

A FLORISTIC SURVEY OF THE NATURE CONSERVANCY'S
PRESERVE IN JOHNSTON COUNTY, OKLAHOMA

By

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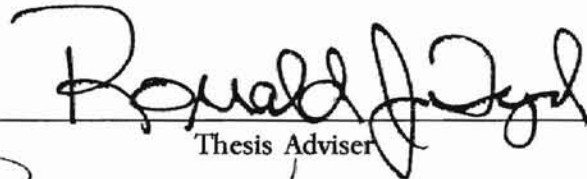
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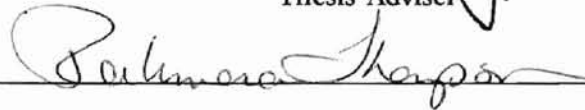
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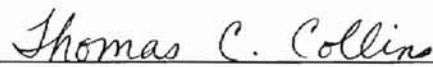
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Thesis Approved:


Thesis Adviser







Dean of the Graduate College

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CHAPTER I

INTRODUCTION

Floristic studies have long been an important means of understanding the plants, vegetation, and ecosystems that surround us. Traditionally floristic surveys have covered relatively large areas, but much can be learned from the survey of small ones as well. One such area is a preserve of The Nature Conservancy located in Johnston County in south-central Oklahoma. Situated on an outcrop of Precambrian granite, it is a 3.2 hectare site that has a number of plant communities - deciduous forest, grasslands, riparian, and granitic outcrop - each with a characteristic assemblage of species. The significance of this site is that exposed Precambrian granite is relatively infrequent in Oklahoma, composing less than 1 percent of the rock outcrop cover of the state and restricted primarily to a small portion in the south-central part (1). These Precambrian outcrop areas typically have an interesting variety of plants and plant communities (2, 3).

In late 1994, the Oklahoma Chapter of The Conservancy acquired the site via donation by the landowner. In order to determine whether it was biologically significant and worthy of protection in accordance with its goals, The Conservancy required a floristic survey of the vascular plants present; this survey was to be one part of an overall biological assessment of the property. During the 1995 and 1996 growing seasons, such a survey was conducted of both the site and the surrounding area of approximately 6.4 hectares. In addition to documenting the plants present, mapping of the site's different communities and physiographic features using Geographic Information Systems (GIS) techniques was completed. The objectives of this work were: 1) to compile a list of the vascular plant species present, 2) to document the taxa present via herbarium specimens, 3) to compile basic ecological and physiographic data, and 4) to produce a site-specific vegetation map using GIS techniques.

CHAPTER II

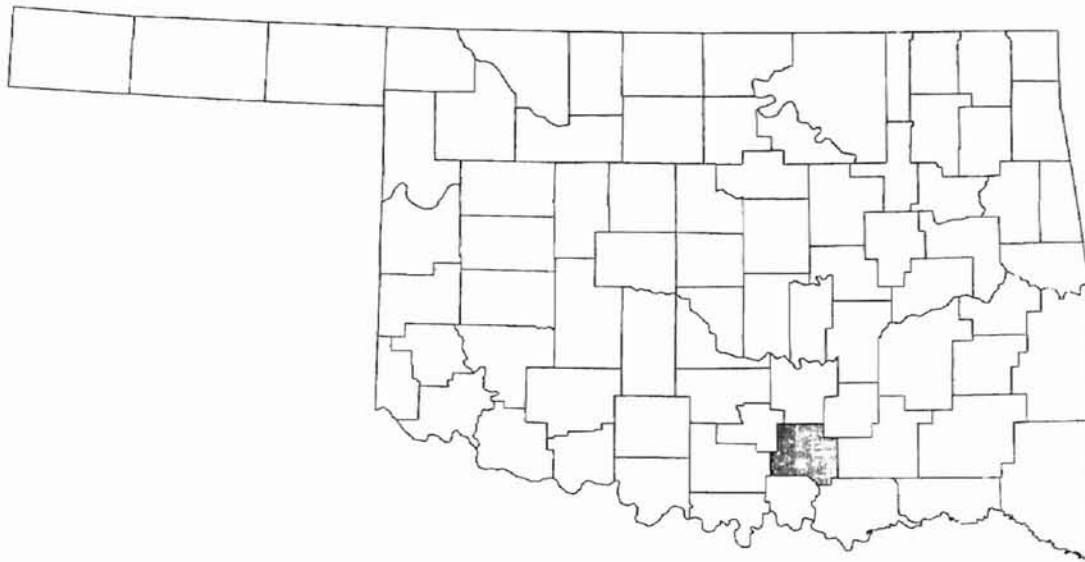
SITE DESCRIPTION

The Conservancy's Pennington Creek nature sanctuary and surrounding area is an approximately 9.6 hectare site located in central Johnson County, (T3S, R6E, Sec. 5, SW 1/4 SW 1/4 and Sec. 6 SE 1/4; Figures 1 and 2). Located 8.0 kilometers north and 3.2 kilometers west of Tishomingo, it is bordered by Pennington Creek and a graveled county road on the northeast side. The site is located within the Arbuckle Uplift geomorphic province and the Grand Prairie land resources area (4, 5). The topography consists of gently rolling hills and plains. Ordovician and Cretaceous limestones and Precambrian granites are the parent rock in the area. These granites and rhyolites are the oldest strata in Oklahoma, dating from 1.05 to 1.35 billion years ago and contribute to this site's uniqueness (1). They were exposed as sedimentary cover eroded from above them (4).

Soil types present are the Chigley-Granite outcrop complex (with 1 to 8 percent slope) and the Gracemont soils (6). The Chigley-Granite outcrop complex consists of a mixture of soils and outcrops of granite. The Chigley soil is a gently sloping, moderately well drained soil on uplands. Its water table is below a depth of 1 m from February to May and the rate of water intake is moderately slow.

The Gracemont soils are characterized as nearly level to gently sloping, somewhat poorly drained soils in flood plains. Their pattern of soils is intricate; about 35% of an area has a surface layer of loamy fine sand, and 50% has a surface layer of fine sandy loam. These soils are next to the stream channels; the water table is below a depth of 0.1-1.0 m for most of the year; rate of water intake is rapid.

Precipitation for the area of the site averages about 101.8 cm while the average temperature is 16.7 °C (6). Of the total annual precipitation, 59% usually falls between the months of April and September. The range of precipitation effectiveness values is from 65 to 50. The growing season for Johnston County ranges from 189 to 230 days (6). The dominant vegetation type for the area is Post Oak-Blackjack Forest (7).



OKI

Figure 1: Map of Oklahoma.

