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The Vascular Flora of Boyle County, KY

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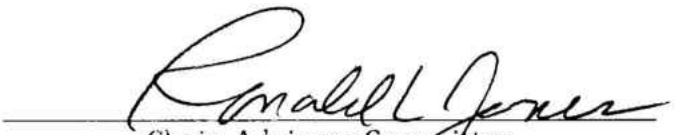

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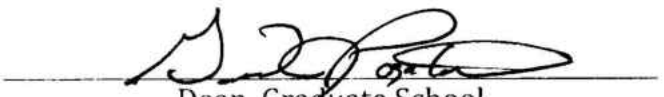

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Submitted to the Faculty of the Graduate School of
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DEDICATION

This thesis is dedicated to Charles Elmer Siewert & Soren Michael Jensen.

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ABSTRACT

The vascular flora of Boyle County, Kentucky, was conducted from March 2013 to March 2015. Boyle County is located in central Kentucky and is part of the Bluegrass Physiographic Section. A total of 127 families, 392 genera, and 722 species, varieties, and subspecies were documented from Boyle County. Twelve plant communities were described: acidic mesophytic forest, acidic sub-xeric forest, acidic xeric forest, Bluegrass woodland, bottomland ridge/terrace forest, calcareous mesophytic forest, calcareous sub-xeric forest, depression pond/mudflat, dry limestone cliff/outcrops, riparian forest, wet prairie/meadow, and one rare state-listed plant community, the shale/siltstone glade. Five rare species with state rankings were discussed: American chestnut (*Castanea dentata*), eastern eulophus (*Perideridia americana*), grass pink (*Calopogon tuberosus*), softleaf arrowwood (*Viburnum molle*), and yellow lady-slipper (*Cypripedium parviflorum*). Seventeen other species that are rare, infrequent, or of special interest are also discussed. There were 156 non-native species (22% of the flora), and 80 of these species are considered invasive in Kentucky.

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CHAPTER I

INTRODUCTION

County floras provide significant information regarding the biodiversity within an area. Valuable information is gathered concerning habitats, distribution of species, and presence of rare and introduced plant species. Species lists generated from these floras can be used in conjunction with previous, concurrent, or future studies to track: effects of climate change on species ranges, local extirpation and colonization of species, changing land use patterns, and spread of invasive species; as well as to gauge the thoroughness of state inventories. In essence, county floras can provide the baseline information for more comprehensive works. In Kentucky, multiple comprehensive works have benefitted from the voucher specimens collected as part of county floras, for example: Wharton and Barbour (1973), Cranfill (1980), Beal and Theiret (1986), Jones (2005), Clark and Weckman (2008), Campbell and Medley (2012), and Jones and Wofford (2013).

Herbaria are a great resource for research, teaching, species identification, and documentation of previous botanical work. All voucher specimens collected from county floras are typically deposited into herbaria for the purpose of documentation of each species in the county, as well as being a resource for future studies. About 32% of Kentucky's 120 counties have had exhaustive floristic surveys completed, which may be one of the reasons Kentucky was ranked tenth out of 13 southeastern states in total number of specimens in Kentucky herbaria and in total number of specimens per square mile in Kentucky herbaria (Jones 1986; Funk and Morin 2000). Graduate students at Eastern Kentucky University (EKU) have been conducting floras of counties or sections of counties since the early 1980s to enhance the available information concerning the occurrence and distribution of Kentucky's state flora. The vascular flora of Boyle County was chosen as the subject of this thesis project to continue with this tradition.

Botanists commonly use a species-area curve to estimate the species present within a given area. Using the corrected Kentucky regional curve as described by Wade and Thompson (1991), Boyle County's predicted species total was 918. After searching the available databases of Kentucky herbaria (Pace et al. 2013; Campbell and Medley 2012), it was discovered 388 species have been documented from Boyle County leaving over 500 additional species to be discovered and documented. Although studies have been done in the Knobs and Bluegrass Regions of Kentucky, there have been no studies specific to Boyle County completed since Linney (1880), which provided a species list for trees and the spring flora. The goals of this study were to (1) inventory the vascular flora of Boyle County, Kentucky, (2) document the occurrence of rare and introduced species, and (3) provide a descriptive account of the plant communities present in the county.

CHAPTER II

STUDY AREA

Boyle County is located between 85°02'21" (−85.039) and 84°39'05" (−84.651) longitudes and 37°42'60" (37.717) and 37°31'58" (37.533) latitudes in central Kentucky (Figure 1). It consists of 47,397 ha that range in elevation from 225.6m (740') to 415.7m (1364') (Currens and McGrain 1978). Eight 7.5 min USGS quadrangle maps represent the topography of the county: Bryantsville, Danville, Gravel Switch, Junction City, Mackville, Parksville, Perryville, and Stanford (Figure 2). Six different counties border Boyle County: Mercer County to the north, Garrard County to the east, Lincoln County to the southeast, Washington County to the southwest, and Marion County to the northwest, (Figure 3). Herrington Lake, which lies between Boyle County and Garrard County to the northeast, is the largest body of water in Boyle County with a surface area of 945 hectares (2,335 acres). It is an impoundment of the Dix River, which delineates Boyle County's southeastern border, and is the deepest lake in Kentucky with a maximum depth of 76 m (249'). A portion of the southwestern corner of the county is delineated by the North Rolling Fork, which runs east to west. Danville, Kentucky, which is home to Centre College, is the largest city in Boyle County with a population of 16,218 people in the 2010 census. Two natural areas of interest in the county are the Central Kentucky Wildlife Refuge in Parksville, Kentucky and The Perryville Battlefield State Historic Site in Perryville, Kentucky.

Figure 1. Location of Boyle County, Kentucky.

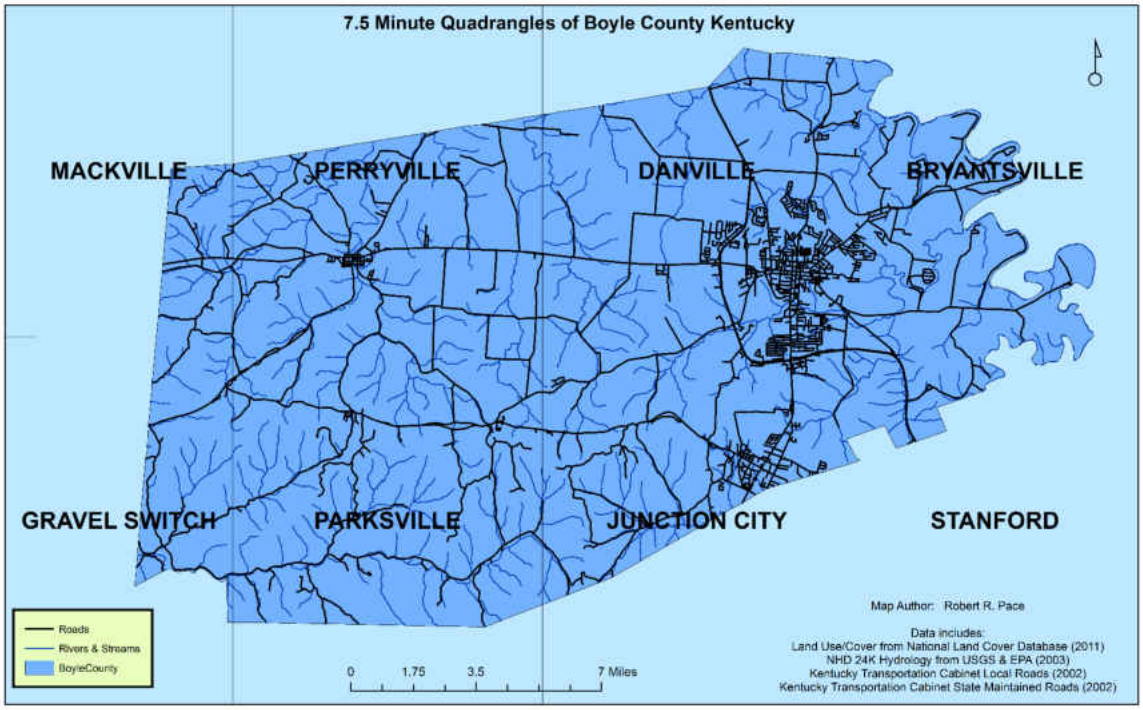

Figure 2. Map of the 7.5" Quadrangles of Boyle County, Kentucky

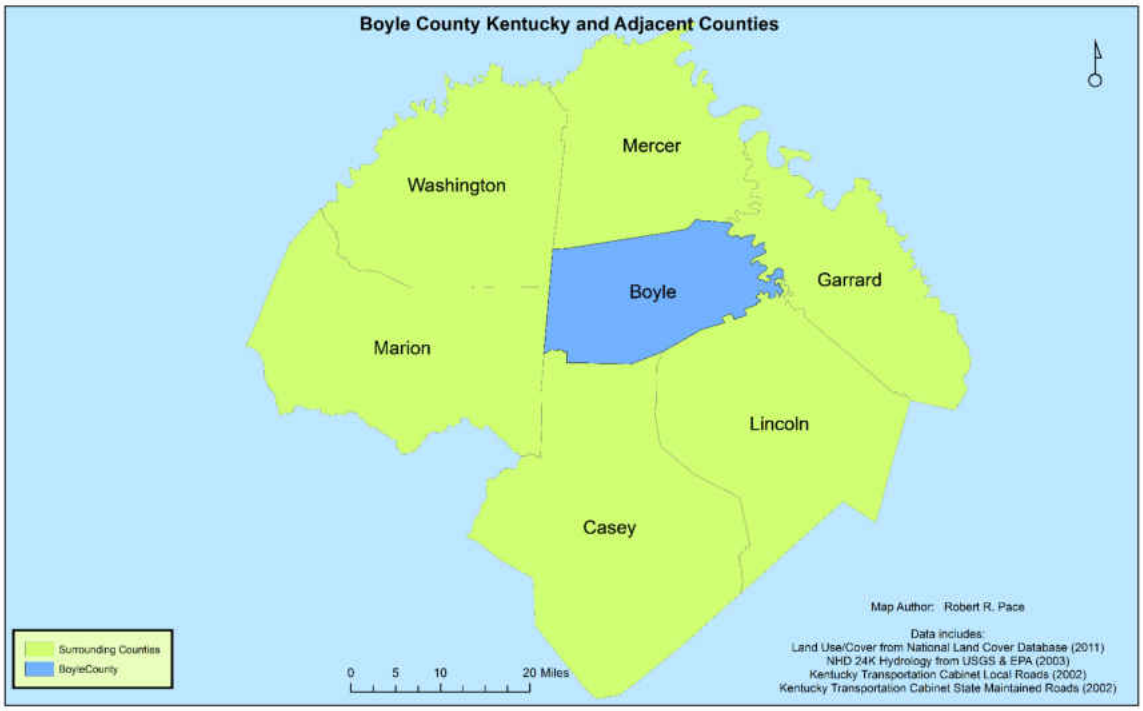

Figure 3. Map of Boyle County, Kentucky and adjacent counties.

Climate

Kentucky's climate is classified as continental and characterized by long, hot summers, and short moderately cold winters (Jones 2005). Precipitation is generally regular throughout the year with rains being fairly heavy, and snow occurring at least once a winter but tending to last for only a day (Craddock 1983). According to the National Historical Climate Data for the Dix Dam from 1971 to 2000, the median growing season lasts for 203 days in Boyle County (Midwest Climate Center 2014). The median date for the last frost is April 10; the first frost October 29. July is the warmest month with a mean temperature of 25.1°C (77.1°F); while January is the coldest month with a mean temperature of 1.3°C (34.4°F). Mean annual precipitation for Boyle County is 109.74 cm (43.2 inches). The least amount of precipitation occurs in October [7.49 cm (2.95")] and the most in May [11.9 cm (4.68")] (Midwest Climate Center 2014).

Watersheds

Boyle County is divided into two watersheds; the western half is in the Salt Licking River watershed and the eastern half is in the Kentucky River watershed. The Salt River and Chaplin River start in the center of the county near Parksville, Kentucky, and flow north into Mercer County. The North Rolling Fork and its tributaries heavily dissect the southwestern portion of the county and flow westward into Marion County (Craddock 1983). The east half of Boyle County is in the lower sub-basin of the Kentucky River Basin. This area has karst topography with many sinks scattered across the landscape. The Dix River and its tributaries dissect the eastern edge of the county. Herrington Lake is a dammed reservoir of the Dix River (Craddock 1983).

Natural Regions

Three classification systems are used to describe the natural regions of Kentucky: physiographic provinces, forest types, and ecoregions. The traditional classifications are physiographic provinces, which are defined by differences in the underlying geology and topography of a landscape; and forest types, which depend

on the species composition of a forest (Jones 2005). Ecoregions are the latest classification system employing "areas of general similarity in ecosystems and in the type, quality and quantity of environmental resources" (Woods et al. 2002). The following discussion will include a description of each classification system as it relates to Boyle County.

Boyle County is located in the Interior Low Plateau Physiographic Province (ILP), and includes portions of the Inner Bluegrass, Eden Shale Belt, Outer Bluegrass and the Knobs Subsections of the Bluegrass Physiographic Section (Figure 4) (Fenneman 1938, Smalley 1983). The northeastern corner of Boyle County is in the Inner Bluegrass, directly surrounded by the Eden Shale Belt that covers the entire northwestern portion of the county and continues as a strip of land south of the Inner Bluegrass. The Outer Bluegrass occurs in two small pockets on the western and eastern edges of the county between the Eden Shale belt and the Knobs Region. The Knobs cover the western and central portions of the southern half of the county. The Inner and Outer Bluegrass, Eden Shale Belt, and Knobs accout for 41%, 31%, and 28%, respectively, of the land in Boyle County (Craddock 1983).

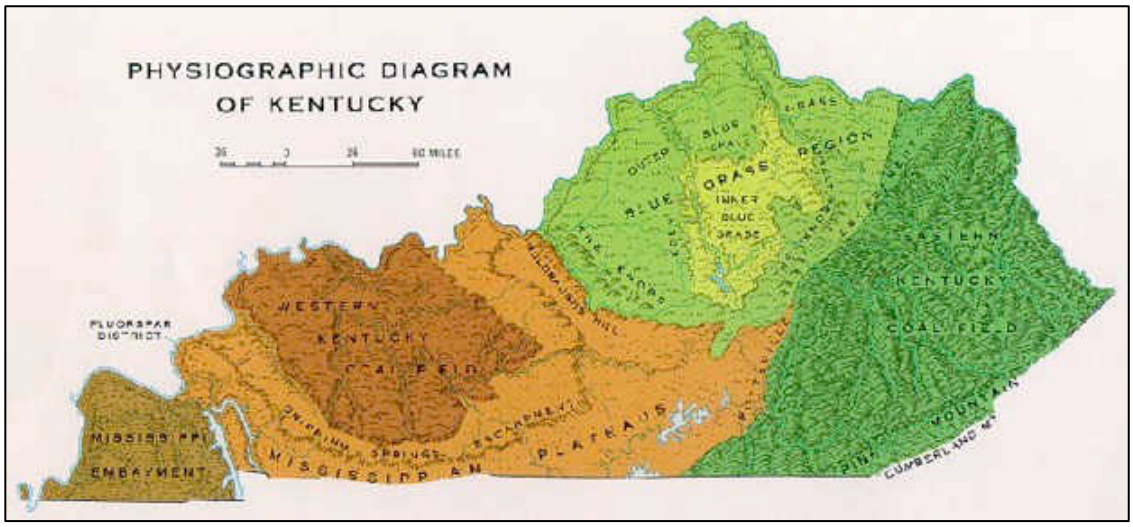

Figure 4. Physiographic provinces of Kentucky. Source: Kentucky Geologic Survey. 2012. Website: https://www.uky.edu/KGS/geoky/physiographic.htm (Accessed on 12/1/2014).

