andropogonfemarius Michx.
Andropogon virginicus L. var. virginicus. Syn. =
Andropogon virginicus L. var.
tetrasachyus (Ell.) Hack.
#Aristibasiramea Engelm. ex Vasey
Aristidachitomamichx. var. curtissii Gray ex
S. Wats. & Coul.
Aristidachitomamichx. var. dichotoma
Aristidalongespica Poir. var. geniculata (Raf.)
Fern. Syn. = Aristida intermediary Scribn. &
Ball.
Aristidalongespica Poir. var. longespica
Aristidagallicantha Michx.
Aristidapurpurascens Poir.
*Arthraxonhispidus (Thunb.) Makino. Syn. =
Arthraxon hispidus (Thunb.) Makino var.
cryptatherus (Hack) Houda.
Arundinaria gigantea (Walt.) Muhl.
**Avenasativa L.
Axonopusfissifolius (Raddi) Kuhlm. Syn. =
Axonopus affinis Chase.
Andropogonischaemum L.
Bothriochloasaccharoides (Sw.) Rydb. Syn. =
Andropogon saccharoides Sw.
Bouteloua curtipendula (Michx.) Torr.
#Brachyelytrum erectum (Schrebl. ex Spreng.)
Beauv.
*Bromuscatharticus Vahl.
*Bromus hordeaceus L. ssp. hordeaceus. Syn. =
Bromus mollis L.
*Bromus japonicus Thunb.
Bromus pubescens Muhr. ex Willd.
*Bromussecalinus L.
*Bromus tectorum L.
Cenchrus spinifex Cav. Syns. = Cenchrus
incterus M.A. Curtis and Cenchrus
pauciflorus Benth.
Chasmanthiumlatifolium (Michx.) Yates. Syn. =
Uniola latifolia Michx.
Chlorisverticillata Nutt.
#Chlorisvirgata Sw.
*Coenarrhenacaroliniana L. Syn. = Coenarrhenacaroliniana L. var. inexplana Fern. &
Grisc.
Coelorachiscylindrica (Michx.) Nash. Syn. =
Manisuris cylindrica (Michx.) Kuntze.
*Cynodon dactylon (L.) Pers.
*Dactylisglomerata L.
Dantionthespicata (L.) Beauv. ex Roemer &
J.A. Schultes. Syn. = Danthoniaspicata
(L.) Beauv. ex Roemer & J.A. Schultes var.
longipila Scribn. & Merr.
#Diarrhenamericana Beauv.
Diarrhenabovata (Gleason) Brandenburg.
Syn. = Diarrhenamericana Beauv. var.
obovata Gleason.
#Dichanthelmiasculares (Desv. ex Poir.)
Gould & C.A. Clark
*Dichantheliumacuminatum (Sw.) Gould &
C.A. Clark var. acuminatum
Dichantheliumacuminatum (Sw.) Gould & C.A.
Clark var. fasciculatum (Torr.) Freckmann.
Syn. = Panicumlaunderosum Ell. var.
fasciculatum (Torr.) Fern.
#Dichantheliumacuminatum (Sw.) Gould &
C.A. Clark var. lindheimeri (Nash) Gould &
C.A. Clark
Dichantheliumbosci (Poir.) Gould & C.A.

Hoagland, B.W.
Dichanthelium clandestinum (L.) Gould
Dichanthelium depauperatum (Muhl.) Gould
Dichanthelium dichotomum (L.) Gould var. dichotomum
Dichanthelium linearifolium (Scribn. ex Nash) Gould. Syns = Panicum linearifolium Scribn. var. linearifolium, Panicum linearifolium Scribn. ex Nash var. werneri (Scribn.) Fern., and Panicum perlongum Nash.
Dichanthelium oligosanthes (J.A. Schultes) Gould var. oligosanthes
#Digitaria ciliaris (Retz.) Koel.
Digitaria filiformis (L.) Koel.
*Digitaria ischaemum (Schreb.) Schreb. ex Muhl. Syn. = Digitaria ischaemum (Schreb.) Schreb. ex 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 villosus Muhl. ex Willd.
Elymus virginicus L. var. virginicus. Syns. = Elymus virginicus L. var. glabrius (Vasey) Bush (Wallis listed formas australis (Scribn. & Ball) Fern., hirsutiglumis (Scribn.) Fern., and virginicus) and Elymus virginicus L. var. jejunus (Ramaley) Rydb.
*Eragrostis barrelieri Daveau
Eragrostis capillaris (L.) Nees
*Eragrostis ciliaris (L.) Scop.
*Eragrostis curtipedicellata Buckl.
*Eragrostis curvula (Schrad.) 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.
#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.
Leersia oryzoides (L) Sw. Wallis listed formas glabra A.A. Eat. and oryzoides.
Leersia virginica Willd.
Leptochloa fusca (L.) Kunth ssp. fascicularis
Oklahoma Native Plant Record
Volume 7, Number 1, December 2007