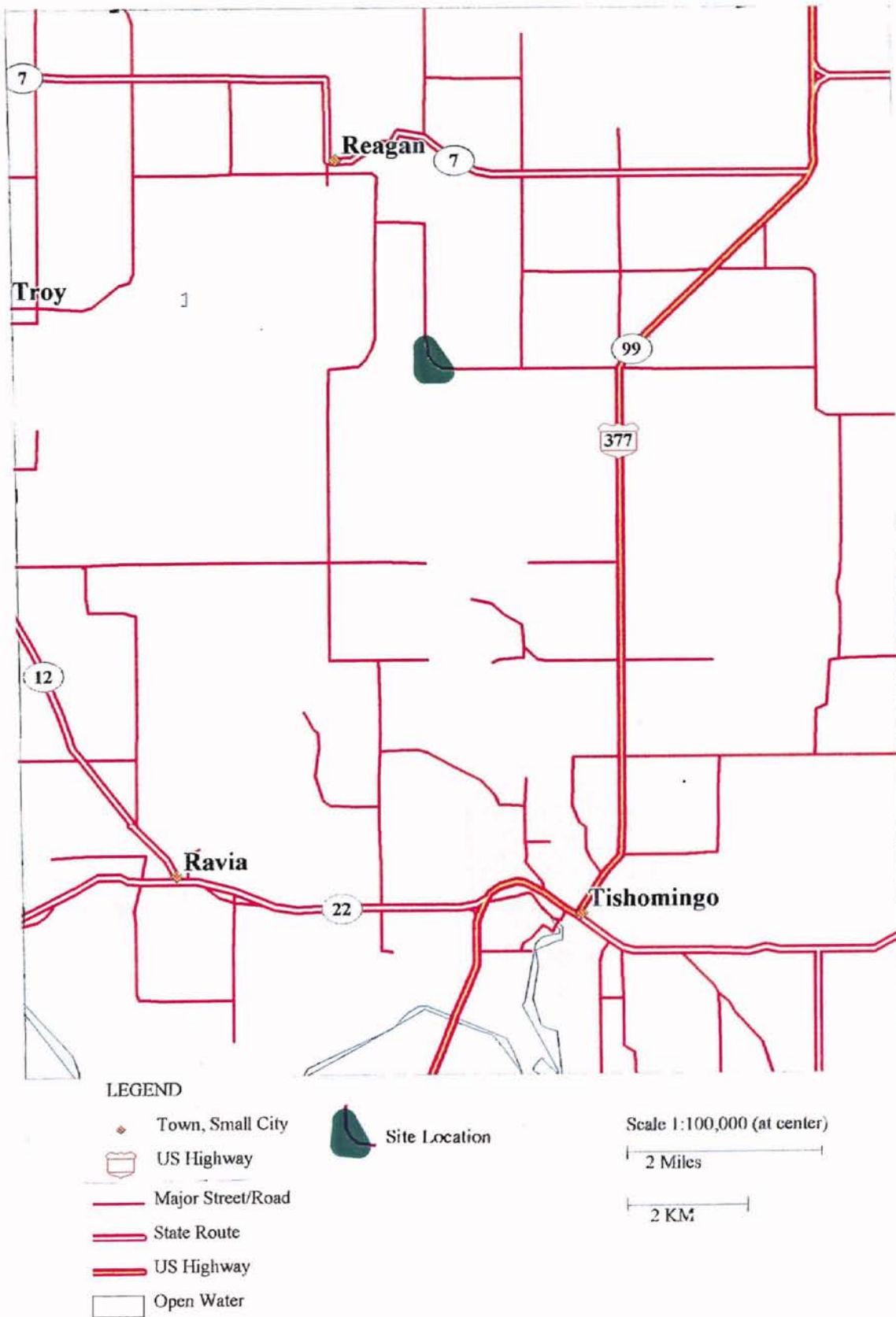


Figure 2: Map of Pennington Creek Site.

CHAPTER III

METHOD OF SURVEY

The major component of this research was the collection and identification of the vascular plants found at the site. During 13 trips from March 1995 to October 1996, vascular plants in fertile condition were collected while the site was systematically traversed on foot. Traditional taxonomic procedures of collecting, pressing, drying, and preservation were employed (Appendix A). Unknown species were identified using the resources of the OSU Herbarium. Some plants were identified only to genus because they were not in flower or fruit. Nomenclature was based primarily on that of Waterfall (8) and Gleason and Cronquist (9). Common names were taken from Taylor and Taylor (10). Voucher specimens were deposited in the OSU Herbarium (OKLA).

The GIS comprised spatial data layers collected in either digital or analog form from a U.S.G.S. aerial photograph, a topographic quadrangle map, and the soil survey map of Johnston County. Elevation and soils coverages were digitized from U.S.G.S. quad map and the soil survey map of Johnston County, respectively (Figure 3). Coverages of plant communities, road, and creek were derived directly from the digitized aerial photograph (Figure 4). Each spatial data layer was accompanied by a table of attribute or nonspatial data (Appendices B and C). The plant species coverage included attribute data in tabular form for a representative group of species from each plant community. Each record in the table comprised scientific name, common name, plant community, habit, collection date, collection number and relative abundance. Spatial relationships between distribution of plant species and parameters of plant communities were compared.