In Boyle County, the Interior Low Plateau Level III Ecoregion is divided into four Level IV ecoregions (Figure 5): the Inner Bluegrass, Hills of the Bluegrass, Outer Bluegrass, and the Knobs-Norman Uplands, which coincide with the four aforementioned physiographic provinces, in their respective orders (Woods et al. 2002). The subsequent sections on geology, soils, topography, land use, and vegetation will give detailed descriptions of each of these subsections as they relate to Boyle County, hereon referred to with their physiographic designations.

Forest regions of Kentucky have been variously defined. The Bluegrass Region has been placed into the Western Mesophytic Forest Region by Braun (1950), along with most of central Kentucky east of the Mississippi River and west of the Cumberland Plateau. Braun (1950) described this area as a broad transitional zone where characters of adjacent regions are intermingled and the controlling environmental factors, such as climate, topography, and edaphic factors, cause a gradual change in forest composition. As such, there is a mosaic of forest types present in the Bluegrass, including mixed mesophytic, mixed hardwoods,

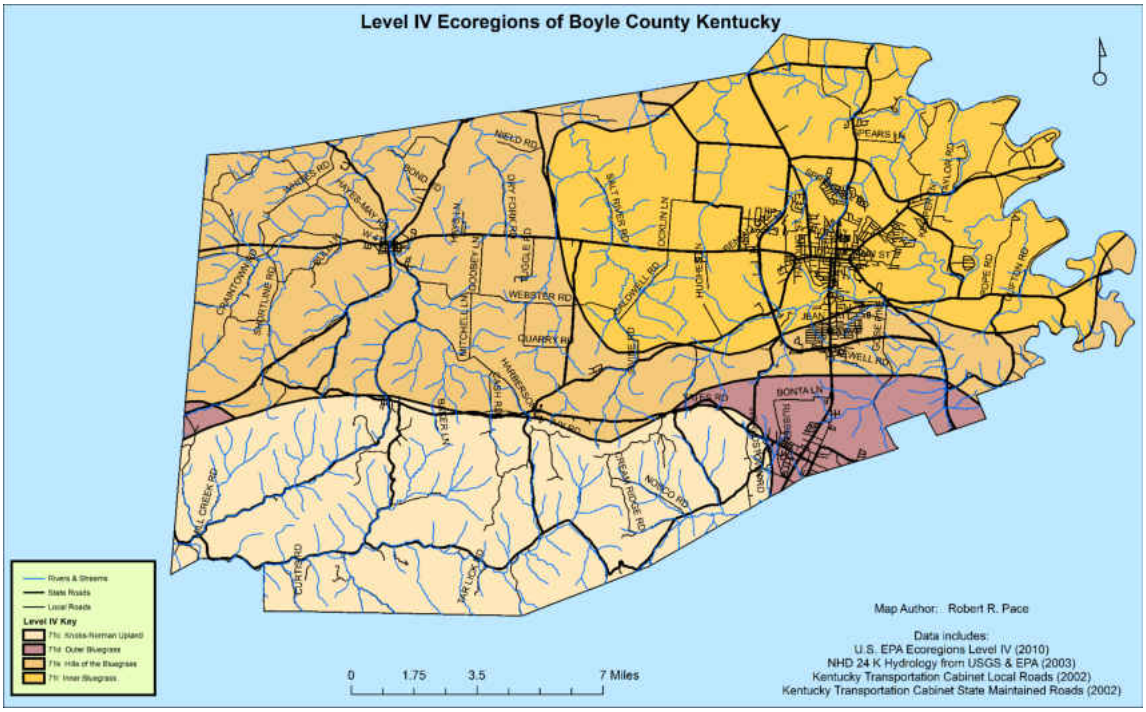

Figure 5. Map of Level IV Ecoregions in Boyle County, Kentucky.

oak-hickory, cedar glades, and swamp forests (Wharton and Barbour 1991). Broad ecotones with gradual changes, such as Braun's Western Mesophytic Forest Region, may prompt differing interpretations due to the overlapping vegetational features (Braun 1950). Küchler (1964) described the forests of the ILP as the Oak-Hickory Forest Region; while Dryer (2006) defined it as the Beech-Maple-Basswood Forest Region. Although these authors cannot agree on the Bluegrass forests, they are in agreement that the Bluegrass forests are quite different from the forests of the Knobs.

Braun (1950) suggested vegetation of the Knobs is an "interrupted extension of the characteristic mixed mesophytic vegetation of the Appalachian Plateaus into the Interior Low Plateaus Physiographic Province. She divided the forests of the knobs into two sections and classified the eastern Knobs on the edge of the Cumberland Plateau as part of the Mixed Mesophytic Forest Regions, and the southern and western Knobs on the edge of the Mississippi Plateau as part of the Western Mesophytic Forest Region. Küchler (1964) classified the southern and western Knobs as Oak-Hickory and the northeastern Knobs as Mixed Mesophytic Forest, which is analogous to Braun's (1950) classification.

Boyle County lies in the western Knobs, meaning part of the Western Mesophytic Forest Region, but Wharton (1945) noted some scattered Mixed Mesophytic forest communities occur as far west as Boyle and Casey counties. Forests of the Knobs in Boyle County are categorized as upland, slope, riparian, and flatwood forests (Jones 2005).

Geology

The Inner Bluegrass lies on top of Middle Ordovician limestone deposited around 400 million years ago (Barbour and Wharton 1991). The area is positioned above the Jessamine Dome of the Cincinnati Arch. Erosion has exposed the oldest strata in Kentucky at the point of greatest uplift at the crest of the Cincinnati Arch. Moving outward from the dome, successively younger rock is encountered: the Ordovician area is surrounded by a belt of Silurian and Devonian rocks, followed by Mississippian and Pennsylvanian (Wharton 1945) (Figure 6).

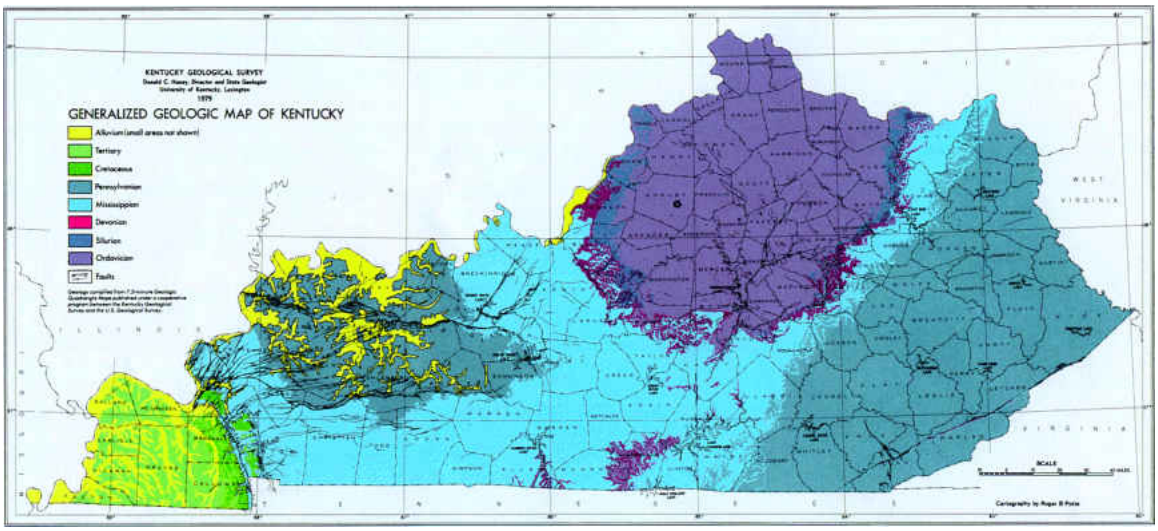

Figure 6. Generalized Geologic Map of Kentucky. Source: Kentucky Atlas and Gazeteer. 2015. Website: http://www.kyatlas.com/kentucky-atlasp.html (Accessed 1/15/2015).

In Boyle County, the stratum of the Inner Bluegrass is composed primarily of Grier and Curdsville Limestone Member, Tanglewood Limestone Member, and Perryville Limestone Member of the Lexington Limestone; with Tyrone Limestone of the High Bridge Group closely following the contours of Herrington Lake and the Dix River. Alluvium from the Holocene era is deposited along Mocks Branch and Salt River and is composed of silt, clay, sand, and gravel (Cressman 1972).

The Eden Shale Belt immediately surrounding the Inner Bluegrass is composed of Upper Ordovician shales (Wharton and Barbour 1991). In Boyle County, this area is primarily composed of the Clays Ferry Formation made up of shale, limestone, and siltstone. Alluvium from the Holocene era is deposited along Begley Branch, Doctor's Fork, and the Chaplin River. In areas around streams and rivers that are more heavily eroded, members of the Lexington Limestone are exposed (Cressman 1974).

The Outer Bluegrass is outside of the Eden Shale Belt and lies on top of Upper Ordovician limestone (Wharton and Barbour 1991). In Boyle County, the Upper Ordovician Limestone is composed of Garrard Siltstone, Calloway Creek Limestone, and the Ashlock Formation, which is a combination of limestone, mudstone, shale,

and siltstone. The Outer Bluegrass in the eastern portion of Boyle County has fluvial and eolian deposits from the Pleistocene era, which are made up of clays, silts and gravel (Harris 1972).

The Brumfield Fault marks the beginning of the Muldraugh's Escarpment and the knobs surrounding the Outer Bluegrass (Cranfill 1991). The hard capstone rocks from the Mississippian era that were once continuous with the Mississippi Plateau are the St. Louis Limestone, the Salem and Harrodsburg Limestone, and the Borden Formation, which is composed of siltstone, limestone and shale. The St. Louis limestone and Salem and Harrodsburg limestone, which are composed of erosion resistant limestone and sandstones, only occur at the highest peaks around elevations of 427 m (1400') in southeastern Boyle County. The southwestern portion of the county has been so heavily dissected by the North Rolling Fork and its tributaries that the St. Louis, Salem and Harrodsburg Limestones have been eroded away. The Muldraugh member (siltstone and limestone), caps most knobs and ridges in southwestern Boyle County, underlain in succession by the Halls Gap member, the Nancy Member and the New Providence Shale Member (Moore 1978). The Borden Formation is easily weathered and has been worn down by streams to create steep slopes and narrow ravines in the Muldraugh's Escarpment (Cranfill 1991). The bottoms of the knobs have a layer of Middle and Upper Devonian shale from the New Albany Shale, which Wharton (1945) refers to as black shale and Linney (1880) refers to as Ohio Shale. Large areas around the North Rolling Fork have alluvium depositions from the Holocene era. Some areas of Upper Ordovician and Lower Silurian limestone have been exposed along the North Rolling Fork (Moore 1978).

Soils

As seen in Figure 7, the soils of Boyle County contrast greatly between the Bluegrass and Knobs regions. Bluegrass soils are very rich in nutrients and low in acidity, while the Knobs are nutrient-depleted and acidic (McInteer 1952). Soils of the Bluegrass are considered Alfisols, derived from mineral residuum of calcareous bedrock; while soils of the Knobs are Inceptisols of the suborder Ochrepts derived

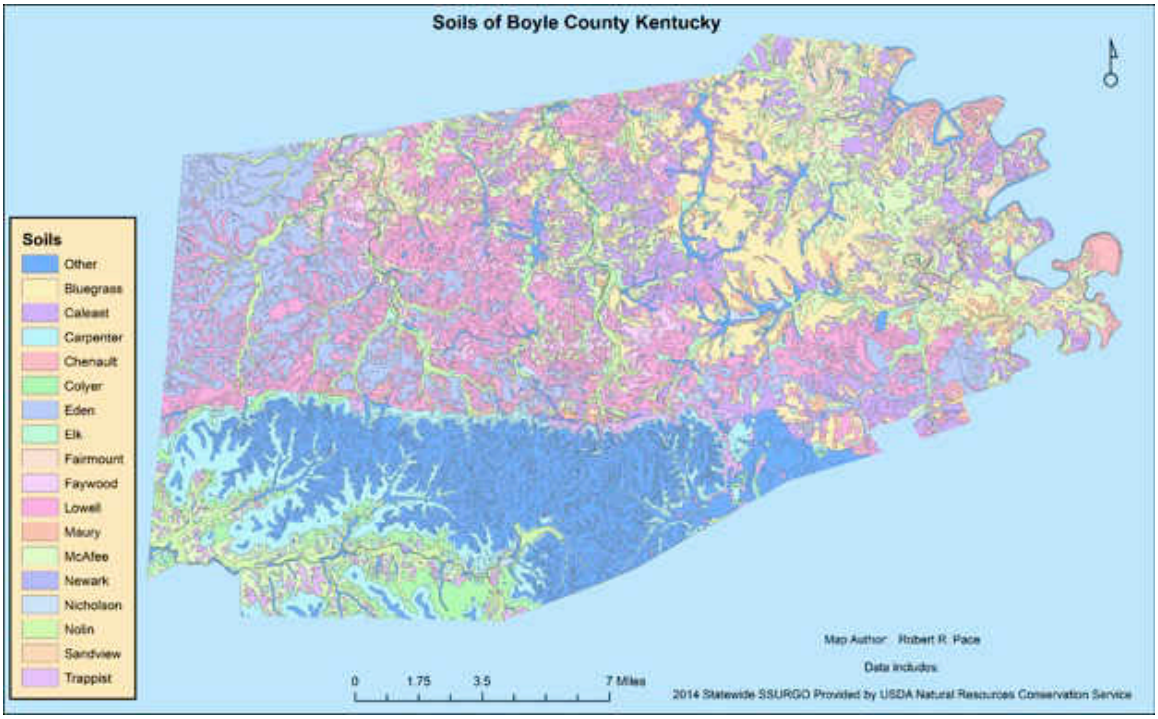

Figure 7. Map of the soils of Boyle County, Kentucky.

from the residuum of sandstones and shales (Wharton and Barbour 1991; Harker et al. 1981).

Forty-one percent of the soils in Boyle County have the following combination of soil units: Maury-McAfee-Fairmount, Fairmount-McAfee-Maury, Chenault-Fairmount-McAfee, Maury-Caleast, McAfee-Caleast-Fairmount, Caleast-McAfee-Maury, and Caleast-Maury, making up the Inner and Outer Bluegrass. These soils are well drained, generally deep except in the vicinity of cliffs along the eastern border of the county where they are shallow, and have extensive karst topography. They have high contents of loam and some clay, moderately slow to slow permeability, and are mostly derived from the residuum of weathered limestone, except in the Cheanault-Fairmount-McAfee formation; which is derived from weathered limestone or old alluvium over limestone. Thirty-one percent of Boyle County has a combination of Lowell-Faywood-Eden soil units forming the Eden Shale Belt. These soils are generally well drained, deep to moderately deep, with

high clay content, and derived from the residuum of limestone, siltstone, and shale (Craddock 1983).