Hoagland, B.W.

(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 capillaris (Lam.) Trin.
#Muhlenbergia frondosa (Poir.) Fern.
*Muhlenbergia micrantha Willd.
#*Muhlenbergia schreberi J.F. Gmel.
Muhlenbergia sylvatica Torr. ex Gray
#Muhlenbergia tenuiflora (Willd.) B.S.P.
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 virgatum L.
#Paspalidium geminatum (Forsk.) Stapf
*Paspalum dilatatum Poir.
Paspalum fluitans (Ell.) Kunth
Phalaris caroliniana Walt.
*#Phleum pratense L.
*Poa annua L.
#Poa champaniana Scribn.
Poa pratensis L.
Poa sylvestris Gray
Polypogon interruptus Kunth
Schedonardus paniculatus (Nutt.) Trel.
*#Schedonorus phoenix (Scop.) Holub
*#Schedonorus pratensis (Huds.) Beauv.
#Setaria leucopila Bosc ex Link. Syn. = Sporobolus leucopila Bosc ex Link var. suttiei (Farw.) Fern.
Sphenopholis filiformis (Chapman) Scribn.
Sphenopholis intermedia (Rydberg) Rydberg.
Sphenopholis obtusata (Michx.) Scribn. Syn. = Sphenopholis obtusata (Michx.) Scribn. var. lobata (Trin.) scribn. Wallis listed forma lobata.
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.) Shinners
Tridens muticus (Torr.) Nash var. elongatus

52
Oklahoma Native Plant Record
Volume 7, Number 1, December 2007

Hoagland, B.W.

(Buckl.) Shinners. Syn. = Triodia elongata (Buckl.) Scribn.
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 herbacea L.
Smilax lasioneura Hook.
Smilax pulverulenta Michx.
#Smilax rotundifolia L.

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

Hoagland, B.W.
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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 Symphyotrichum (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, Daunthonia spicata, Helianthus hirsutus, Hypericum hypericoides, Symphyotrichum 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 atorubens, 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, Amnanina anulicatun, Callitriche heterophylla, Cephalanthus occidentalis, Eclipta prostrata, Finimnastis antumnalis, Juncus brachycarpus, Ludwigia palustris, Nelumbo lutea, Polygonum pensylvanicum, 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 bursapastoris, Cardhuus nutans, Convolvulus arvensis, Dausia pusillius, Juniperus virginiana, Lamium amplexicaule, Rhus copallinum, R. glabra, and Torilis arvensis.
LITERATURE CITED


Oklahoma Natural Heritage Inventory. 2007. Oklahoma Natural Heritage Inventory working list of rare Oklahoma plants. University of Oklahoma, Norman. (www.biosurvey.ou.edu/publicat.html accessed 1 August 2007).


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

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Taxa</th>
<th>Native</th>
<th>Non-native</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pteridophyta</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Coniferophyta</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Magnoliophyta</td>
<td>291</td>
<td>247</td>
<td>44</td>
</tr>
<tr>
<td>Magnoliopsida</td>
<td>199</td>
<td>165</td>
<td>34</td>
</tr>
<tr>
<td>Liliopsida</td>
<td>92</td>
<td>82</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293</td>
<td>249</td>
<td>44</td>
</tr>
</tbody>
</table>

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
Ptillimnium 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

Hoagland & Buthod
Oklahoma Native Plant Record
Volume 7, Number 1, December 2007

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 dwarfdandelion)
QSQM; A; H; OBG-240