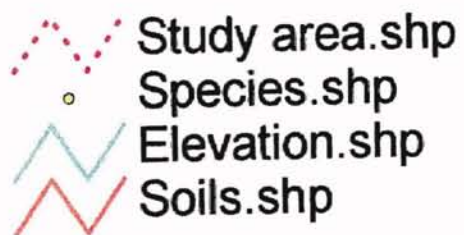
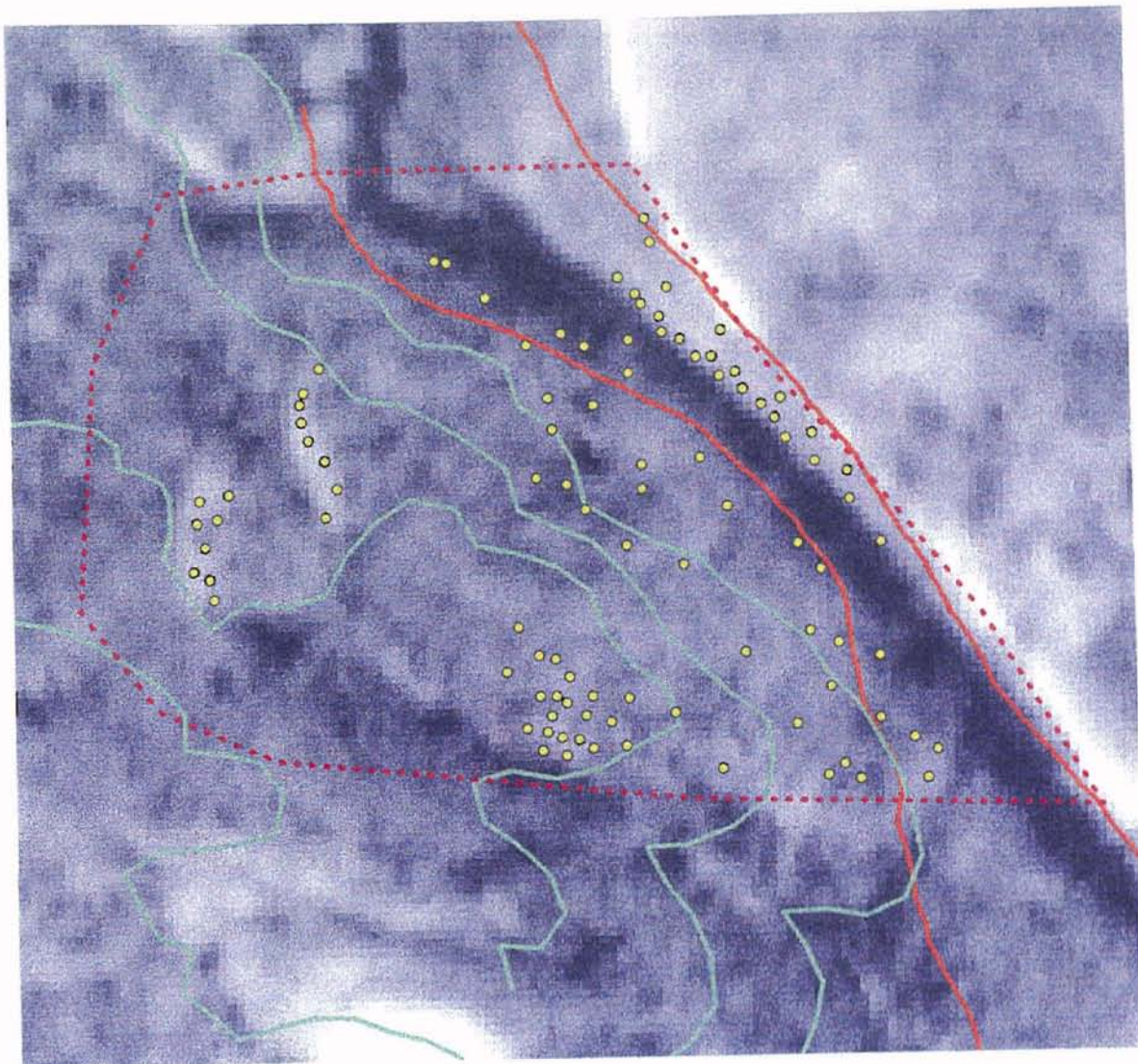
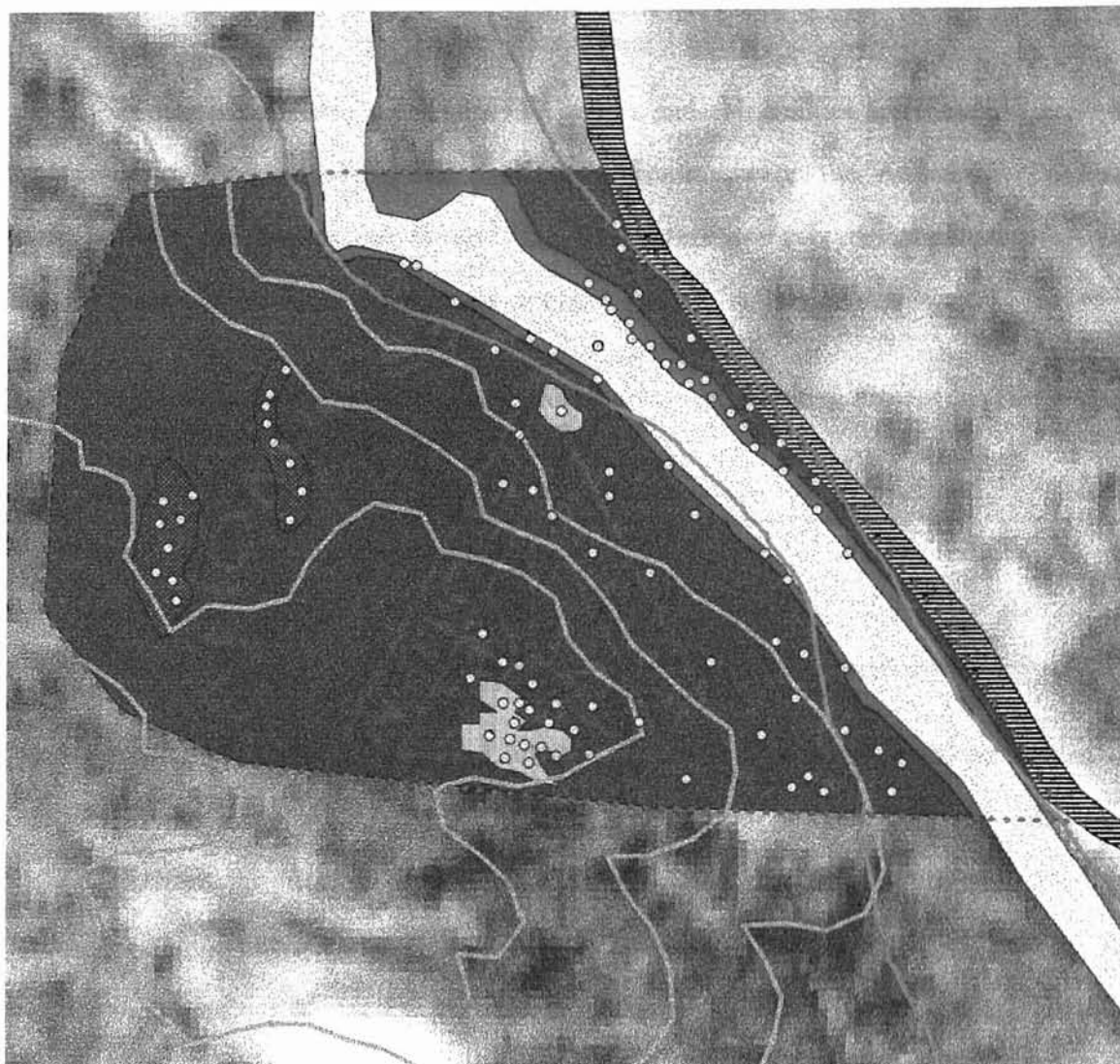


Figure 3: GIS Layout of Pennington Creek; Aerial Photograph with Elevation and Soils Coverages.



- Study area.shp
- Species.shp
- Elevation.shp
- Soils.shp
- Penncreek.shp
- Riparian community.shp
- Granite community.shp
- Grassland community.shp
- Forest community.shp
- road.shp

Figure 4: GIS Layout of Pennington Creek; All Coverages.

CHAPTER IV
RESULTS AND DISCUSSION

Two hundred three species in 157 genera and 64 families were encountered in this survey (Appendices C-E). The four largest families were the Asteraceae, Poaceae, Fabaceae, and the Cyperaceae (Table 1). These taxa were representative of riparian habitats, post oak-blackjack woods, and prairies.

TABLE 1: Number of Genera and Species for the Largest Families Present at The Nature Conservancy's Pennington Creek Site.

Family	Number of Genera	Number of Species
Asteraceae	24	32
Poaceae	21	28
Fabaceae	11	14
Cyperaceae	4	10

Species designated by the U.S. Fish and Wildlife Service (11) as endangered, threatened or Category 1 were not encountered. The only species present ranked by the Oklahoma Natural Heritage Inventory (12) as S1 or S2 was *Alnus maritima*. Although cited as present in the county, *Carex fissa* (S2) and *Penstemon oklahomensis* (S3) were not discovered. A species of interest because of its unusual distribution is *Alnus maritima*, seaside alder. It is found only in Johnston and Pontotoc Counties along the Blue River, its tributaries, and Pennington Creek (13). This shrub or small tree comprises large populations on the Delmarva Peninsula of southern Delaware and eastern Maryland. The seaside alder's presence in south-central Oklahoma is unexplained. Documentation of the species existence in the area dates from 1872 (14). Another riparian plant of interest is *Lobelia cardinalis*. It is an example of a taxon encountered less frequently in its natural setting due to extensive collecting by plant collectors and gardeners.