The soil types of the Knobs Region vary from the ridgetops, to the slopes, to the base of the knobs. Two percent of the soils in Boyle County are made up of Tilsit-Trappist soil units and account for the top of the Knobs and ridgetops. These soils are moderately well drained, deep to moderately deep, containing loam or clay. They were derived in collivium or residuum of weathered black shale. Twenty-one percent of the county is made up of Garmon-Carpenter-Vertrees soil units, which are found on very steep to gentle slopes of the knobs. They are well drained, moderately deep to deep soils containing loam or clay, and were derived in collivium or residuum of weathered limestone, siltstone, or shale. The last five percent of the county is composed of Trappist-McAfee-Coyler soil units, making up the gentle to steep slopes at the base of the Knobs. They are well drained, moderately deep to shallow soils containing shale or clays. They were derived from the residuum of weathered limestone or black shale (Craddock 1983). Valley soils of the knobs are generally poorly drained, low in nutrients, and acidic (Wharton 1945).

Topography

As seen in Figure 8, the topography of Boyle County has striking differences between the gently rolling plains of the Bluegrass to the steep-sided conical hills and ridges of the Knobs. The Inner and Outer Bluegrass have nearly level to rolling plains with local relief of 18 to 30 m (roughly 60 to 100') except in the vicinity of Herrington Lake and the Dix River along the eastern border where steep valleys have relief as great as 70 m (230') (McGrain and Currens 1978). Much of this region contains an extensive karst landscape that is characterized by sinkholes, springs, and sinking streams (Woods et al. 2002). Danville, Kentucky, in the Inner Bluegrass, sits at an elevation of 301 m (989') and Herrington Lake at 229 m (750') when full (McGrain and Currens 1978). Greater dissection and higher local relief characterize

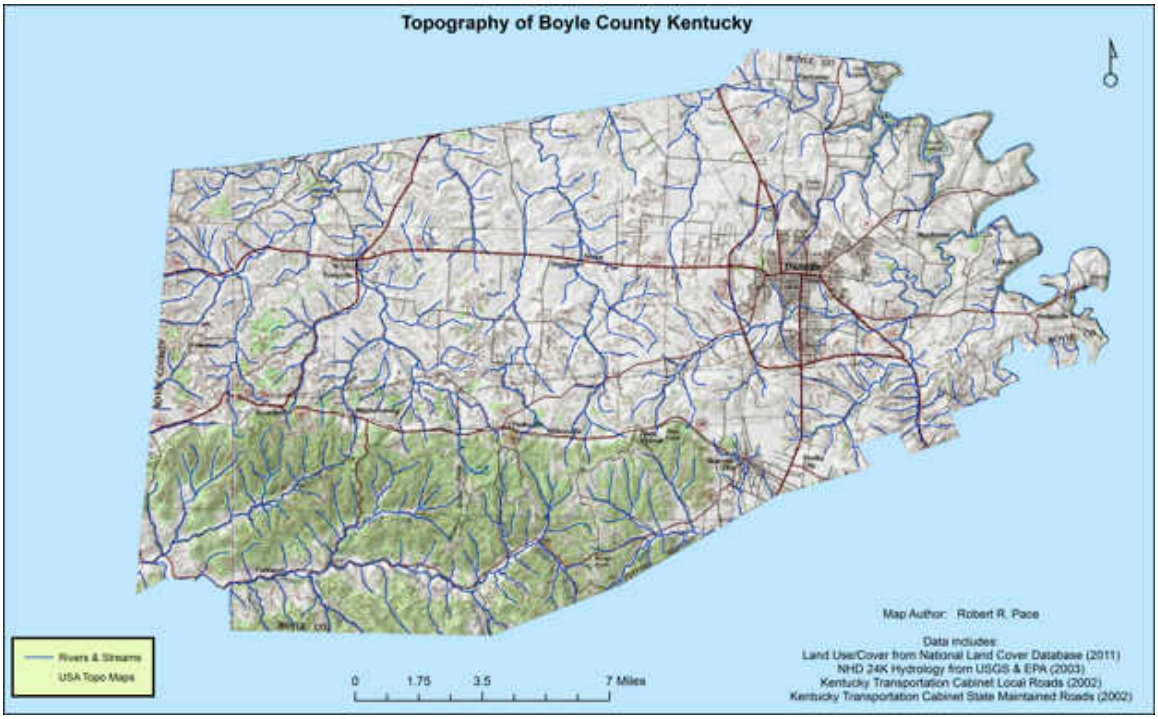

Figure 8. Map of the topography of Boyle County, Kentucky.

the northwestern portion of Boyle County, which is in the Eden Shale Belt or the Hills of the Bluegrass. Perryville, Kentucky, in the Eden Shale Belt, sits at 259 m (851') (McGrain and Currens 1978).

The transition from the Bluegrass Region to the Knobs is a sudden change from the somewhat hilly rolling plains of the Eden Shale belt to a north-facing cuesta rising up to 91 m (300') tall (Cranfill 1991). The Muldraugh escarpment, or Muldraugh's Hill, dissects the county starting at Junction City and extends westward parallel to Kentucky Highway 34 (McGrain and Currens 1978). The landscape of the escarpment varies from gently sloping hills and ridges with broad to flat bottoms to hilly and mountainous terrain that rises and eventually merges with the plateau areas from which it eroded (Smalley 1983). The dissected outer edge of the escarpment consists of a belt of isolated, conical-shaped hills and ridges, called knobs, which are the erosional remnants of the resistant cap-rock of Muldrough's Hill (Cranfill 1991). The shape of knobs vary from narrow, high gradient valleys steeply cutting down to streams to gently sloping gradients with swampy valley

floors (Carey et al. 2006). The lower slopes of these hills have a hummocky appearance due to the erodible nature of the soft clay shales that make up much of the geology in the region (McGrain and Currens 1978). The highest elevation in the county is Parksville Knob at 416 m (1364'). Parksville, Kentucky, which is south-centrally located in Boyle County, sits at an elevation of 329 m (1080'). Junction City, Kentucky, in the southeastern portion of the county is at an elevation of 301 m (986') (McGrain and Currens 1978). In the southwestern corner of the county, the land is well dissected by the North Rolling Fork and its tributaries forming extensive floodplains between the knobs. The lowest elevation of Boyle County is 226 m (740') where the North Rolling Fork leaves Boyle County on the western border (McGrain and Currens 1978).

Land Use

All of the soils in the Bluegrass Region are rich in calcium and phosphorous and low in acidity, which is ideal for the cultivation of crops (McInteer 1952). The Inner Bluegrass is ranked first in terms of crop cultivation within the region; with Outer Bluegrass ranking second (McInteer 1952). Most of the land is used for cultivated crops as well as hay and pasture, except in the vicinity of the steep slopes of the Dix River and Herrington Lake, which are forested (Craddock 1983). Due to the underlying shaley bedrock and more rugged terrain of the Eden Shale Belt, this area suffers from more erosion and water run-off than the Inner and Outer Bluegrass. This results in thinner soils and makes the area more susceptible to droughts. Despite its fertile soils, the land is not ideal for crop cultivation and is predominantly pastureland (McInteer 1952; Craddock 1983).

Soils of the Knobs are low in nutrients, acidic, have slow permeability, and tend to be on very steep slopes prone to erosion. Despite this, much of the knobs at some point in time have been used for cultivation, typically corn or tobacco, as well as for hay or pasture (Craddock 1983; Wharton 1945). Lumbering was also once an important industry in the area and resulted in the removal of most of the valuable timber of the Knobs, and highly degraded the soil beds in Boyle County (Linney 1880).

Clearing of forest tracts can lead to increases in flooding and increased soil erosion (Linney 1880). On terrains with thin soils, clear-cutting can cause the soil bed to erode away, completely exposing bare bedrock. This happened particularly along the Dix River, where forested slopes with thin soils were clear-cut exposing the limestone cliffs. This also occurred in Boyle County at Knob Lick, where an area of over 100 acres had its shale bedrock completely exposed and was void of all vegetation, due to the clear-cutting of the forest (Linney 1880). In areas of the Knobs where forests were cleared to make room for farming, both tree loss and crop cultivation caused adverse effects on the soil bed. The combination of poor agricultural practices, a very active lumbering industry, and the naturally thin soil and erodible nature of knobs, led the soils of the Knobs Region and parts of the Bluegrass Region to be heavily degraded (Wharton 1945; Wharton and Barbour 1991).

Maria Daviess (1924) published an account of the History of Mercer and Boyle Counties and included a description of land use at the time. In the "Blue Grass beds" east of the Salt River "grass grows most luxuriously, and it is on this soil also that hemp delights to revel." The lands west of the Salt River are referred to as "the finest cereal lands in Kentucky." Crops at the time included hemp, corn, wheat, rye, oats, hay and tobacco. Daviess (1924) expressed her fear that the forests of the knobs, "if cleared of trees and loosened by cultivation…will soon wash ruinously into gullies." Much of the forests had been cut down and used for building materials. In one passage, she laments on the current destruction of the forest,

> "None can deny, and all should lament the wanton destruction that has been made of our timber resources, especially since the investigation of our timber resources show that, beside being drawn on so heavily for building, in fencing, and for commerce; drought, increase in insects, of some undiscovered reason, is causing large classes of our trees to die out, notably the elm and white oak. Scientists, who are the wise ones in such matters, say the loss of our springs and the frequency of droughts, are both caused by the destruction of our forests (Daviess 1924)."

Linney (1880) also made note on the destruction of the forests in Boyle County asserting that what remained in the area "seems doomed to speedy destruction, while no effort is being made to reproduce or protect young forests for the future." Daviess (1924) acknowledged that the Dix River had no commercial or agricultural value due to the steep cliffs,

> "but between the grand ranges of the Rocky and the Alleghany mountains, there is no scenery so wild and grand as borders this stream. The deep, rapid waters of the hurrying river sometimes flow on silently and dark, as an evil destiny, and again rushing on like a torrent of broken sunshine, the granite walls chiefly rise perpendicular…from out of unforeseen footing rise tremendous trees and luxuriant down-trailing vines and flowers of Alpine beauty and hardiness…(Daviess 1924)."

Most of Daviess (1924) account goes on to describe the culture of Boyle and Mercer counties, as well as the involvement its inhabitants had in various wars.

Currently, most of the land in the Bluegrass Region of Boyle County is used for hay or pasture and cultivated crops (Figure 9). Deciduous forests cover most of the Knobs region, while mixed and evergreen forests of mostly red cedar cover the steep slopes along the eastern edge of the county. A large urbanized area occurs in the eastern part of the county around Danville, KY.

Vegetation and Flora

Many floristic and ecological studies have focused on varying features of the vegetation of the Bluegrass and Knobs regions. For a comprehensive list of these studies, refer to Overbeck (2014). Braun (1950), Wharton and Barbour (1991), and Jones (2005) provide overviews of the natural history and vegetation of the Knobs and Bluegrass regions. Floristic surveys that have elaborated on vegetation specific to Boyle County are limited to Wharton and Barbour (1991), Muller and McComb (1986), Wharton (1945), and Linney (1880). Wharton and Barbour (1991) include

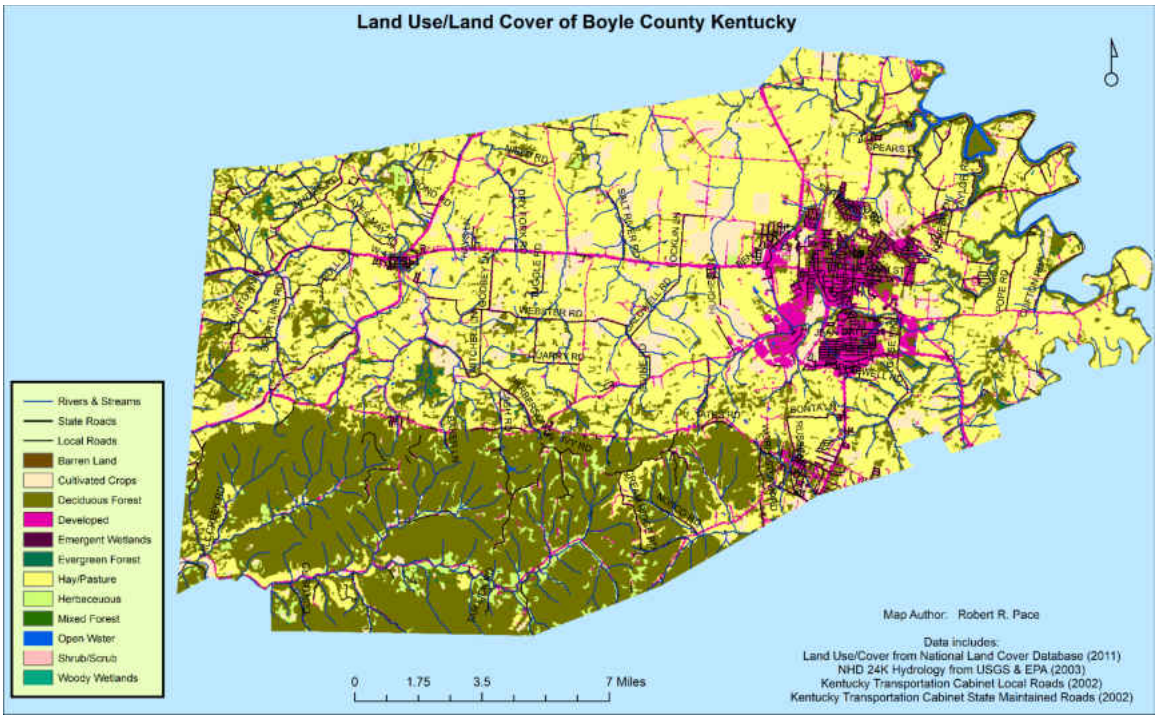

Figure 9. Map of the Land Use/Land Cover of Boyle County, Kentucky.

a species list, documenting plants from the Inner Bluegrass found in Boyle County. Muller and McComb (1986) conducted a quantitative survey on the vegetation of eight sites in the Knobs, one in Boyle County, to provide baseline data concerning species composition, stand structure, and species-environment relations of the upland forest of the Knobs Region. Wharton's (1945) dissertation on the flora and vegetation of the Devonian-Mississippian black-shale region of Kentucky provides an in-depth synopsis of the natural history and vegetational composition of the black-shale region of the Knobs. Wharton (1945) surveyed a mixed-mesophytic forest community near Alum Springs, about 3.2 km northwest of Junction City in Boyle County. Linney (1880) conducted a survey of the timber in Boyle County in relation to geological formations and edaphic features. He compiled a species list of the trees and spring flowering plants. More details on the works listed above, as well as a comparison to the results of the current study will be provided in the Discussion.

Major Collecting Sites

The Perryville Battlefield State Historic Site (PBSHS) is a Kentucky State Park located in northwestern Boyle County in Perryville, KY at the site of the largest battle to occur on Kentucky soil. Today, the state park is open to the public with 11.3 km (7 mi.) of interpretive walking trails. The terrain is hilly and plant communities include prairies with limestone outcrops, fallow fields, ponds, and riparian forests along Doctor's Creek.