Packera platensis (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 & Burtt (rabbit tobacco)
DAOF, SSSN; A; H; OBG-002

Pyrhopappus 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

Symphyotrichum 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 (Ruíz & 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
Acalphya monococca (Engelm. ex Gray) L. Mill. & Gandhi (slender threeed mercury) SSSN; A; H; OBG-281

A. virginica L. (Virginia threeed 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 (Wildenow’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 leafflower) DAOF; A; H; OBG-072

Hoagland & Buthod
**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; S; 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
*Mellilotus 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 penicillover) 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 illinoinensis* (Wangenh.) K. Koch (pecan) QSQM; P; T; OBG-135
*C. texana* Buckl. (black hickory) QSQM; P; T; OBG-128

**Krameriacae**

*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

Hoagland & Buthod
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. (waxyleaf privet) QSQM; P; S; OBG-143
L. sinense* Lour. (Chinese privet) QSQM; P; S; OBG-046

Onagraceae
Gaura villosa Torr. (woolly bee blossoms) SSSN; P; H; OBG-010

Oxalidaceae
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

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 parviflorus (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

Hoa gland & Buthod
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 All. var. puncticulosum (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-326
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
Issolepis 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-168
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

Hoagland & Buthod
### Liliaceae

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<th>Location Code</th>
<th>Field Code</th>
<th>OBG Code</th>
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<tbody>
<tr>
<td>Allium canadense (meadow garlic)</td>
<td>SSSN</td>
<td>P</td>
<td>H; OBG-188</td>
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<tr>
<td>Erythronium mesochoreum Knerr (midland fawnlily)</td>
<td>QSQM</td>
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<td>H; OBG-301</td>
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<tr>
<td>Hypoxis hirsuta (L.) Coville (common goldstar)</td>
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<td>Nothoscordum bivalve (L.) Britt. (crowpoison)</td>
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### Orchidaceae

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<td>Spiranthes vernalis Engelm. &amp; Gray (spring ladies'-tresses)</td>
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### Poaceae

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<td>Aegilops cylindrica* Host (jointed goatgrass)</td>
<td>DAOF</td>
<td>A</td>
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<td>Agrostis hyemalis (Walt.) B.S.P. (winter bentgrass)</td>
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<td>A. perennans (Walt.) Tuckerman (upland bentgrass)</td>
<td>QSQM</td>
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<td>Andropogon gerardii Vitman (big bluestem)</td>
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<td>G; OBG-112</td>
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<td>A. virginicus L. (Virginia wildrye)</td>
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<td>Aristida dichotoma Michx. (churchmouse threeawn)</td>
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<td>Bothriochloa laguroides (DC.) Herter (silver beardgrass)</td>
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<td>Bromus catharticus* Vahl (rescuegrass)</td>
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<td>B. tectorum* L. (cheatgrass)</td>
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<td>Buchloe dactyloides (buffalograss)</td>
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<td>Danthonia spicata (L.) Beauv. ex Roemer &amp; J.A. Schultes (poverty oatgrass)</td>
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<td>Dichanthelium acuminatum (Sw.) Gould &amp; C.A. Clark var. fasciculatum (Torr.) Freckmann (Western panicgrass)</td>
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<td>D. depauperatum (Muhl.) Gould (starved panicgrass)</td>
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<td>D. malacophyllum (Nash) Gould (softleaf rosette grass)</td>
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<td>D. scoparium (Lam.) Gould (velvet panicum)</td>
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<td>D. villosissimum (Nash) Freckmann (whitehair rosette grass)</td>
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<td>Digitaria cognata (J.A. Schultes) Pliger (Carolina crabgrass)</td>
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<td>P</td>
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<td>D. sanguinalis (L.) Scop. (hairy crabgrass)</td>
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<td>G; OBG-004</td>
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<td>Echinocloa crus-galli* (L.) Beauv. (barnyardgrass)</td>
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<td>A</td>
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<td>Eleusine indica* (L.) Gaertn. (Indian goosegrass)</td>
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<td>Elymus virginicus L. (Virginia wildrye)</td>
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<td>Eragrostis barrelieri* Daveau (Mediterranean lovegrass)</td>
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<td>A</td>
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<td>E. intermedia A.S. Hitchc. (plains lovegrass)</td>
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<td>Hordeum pusillum Nutt. (little barley)</td>
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<td>Leersia oryzoides (L.) Sw. (rice cutgrass)</td>
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<td>L. virginica Willd. (whitegrass)</td>
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<td>Lolium perenne* L. (perennial ryegrass)</td>
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<td>Muhlenbergia sobolifera (Muhl. ex Willd.) Trin. (rock muhly)</td>
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<td>SSSN</td>
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<td>P. dichotomiflorum Michx. (fall panicgrass)</td>
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<td>P. philadelphicum Bernh. ex Trin. (Philadelphia panicgrass)</td>
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<td>P. rigidulum Bosc ex Nees (redtop panicgrass)</td>
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<td>P. virgatum L. (switchgrass)</td>
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<td>Paspalum pubiflorum Rupr. ex Fourn. (hairyseed paspalum)</td>
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<td>Phalaris caroliniana Walt. (Carolina canarygrass)</td>
<td>WETL</td>
<td>A</td>
<td>G; OBG-228</td>
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</tbody>
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Hoagland & Buthod
Poa annua* L. (annual bluegrass) QSQM; A; G; OBG-178
Schedonardus paniculatus (Nutt.) Trel. (tumblegrass) DAOF, SSSN; P; G; OBG-057
Schedonorus phoenic* (Scop.) Holub DAOF; P; G; OBG-238
Schizachyrium scoparium (Michx.) Nash (little bluestem) SSSN; P; G; OBG-149
Setaria parviflora (Poir.) Kerguélen (marsh bristlegrass) 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 elliotea (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 arguably 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.