Present at the preserve are four distinct plant communities: forest, grassland, granitic outcrop and riparian. The forest community is the largest. It is composed of characteristic crosstimbers taxa. The trees are oak-hickory dominants (15) and include:

Quercus stellata, *Q. marilandica*, *Carya texana*, *C. cordiformis*, *C. illinoensis*, *Ulmus alata*, and *U. rubra*. Dominant shrubby taxa include *Symphoricarpos orbiculatus* and *Rhus copallina*. Common herbaceous species present include: *Elymus canadensis*, *Geum canadense*, *Antennaria plantaginifolia*, and *Carex caroliniana*.

Small grassland communities are present in openings of the forest community and consist of a mixture of grasses and forbs. Typical species include *Tridens flavus*, *Gaillardia pulchella*, *Sorghastrum nutans*, *Coreopsis tinctoria*, *Castilleja indivisa*, *Setaria lutescens*, and *Bouteloua curtipendula*. The granitic outcrop community is the most unique community of the site. It occurs on the shallow, loose soils surrounding the ground-level granite domes. These shallow soils support species such as *Sedum pulchellum*, *S. nuttallianum*, *Chaetopappa asteroides*, and *Krigia virginica*. Many of these species are typical of early successional stages in granite outcrop communities (16). There are also large granite boulders throughout the site, some of which provide habitat on their surfaces or in crevices for taxa such as *Polypodium polypodioides*, *Eragrostis capillaris*, and *Woodsia obtusa*.

The riparian community is characterized by herbaceous species such as *Chasmanthium latifolium*, *Justicia americana*, *Equisetum hyemale*, *Ranunculus hispidus* and *Lobelia cardinalis*. Woody species present include *Platanus occidentalis* and *Alnus maritima*. Aquatic macrophytes were not observed in the creek.

The GIS permitted comparison of plant distribution and community parameters by creating multiple layers of spatial data and accompanying attribute data. For example, the distribution of *Sedum nuttallianum* and *S. pulchellum* correlated with the occurrence of the Precambrian granite outcrops and the distribution of *Lobelia cardinalis* with the occurrence of riparian habitat.

Chapter V

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APPENDIX A

Collection of Specimens

Field notes were compiled as each plant was collected and included: a description of the plant's habitat, morphology, topography, associated species; the date; collection number, and any additional comments. These notes were made with a micro-cassette recorder and later transcribed onto individual data collection sheets for each specimen. A small site map in the lower-right corner of each sheet allowed the general position of each plant collected to be recorded (Figure 5).

Specimens were placed in plant presses between layers of newsprint, absorbent blotting paper and cardboard. After the presses were loaded, they were placed in drying cabinets at approximately 43°C for 2 to 3 days. Once the specimens were completely dry, they were then placed in a freezer at 0 °C for a minimum of 1 week. The freezing process ensured that all insects and other potential pests were dead before the specimens are placed in the herbarium.

Most specimens were identified using the Key of the Vascular Plant Families of Oklahoma (17) along with U.T. Waterfall's Keys to the Flora of Oklahoma (8). On occasion, keys in the Flora of the Great Plains (18), Correll and Johnston's Flora of Texas (19), Gray's Manual of Botany (20), and Hampton's Treatment of the Amaranthaceae (21) were also used to identify plant specimens and herbarium sheets from the OSU herbarium were used to verify identifications. Nomenclature was based primarily on that of Waterfall (8) and Gleason and Cronquist (9).

After the specimens were identified, pressed and dried, they were mounted on herbarium paper. Labels on each specimen provide the scientific name, common name, topography, associated species, collection number, date collected and relative location of the plant. Each specimen was glued to acid-free herbarium paper with Elmer's wood glue, allowed to dry and then refrozen to kill insects before being accessioned to the OSU herbarium.

Collection Number: PC 261

Date: 10-8-96

Scientific Name: Quercus marilandica

Common Name: Blackpick Oak

Family: Fagaceae

Habit: arborescent,

Height: 7ft

Flower or Fruit: acorn present

Topographical Situation: top of hill, drier spot,
somewhat rocky

Associated Species: Rhus copallina, Leopedeia sp.,
Eragrostis spectabilis, Quercus velutina;

Abundance: Juniperus virginiana
prolific throughout high pts. of site

Comments (sap, scent, etc.):



Figure 5: Sample of Specimen Collection Data Sheet

APPENDIX B

GIS Data

This project was created using the Arcview 3.0 program developed by the Environmental Systems Research Institute (ESRI). Multiple layers of data were created for this project. The first steps of the project included scanning, registering, and referencing a U.S.G.S. aerial photograph. This data layer was assigned real-world coordinates using U.T.M. coordinates. Four derived coverages including property boundaries, road, creek and plant communities were created on-screen from the digitized aerial photo. The road, creek, and plant community themes were created as polygon coverages and the property boundary, elevation, and soils themes are line coverages. The elevation and soils coverages were digitized directly from a U.S.G.S. quad map (Reagan series) and the Johnston County Soil Survey, respectively. The plant species coverage was added as points within the boundaries of the plant community coverages.

Most of the attribute data came from the derived coverage plant communities. The soil attribute data supplied important information for each plant community. Along with actual soil types, information regarding the depths, and their drainage properties was included. The point attribute data of the plant species coverage were added from data collected during the 1995-1996 field research seasons.

Analysis of the data represented within each coverage was done as a point-in-polygon analysis. To gain an understanding of the relationships between each species's distribution and the physical features of the site, the plant community layers and the soils layer were linked to each taxon.

APPENDIX C

GIS Attribute Tables

Ten coverages were generated in the GIS study: they were study area, species, elevation, soils, penncreek, riparian community, granite community, grassland community, forest community, and road. For each coverage two files - shape (.shp) and text (.dbf or .txt) were created. The shape files depict coverages as either polygons, lines, or points. The text files describe the shape files by means of tabular attribute or aspatial data. For each coverage, an attribute table comprising three to seven fields and one to 100 records was created. Attribute data allows coverages to be linked or joined via matching fields. Attribute tables created are presented below.

Attribute Table for Study Area:

<u>Shape</u>	<u>ID#</u>	<u>Boundary Line</u>
line	1	Study Area Boundary

Attribute Table for Elevation:

<u>Shape</u>	<u>ID#</u>	<u>Elevation Line</u>
line	1	820 feet
line	2	830 feet
line	3	840 feet
line	4	850 feet

Attribute Table for Soils:

<u>Shape</u>	<u>ID#</u>	<u>Soil Type</u>	<u>Soil Name</u>	<u>Depth</u>	<u>High Water Table Depth</u>
line	1	6	Chigley Granite Outcrop	0-72in.	3.0 - 4.0 ft.
line	2	27	Gracemont	0-74in.	0.5 - 3.0 ft.