The Central Kentucky Wildlife Refuge (CKWR) is located south-centrally in Boyle County in the Forkland area, off of Carpenter Creek Road. It was established in 1965 by a non-profit organization and includes 200 ha (500 acres) of land in the Knobs Region. The landscape includes a larger knob called Huckleberry Ridge, several man-made ponds built to increase habitat diversity, and lowlands along Carpenter Fork (on the eastern edge of the refuge) and along North Rolling Fork (on the northern edge of the refuge). The Refuge is open to the public year-round with 21 km (13 mi.) of trails for hiking. The trails dissect various plant communities, including: Oak-Hickory Forest, White Oak Forest, Cane Bottomlands Forest, prairies, fallow fields, stream corridors, and along pond banks.

CHAPTER III

MATERIALS AND METHODS

This floristic survey of Boyle County was based on collections made from March of 2013 to March of 2015, as well as previously existing voucher specimens held in Kentucky herbaria. Each year collection trips were conducted from February to October, the period of time when plants could be collected in full bloom or fruit. Major collecting sites were selected so that all major habitat types in the county could be visited on a periodic basis. Queries of the Eastern Kentucky University Herbarium database (Pace et al. 2013) aided in the selection of these collection sites. Multiple collection sites were frequented for the Inner Bluegrass, including: Gwinn Island, areas along Clarks Run, and a wetland in Danville, KY. The Perryville Battlefield State Historic Site served as a collection site within the Eden Shale Belt. A wetland near Junction City off of Knob Lick Road, along with road surveys, served as collection sites for the Outer Bluegrass, and the Central Kentucky Wildlife Refuge served as a collection site within the Knobs. Additional surveys occurred, including some on private lands when granted permission.

Standard collecting and pressing procedures were followed [as described by Murrell (2010)]. When possible, each species was collected in triplicate for deposit in multiple herbaria. Photographic documentation was taken for species considered, rare, threatened, or endangered, or when populations were isolated and consisted of less than 20 individuals. Notes were taken concerning species description, habitat, location (including GPS coordinates), and date of collection. Pressed plants were deposited into a drier for three days at 43.3°C, subsequently transferred to a freezer for three days at -40°C, and then stored in a sterile room free of pests.

Specimens were identified to the lowest taxonomic unit using Jones (2005) with nomenclature also following Jones (2005). Drs. Ronald L. Jones, Ralph L. Thompson, and Ross C. Clark aided in identification of plants. Labels were created for each species and included the following information: family, genus, species,

variety (if applicable), collection number, collection location (including GPS coordinates), habitat, date collected, and collector(s).

Additional species for Boyle County were obtained from regional herbaria (with their official "Index Herbariorum" acronyms indicated): Berea College Herbarium (BEREA), Centre College Herbarium (formerly KBRYO, now merged with EKY, specimens indicated as EKY/Centre), Eastern Kentucky University Herbarium (EKY), Morehead State Herbarium (MDKY), The John W. Thieret Herbarium at Northern Kentucky University (KNK), the Herbarium of the College of Agriculture, University of Kentucky (no official acronym, abbreviated here as UKAg), and the University of Kentucky Herbarium (KY).

The species-area curve generated by Wade and Thompson (1991) for the mixed mesophytic and western mesophytic forest regions predicted 918 plant species to occur in Boyle County. This species-area curve requires the flora to be: within one of the aforementioned forest regions, well inventoried, and not restricted to small, uncommon habitat types or highly disturbed areas (Wade and Thompson 1991). Boyle County is within the Western Mesophytic Forest Region and was comprehensively surveyed in a variety of habitat types.

The status of non-native species was based on Jones (2005) and the Kentucky Exotic Pest Plant Council (KEPPC 2013). Status of rare, threatened, and endangered species, as well as plant community descriptions were based on lists maintained by the Kentucky State Nature Preserves Commission (KSNPC 2010, 2012).

CHAPTER IV

RESULTS

Floristic Summary

A total of 722 species, subspecies, and varieties in 392 genera and 127 families were documented from Boyle County (Table 1). This number represents 24% of all species reported from Kentucky according to Jones (2005). This also accounts for 79% of the estimated total of 918 species predicted to occur using the species area curve (Wade and Thompson 1991). Out of the total 722 taxa, 162 were specimens held in Kentucky herbaria that were not observed during this study. Seven Kentucky herbaria provided previously documented species: EKY (54 taxa), KY (54 taxa), KBRYO (30 taxa), UKAg (10 taxa), KNK (5 taxa), BEREA (5 taxa), and MDKY (4 taxa). Twenty-six of these species had not been collected in the county since 1950 (Table 2).

An annotated list of these taxa identified in Boyle County is provided in Appendix I. The taxa are divided into four major groups: Lycopodiophyta, Polypodiophyta, Coniferophyta, and Magnoliophyta. Magnoliophyta is further divided into Monocotyledoneae and Dicotyledoneae. The Boyle County flora

Table 1. Taxonomic distribution of vascular plant species in Boyle County, KY.

Groups	Families	Genera	Species	Natives	Exotics	Exotic invasives	State-listed
Lycopodiophyta	1	1	1	1	0	0	0
Polypodiophyta	5	12	16	16	0	0	0
Coniferophyta	2	2	3	3	0	0	0
Magnoliophyta	119	377	702	550	156	80	5
Monocots	24	66	140	114	26	11	2
Dicots	95	311	562	432	130	69	3
Flora Totals	127	392	722	566	156	80	5

consists of 1 species of lycophytes, 16 pteridiophytes, 3 gymnosperms, and 708 angiosperms (141 monocots and 567 dicots). The five dominant plant families, representing 35% of the total flora, include: Asteraceae (100 taxa), Poaceae (51 taxa), Fabaceae (38 taxa), Cyperaceae (35 taxa), and Rosaceae (29 taxa).

There were 156 non-native species identified in Boyle County (indicated by a "*" or "**"in Appendix I), accounting for 22% of the total flora. Eighty of those species are considered invasive with severe threat, significant threat, moderate threat, or watch list status (the ones indicated by a double asterisk), accounting for 11% of the total flora (KEPPC 2013). No federally listed species were found, but five species with state-listings were documented [indicated by an exclamation mark (!) in Appendix I]. One rare ecological community, the shale/siltstone glade, as listed by the Kentucky State Nature Preserves Commission, is present in Boyle County (KSNPC 2012).

Vegetation

Plant communities vary by soil moisture, depth, and structure as well as slope aspect, position, form, and steepness (Jones 2005). A major influence of plant communities in Boyle County is the acidity of the soil, with the Bluegrass Region having more calcareous conditions and the Knobs Region having more acidic conditions (Braun 1950). Major plant communities present in Boyle County fall into

Table 2. Native plant species in Boyle County, Kentucky that have not been collected since 1950.

Species List		
Agrimonia pubescens	*Juncus diffusissimus*	*Rhododendron cumberlandense*
Aletris farinosa	*Lechea racemulosa*	*Rumex obtusifolius*
Calopogon tuberosus	*Malus coronaria*	*Sagittaria australis*
Cardamine rhomboidea	*Mimulus ringens*	*Samolus floribunda*
Carex glaucodea	*Panicum rigidulum*	*Scirpus georgianus*
Celastrus scandens	*Paronychia fastigiata*	*Solidago bicolor*
Croton capitatus	*Physostegia virginiana*	*Thalictrum dioicum*
Cuphea petiolata	*Polygala ambigua*	
Hieracium venosum	*Potamogeton diversifolius*	

the following categories: aquatic and wetlands, floodplain forests, upland forests, relict oak savannas, grasslands, rock outcrops, or disturbed communities.

Aquatic and Wetland Communities

Standing water communities such as wet ditches, farm ponds, and natural ponds occur across Boyle County, as well as the artificial impoundment Herrington Lake. Standing water species in Boyle County include *Sagittaria montevidensis, Potamogeton nodosus, Ludwigia alternifolia, and L. peploides.*

Streams and rivers dissect much of the county creating running water communities along shorelines and gravel bars. Plants occupying shorelines of streams and rivers in Boyle County include *Carex crinita, C. frankii, C. squarrosa, C. vulpinoidea*, *Eleocharis erythropoda*, *E. obtusa*, *Hypericum mutilum*, *Juncus acuminatus, J. effusus, and J. tenuis*. Gravel bars in smaller streams in Boyle County are dominated by *Justicia americana*, and smartweeds (*Polygonum caespitosum*, *P. hydropiperoides, P. lapathifolium, P. pensylvanicum, P. persicaria, P. punctatum, P. sagittatum*).

Wet meadows and seepages are considered emergent wetland communities (Jones 2005) and in Boyle County commonly consist of *Agrostis gigantea, Asclepias incarnata*, *Bidens frondosa, B. tripartita, Boehmeria cylindrica, Carex crinita, C. frankii, C. festucacea*, *C. lurida, C. swanii, C. tribuloides, C. vulpinoidea*, *Cicuta maculata, Cyperus bipartitus, C. erythrorhizos*, *C. odoratus, C. strigosus, C. squarrosus*, *Eleocharis erythropoda*, *E. obtusa*, *Eupatorium fistulosum, E. perfoliatum, Hibiscus moscheutos*, *Impatiens capensis*, *I. pallida*, *Juncus acuminatus, J. effusus, J. tenuis, Leersia oryzoides, Lobelia cardinalis, L. siphilitica, Ludwigia alternifolia, Schoenoplectus tabernaemontani*, *Scirpus atrovirens, S. pendulus*, and *Typha latifolia*. A rare plant species associated with emergent wetlands that has been historically documented in Boyle County is *Calopogon tuberosus*.

Floodplain Forests

Floodplain forests are found in Boyle County in the Knobs Region and Bluegrass Regions along lower reaches of the major stream systems. They occur

on elevated banks and in adjacent bottomlands where seasonal flooding occurs (Jones 2005). Tree species on the elevated streambanks of Boyle County include *Acer negundo*, *A. saccharinum, Fraxinus pennsylvanica*, and *Platanus occidentalis*.

Bottomland hardwood forests occur beyond the streambanks on flat terraces and low ridges (Jones 2005). In the Knobs Region of Boyle County, the trees in the bottomlands consist of *Acer rubrum, A. saccharum, Aesculus glabra, Carya cordiformis, C. laciniosa, Fagus grandifolia, Fraxinus pennsylvanica, Gleditsia triacanthos, Juglans nigra, Liquidambar styraciflua, Liriodendron tulipifera, Nyssa sylvatica, Quercus palustris, Salix exigua, Salix nigra, and Ulmus americana.* Understory species include *Arundinaria gigantea, Asimina triloba, Carpinus caroliniana*, and *Lindera benzoin*. This forest occurs in the CKWR along the North Rolling Fork and its tributaries. In the Bluegrass Region of Boyle County, the trees of the bottomlands consist of *Acer negundo*, *Celtis occidentalis, Juglans nigra, Ulmus americana*, *U. rubra*, *Platanus occidentalis*, and *Fraxinus americana*. The understory species include *Cercis canadensis, Cornus drummondii*, and *Rhamnus caroliniana*. This forest occurs along the tributaries of the Dix River in eastern Boyle County. Between the floodplains and upland habitats are transitional forests. Boyle County's transitional forests consist of *Acer saccharum, Fagus grandifolia, Fraxinus americana, Juglans nigra, Liriodendron tulipifera, Q. alba, Quercus rubra, Tilia americana var. americana, T. americana var. heterophylla, and Ulmus rubra.*

Upland Forests

Upland forests are generalized as mixed deciduous, mixed oaks, xeric oaks, and pine forests. Mixed deciduous forests occur on rich, deep mesic soils on lower and north-facing slopes and in ravines. Mixed oaks forests are found on rolling uplands and mid to upper slopes. Xeric oak forests are found on thin, dry and rocky soils of peaks and ridges and south-facing upper slopes. Xeric oak forests have more sun exposure, poorer soil development, and less soil moisture than mixed oak forests (Jones 2005). Boyle County's forests primarily exist within the Knobs but portions of the Bluegrass surrounding streams, Herrington Lake, and disjunct patches remain forested.

Mixed deciduous forests of Boyle County in the Knobs and Bluegrass consist of *Acer saccharum, Carya cordiformis, C. laciniosa, C. ovata, Fraxinus americana, Juglans nigra, Liriodendron tulipifera, Prunus serotina, Quercus alba, Q. rubra,* with understory species of *Asimina triloba, Cercis canadensis, Cornus florida, Hydrangea arborescens, Lindera benzoin,* and *Staphylea trifolia*. In the Bluegrass, additional species include *Acer nigrum, A. rubrum, Aesculus glabra, Celtis occidentalis, Gymnocladus dioicus, Tilia americana* var. *americana*, *Ulmus americana,* and *Quercus shumardii*. The Knobs mixed deciduous forests also contains *Aesculus flava, Fagus grandifolia, Morus rubra, Pinus strobus, Tilia americana* var. *heterophylla,* and shrubby species *including Aralia spinosa, Sambucus canadensis, and Viburnum acerifolium.*

Mixed oaks forests in Boyle County tend to be dominated by Quercus alba, and associated with: *Acer saccharum, A. rubrum, Carya cordiformis, C. ovata, Fraxinus americana, Liriodendron tulipifera, Nyssa sylvatica, Quercus alba, Q. montana, Q. velutina,* and *Ulmus americana.* In the Knobs, *Aralia spinosa, Cercis canandensis, Cornus florida, Fagus grandifolia, Pinus strobus, Sambucus canadensis, Smilax glauca, S. rotundifolia, and Vitis spp.* are also components of this forest as well as ericaceous species in the understory, including *Gaylussacia baccata, Vaccinium corymbosum, V. pallidum,* and *V. stamineum.* This forest also occurs in the Forkland Area across Carpenter Creek from CKWR on east and north facing slopes. In the Bluegrass Region, oak-ash forests are associated with limestone and also include: *Acer saccharum, Fraxinus americana, F. quadrangulata, Ostrya virginiana, Quercus muhlenbergii, Q. shumardii, and Viburnum prunifolium.* A state-listed species, *Viburnum molle*, occurs in the Bluegrass in a mixed oak forest along the north-facing slopes of Clarks Run. This forest association also occurs along other tributaries of the Dix River in the Bluegrass Region on mid to upper slopes.

Xeric oak forests in the Knobs of Boyle County are dominated by *Quercus montana* and associated with *Acer rubrum, Carya glabra, C. ovata, C. tomentosa, Nyssa sylvatica, Oxydendrum arboreum, Pinus virginiana, Quercus alba, Q. coccinea, Q. falcata, Q. stellata, Q. velutina*, and formerly *Castanea dentata*. Shrubbery includes *Amelanchier arborea, Gaylussacia baccata, Hamamelis virginiana, Sassafrass albidum,*

Vaccinium corymbosum, and *V. pallidum,* and woody vines S*milax glauca and S. rotundifolia*. This forest occurs on ridgetops of the CKWR, and other knobs and ridges in Boyle County. In the Bluegrass Region, *Quercus muhlenbergii* dominates xeric oak forests and is associated with *Carya glabra, C. ovata, Fraxinus americana, F. quadrangulata, Juniperus virginiana, Quercus alba, and Q. rubra*

The understory consists of *Cercis canandensis, Ostrya virginiana*, *Ptelea trifoliata, Rhamnus caroliniana, Rhus aromatica, Smilax bona-nox,* and *Viburnum rafinesquianum*. This forest occurs on ridgetops and limestone bluffs in the Inner Bluegrass surrounding Herrington Lake, specifically on Gwinn Island, where *Carya ovalis* is also present.

Pine forests in Boyle County only occur in the Knobs on the highest and driest ridges. Species are low in diversity and consist of *Pinus strobus, P. virginiana*, and occasionally *Carya glabra, Quercus montana*, and *Q. coccinnea*.