Palmer, M.W.
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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.

REFERENCES CITED


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.


Eskew, CT (1938): The flowering plants of the Wichita Mountains Wildlife Refuge. Amer. Midl. Nat. 20, 695-703. TAXA EXCLUDED [556]


Folley, P (1994): Checklist of plants found in Cleveland County. 15100 Etowah Rd., Noble OK 73068, (405)872-8361. COMPLETE [4852]


roger mills county, oklahoma. sida 21, 1187-1197. complete [21491]
hoagland, b.w.; crawford, p.h.c.; crawford, p.t.; johnson, f. (2004): vascular flora of hackberry flat, frederick lake, and suttle creek, tillman county, oklahoma. sida 21, 429-445. complete [21360]
hoagland, b.w.; johnson, f. (2004): the vascular flora of red slough and grassy slough wildlife management areas, gulf coastal plain, mccurtain county, oklahoma. castanea 69, 284-296. complete [21479]
hoagland, b.w.; johnson, f. (2004): vascular flora of love valley wildlife management area, love county, oklahoma. proc. okla. acad. sci. 84, 9-18. complete [21707]
hoagland, b.w.; johnson, f.l. (2001): vascular flora of the chickasaw national recreation area, murray county, oklahoma. castanea 66, 383-400. complete [20021]
hoagland, b.w.; wallick, k. (2003): vascular flora of oolagah wildlife management area in nowata county, oklahoma. proc. okla. acad. sci. 83, 47-62. complete [21315]
hoagland, b.w. (2001): floristic list for oklahoma county. oklahoma native plant record 1, 25-38. complete [20010]
holzinger, j.m. (1892): list of plants collected by c. s. sheldon and m. a. carleton in the indian territory in 1891. contrib. u.s. nat. herb. 1, 189-219. not a flora [1305]
jeffs, r.e. (1931): a key to the ferns and seed plants of oklahoma. university mimeograph pub. norman. taxa excluded [2229]


Riddell, J.L.: (1835): A Synopsis of the Flora of the Western States. E. Deming, Cincinnati, OH. 116 pages. NO DATA YET, OTHER STATES [1663]


Rogers, C.M. (1953): The vegetation of the Mesa de Maya Region of Colorado, New Mexico and Oklahoma. Lloydia 16, 257-290. COMPLETE [2051]


Palmer, M.W.