Attribute Table for Riparian Community:

<u>Shape</u>	<u>ID#</u>	<u>Community Type</u>	<u>Community Name</u>
polygon	1	RP	Riparian
polygon	2	RP	Riparian

Attribute Table for Forest Community:

<u>Shape</u>	<u>ID#</u>	<u>Community Type</u>	<u>Community Name</u>
polygon	1	FO	Forest
polygon	2	FO	Forest

Attribute Table for Grassland Community:

<u>Shape</u>	<u>ID#</u>	<u>Community Type</u>	<u>Community Name</u>
polygon	1	GR	Grassland
polygon	2	GR	Grassland

Attribute Table for Granite Community:

<u>Shape</u>	<u>ID#</u>	<u>Community Type</u>	<u>Community Name</u>
polygon	1	GO	Granitic outcrop-boulder
polygon	2	GO	Granitic outcrop-ground level

Attribute Table for Road:

<u>Shape</u>	<u>ID#</u>	<u>Road Type</u>
polygon	1	County Road

APPENDIX D

Alphabetical List of Families

Acanthaceae Juss.	Acanthus Family
Amaranthaceae Juss.	Pigweed Family
Anacardiaceae Lindl.	Cashew Family
Apiaceae Lindl.	Parsley Family
Apocynaceae Juss.	Dogbane Family
Aquifoliaceae Bartl.	Holly Family
Aristolochiaceae Juss.	Birthwort Family
Asclepiadaceae R. Br.	Milkweed Family
Aspleniaceae Mett. ex A. B. Frank	Spleenwort Family
Asteraceae Dum.	Sunflower Family
Betulaceae S.F. Gray	Birch Family
Brassicaceae Burnett	Mustard Family
Cactaceae Juss.	Cactus Family
Campanulaceae Juss.	Bellflower Family
Caprifoliaceae Juss.	Honeysuckle Family
Caryophyllaceae Juss.	Pink Family
Clusiaceae Lindl.	St. John's-wort Family
Commelinaceae R. Br.	Spiderwort Family
Cornaceae Dum.	Dogwood Family
Crassulaceae DC.	Stonecrop Family
Cucurbitaceae Juss.	Cucumber Family
Cupressaceae Rich. ex Bartl.	Cypress Family
Cyperaceae Juss.	Sedge Family
Dryopteridaceae Ching	Wood Fern Family
Equisetaceae Rich.	Horsetail Family

Euphorbiaceae Juss.	Spurge Family
Fabaceae Lindl.	Bean Family
Fagaceae Dum.	Oak Family
Fumariaceae DC.	Fumitory Family
Gentianaceae Juss.	Gentian Family
Hydrophyllaceae R. Br.	Waterleaf Family
Iridaceae Juss.	Iris Family
Juglandaceae A. Rich. ex Kunth.	Walnut Family
Juncaceae Juss.	Rush Family
Lamiaceae Lindl.	Mint Family
Liliaceae Juss.	Lily Family
Lythraceae J. St.-Hil.	Loosestrife Family
Malvaceae Juss.	Mallow Family
Menispermaceae Juss.	Moonseed Family
Moraceae Link	Mulberry Family
Nyctaginaceae Juss.	Four O'clock Family
Oleaceae Hoffmsg. & Link	Olive Family
Onagraceae Juss.	Evening Primrose Family
Oxalidaceae R. Br.	Wood Sorrel Family
Plantaginaceae Juss.	Plantain Family
Platanaceae Dum.	Sycamore Family
Poaceae Barnh.	Grass Family
Polemoniaceae Juss.	Polemonium Family
Polygonaceae Juss.	Buckwheat Family
Polypodiaceae S.F. Gray	True Fern Family
Primulaceae Vent.	Primrose Family
Ranunculaceae Juss.	Buttercup Family

Rhamnaceae Juss.	Buckthorn Family
Rosaceae Juss.	Rose Family
Rubiaceae Juss.	Madder Family
Rutaceae Juss.	Citrus Family
Sapotaceae Juss.	Sapodilla Family
Scrophulariaceae Juss.	Figwort Family
Smilacaceae Vent.	Greenbrier Family
Ulmaceae Mirb.	Elm Family
Valerianaceae Batsch	Valerian Family
Verbenaceae St.-Hil.	Vervain Family
Violaceae Batsch	Violet Family
Vitaceae Juss.	Grape Family

APPENDIX E

List of Species by Family

Acanthaceae Juss.	Acanthus Family
<i>Justicia americana</i> (L.) Vahl	
<i>Ruellia strepens</i> L.	
Amaranthaceae Juss.	Pigweed Family
<i>Amaranthus rudis</i> Sauer	
Anacardiaceae Lindl.	Cashew Family
<i>Rhus copallina</i> L.	
<i>Toxicodendron radicans</i> L.	
Apiaceae Lindl.	Parsley Family
<i>Chaerophyllum procumbens</i> L.	
<i>C. tainturieri</i> Hook.	
<i>Cicuta maculata</i> L.	
<i>Limnoscium pinnatum</i> (DC.) Math. & Const.	
<i>Ptilimnium nuttallii</i> (DC.) Britt.	
<i>Sanicula canadensis</i> L.	
<i>Zizia aurea</i> (L.) Koch	
Apocynaceae Juss.	Dogbane Family
<i>Amsonia ciliata</i> Walt.	

Aquifoliaceae Bartl.	Holly Family
<i>Ilex decidua</i> Walt.	
Aristolochiaceae Juss.	Birthwort Family
<i>Aristolochia tomentosa</i> Sims	
Asclepiadaceae R. Br.	Milkweed Family
<i>Asclepias asperula</i> (Dcne.) Woods.	
<i>A. viridis</i> Walt.	
<i>Matelea</i> sp.	
Aspleniaceae Mett. ex A.B. Frank	Spleenwort Family
<i>Asplenium platyneuron</i> (L.) D.C. Eat.	
Asteraceae Dum.	Sunflower Family
<i>Achillea millefolium</i> L.	
<i>Actinomeris alternifolia</i> (L.) DC.	
<i>Antennaria plantaginifolia</i> (L.) Richard	
<i>Aster azureus</i> Lindl.	
<i>A. sagittifolius</i> Willd.	
<i>Bidens polylepis</i> Blake	
<i>Chaetopappa asteroides</i> DC.	
<i>Chrysopsis pilosa</i> Nutt.	
<i>Coreopsis tinctoria</i> forma <i>tinctoria</i> Nutt.	
<i>Elephantopus carolinianus</i> Raeusch.	
<i>Erigeron philadelphicus</i> L.	
<i>E. pulchellus</i> Michx.	

Eupatorium incarnatum Walt.
E. rugosum Houtt.
E. serotinum Michx.
Gaillardia putchella Foug.
Gnathalium purpureum L.
Helenium amarum var. *amarum* (Raf.) Rock
Helianthus laetiflorus Pers.
Hymenopappus tenuifolius Pursh.
Krigia oppositifolia Raf.
K. virginica (L.) Willd.
Lactuca canadensis L.
Pyrrhopappus carolinianus (Walt.) DC.
P. scaposus DC.
Rudbeckia hirta L.
R. subtomentosa Pursh.
R. triloba L.
Senecio aureus L.
Solidago delicatula Small
Verbesina virginica L.
Vernonia baldwinii Torr.

Betulaceae S. F. Gray

Birch Family

Alnus maritima Muhl. ex Nutt.

Brassicaceae Burnett

Mustard Family

Cardamine parviflora var. *arenicola* (Britt). O. E. Schulz

C. pennsylvanica Muhl.

Lepidium virginicum L.

Cactaceae Juss.

Cactus Family

Opuntia macrorhiza Engelm.

Campanulaceae Juss.

Bellflower Family

Lobelia appendiculata DC.

L. cardinalis L.

Specularia leptocarpa (Nuttall) Gray

S. perfoliata (L.) A. DC.

Caprifoliaceae Juss.