Ash-Oak Savanna of the Bluegrass

Open ash-oak woodlands with less than 50% canopy cover were thought to once cover the Bluegrass plains (Jones 2005). A relict old-growth savanna is present in Danville, KY, on the estate of the Berney Home Historical Site. Dominant species is *Quercus macrocarpa* and a combination of *Fraxinus americana, Liquidambar styraciflua, Quercus muhlenbergii, Q. palustris,* and *Q. shumardii.*

Grasslands

Grass-dominated communities, including barrens, meadows and prairies, are scattered across Boyle County. Most pre-settlement grasslands have been converted to pasture or cropland and modern communities now exist along roadsides, or in old-field habitats. Species present in these communities in Boyle County include: *Acalypha ostryifolia, A. virginica, Agrostis gigantea, Andropogon gerardii, A. virginicus, Ampelamus albidus, Anemone virginiana, Apocynum cannabinum, Asclepias syriaca, A. tuberosa, Asclepias viridis, Bidens cernua, B. polylepis, Chamaecrista fasciculata, Cirsium discolor, Commelina communis, Coreopsis grandiflora, Croton monanthogynus, Desmodium canescens, Dichanthelium*

clandestinum, Echinacea purpurea, Elephantopus carolinianus, Erigeron annuus, E. philadelphicus, Eupatorium serotinum, Euphorbia corollata, Gaillardia pulchella, Galactia volubilis, Geranium carolinianum, Geum canadense, Helianthus tuberosus, Hieracium gronovii, Houstonia carulea, Hypericum punctatum, Isanthus brachiatus, Krigia biflora, Lobelia spicata, Lysimachia lanceolata, Monarda fistulosa, Narcissus pseudonarcissus, Nothoscordum bivalve, Oenothera biennis, Orbexilum pedunculatum, Packera anonyma, Passiflora incarnata, Penstemon digitalis, Penstemon laevigatus, Perideridia americana, Phlox maculata, Physalis heterophylla, Polygala ambigua, Polygala sanguinea, Pseudognaphalium obtusifolium, Pycnanthemum tenuifolium, Ranunculus hispidus, Rosa setigera, Rudbeckia hirta, R. triloba, Ruellia strepens, Salvia lyrata, Senna marilandica, Silphium trifoliatum, Solanum carolinense, Solidago canadensis, S. gigantea, Sorghastrum nutans, Sphenopholis nitida, Strophostyles helvula, Symphyotrichum dumosum, S. pilosum, Tephrosia virginiana, Teucrium canadense, Thaspium barbinode, Tridens flavus, Verbena simplex, Vernonia gigantea, and *Viola pedata.* CKWR in the Knobs and PBSHS in the Bluegrass have multiple areas of grass-dominated communities.

Rock Outcrops and Cliffsides

Rock outcrops are treeless habitats with thin soil and bedrock at or near the surface including glades, ledges, and clifftops. These habitats present limitation to plant growth due to extreme sun exposure leading to extreme seasonal changes in temperature and moisture. Because of this limitation, they tend to support low plant diversity. Cliffsides create limitations to plant growth for multiple reasons. Soils are limited to crevices, cliffs are highly erodible due to steepness, water can be sparse, exposure to the sun is high, and growing space is limited (Jones 2005). In Boyle County, cliffsides occur along the eastern border of the county and rock outcrops occur in prairies of the Eden Shale Belt, along Knob ridgetops and steep slopes, and cliff tops along the Dix River and Herrington Lake.

Cedar glades are a type of community that occurs on limestone outcrops dominated by *Juniperus virginiana* and associated with *Asclepias verticillata, Isanthus brachiatus, Opuntia humifusa, Ruellia humilis, Sedum pulchellum*, and

Sisyrinchium albidum. They are typically found in the Bluegrass Region of Boyle County in forest openings. Cliffsides in the Bluegrass Region are also dominated by *Juniperus virginiana* in association with *Acer nigrum, Campsis radicans, Fraxinus americana, Gleditsia triacanthos, Parthenocissus quinquefolia, Quercus alba, Q. muhlenbergii, Q. shumardii, Q. velutina, Rhus aromatica, Tilia americana, Toxicodendron radicans,* and *Ulmus rubra.* A grass growing on the cliffsides was *Muhlenbergia sobolifera*. Ferns found growing on cliffsides include *Asplenium rhizophyllum*, *Cheilanthes lanosa*, and *Woodsia obtusa*. Species in the sheltered areas of the cliffs include *Cystopteris bulbifera, Dodecatheon meadia, Heuchera parviflora, Mertensia virginica,* and *Sedum pulchellum.* Other species found growing around limestone outcroppings along the Dix River and Herington Lake include *Asarum canadense, Commelina erecta, Dodecatheon meadia*, *Hepatica acutiloba, Heuchera americana, Osmorhiza longistylis, Passiflora lutea, Plantago virginica, Saxifraga virginiensis, Silene virginica, Sonchus asper, Symphyotrichum lowrieanum, S. pilosum,* and *S. shortii.* Limestone outcrops are also present in Boyle County in the Eden Shale Belt. Species that were found growing in a prairie on limestone outcrops at PBSHS include *Croton monanthogynus, Isanthus brachiatus,* and *Lepidium campestre.* At an abandoned rock quarry near Perryville, KY, species growing on limestone bedrock with no soil consisted of *Juncus dudleyi, Lindernia dubia, Polygonum hydropiperoides, Sedum acre,* and *S. sarmentosum. Opuntia humifusa* was also found at this site but growing in a ditch and not on the bare bedrock. This site was highly disturbed and surrounded by *Lonicera maackii*.

Upland rock outcrops or glade-like communities in the Knobs of Boyle County are generally in xeric forests surrounded by *Pinus virginiana, Quercus coccinea* and *Q. montana*. Shale and siltstone glades of the Knobs are much rarer than the cedar glades of the Bluegrass. A shale/siltstone glade is present near Mitchellsburg, KY. The community occurs in a very open area on top of long, north to south running ridge. There are cliffs along the eastern face, and barrens/xeric woods along western face. Tree species found here include *Juniperus virginiana,* and *Pinus virginiana.* Ground cover includes *Dichanthelieum spp., Panicum spp.,*

Paronychia canadensis, Penstemon hirsutus, Tephrosia virginiana, and *Vaccinium stamineum.*

Forests in the Knobs over calcareous substrates with limestone outcrops on lower slopes tend to support mesic forests with many spring wildflowers including *Arabis laevigata, Arisaema triphyllum, Asarum canadense, Dentaria diphylla, D. laciniata, Erigenia bulbosa, Hydrastis canadensis, Iris cristata, Jeffersonia diphylla, Maianthemum racemosum, Mertensia virginica, Podophyllum peltatum, Polygonatum biflorum, and Trillium sessile,* and ferns such as *Asplenium rhizophyllum,* and *Cystopteris bulbifera.*

Disturbed Communities

Disturbed or ruderal habitats are areas that have been heavily impacted by humans and the vegetation has been replaced by a high percentage of weedy, non-native, and invasive species (Jones 2005). These areas are especially common around Danville and other urban areas in Boyle County including roadsides, fallow fields, yards, railroad corridors, parking lots, waste places, etc. There are 156 non-native species documented in Boyle County, 80 of which are considered invasive species (KEPPC 2013). Not all weedy species are exotic species. Some native species that were commonly found growing in ruderal habitats in Boyle County included *Andropogon* spp., *Asclepias syriaca, Desmodium paniculatum*, *Dichanthelium* spp., *Elephantopus carolinianus*, *Panicum* spp., *Poa pratensis*, *Potentilla* spp., *Robinia pseudoacacia, Rudbeckia* spp., *Ruellia strepens*, and *Tridens flavus*. For a detailed list of non-native and invasive species in Boyle County, refer to Appendices I and II.

CHAPTER V

DISCUSSION

General Flora

The total count of 722 species for Boyle County is somewhat low compared to the estimated total of 918 species. Only 79% of the expected flora was actually documented. Several factors may account for resulting lower species richness. The population of Boyle County has steadily increased over the last century (U.S. Census 2014); in 2000, the population was 27,697 and in 2014, the population increased to an estimated 29,706. Increases in population leads to increased development and urbanization of the land. Very little of Boyle County is set aside as natural areas and with more development, natural communities are rapidly being replaced by ruderal habitats. Another factor that may have influenced the resulting species richness for Boyle County may be the time-span allotted for this study. In roughly two years, over 500 species were collected. If the study continued, new species would undoubtedly be documented and supplement the current list. This intensive, but short-term, study was focused on natural communities existing in Boyle County. With more time, sporadic weedy species that were missed or overlooked, and native plants that may occur at low population levels and/or be in obscure or hard to reach locations, such as cliffsides, would be found. Another influence to consider is the species area curve provides a target number but that number may not always be an accurate prediction, as many of the above mentioned factors may influence the actual floristic composition of the county.

Despite only finding 79% of the expected species richness, Boyle County ranked third out of ten counties located in the Interior Low Plateau of KY in terms of the species to square kilometer ratio (Table 3). Only the floras of Clinton (Gorton 2000) and Garrard (Overbeck 2013) counties exceeded it. This may be due to the fact that much of Kentucky is rapidly being developed and losing its natural

Table 3. Species richness of ten Kentucky county floras with similar physiography.

County	Study	Physiographic Provinces (subsections)	Total area (km^2)	Total Species Count	Species per km^2
Boyle	Current study	ILP (IB, ESB, OB, K)	474	722	1.52
Carroll	Miller, 1986	ILP (OB)	355	713	1.32
Clark	Beckett, 1956	ILP (IB, ESB, OB, K)	660	877	1.08
Clinton	Gorton, 2000	ILP (HR)	534	877	1.64
Estill	Guetig, 1993	ILP & AP (K, CP)	663	853	1.29
Garrard	Overbeck, 2014	ILP (IB, OB, ESB, K)	606	961	1.59
Hardin	Cranfill, 1991	ILP (OB, K, HR)	1,632	1,126	0.69
Henry	Gentry, 1963	ILP (OB)	754	575	0.76
Jessamine	McFarland, 1941	ILP (IB)	451	661	1.47
Nelson	Greenwell, 1935	ILP (ESB, OB, K)	1,098	863	0.79

Physiographic province abbreviations: ILP = Interior Low Plateau, AP = Appalachian Plateau.
Physiographic subsection abbreviations: IB = Inner Bluegrass, ESB = Eden Shale Belt, OB = Outer Bluegrass, K = Knobs, HR = Highland Rim, CP = Cumberland Plateau.

communities, which is another reason why documenting the current flora is so important so future work can be done to preserve it.

Non-native Species

Many plant species of exotic origin have become naturalized in Boyle County and taken over habitats where native species once resided. Once non-native species are introduced into a habitat, they can spread aggressively to the point where their populations are abundant and widespread. These plants are particularly adapted to grow in areas that are repeatedly disturbed, for example species that take over roadsides and vacant lots, which are called ruderals, or species that grow in pastures and fallow fields, which are called agrestals (Jones 2005). The worst offenders of weedy non-native species are those that invade natural communities and displace native species. Invasive species put the survival of native species at risk when they take over the few remaining natural habitats. If they persist long

enough in an area, they can eventually change the entire structure of the plant community in which they exist. Herbaceous species, such as *Alliaria petiolata*, are able to out-compete native species in terms of space and nutrients (Jones 2005). Woody species, like *Lonicera maackii* or *Rosa multiflora*, form thickets displacing the native woody plants and shading out the native herbaceous plants (Jones 2005).

The Kentucky Exotic Pest Plant Council (2013) maintains a list of Kentucky's invasive species and classifies them as severe threat, significant threat, moderate threat, or watch list. Severe threat means the species can easily move into native communities, displace the native vegetation, and become widespread. There are 25 species designated as severe threat in Boyle County (Appendix II). From personal observations in the field, these species are especially aggressive in the Inner Bluegrass following the Dix River and its tributaries, alongside roads forming thickets in the entire Bluegrass Region, and as well as in the Knobs to lesser degrees. *Coronilla varia, Euonymus fortunei, Glechoma hederacea,* and *Stellaria media* are commonly found in residential and urban areas along sidewalks and in yards; or in the case of *E. fortunei,* climbing trees or forming ground covers. *Paulownia tomentosa* and *Pyrus calleryana* are trees commonly planted in residential and urban areas, and then escaping into the surrounding areas. *Carduus nutans, Cirsium arvense, Festuca arundinacea, Lespedeza cuneata, L. stipulacea, Melilotus alba,* and *Sorghum halepense* are associated with pastures and disturbed fields across the county. *Alliaria petiolata, Clematis terniflora, Dioscorea polystachya, Euonymus alatus, Elaeagnus umbellata, Ligustrum sinense, Lonicera fragrantissima, L. japonica, L. maackii, Polygonum cuspidatum,* and *Rosa multiflora* are invading Boyle County's forests and growing in thickets countywide along roadsides and taking over fallow fields. All of the species listed as severe threat are causing changes to the vegetation of Boyle County and need monitoring and removal so natural communities can be preserved.

There are 26 species of significant threat in Boyle County that possess some ability to invade natural communities but not to the degree of severe threat (Appendix II). Twenty-one species are listed as moderate threats and tend to remain in disturbed corridors and do not readily invade the natural communities.

The last nine invasive species documented in Boyle County are on KEPPC's watch list, meaning they are not well documented in Kentucky but have been observed as invaders in neighboring states (KEPPC 2013). From personal observation, the four rankings designated by the KEPPC (2013) accurately reflect the abundance and occurrences of the invasive species present in Boyle County.

Rare Species Overview

A total of five state-listed species are discussed as being present, or historically present, in Boyle County. Records provided by the Kentucky State Nature Preserve Commission documented the presence of two state-listed species in Boyle County: grass pink (*Calopogon tuberosus*) and softleaf arrowwood (*Viburnum molle*). One record from EKY documented the presence of American chestnut (*Castanea dentata*), and two state-listed species were found as part of this study: yellow lady-slipper (*Cypripedium parviflorum*) and eastern eulophus (*Perideridia americana*).

Nine species considered rare by Jones (2005) for the state of Kentucky were documented and five species considered infrequent by Jones (2005) but observed as rare in Boyle County were also documented. Detailed accounts of these rare species will be given below. Accounts are also given for two species of interest. Photographs of many of these species are provided in Appendix III (Figures 10-19).

Rare Species Accounts

Antennaria neglecta Greene (Asteraceae). Field pussytoes. Rare.

Field pussytoes is a perennial herb that grows in dry fields or open woods across the state of Kentucky (Jones 2005). This species was not observed during this study but a voucher was collected on April 17, 1981, in Parksville, KY.

Arisaema dracontium (L.) Schott (Araceae). Green dragon. Rare.

Green dragon is a perennial herb that occurs across the state of Kentucky infrequently (Jones 2005). In Boyle County, only one plant was observed during this study so a photographic voucher was taken. It was found growing in a mesic mixed

deciduous forest along with *Panax quinquifolius* in the Knobs at the CKWR. A photograph is available in Appendix III (Figure 10).

Calopogon tuberosus (L.) B.S.P. (Orchidaceae). Grass pink. Endangered. Historical.