Taylor, R.J.; Taylor, C.E.S. (1994): An annotated list of the ferns, fern allies, gymnosperms and flowering plants of Oklahoma. 3rd ed. Southeastern Oklahoma State University, Durant, Oklahoma. 133 pages. COMPLETE [20006]

Taylor, R.J.; Taylor, C.E.S. (Eds.) (1989): An annotated list of the ferns, fern allies, gymnosperms, and flowering plants of Oklahoma. 1st ed. Southeastern Oklahoma State University, Durant, Oklahoma. 110 pages. NO DATA YET [4303]


Tyrl, R.J. (1980): Identification and mapping of the extant flora at the Deer Creek archaeological site (34Ka 3, Kaw Lake, Oklahoma). (Final Report.) Environmental Resources Branch, U.S. Army Corps of Engineers, Tulsa, Oklahoma. 31 pages. COMPLETE [2056]

University of Tulsa, Faculty of Natural Sciences (1977): A biological inventory of the Fort Gibson Lake area. U.S. Dept. of the Army, Corps


### 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.

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Palmer, M.W.
The Need for Savanna Restoration in the Cross Timbers

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-Langendeon (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 roting after scarring (Abrams 1992).

Stotts, et al.
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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 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

Stotts et al.
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, Dijkstraux 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 (Dijkstraux 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-Langendelon 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 lead 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.

Stotts et al.
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.

**ACKNOWLEDGMENTS**

The authors recognize the invaluable contributions of the following: The Stotts family, Jim Minnerath, Daniel Dyer, the USFWS Eastern Kansas District Fire Crew, and the Stotts.

**LITERATURE CITED**


Stotts, et al.


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 hallii. 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. hallii (name since changed to Schoenoplectus hallii) 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 valdii, Cyperus odoratus, Amannia coccinea, and a strange liverwort called Ricocarpus 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 hallii 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

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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

ONPS

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.

Papers must not have been published previously or accepted for submission elsewhere and should represent research conducted in accordance with accepted procedures and scientific ethics. All authors retain copyright of their articles. Submission of the article implies the granting to Oklahoma Native Plant Society of permission to publish it. We ask only for the right to publish articles. We do not seek to own them. In return, we require our authors to allow that work to be used freely for non-commercial purposes, allowing each individual to make, gratis, a single copy of the published manuscript whether from its print or its Internet version; instructors to make gratis, multiple copies available for non-commercial teaching purposes; and libraries to make copies available, gratis, for interlibrary loan. Authors are responsible for supplying reprints upon request.

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-Peridoicum-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
Oklahoma Native Plant Society c/o Tulsa Garden Center
2435 South Peoria
Tulsa, Oklahoma 74114
## Five-Year Index to *Oklahoma Native Plant Record*

### Volume 2

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Vascular Plants of the Wichita Mountains</td>
<td>Paul Buck</td>
</tr>
<tr>
<td>22</td>
<td>Floristic List for Comanche County, Oklahoma</td>
<td>Bruce W. Hoagland</td>
</tr>
<tr>
<td>54</td>
<td><em>Schoenoplectus hallii</em> and <em>S. saximontanus</em>; Wichita Mountains Wildlife Refuge Survey: 2000</td>
<td>Lawrence K. Magrath</td>
</tr>
<tr>
<td>65</td>
<td>Pontotoc Ridge Floristic Survey: 1999</td>
<td>Forrest L. Johnson, Patricia Folley (ed.)</td>
</tr>
<tr>
<td>82</td>
<td>Water, Soil, and Plant Diversity in Oklahoma</td>
<td>Sheila Strawn</td>
</tr>
</tbody>
</table>

### Volume 3

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Black Mesa Flora Study</td>
<td>James K. McPherson</td>
</tr>
<tr>
<td>19</td>
<td>Black Mesa State Park Flora Update</td>
<td>Patricia A. Folley</td>
</tr>
<tr>
<td>23</td>
<td>Vascular Flora of the Keystone Wildlife Management Area</td>
<td>Bruce Hoagland and Amy K. Buthod</td>
</tr>
<tr>
<td>38</td>
<td>Floristic Survey of The Nature Conservancy’s Preserve</td>
<td>Johnston County, OK, Kimberly A. Shannon</td>
</tr>
<tr>
<td>51</td>
<td>Historical Accounts of the Transformation of a Pairie Town</td>
<td>Todd D. Fagin and Melissa S. Brown</td>
</tr>
<tr>
<td>68</td>
<td><em>Triphora trianthophora</em> and <em>Tipularia discolor</em> in Oklahoma</td>
<td>Lawrence K. Magrath</td>
</tr>
<tr>
<td>73</td>
<td>Take time to watch, not just smell the wildflowers</td>
<td>Gloria M. Caddell</td>
</tr>
</tbody>
</table>