Honeysuckle Family

Symphoricarpos orbiculatus Moench.

Viburnum prunifolium L.

Caryophyllaceae Juss.

Pink Family

Arenaria serpyllifolia L.

Stellaria media L.

Clusiaceae Lindl.

St. John's-wort Family

Hypericum drummondii (Grev. & Hook.) T. & G.

H. punctatum Lam.

Commelinaceae R. Br.

Spiderwort Family

Commelina communis L.

Cornaceae Dum.	Dogwood Family
<i>Cornus drummondii</i> Meyer	
Crassulaceae DC.	Stonecrop Family
<i>Sedum nuttallianum</i> Raf.	
<i>S. pulchellum</i> Michx.	
Cucurbitaceae Juss.	Cucumber Family
<i>Melothria pendula</i> L.	
Cupressaceae Rich. ex Bartl.	Cypress Family
<i>Juniperus virginiana</i> L.	
Cyperaceae Juss.	Sedge Family
<i>Carex blanda</i> Dewey	
<i>C. caroliniana</i> Schwein	
<i>C. microdonta</i> Torr. & Hook.	
<i>C. planostachys</i> Mack.	
<i>C. shortiana</i> Dew.	
<i>C. stricta</i> Lam.	
<i>Cyperus ovularis</i> (Michx.) Torr.	
<i>C. strigosus</i> L.	
<i>Eleocharis</i> sp.	
<i>Scirpus</i> sp.	
Dryopteridaceae Ching	Wood Fern Family
<i>Woodsia obtusa</i> (Spreng.) Torr.	

Equisitaceae Rich.

Horsetail Family

Equisetum hyemale L.

Euphorbiaceae Juss.

Spurge Family

Croton lindheimerianus Scheele.*Euphorbia dentata* Michx.*E. maculata* L.*E. nutans* Lag.*Tragia ramosa* Torr.

Fabaceae Lindl.

Bean Family

Amorpha fruticosa L.*Baptisia leucophaea* Nutt.*Cassia fasciculata* Michx.*Cercis canadensis* L.*Desmodium canescens* (L.) DC.*D. glutinosum* (Muhl. ex Willd.) Wood*D. nudiflorum* (L.) DC.*Lespedeza cuneata* (Dumont) G. Don*L. virginica* (L.) Britt.*Neptunca lutea* (Leavenw.) Benth.*Psoralea tenuiflora* Pursh*Strophostyles helvola* (L.) Ell.*Trifolium dubium* Sibth.*Vicia villosa* Roth.

Fagaceae Dum.	Oak Family
<i>Quercus macrocarpa</i> Michx.	
<i>Q. marilandica</i> Muench.	
<i>Q. muehlenbergii</i> Engelm.	
<i>Q. shumardii</i> Buckl.	
<i>Q. stellata</i> Wang.	
Fumariaceae DC.	Fumitory Family
<i>Corydalis micrantha</i> (Engelm.) Gray	
Gentianaceae Juss.	Gentian Family
<i>Sabatia campestris</i> Nutt.	
Hydrophyllaceae R. Br.	Waterleaf Family
<i>Phacelia strictiflora</i> (Engelm. & Gray) Gray	
Iridaceae Juss.	Iris Family
<i>Sisyrinchium angustifolium</i> P. Mill.	
Juglandaceae A. Rich. ex Kunth.	Walnut Family
<i>Carya cordiformis</i> (Wang.) K. Koch	
<i>C. illinoensis</i> (Wang.) K. Koch	
<i>C. texana</i> Buckl.	
<i>Juglans nigra</i> L.	
Juncaceae Juss.	Rush Family
<i>Juncus marginatus</i> Rostk.	

Juncus sp.

Lamiaceae Lindl.

Mint Family

Hedeoma hispida Pursh.

Monarda fistulosa L.

Prunella vulgaris L.

Satureja arkansana (Nutt.) Briq.

Scutellaria parvula Michx.

Lilaceae Juss.

Lily Family

Allium canadense L.

Hypoxis hirsuta (L.) Coville

Nothoscordum bivalve (L.) Britton

Polygonatum canaliculatum (Muhl.) Pursh.

Lythraceae J. St.-Hil.

Loosestrife Family

Lythrum alatum Pursh

Malvaceae Juss.

Mallow Family

Callirhoe involucrata (T. & G.) A.

Menispermaceae Juss.

Moonseed Family

Cocculus carolinus (L) DC.

Moraceae Link

Mulberry Family

Maclura pomifera (Raf.) Schneid.

Morus rubra L.

- Nyctaginaceae Juss. Four O'clock Family
Mirabilis linearis (Pursh.) Heimerl.
- Oleaceae Hoffmsg. & Link Olive Family
Fraxinus americana L.
- Onagraceae Juss. Evening Primrose Family
Gaura biennis L. var. *pitcheri* Pickering
Ludwigia alternifolia L.
Oenothera linifolia Nutt.
- Oxalidaceae R. Br. Wood Sorrel Family
Oxalis corniculata L.
- Plantaginaceae Juss. Plantain Family
Plantago purshii R. & S.
P. virginica L.
P. wrightiana Dcne.
- Platanaceae Dum. Sycamore Family
Platanus occidentalis L.
- Poaceae Barnh. Grass Family
Agrostis scabra Willd.
Aira elegans Willd. ex Gaudin
Bothriochloa saccharoides (Sw.) Rydb.
Bouteloua curtipendula (Michx.) Torr.

Bromus japonicus Thunb. ex Murr.
B. pubescens Muhl. ex Willd.
B. purgans L.
Chasmanthium latifolium (Michx.) Yates
Cinna arundinacea L.
Echinochloa crus-galli (L.) Beauv.
Elymus virginicus L.
Eragrostis capillaris (L.) Nees
E. spectabilis (Pursh.) Steud.
Festuca arundinacea Schreb.
Lolium multiflorum Lam.
Muhlenbergia sobolifera (Muhl.) Trin.
Panicum acuminatum Swartz.
P. anceps Michx.
P. clandestinum L.
P. depauperatum Muhl.
P. laxiflorum Lam.
Paspalum dilatatum Poir.
Setaria lutescens (Weigel) Hubb.
Sorghastrum nutans (L.) Nash
Sorghum halepense (L.) Pers.
Sphenopholis obtusata (Michx.) Scribn.
Sporobolus clandestinus (Biehler) Hitchc.
Tridens flavus (L.) Hitchc.

Polemoniaceae Juss.

Gilia rubra (L.) Wherry

Polemonium Family

- Polygonaceae Juss. Buckwheat Family
Polygonum punctatum Ell.
Rumex hastulus Baldw.
- Polypodiaceae S.F. Gray True Fern Family
Polypodium polypodioides (L.) Watt
- Primulaceae Vent. Primrose Family
Samolus parviflorus Raf.
- Ranunculaceae Juss. Buttercup Family
Delphinium tricornis Michx.
Ranunculus sp.
Ranunculus fascicularis Muhl.
R. hispidus Michx.
- Rhamnaceae Juss. Buckthorn Family
Berchemia scandens (Hill) K. Koch
Rhamnus caroliniana Walt.
- Rosaceae Juss. Rose Family
Geum canadense Jacq. var. *camporum* (Rydb.) Fern.
Prunus mexicana S. Wats.
Rosa setigera var. *setigera* Michx.
Rubus sp.