Grass pink is a perennial herb that grows in wet meadows and power line cuts primarily in the Appalachian Plateau and is a facultative wetland species, meaning it usually is found in wetlands, but sometimes can be in nonwetland habitat (Jones 2005). It was not observed during this study but a voucher specimen was collected on June 19, 1892. Efforts were made to relocate this species but the location on the voucher only indicated Junction City, Kentucky. It is possibly extinct in Boyle, County.

Castanea dentata (Marshall) Borkh. (Fagaceae). American chestnut. Endangered.

American chestnut is a deciduous tree that inhabits dry to mesic woodlands across Kentucky (Jones 2005). It was once a dominant trees species of Eastern United States forests, but due to the Chestnut Blight epidemic, it has been listed as endangered in the state of Kentucky. This species was not observed during this study but a voucher specimen was collected on June 19, 1981, in Parksville, KY along Gee Branch. It was found growing in xeric upland woodlands with sprouts coming out of an old stump.

Commelina erecta L. (Commelinaceae). Erect dayflower. Rare.

Erect dayflower is perennial herb found on dry rocky or sandy soils and is rare in the state of Kentucky in the Mississippi Embayment and Interior Low Plateau (Jones 2005). It was collected as part of this study on dry rock outcrops along the side of Stanford Avenue, near Danville, KY.

Cypripedium parviflorum Salisb. (Orchidaceae). Yellow lady-slipper. Possibly Threatened.

Yellow lady-slipper is a perennial herb with two varieties that occur in Kentucky: var. *parviflorum*, the small yellow lady-slipper, has a small pouch and

dark purple lateral petals, grows in lowland sites, and is threatened; var. *pubescens* (Willd.) O.W.Knight, the greater yellow lady-slipper, has a larger pouch and yellow to green lateral petals, grows in upland sites, and infrequently occurs in Kentucky but occurs more commonly than the previous variety (Jones 2005). For the specimen documented in this study, the flowers were past their prime and the variety was undetermined. The specimen was growing in a mesic forest on a lower slope of a knob at the CKWR; down slope from the plant was a tributary to the North Rolling Fork. It is included in this discussion as there is a possibility that it could be the less common var. *parviflorum*. A photograph is included in Appendix III (Figure 13).

Elephantopus tomentosus L. (Asteraceae). Devil's grandmother. Rare.

Devil's grandmother is a perennial herb that grows in open, sandy woods and fields of the Appalachian Plateau and is considered rare (Jones 2005). It was found in Boyle County, outside of its typical range, along a railroad corridor off of Knob Lick Road in Junction City, Kentucky.

Hydrastis canadensis L. (Ranunculaceae). Goldenseal. Rare.

Goldenseal is a perennial herb that grows in mesic forests across Kentucky (Jones 2005). It was only observed once during this study on the west-facing slope of a white oak mesic forest at the CKWR amongst many wildflowers including *Hepatica acutiloba, Iris cristata, Jeffersonia dipyhlla, Polemonium reptans, Sanguinaria canadensis,* and *Stylophorum diphyllum.* The population found consisted of ten plants. Due to overharvesting of Goldenseal for the herbal trade, it is becoming increasingly rare. A photograph is available in Appendix III (Figure 14).

Minuartia patula (Michx.) Mattf. (Caryophyllaceae). Pitcher's stitchwort. Rare.

Pitcher's stitchwort is a herbaceous annual that grows on limestone cliffs and glades in the Appalachian and Interior Low plateaus and is considered rare in Kentucky (Jones 2005). It was found growing along Herrington Lake on Gwinn Island on limestone outcrops near cliffs.

Monotropa uniflora L. (Monotropaceae). Indian-pipe. Rare.

Indian-pipe is a perennial herb that absorbs nutrients from mycorrhizal fungi growing in the soil of dry to mesic woods and occurs infrequently in the state of Kentucky (Jones 2005). It was only observed twice during this study on an open xeric knob ridgetop at the CKWR. Only one plant was found each time so a photographic voucher was taken. A photograph is available in Appendix III (Figure 15).

Opuntia humifusa (Raf.) Raf. (Cactaceae). Eastern prickly-pear. Rare.

Eastern prickly-pear is a cactus that grows on rocky limestone glades and open woodlands. It infrequently occurs in the Interior Low Plateau (Jones 2005). It was only observed once during this study growing alongside Highway 150 near an old limestone quarry. A large population was growing in a dry, rocky ditch.

Orobanche uniflora L. (Orobanchaceae). One-flowered broomrape. Rare.

One-flowered broomrape is a herbaceous annual that grows in woodlands of the Appalachian and Interior Low plateaus (Jones 2005). It was observed once during this study on a dry ridgetop in an open xeric woodland. A photograph is available in Appendix III (Figure 16).

Panax quinquefolius L. (Araliaceae). American ginseng. Rare.

American ginseng is a perennial herb that grows in mesic forests across Kentucky but is rare due to overharvesting of the roots for medicinal properties (Jones 2005). There is a fairly large population of this species at the CKWR in a mesic forest. Research is being done on the population so a photographic voucher was taken. A photograph is available in Appendix III (Figure 17).

Perideridia americana (Nutt. Ex DC.) Rchb. (Apiaceae) Eastern eulophus. Threatened.

Eastern eulophus is a perennial herb that grows in open limestone woods, on rocky bluffs, and in cedar glades in the Interior Low Plateau (Jones 2005). It is a

state-listed threatened species. Before discovering it at PBSHS, it was only known to exist in seven other counties in Kentucky. It was found growing along the eastern bank of Doctor's Creek in a mesic riparian forest transitioning into an open limestone prairie. Species found growing in the same area included: *Carex leavenworthii, Eleocharis erythropoda, Elymus macgregorii, Festuca arundinacea, Galium aparine, Phalaris arundinacea, Ranunculus hispidus,* and *Sisymbrium officinale.*

Physostegia virginiana (L.) Benth. (Lamiaceae). False dragonhead. Rare.

False dragonhead is a perennial herb that grows in open mesic to wet habitats, including shorelines and wet barrens in the Appalachian and Interior Low Plateaus. It is considered rare in the state of Kentucky (Jones 2005). This species was not observed during this study but a voucher specimen was collected on September 8, 1935, in Danville, KY.

Rhus typhina L. (Anacardiaceae). Staghorn sumac. Rare.

Staghorn sumac is a perennial shrub that grows in open woodlands, fields and roadsides in the northern Appalachian and Interior Low Plateaus (Jones 2005). In Boyle County, it was found growing in a mesic white oak forest on a steep west-facing slope.

Verbena canadensis (L.) Britt. (Verbenaceae). Rose vervain. Rare.

Rosa vervain is a perennial herb that grows in disturbed places in the Mississippi embankment and the Interior Low Plateau (Jones 2005). It was not observed during this study but a voucher specimen was collected in Junction City, KY, on May 6, 1957.

Viburnum molle Michx. (Caprifoliaceae). Softleaf arrowwood. Special Concern.

Softleaf Arrowwood is a perennial shrub that grows in calcareous woods and on ledges above streams (Jones 2005). According to records provided by the KSNPC, there are five locations of this species along Mock's Branch and Clarks Run

in Boyle County. Attempts were made to check each of these populations but access to only one population on Clarks Run was possible. Eight plants were located in a mesic forest on a north-facing slope. Three plants were about 6 m feet away from the stream on a steep slope, about 6 m apart from each other. Two plants were located on a limestone cliff-ledge overlooking the water and three plants were located in the uplands above the slope in a thicket of bush honeysuckle. The site was undisturbed except for the encroachment of honeysuckle from the uplands above the stream.

Viburnum rafinesquianum Schultes. (Caprifoliaceae). Downy arrowwood. Rare.

Downy Arrowwoody is a perennial shrub found in calcareous woods and on ledges above streams in the Interior Low Plateau (Jones 2005). There are two varieties present in Kentucky, one of them occurring rarely and the other threatened. It was not observed during this study but a voucher specimen that was only identified to species was collected from the disturbed woods along the limestone cliffs of Gwinn Island on October 29, 2003.

Viola primulifolia L. (Violaceae). Primrose-leaved violet. Rare.

Primrose-leaved violet is found in wet areas in the Appalachain and Interior Low plateaus and is considered a facultative species (FAC+) of wetlands meaning it occurs in wetlands and nonwetlands (Jones 2005). In Boyle County, it was found in a saturated mud flat next to a pond off of Knob Lick Road in Junction City, KY. Associated species included: *Apocynum cannabinum, Claytonia virginica, Conoclinium coelestinum, Desmodium canescens, Dioda teres, Echinochloa crus-galli, Eupatorium fistulosum, Eupatorium perfoliatum, Fragaria virginiana, Galium tinctorium, Juncus canadensis, Lycopus americanus, Polygala sanguinea, Polygonum sagittum, Rhexia virginica, Sagittaria brevirostra,* and *Typha latifolia.*

Species of Interest

Carya ovalis (Wangenh.) Sarg. (Juglandaceae). Red hickory. Species of Interest.

Red hickory is a deciduous tree and was found growing on dry calcareous uplands of Gwinn Island in the Inner Bluegrass Region of Boyle County. Although not recognized in Jones (2005), it has received increased attention in recent years as a possibly distinct species (Ladd and Thomas 2015). It has been variously treated as a distinct species or as a synonym of pignut hickory, *Carya glabra,* or as a possible hybrid between *Carya glabra* and *C. ovata*, shagbark hickory, both of which were found growing in close proximity to the tree. It exhibits the shaggy bark of *Carya ovata*, but the thin husked fruit of *Carya glabra.* Other species growing in the vicinity included *Aesculus flava, Carya cordiformis, Quercus alba, Q. falcata, and Q. velutina.* Photographs of the trees bark and fruits are in Appendix III (Figures 11 and 12).

Poa alsodes A. Gray. (Poaceae). Grove blue grass. Species of Interest.

Grove blue grass is a perennial graminoid that grows in the woods of the Appalachian Plateau and occurs infrequently in Kentucky. It is a facultative wetland species (FACW-) meaning it will usually occur in a wetland roughly 70% of the time (Jones 2005). It was discovered growing outside of its typical range near Mitchellsburg, KY, on the same knob where a shale/siltstone glade in Boyle County is located. It was growing alongside Scrubgrass Branch in a mesic forest on the lower slopes of the knob.

Documented Vegetation of Boyle County

Linney (1880) provided the earliest account of what forests in Boyle County once looked like. During the early settlement of Boyle County, a great deal of timber was removed and the vegetation was replaced by weedy species, including black locust (*Robinia pseudoacacia*), boxelder (*Acer negundo*), red cedar (*Juniperus virginiana*), hackberry (*Celtis occidenta*lis), haws (*Viburnum* spp.), honey locust (*Gleditsia triacanthos*), white elm (*Ulmus americana*), and wild cherry (*Prunus serotina*). Oak populations were not regnerating, many trees were dying from pests,

and there was a noted increase in the frequency of mistletoe. Streams disappeared after the forests were cleared, the atmosphere became drier with more variable precipitation, and the summers were more oppressive. The land had been badly damaged from the destruction of the forest (Linney 1880).

In areas of Boyle County where the land remained forested, Linney (1880) described the forest composition in relation to the geological features. The Inner Bluegrass laid over the Trenton limestones. Lowland forests occurred mostly in the area around and northeast of Danville, KY and the upland forests surrounded them on the outer edge of the Inner Bluegrass. Lowland forests were dominated by blue ash (*Fraxinus quadrangulata*) and chinkapin oak (*Quercus muhlenbergii*). Common species associated with those were black walnut (*Juglans nigra*), hackberry (*Celtis occidentalis*), hickories (*Carya* spp.), ohio buckeye (*Aesculus glabra*), sycamore (*Platanus occidentalis*), and wild cherry (*Prunus serotina*), and the understory contained grape-vines (*Vitis* spp.), spicewood (*Lindera benzoin*) and cane (*Arundinaria gigantea*). In the upland forests, there was a significant decrease in blue ash, chinkapin oak, overcup oak (*Quercus lyrata*), and prunus serotina. Sycamores were completely absent and there was an distinct increase in white oaks (*Quercus alba*), black oaks (*Q. velutina*), and sugar maple (*Acer saccharum*). Birches (*Fagus grandifolia*) and poplars (*Liriodendron tulipifera*) were also part of the forest. Rock walls and river cliffs were covered in red cedar, with an understory of dogwood (*Cornus* spp.) and cane. All the trees along the rivers were eventually felled which resulted in substantial erosion (Linney 1880).

The Eden Shale Belt and the Outer Bluegrass, underlain by Lower Cincinnatti shale, comprised a belt of almost entirely white oaks within Boyle County. Species that were interspersed among the white oaks included red oak (*Quercus rubra*), sugar maple, and white ash (*Fraxinus americana*) with an understory of dogwoods. In the very lowest areas of the topography, there were laurel oaks (*Quercus imbricaria*) and post oaks (*Q. stellata*). The forests of the the Eden Shale Belt and Outer Bluegrass were almost entirely cleared and only scattered trees remained in the fields (Linney 1880).

Linney (1880) split the forests of the Knobs into vegetation over Silitious mudstones, upper Cincinnati shales, Ohio Shale, Waverly Shale, sub-carboniferous limestones and the bottomlands. Silitious mudstones had loose soil made up of half shale and half sand, were low in fertility, and usually on very steep slopes. Beech was high in abundance on this substrate. Walnuts (*Juglans cinerea* and *Juglans nigra*) and poplars were common and very large in size, up to 2.7 m (eight or nine feet) in diameter. Other associated species included white ash, white oak, and sugar maple. Upper Cincinnati shales was dominated by black walnut, poplar, white oak, and sugar maple; but these forests were entirely cleared. Ohio Shales had thin soils and were dominated by beech, with some instances where that was the only species in the entire stand (Linney 1880). Waverly shales composed much of the knobs on steep slopes or flat ridgetops. The largest amount of the remaining forests were over this substrate. American chestnut (*Castanea dentata*) was common along the slopes, and chestnut oak (*Quercus montana*), and pine (*Pinus virginiana*) were common on the tops of knobs and ridgetops. Understories consisted of huckleberry (*Gaylussacia baccata*), serviceberry (*Amelanchier* spp.), and sumac (*Rhus* spp.). Along streams, silver maple (*Acer saccharinum*), sugar maple, sycamore, and walnut (*Juglans* spp.) were more common (Linney 1880). The sub-carboniferous limestones represented only a small portion of the knobs and suported white, red and black oaks. A few areas of millstone grit where the soil was sandy and pebbly, supported cucumber magnolia (*Magnolia acuminata*). The only occurrence of bottomlands in Boyle County were along the North Rolling Fork but they were being eroded away by the river due to increased flooding and soils being washed away from the clearcutting of the forest (Linney 1880).

Braun (1950) described the composition of the Inner Bluegrass deciduous forest similair to Linney (1880) but with the additions of *Fraxinus americana, Gleditsia triacanthos, Gymnocladus dioicus, Morus rubra*, and *Quercus macrocarpa.* Unlike Linney (1880), she described the Outer Bluegrass forest to be more similar to the Inner Bluegrass forest than that of the Eden Shale Belt, except with the addition of *Fagus grandifolia*. She agreed the land of the Eden Shale Belt was badly deteriorated and little of the forest remained, but suggested the composition was of

an oak or oak-hickory belt. Braun (1950), like Linney (1880), also described the dry open cliffs of the Dix River as *Juniperus virginiana* communities but noted that the vegetation ranged to more mesic communites on the more sheltered slopes of the river.