### Volume 4

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Ecological Factors Affecting the Distribution of Woody Vegetation Near the Arkansas River</td>
<td>Anne Wanamaker Long</td>
</tr>
<tr>
<td>24</td>
<td><em>Cotinus obovatus</em> Raf. (Smoke-tree) in Oklahoma</td>
<td>Bruce Hoagland</td>
</tr>
<tr>
<td>26</td>
<td>Giant Cane and Southeastern Indian Baskets</td>
<td>Julia A. Jordan</td>
</tr>
<tr>
<td>30</td>
<td>Vascular Flora of the Couteau Wildlife Management Area</td>
<td>Bruce W. Hoagland and Forrest L. Johnson</td>
</tr>
<tr>
<td>40</td>
<td>Status and Habitat Characteristics of <em>Chyprepedium kentuckiens</em> (Kentucky lady’s slipper) in Southeastern Oklahoma</td>
<td>Bruce Hoagland and Amy K. Buthod</td>
</tr>
<tr>
<td>48</td>
<td>Common Lawn and Garden Mushrooms of Central Oklahoma</td>
<td>Clark L. Ovrebo</td>
</tr>
<tr>
<td>56</td>
<td>Why Do Species Names Change?</td>
<td>Patricia A. Folley</td>
</tr>
</tbody>
</table>

### Volume 5

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Relationship of Forest Vegetation to Soils on Geological Formations of the Oklahoma Gulf Coastal Plain</td>
<td>R. John Taylor</td>
</tr>
<tr>
<td>39</td>
<td>A Vegetation Analysis of a Pimpled Prairie in Northeastern Oklahoma</td>
<td>Constance L. Murray</td>
</tr>
<tr>
<td>61</td>
<td>Vascular Flora of a Site Along the Arkansas River, Pawnee County, Oklahoma</td>
<td>Bruce W. Hoagland and Amy K. Buthod</td>
</tr>
<tr>
<td>73</td>
<td>Additions to the Flora of Garvin County, Oklahoma</td>
<td>Phillip T. Crawford and Priscilla H.C. Crawford</td>
</tr>
<tr>
<td>98</td>
<td>Tribute to John Taylor, ONPS members</td>
<td></td>
</tr>
</tbody>
</table>

### Volume 6

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The Lichens of North Central Oklahoma</td>
<td>Darvin W. Keck</td>
</tr>
<tr>
<td>51</td>
<td>Annotated Nomenclatural Update to Keck (1961)</td>
<td>Douglas M. Ladd</td>
</tr>
<tr>
<td>53</td>
<td>Vascular Flora of a Red Sandstone Hills Site, Canadian County, Oklahoma</td>
<td>Bruce W. Hoagland and Amy K. Buthod</td>
</tr>
<tr>
<td>69</td>
<td>Vascular Flora of a Riparian Site on the Canadian River, Cleveland County, Oklahoma</td>
<td>Lucy Burgess and Bruce W. Hoagland</td>
</tr>
<tr>
<td>80</td>
<td>Cedar-apple Rust</td>
<td>Clark L. Ovrebo</td>
</tr>
</tbody>
</table>
In this issue of Oklahoma Native Plant Record Volume 7, Number 1, December 2007:

4   Vascular Plants of the Oklahoma Ozarks
    Charles S. Wallis

21  Updated Oklahoma Ozark Flora
    Bruce W. Hoagland

54  The Vascular Flora of the Oklahoma Centennial Botanical Garden Site
    Osage County, Oklahoma
    Bruce W. Hoagland and Amy Buthod

67  Vascular Plant Checklists from Oklahoma
    Michael W. Palmer

78  The Need for Savanna Restoration in the Cross Timbers
    Caleb Stotts, Michael W. Palmer, and Kelly Kindscher

91  Botanizing with Larry Magrath
    Patricia A. Folley

Five Year Index to *Oklahoma Native Plant Record* inside back cover