Rubiaceae Juss.	Madder Family
<i>Cephalanthus occidentalis</i> L.	
<i>Diodia teres</i> Walt.	
<i>Galium aparine</i> L.	
<i>G. pilosum</i> Ait.	
<i>Hedyotis crassifolia</i> Raf.	
Rutaceae Juss.	Citrus Family
<i>Zanthoxylum americanum</i> Mill.	
Sapotaceae Juss.	Sapodilla Family
<i>Bumelia lanuginosa</i> (Michx.) Pers.	
Scrophulariaceae Juss.	Figwort Family
<i>Castilleja indivisa</i> Engelm.	
<i>Collinsia violacea</i> Nutt.	
<i>Linaria canadensis</i> (L.) Dumont	
Smilacaceae Vent.	Greenbrier Family
<i>Smilax bona-nox</i> L.	
Ulmaceae Mirb.	Elm Family
<i>Ulmus alata</i> Michx.	
<i>U. rubra</i> Muhl.	
Valerianaceae Batsch	Valerian Family
<i>Valerianella radiata</i> (L.) Dufr.	

Verbenaceae St.-Hil.

Phryma leptostachya L.*Verbena urticifolia* L.

Vervain Family

Violaceae Batsch

Viola langloisii Greene*V. rafinesquii* Greene*V. sororia* Willd.

Violet Family

Vitaceae Juss.

Vitis acerifolia Raf.

Grape Family

APPENDIX F

Alphabetical List of Species

<u>Scientific Name</u>	<u>Common Name</u>
<i>Achillea millefolium</i>	Yarrow
<i>Actinomeris alternifolia</i>	Yellow Ironweed
<i>Agrostis scabra</i>	Ticklegrass
<i>Aira elegans</i> (= <i>Aira elegantissima</i>)	Elegant Hairgrass
<i>Allium canadense</i> var. <i>canadense</i>	Wild Onion
<i>Alnus maritima</i>	Seaside Alder
<i>Amaranthus rudis</i>	Water Hemp
<i>Amorpha fruticosa</i>	False Indigo
<i>Amsonia ciliata</i>	Ciliate Blue-star
<i>Andropogon saccharoides</i>	Silver Bluestem
<i>Antennaria plantaginifolia</i>	Pussy Toes
<i>Arenaria serpyllifolia</i>	Thyme-leaved Sandwort
<i>Aristolochia tomentosa</i>	Dutchmen's Pipe
<i>Asclepias asperula</i>	Spider Antelopehorn
<i>A. viridis</i>	Green Milkweed
<i>Asplenium platyneuron</i>	Ebony Spleenwort
<i>Aster azureus</i>	Sky-blue Aster
<i>A. sagittifolius</i>	Arrowleaf Aster
<i>Baptisia leucophaea</i>	Plain's Wild Indigo
<i>Berchemia scandens</i>	Rattan Vine
<i>Bidens polylepis</i>	Coreopsis Beggarticks
<i>Bothriochloa saccharoides</i> (= <i>Andropogon saccharoides</i>)	Silver Bluestem
<i>Bouteloua curtipendula</i>	Side Oats Grama
<i>Bromus japonicus</i>	Japanese Brome
<i>B. pubescens</i>	Canada Brome
<i>B. purgans</i>	Canada Brome
<i>Bumelia lanuginosa</i>	Chittamwood
<i>Callirhoe involucrata</i> forma <i>novomexicana</i>	Cowboy Rose
<i>Cardamine parviflora</i> var. <i>arenicola</i>	Smallflower Bitter Cress
<i>C. pensylvanica</i>	Bitter Cress
<i>Carex blanda</i>	Eastern Woodland Sedge
<i>C. caroliniana</i>	Carolina Sedge
<i>C. microdonta</i>	Sawtoothed Sedge
<i>C. planostachys</i>	Cedar Sedge
<i>C. shortiana</i>	Short's Sedge
<i>C. stricta</i> (= <i>C. emoryi</i>)	Tussock Sedge
<i>Carya cordiformis</i>	Bitternut Hickory
<i>C. illinoensis</i>	Pecan

<i>C. texana</i>	Black Hickory
<i>Cassia fasciculata</i>	Partridge Pea
<i>Castilleja indivisa</i>	Indian Paintbrush
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Cercis canadensis</i>	Redbud
<i>Chaerophyllum procumbens</i>	Wild Chervil
<i>C. tainturieri</i>	Hairy Fruit Wild Chervil
<i>Chaetopappa asteroides</i>	Least Daisy
<i>Chasmanthium latifolium</i> (= <i>Uniola latifolia</i>)	Fish-on-a-Fishin-Pole Grass
<i>Chrysopsis pilosa</i>	Soft Hair Golden Aster
<i>Cicuta maculata</i>	Water Hemlock
<i>Cinna arundinacea</i>	Stout Woodreed
<i>Cocculus carolinus</i>	Carolina Snailseed
<i>Collinsia violaceae</i>	Violet Collinsia
<i>Commelina communis</i>	Day-flower
<i>Coreopsis tinctoria forma tinctoria</i>	Plain's Coreopsis
<i>Cornus drummondii</i>	Roughleaf Dogwood
<i>Corydalis micrantha</i>	Slender Fumewort
<i>Croton lindheimerianus</i>	Three-seeded Croton
<i>Cyperus ovularis var. sphaericus</i>	Globe Flatsedge
<i>C. strigosus</i>	False Nutgrass
<i>Danthonia spicata</i>	Poverty Ryegrass
<i>Delphinium tricornes forma alibiflora</i>	Dwarf Larkspur
<i>Desmodium canescens</i>	
<i>D. glutinosum</i>	Large-flowered Tick Clover
<i>D. nudiflorum</i>	Tick Trefoil
<i>Diodia teres</i>	Rough Buttonweed
<i>Echinochloa crus-galli</i>	Barnyard Grass
<i>Eteocharis sp.</i>	Spikerush
<i>Elephantopus carolinianus</i>	Leafy Elephantfoot
<i>Elymus virginicus</i>	Virginia Wild Rye
<i>Equisetum hyemale</i>	Horsetail
<i>Eragrostis capillaris</i>	Lacegrass
<i>E. spectabilis</i>	Purple Lovegrass
<i>Erigeron philadelphicus</i>	Philadelphia Fleabane
<i>E. pulchellus</i>	Robin's Plantain
<i>Eupatorium incarnatum</i>	Pink Eupatorium
<i>E. rugosum</i>	White Snakeroot
<i>E. serotinum</i>	Late Boneset
<i>Euphorbia dentata</i>	Toothed Spurge
<i>E. maculata</i>	Prostrate Spurge
<i>E. nutans</i>	Eyebane
<i>Festuca arundinacea</i>	Reed Fescue
<i>Fraxinus americana</i>	White Ash
<i>Gaillardia pulchella</i>	Indian Blanket