Braun (1950) describes the forests in the south and southwest knobs, where Boyle County is located, to range from the most mesophytic of deep ravines and lower sheltered slopes to the most xerophytic of shaly knobs, sandy ridge crests, and limestone ledges. She categorized these broad ranging forests into the Western Mesophytic forest region but with characteristics akin to the Appalachian forests. They could support species like *Castanea dentata, Oxydendrum arboreum, Pinus virginiana, Quercus montana*, and *Vaccinium* spp., which was very unlike the forests of the Bluegrass Region. Braun (1950) described the drier slopes and uplands to support oak, oak-hickory and oak-chestnut communities, and the mesic uplands to support chestnut-beech-tuliptree associations. Pine forests covered the dry and barren devonian shales, and red cedars covered the dry limestones. Tree assemblages in the ravines were similar to those typical to ravines in the mixed mesophytic communites but with less species diversity and a higher abundance of beech, which she noted is a feature of the transitional forest region.

Wharton and Barbour (1991) described the plant communities of the Bluegrass. They divided communities into the Kentucky River Gorge and vicinity, and the plains of the Bluegrass. Around the riverbanks, *Acer saccharinum* dominates with common species consisting of *Acer negundo, Platanus occidentalis,* and *Ulmus americana*, with a shrubby layer of *Sambucus canadensis*. Floodplains support *Acer negundo, A. saccharinum, Carya laciniosa, Juglans nigra, Platanus occidentalis,* and *Ulmus americana,* and an understory of *Arundinaria gigantea, Asimina triloba, Lindera benzoin*, and *Sambucus canadensis*. Cliffbases are dominated by *Celtis occidentalis*, followed by *Gymnocladus dioicus, Acer nigrum, Juglans nigra*, and various other species infrequently occuring. Cliffsides typically support associations of maple-oak-ash, oak-ash-maple, or oak-hickory-cedar depending on exposure and soil depth. On cliff summits in xeric conditions, red cedars are associated with *Carya cordiformis, C. glabra, C. ovata, Fraxinus americana,*

F. quadrangulata, Ostrya virginiana, Quercus alba, *Q. muhlenbergii,* and *Ulmus thomasii.* Old fields are often infiltrated by woody plants like *Campsis radicans, Rhus glabra, Rubus spp., Symphoricarpos orbiculatus* and many weedy tree species.

Natural communities of the Bluegrass plains are fragmented and diminishing rapidly due to development (Wharton and Barbour 1991). Communites in pastures and around creek banks tend to support species like *Acer negundo, Acer saccharum, Aesculus glabra, Carpinus caroliniana, Carya laciniosa, Fraxinus americana, F. quadrangulata, Gymnocladus dioicus, Maclura pomifera, Ostrya virginiana, Platanus occidentalis, Prunus serotina, Quercus macrocarpa, Q. muhlenbergii,* and *Q. shumardii*. Bur oak savanna-woodland communities were once common in the plains, but after settlement, land practices kept them from persisiting, except for some old relict sites. Dominant species include *Fraxinus quadrangulata* and *Quercus macrocarpa*. Other common species included *Carya laciniosa, C. ovata, Fraxinus americana,* and *Robinia pseudoacacia* (Wharton and Barbour 1991).

A species list of the Bluegrass was compiled by Barbour and Wharton (1991) and species growing in Boyle County were indicated. Fifteen species that were not documented during this study were said to be located in Boyle County: *Acalypha rhomboidea, Bignonia capreolata, Epilobium coloratum, Euphorbia maculata, Festuca pratensis, Liparis lilifolia, Lippia lanceolata, Panicum dichotomum, P. philadelphicum, Pellaea atropurpurea, Setaria glauca, Silene alba, Smilax hispida, Solanum americanum,* and *Solidago flexicaulis.*

Wharton (1945) conducted the first extensive vegetational study on the Knobs, specifically, the black shale region of Kentucky. She described five major communities: pine, oak-pine, chestnut oak-scarlet oak, white oak, and mixed mesophytic. One of her study sites was in Boyle County in Alum Springs, Kentucky. She determined the composition of the forest to reflect a mixed mesophytic community. The forest compositon in Alum Springs was a beech-white oak-sugar maple association on somewhat level land at the base of the knobs. Trees common in the canopy were *Acer rubrum, A. saccharum, Aesculus octandra* (*A. flava*), *Carya laciniosa, Fagus grandifolia, Nyssa sylvatica, Quercus alba,* and *Ulmus americana*. Shrubs common in the understory included: *Acer rubrum, A. saccharum, Asimina*

triloba, Carya glabra, C. ovata, Cornus florida, Fagus grandifolia, Fraxinus americana, Parthenocissus quinquefolia, Prunus serotina, Quercus alba, Toxicodendron radicans, Sassafras albidum, Smilax rotundifolium, Vitis aestivalis, and *V. vulpina.* Herbaceous species included: *Eupatorium rugosum, Podophyllum peltatum*, and *Smilacina* (*Maianthemum*) *racemosa.* Wharton (1945) determined that in the black shale region of Kentucky, mixed mesophytic forest associations are restricted to coves (or "hollows"), bases of white-oak wooded hills, north slopes, and on steep banks above streams.

Mueller and McComb (1986) conducted a quantitative survey on the vegetation of eight sites in the Knobs, one in Boyle County, to provide baseline data concerning species composition, stand structure, and species-environment relations of the upland forest of the Knobs Region. They listed four major forest types: mesophytic hardwoods, white oak forest, chestnut oak forest, and scarlet oak forest. Mesophytic hardwoods were dominated by *Fagus grandifolia* or the combination of *Acer saccharum* and *Liriodendrum tulipifera* with associate species including: *Acer rubrum, A. saccharum, Quercus alba, and Q. rubra.* White oak forests were dominated by *Quercus alba* with associate species: *Acer rubrum, A. saccharum, Carya glabra, Fagus grandifolia, Pinus virginiana,* and *Quercus montana.* Chestnut oak forests were dominated by *Quercus montana* with associate species: *Acer rubrum, Carya glabra, Pinus virginiana, and Quercus coccinea.* Scarlet oak forests were dominated by *Quercus coccinea* with associated species: *Acer rubrum, Nyssa sylvatica, Pinus virginiana, and Quercus alba, Quercus coccinea,* and *Quercus montana.* The most common shrubs and trees present in the understory were *Cornus florida, Oxydendrum arboreum,* and *Sassafras albidum.* Muller and McComb (1986) found no environmental trends that distinguished the distribution of the three oak dominated forests. Species associations of the mixed mesophytic hardwoods were more often found on sites with higher soil fertility. They determined the presence of *Acer saccharum* was an indicator of greater soil moisture and higher overall soil fertility. They concluded the data they found supported Braun's (1950) theory that the Knobs supported transitional gradients of the Western Mesophytic Forest and that the Knobs can serve as a route for species range expansion.

Current Vegetation of Boyle County

Communities described by Wharton and Barbour (1991), Muller and McComb (1986), Braun (1950), Wharton (1945), and Linney (1880) are still present in Boyle County. Species like *Quercus macrocarpa* are noticeably missing from the Bluegrass plains, and *Castanea dentata, Juglans cinerea,* and *Magnolia acuminata* are noticeably absent from the forests of the Knobs; but overall, species compositions described historically still portray the communities present in the existing forests. Common plant communities of Boyle County, as determined by the Kentucky State Nature Preserve Commission (2010) will be described in detail, as well as some interesting remnant and rare communities.

Acidic mesophytic forest

This forest type occurs in the Knobs on slopes of ravines, for example, at CKWR on the northeast-facing slope along the Circle Trail. Soils are rich, moist, moderately well drained and derived from sandstones, shales or colluviums. Dominance is often shared by many species. Characteristic species include: *Acer saccharum, Acer rubrum, Fagus grandifolia, Liriodendron tulipifera, Quercus alba, Q. rubra,* and *Tilia heterophylla*. Common understory species include: *Asimina triloba, Carpinus caroliniana, Cornus florida, Lindera benzoin,* and *Ostrya virginiana.* Spring herbs and ferns are typically very rich and diverse including *Actaea pachypoda, Botrychium virginianum, Caulophyllum thalictroides, Diplazium pycnocarpon, Epifagus virginiana, Goodyera pubescens,* and *Polystichum acrostichoides*.

Acidic sub-xeric forest

This forest type occurs in the Knobs on mid to upper slopes and ridges in dry uplands best developed on south and west facing slopes. A good example of this forest type is on the Circle Trail at the CKWR before and after it intersects with the Waterfall Trail and on south-facing slopes of the knob along Circle Trail. Soils are well drained, moderately deep, and derived from shales or siltstones. The canopy is dominated by oak-hickory associations, including: *Carya glabra, C. ovata, C. tomentosa, C. cordiformis, Quercus alba, Q. coccinea, Q. falcata, Q. montana,* and *Q.*

velutina. The understory is poorly developed with *Fagus grandifolia* and *Smilax* spp. and has a sparse groundcover.

Acidic xeric Forest

This forest type occurs on steep west or south facing upper slopes and knob apexes, and bluff escarpments. Soils are shallow, acidic, drain rapidly, and derived from sandstone or shales. Outcrops and boulders are common. Tree canopy is mostly open with an understory of grasses and scattered shrubs. Species present include: *Quercus marilandica, Q. stellata, Vaccinium spp*. This community occurs on the top of Huckleberry Ridge at the CKWR.

Bluegrass Woodland

A relict old-growth open ash-oak woodland savanna with less than 50% canopy cover is present at the Berney Home Historical Site. The dominant species consist of *Quercus macrocarpa* and a combination of *Fraxinus americana, Liquidambar styraciflua, Q. muhlenbergii, Q. palustris,* and *Q. shumardii*.

Bottomland ridge/terrace forest

This forest type occurs on floodplains and terraces above streams and rivers with deep soils that are moderately drained and derived from alluvium. The canopy consists of *Acer saccharum, Aesculus glabra, Carya cordifomis, Gymnocladus dioicus, Juglans nigra, Liquidambar styraciflua, Nyssa sylvatica, Tilia americana,* and *Ulmus americana.* The understory contains *Arundinaria gigantea, Asimina triloba, and Lindera benzoin* with a moderately dense ground cover. This community occurs along the rivers in Boyle County where alluvium has been deposited as listed above. An area at the CKWR on a bottomland ridge has a large population of *Arundinaria gigantea*, with plants reaching heights of 2.3 to 2.7 m (8 to 9 feet) tall. A photograph of this area is available in Appendix III (Figure 18).

Calcareous mesophytic forest

This forest type occurs in the Bluegrass on lower slopes above the Dix River floodplain, and in the Knobs in coves like the white oak forest along the Wildflower Trail at the CKWR. Soils are rich, moist, moderately well drained, and derived from limestone. The closed canopy consists of trees with a well-developed understory and rich herb and fern flora. Cliffsides typically have oak-ash-maple, or oak-hickory-cedar depending on exposure and soil depth. Species composition includes: *A*cer *saccharum*, *Carya cordiformis*, *C. laciniosa*, *C. ovata*, *Fagus grandifolia*, *Fraxinus americana*, *F. quadrangulata* (in Bluegrass), *Liriodendron tulipifera*, *Quercus alba*, *Q. muhlenbergii* (in Bluegrass), *Q. rubra*, *Tilia americana*, and *Ulmus americana.* Understory species include*: Asimina triloba*, *Lindera benzoin*, and *Staphylea trifolia*. Characteristic herbs include *Asarum canadense*, *Delphinium tricorne, Hydrastis canadensis, Hydrophyllum appendiculatum, Polemonium reptans, Stylophorum diphyllum,* and *Viola* spp. Several very large trees were found in this forest along the Wildflower Trail at the CKWR, including: *Aesculus glabra, Platanus occidentalis, Quercus alba,* and *Q. rubra.* A photograph of a large *Aesculus glabra* is available in Appendix III (Figure 19).

Calcareous sub-xeric forest

This forest type occurs on flat uplands, clifflines, steep rock faces and mid to upper slopes above the Dix River and Herrington Lake. Soils are well drained, shallow to deep, and derived from limestones, or calcareous shales; bedrock and outcrops are usually present. The canopy cover ranges from 70 to 90%. The forests are composed of oak-hickory-maple or oak-cedar associations based on aspect and soil depth. Characteristic species include: *Acer saccharum*, *Acer rubrum*, *Carya ovata*, *C. tomentosa, Fraxinus quadrangulata, Juniperus virginiana*, *Quercus alba*, *Q. muhlenbergii*, *Q. stellata*, *Q. velutina*, and *Ulmus rubra*. In more open canopies, for instance the flat upland of Gwinn Island, *Carya ovalis, C. glabra, C. cordiformis, Aesculus flava,* and *Quercus falcata* can occur. Understory species can include *Cornus florida, Lonicera* spp*., Rhamnus caroliniana, Rhus aromatica, Smilax bona-nox,* and *Viburnum rufidulum.* Ground cover can be somewhat sparse to well developed.

Depression pond/mud flat

This community occurs in areas with well-developed karst topography, as in the eastern pocket of the Outer Bluegrass in Boyle County. Junction City is located in this pocket and has several depressional ponds with mud flats surrounding them. Mud flats have varying moisture levels throughout the year. Common species in and around the ponds include: *S. montevidensis, Potamogeton nodosus, Ludwigia alternifolia, and L. peploides.* Species in the mud flat included: *Apocynum cannabinum, Claytonia virginica, Conoclinium coelestinum, Desmodium canescens, Dioda teres, Echinochloa crus-gali, Eupatorium fistulosum, Eupatorium perfoliatum, Fragaria virginiana, Galium tinctorium, Juncus canadensis, Lycopus americanus, Polygala sanguinea, Polygonum sagittatum, Rhexia virginica, Sagittaria brevirostra, Typha latifolia,* and *Viola primulifolia.*

Dry limestone cliff/outcrops

These occur on vertical limestone exposures along the Dix River and Herrington Lake on south and west facing cliffs. Soils are absent or restricted to crevices or ledges. Trees are stunted and gnarled and there are scattered shrubs. These communities tend to be dominated by *Juniperus virginiana* in association with *Acer nigrum, Campsis radicans, Celastrus scandens, Fraxinus americana, Gleditsia triacanthos, Parthenocissus quinquefolia, Quercus alba, Q. muhlenbergii, Q. shumardii, Q. velutina, Rhus aromatica, Tilia americana, Toxicodendron radicans,* and *Ulmus rubra.* A grass that may be found is *Muhlenbergia sobolifera*. Ferns found growing on cliffsides include *Asplenium rhizophyllum*, *Cheilanthes lanosa*, and *Woodsia obtusa*. Species in the sheltered areas of the cliffs include *Cystopteris bulbifera, Dodecatheon meadia, Heuchera parviflora, Mertensia virginica,* and *Sedum pulchellum.*

Riparian Forest

This forest type occurs on riverbanks adjacent to streams in floodplains, with deep soils that are moderately well drained and derived from alluvium. Seasonal flooding occurs. Common tree species included *Acer sccharinum, Fraxinus*

pennsylvanica, Liquidambar styraciflua, and *Platanus occidentalis.* Several rivers in Boyle County have alluvium-derived soils deposited around them, including Begley Branch, Chaplin River, Doctor's Creek, Mocks Branch, North Rolling Fork, and Salt River. Riparian forests occur along these rivers.