<i>Galium aparine</i>	Catchweed Bedstraw
<i>G. pilosum</i>	Hairy Bedstraw
<i>Gaura biennis</i>	Long Flowered Gaura
<i>Geum canadense</i> var. <i>camporum</i>	White Avens
<i>Gilia rubra</i>	Standing Cypress
<i>Hedeoma hispida</i>	Rough Pennroyal
<i>Hedyotis crassifolia</i>	Tiny Bluet
(= <i>Houstonia minima</i>)	
<i>Helenium amarum</i>	Sneezeweed
<i>Helianthus laetiflorus</i>	-----
<i>Houstonia minima</i>	Tiny Bluet
<i>Hymenopappus tenuifolius</i>	Old Plain's Man
<i>Hypericum drummondii</i>	Nits-and-Lice
<i>H. punctatum</i>	Spotted St. John Wort
<i>Hypoxis hirsuta</i>	Yellow Stargrass
<i>Ilex decidua</i>	Deciduous Holly
<i>Ipomopsis rubra</i>	Standing Cypress
(= <i>Gilia rubra</i>)	
<i>Juglans nigra</i>	Black Walnut
<i>Juncus marginatus</i>	Grassleaf Rush
<i>Juniperus virginiana</i>	Eastern Red Cedar
<i>Justicia americana</i>	American Waterwillow
<i>Krigia oppositifolia</i>	Weedy Dwarf Dandelion
<i>K. virginica</i>	Dwarf Dandelion
<i>Lactuca canadensis</i>	Wild Lettuce
<i>Lepidium virginicum</i>	Virginia Peppergrass
<i>Lespedeza cuneata</i>	Sericea Lespedeza
<i>L. virginica</i>	Slender Lespedeza
<i>Limnoscium pinnatum</i>	-----
<i>Linaria canadensis</i>	Blue Toadflax
<i>Lobelia appendiculata</i>	Earflower Lobelia
<i>L. cardinalis</i>	Cardinal Flower
<i>Lolium multiflorum</i>	Ryegrass
<i>Ludwigia alternifolia</i> var. <i>alternifolia</i>	Bushy Seedbox
<i>Lythrum alatum</i>	Winged Loosestrife
<i>Maclura pomifera</i>	Osage Orange
<i>Matalea</i> sp.	Climbing Milkweed
<i>Melothria pendula</i>	Drooping Melonette
<i>Mirabilis linearis</i>	Narrowleaf 4 O'clock
<i>Monarda fistulosa</i>	Wild Bergamot
<i>Morus rubra</i>	Red Mulberry
<i>Muhlenbergia sobolifera</i>	Rocky Muhly
<i>Neptunia lutea</i>	Yellow Neptunia
<i>Nothoscordum bivalve</i>	Crow Poison
<i>Oenothera linifolia</i>	Narrow-leaved Evening Primrose

Opuntia macrorhiza
Oxalis corniculata
Panicum acuminatum
P. anceps
P. clandestinum
P. depauperatum
P. laxiflorum
Paspalum dilatatum
Phacelia strictiflora
Phryma leptostachya
Plantago purshii
P. virginica
P. wrightiana
Platanus occidentalis
Polygonatum canaliculatum
Polygonum punctatum
Polypodium polypodioides
Prunella vulgaris
Prunus mexicana
Psoralea tenuiflora
Ptilimnium nuttallii

Pyrrochloa caroliniana
P. scaposus
Quercus macrocarpa
Q. marilandica
Q. muehlenbergii
Q. shumardii
Q. stellata
Ranunculus sp.
Ranunculus fascicularis
R. hispidus
Rhamnus caroliniana
Rhus copallina
Rhus radicans
Rosa setigera var. *setigera*
Rubus sp.
Rudbeckia hirta
R. subtomentosa
R. triloba
Ruellia strepens forma *strepens*
Rumex hastulus
Sabatia campestris forma *campestris*
Samolus parviflorus
Sanicula canadensis
Satureja arkansana

Prickly Pear Cactus
 Creeping Wood Sorrel
 Woolly Panicum
 Beaked Panicum
 Panicum
 Slimleaf Panicum
 Open-flower Panicum
 Dallis Grass
 Prairie Blue Curls
 Lopseed
 Pursh Plantain
 Pale-seeded Plantain
 Wright's Plantain
 Sycamore
 Solomon's Seal
 Water Smartweed
 Resurrection Fern
 Cure All
 Mexican Plum
 Scurfy Pea
 Nutall's Mock
 Bishopweed
 False Dandelion
 False Dandelion
 Bur Oak
 Blackjack Oak
 Chinkapin Oak
 Shumard's Oak
 Post Oak
 Buttercup
 Early Buttercup
 Hispid Buttercup
 Indian Cherry
 Winged Sumac
 Poison Ivy
 Climbing Prairie Rose
 Raspberry
 Black-eyed Susan
 Sweet Coneflower
 Brown-eyed Susan
 Wild Petunia
 Heartwing Sorrel
 Prairie Rose
 Water Pimpernel
 Canada Sanicula
 Ozark Savory

<i>Scirpus</i> sp.	Bullrush
<i>Scutellaria parvula</i>	Small Skullcap
<i>Sedum nuttallianum</i>	Yellow Stonecrop
<i>S. pulchellum</i>	Pink Stonecrop
<i>Senecio aureus</i>	Groundsel
<i>Setaria lutescens</i>	Foxtail
<i>Sisyrinchium angustifolium</i>	Blue-eyed Grass
<i>Smilax bona-nox</i>	Greenbrier
<i>Solidago delicatula</i>	-----
<i>Sorghastrum nutans</i>	Indian Grass
<i>Sorghum halepense</i>	Johnson Grass
<i>Specularia leptocarpa</i> (= <i>Triodanis leptocarpa</i>)	Venus Looking-glass
<i>S. perfoliata</i> (= <i>Triodanis perfoliata</i>)	Clasping Venus Looking- glass
<i>Sphenopholis obtusata</i>	Prairie Wedgegrass
<i>Sporobolus clandestinus</i>	Sand Dropseed
<i>Stellaria media</i>	Common Chickweed
<i>Strophostyles helvola</i>	Wild Bean
<i>Symphoricarpos orbiculatus</i>	Buckbrush
<i>Toxicodendron radicans</i> (= <i>Rhus radicans</i>)	Poison Ivy
<i>Tragia ramosa</i>	Branching Noseburn
<i>Tridens flavus</i>	Purple top
<i>Trifolium dubium</i>	Hop Clover
<i>Triodanis leptocarpa</i>	Venus Looking-glass
<i>T. perfoliata</i>	Clasping Venus Looking- glass
<i>Ulmus alata</i>	Winged Elm
<i>U. rubra</i>	Slippery Elm
<i>Uniola latifolia</i>	Fish-on-a-fishin-pote Grass
<i>Valerianella radiata</i>	Common Beaked Cornsalad
<i>Verbena urticifolia</i>	White Vervain
<i>Verbesina virginica</i>	Whitecrownbeard
<i>Vernonia baldwinii</i>	Ironweed
<i>Viburnum prunifolium</i>	Black Haw
<i>Vicia villosa</i>	Hairy Vetch
<i>Viola langloisii</i>	Lanceleaf Violet
<i>V. rafinesquii</i>	Field Pansy
<i>V. sororia</i>	Downy Blue Violet
<i>Vitis acerifolia</i>	Bush Grape
<i>Woodsia obtusa</i>	Wood Fern
<i>Zanthoxylum americanum</i>	Prickly Ash
<i>Zizia aurea</i>	Golden Alexanders

VITA

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