Shale/siltstone glade

These occur on moderate to steep slopes in the Knobs on south and west aspects. Soils are very thin, rapidly drain, and derived from shale or siltstones. Parent material is usually exposed at the surface. A shale/siltstone glade is present near Mitchellsburg, KY, in a very open area on top of a long, north to south running ridge. There are cliffs along the eastern face, and barrens/xeric oak woods along the western face. Species found here included *Juniperus virginiana, Pinus virginiana, Dichanthelium* spp.*, Panicum* spp.*, Paronychia canadensis, Tephrosia virginiana, Penstemon hirsutus,* and *Vaccinium stamineum.* This community is not very large in size. Shale/siltstone glades are listed as rare by the KSNPC (2010).

Wet prairie/meadow

This community occurs in areas with poor drainage in uplands and bottomlands. Soils remain saturated for extended periods of time and a fragipan is usually present. Dominant herbaceous species included: *Agrostis gigantea, Asclepias incarnata*, *Bidens frondosa, B. tripartita, Boehmeria cylindrica, Carex crinita, C. frankii, C. festucacea C. lurida, C. swanii, C. tribuloides, C. vulpinoidea*, *Cicuta maculata, Cyperus bipartitus, C. erythrorhizos*, *C. odoratus, C. strigosus, C. squarrosus*, *Eleocharis erythropoda*, *E. obtusa*, *Eupatorium fistulosum, E. perfoliatum, Hibiscus moscheutos*, *Impatiens capensis*, *I. pallida*, *Juncus acuminatus, J. effusus, J. tenuis, Leersia oryzoides, Lobelia cardinalis, L. siphilitica, Ludwigia alternifolia, Mentha spicata, Panicum rigidulum, Schoenoplectus tabernaemontani*, *Scirpus atrovirens,* and *S. pendulus*. A large wet meadow is located in Danville, KY, on a raised terrace above Clarks Run.

CHAPTER VI

SUMMARY AND CONCLUSION

Boyle County is located in central Kentucky in the Bluegrass Physiographic Section, which includes the Inner Bluegrass, Eden Shale Belt, Outer Bluegrass, and the Knobs. Braun (1950) has categorized it as part of the Western Mesopythic forest region where there is a gradient between the dry oak-hickory forests and rich mixed mesophytic forests. A total of 722 species were documented in 392 genera and 127 families. Out of the total 722 taxa, 162 were specimens held in KY herbaria and 566 taxa were collected as a part of this survey. There were 156 non-native species identified, 80 of which are considered invasive. Twelve vegetative communities were described, five rare species with state rankings were identified, and one rare listed plant community is known to occur in the county.

The goals of this study were to (1) inventory the vascular flora of Boyle County, Kentucky, (2) document the occurrence of rare and introduced species, and (3) provide a descriptive account of the plant communities present in the county. Additional surveys are needed in various sites in the county, including the southwest portion of the county, along the western border, and in areas where the Inner Bluegrass transtions into the Eden Shale Belt. Urban areas and railroad corridors need to be searched for weedy and invasive species, and the invasives need to be more closely monitored in the future. Further work in these areas would undoubtedly reveal additional species, especially weedy species, species with few populations, and species in obscure locations. Future studies could focus on initiating quantitative vegetation sampling on both woody and herbaceous communities, searching for the 26 native species that have not been observed since 1950 in Boyle County, and finding more rare species, as well as monitoring the known rare plant populations, particularly the *Perideridia americana* at the PBSHS and the *Viburnum molle* along Clarks Run and Mock's Branch.

The knowledge gained from this study provides valuable baseline information regarding the botanical biodiversity in Boyle County, and this information can provide a foundation for future investigations, as well as assist in gaining a better understanding of how to protect the rare plant populations and the natural communities during a time of rapid urban development and climate change.

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APPENDICES

APPENDIX I

Annotated List of the Vascular Plants of Boyle County

The annotated species list that follows is divided into four major groups: Lycopodiophyta, Polypodiophyta, Coniferophyta, and Magnoliophyta. Magnoliophyta is further divided into Monocotyledoneae and Dicotyledoneae. Within each division, taxa are grouped alphabetically by family, genus, and species. Taxonomic nomenclature follows Jones (2005). An asterisk (*) in front of a species name indicates a non-native species and a double asterisk (**) indicates a non-native, invasive species of either severe threat, significant threat, moderate threat, or watch list status as determined by the Kentucky Exotic Pest Plant Council (KEPPC, 2013). An exclamation point (!) indicates a state-listed species with a status of endangered, threatened, or special concern as determined by the Kentucky State Nature Preserves Commission (KSNPC, 2012). Each taxa collected by the author is annotated with collection number, general description of habitat, occurrence, location, and comment if photograph was taken instead of collection. Each species was subjectively assigned an occurrence value of abundant, frequent, infrequent, or rare based on its individual density and population frequency within the county. Taxa collected otherwise are annotated with collector's name, collection number, date collected, herbarium acronym, description of habitat, and locality (date, collection number, or habitat information was not always available).

LYCOPODIOPHYTA

Lycopodiaceae

Lycopodium obscurum L., #9, mixed mesic woodland, infrequent, Central Kentucky Wildlife Refuge in Oak-Hickory Forest along Waterfall Trail.

POLYPODIOPHYTA

Aspleniaceae

Asplenium platyneuron (L.) B.S.P., #275, 368, 392, xeric oak-hickory forest and streamside, frequent, Perryville Battlefield State Historic Site along Doctor's Creek and Central Kentucky Wildlife Refuge on apex of knob off of Ridge Trail.

Asplenium rhizophyllum L., R. Hannan #7241, 19 June 1981 (EKY), on moss covered rock in mesic forest, Gee Branch.

Dryopteridaceae

Athyrium asplenioides (Michx.) A.A. Eat., J. Campbell, 14 October 1984 (KY) Central Kentucky Wildlife Refuge.

Cystopteris bulbifera (L.) Bernh., R. Hannan #7232, 19 June 1981 (EKY), rocky ledge near creek, Gee Branch.

Cystopteris protrusa (Weatherby) Blasdell, #396, sub-xeric oak-hickory forest, frequent, Central Kentucky Wildlife Refuge on SE facing slope of knob along Ridge Trail.

Deparia acrostichoides (Sw.) M. Kato, #652, 849, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail and Mitchellsburg, KY in mesic forest along Scrubgrass Branch at base of knob.

Diplazium pycnocarpon (Spreng.) Broun, #700, mixed mesic woodland, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Onoclea sensibilis L., #649, 864, mesic forest dominated by white oak on steep west-facing slope, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail and in Mitchellsburg, KY in mesic forest at base of knob along stream.

Polystichum acrostichoides (Michx.) Schott, #367, mesic oak-hickory forest surrounding pond, frequent, Central Kentucky Wildlife on northern bank of Island Pond.

Woodsia obtusa (Spreng.) Torr., M.E. Wharton #10887, 20 June 1957 (KY), on limestone ledge in thicket near Mock's Branch.

Ophioglossaceae

Botrychium biternatum (Sav.), JWT #51133, 3 August 1979 (KNK), woods on slope above Tank Pond, ca 1.2 mi SW of Parksville, KY.

Botrychium dissectum Spreng., JWT #51134, 3 August 1979 (KNK), woods on slope above Tank Pond, ca 1.2 mi SW of Parksville, KY.

Botrychium virginianum (L.) Sw., #150, mixed mesic woodland, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Pteridaceae

Adiantum pedatum L., #691, mixed mesic woodland, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Cheilanthes lanosa (Michx.) D.C. Eat., #390, sub-xeric oak-hickory forest, infrequent, Central Kentucky Wildlife Refuge on southeast-facing upper slope of knob.

Thelypteridaceae

Thelypteris noveboracensis (L.) Nieuwl., #647, mixed mesic woodland, frequent, Central Kentucky Wildlife Refuge along the Wildflower Trail on steep northwest-facing slope in White Oak forest.

CONIFEROPHYTA

Cupressaceae

Juniperus virginiana L., #237, 722, open field, xeric, frequent, Danville, KY and Perryville Battlefield State Historic Site.

Pinaceae

Pinus strobus L., #366, mixed mesic woodland, frequent, Central Kentucky Wildlife Refuge along Bluebird Trail.

Pinus virginiana P. Mill., #94, in open rock outcrop, xeric, frequent, near CKWR in Forkland Area.

MAGNOLIOPHYTA: MONOCOTYLEDONAE (Monocots)

Alismataceae

Sagittaria australis (J.G. Sm.) Small, M.E. Wharton #5734, 13 August 1940 (KY), a quarter mile west of Junction City at edge of pond.

Sagittaria brevirostra Mackenzie & Bush, #598, open saturated mud flat next to pond, infrequent, Junction City, KY in wet area surrounding pond.

Sagittaria montevidensis Cham. & Schlecht., #432, 508, open, wet ditch, frequent, along Forkland Road and at Perryville Battlefield State Historic Site.

Agavaceae

**Yucca filamentosa* L., #269, fencerow, infrequent, Perryville Battlefield State Historic Site.

Alliaceae

Allium canadense L., #158, 765, mixed mesic woodland along stream, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Allium tricoccum Ait., #501, mixed mesic woodland along stream, infrequent, Central Kentucky Wildlife Refuge along North Rolling Fork.

***Allium vineale* L., # 196, 258, 791, meadow and disturbed sites, abundant, Perryville Battlefield State Historic Site in open field, along road, and on rocky shore of Herrington Lake.

Nothoscordum bivalve (L.) Britt., E. Rowe #22, 7 April 1952 (EKY/Centre) Danville, KY.

Amaryllidaceae

***Narcissus pseudonarcissus* L., #8, 30, meadow and along roadside, frequent, Central Kentucky Wildlife Refuge in and Junction City along Hwy52.

Araceae

Arisaema dracontium (L.) Schott, #377, mixed mesic woodland, rare, Central Kentucky Wildlife Refuge on Waterfall Trail. Only one plant was located, no collection taken, photograph voucher.

Arisaema triphyllum (L.) Schott ssp. *triphyllum*, #124, 149, mixed mesic woodland, frequent, Central Kentucky Wildlife Refuge on Blue Trail and Circle Trail.

Asparagaceae

**Asparagus officinalis* L., E.M. Browne, E.T. Browne, Jr. #4509, 15 July 1961 (EKY) along US 68, just south of Boyle-Mercer County line in Bluegrass Province.

Commelinaceae

***Commelina communis* L., #659, 869, limestone/dolomite prairie and mixed mesic woodland, frequent, Perryville Battlefield State Historic Site, and north-facing slope along Clarks Run.

Commelina erecta L., #626, 679, rocky cliffs, xeric, rare, along Old Lancaster Road and along Stanford Avenue in Danville, KY.

Tradescantia subaspera Ker-Gawl., #141, 814, mixed mesic woodlands, frequent, Central Kentucky Wildlife Refuge on Ridge Trail at apex of Knob and south-facing slope along Hanging Fork Creek.

Tradescantia virginiana L., # 125, mixed mesic woodland, infrequent, Central Kentucky Wildlife Refuge on Blue Trail.

Convallariaceae

Maianthemum racemosum (L.) Link, #53, 112, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Polygonatum biflorum (Walt.) Ell., #118, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Polygonatum pubescens (Willd.) Pursh, D. Nance #19, 15 April 1977 (EKY) Dispersed throughout trees on Gwinn Island.

Cyperaceae

Carex albicans Willd. ex Spreng., #742, sub-xeric oak-hickory forested streambank, frequent, outside Junction City, KY.

Carex amphibola Steud., #766, sub-xeric oak-hickory forested streambank, frequent, outside Junction City, KY.

Carex blanda Dewey, #156, 313, forested streambank and in disturbed wet field, frequent, Central Kentucky Wildlife Refuge off of Brooks Hollow Trail and in Danville, KY.

Carex cephalophora Muhl. ex Willd., #135, 345, rocky edge of pond and mesic woods, frequent, Central Kentucky Wildlife Refuge on Bluebird Trail in rocky outcrop along edge of Island Pond trail and along Bluebird Trail.

Carex crinita Lam., #819, 841, surrounding pond and streambank, frequent, pond off of Phillips Lane outside of Junction City, KY and along Scrubgrass Branch.

Carex cumberlandensis Naczi, Kral & Bryson, L. McKinney #4991, 13 May 1992 (KNK), mesic woods along North Rolling Fork in Central Kentucky Wildlife Refuge.

Carex festucacea Schkuhr ex Willd., #863, wet meadow frequent, near Mitchellsburg, KY.

Carex frankii Kunth, #317, wet meadow along drainage, frequent, in Danville, KY.

Carex glaucodea Tuckerman ex Olney, H. Garman, 19 June 1892 (UKAg), Junction City, KY. Also collecgted by M.E. Wharton #664, 2 July 1937 (KY), in dry upland pine woods of the Black Shale Region of Kentucky, two miles west of Junction City.

Carex hirsutella Mackenzie, #346, 829, mixed mesic woodland, frequent, Central Kentucky Wildlife Refuge, on Bluebird Trail in Oak-Hickory Forest, and off of Phillips Lane, near Junction City, KY on south-facing slope of Oak-Hickory Forest.

Carex leavenworthii Dewey, #763, 802, forested streambank, frequent, Perryville Battlefield State Historic Site along Doctor's Creek.

Carex lurida Wahlenb., #818, open edge of pond, frequent, off of Phillips Lane, near Junction City, KY.

Carex mesochorea Mackenzie, #314, 796, dry to wet meadow, infrequent, in Danville, KY, and on Gwinn Island.

Carex platyphylla Carey, #162, mesic woodland, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail in White Oak Forest on northwest-facing slope.

Carex rosea Schkuhr ex Willd., #820, forested edge of pond, frequent, off of Phillips Lane, near Junction City, KY, elevation 980'.

Carex squarrosa L., #838, forested streambank, infrequent, along Scrubgrass Branch, near Mitchellsburg, KY.

Carex swanii (Fern.) Mackenzie, #369, forested edge of pond, frequent, Central Kentucky Wildlife Refuge on the bank of Island Pond.

Carex tribuloides Wahlenb., #830, open wet mud flat surrounding pond, frequent, off of Phillips Lane, near Junction City, KY.

Carex vulpinoidea Michx., #241, 323, 359, along stream, drainage in wet meadow, and bank of pond, open areas, frequent, Perryville Battlefield State Historic Site off of Gravel Road, in Danville, KY and Central Kentucky Wildlife Refuge on the banks of Island Pond.

Carex willdenowii Schkuhr ex Willd., L. McKinney #4989, 14 May 1992 (KNK), mesic woods along North Rolling Fork in Central Kentucky Wildlife Refuge.

Cyperus bipartita All., R.L. Mears #303, 16 September 1993 (EKY), growing in ditch on south side of US 150, near intersection with Hughes Lane, east of Danville, KY.

Cyperus erythrorhizos Muhl., #578, open limestone/dolomite prairie in wet area, frequent, Perryville Battlefield State Historic Site off of Artillery Trail.

Cyperus esculentus L., M.H. Hills #28, 6/25/79 (KNK) Roadside, moist, black, fine, and sandy soil with Echinocloa, infrequent.

Cyperus odoratus L., #894, edge of pond, frequent, off of Phillips Lane, near Junction City, KY.

Cyperus squarrosus L., #542, wet meadow along drainage, infrequent, in Danville, KY.

Cyperus strigosus L., #350, 532, 655, 662, bank of pond, open, wet meadow, and in limestone/dolomite prairie, frequent, Central Kentucky Wildlife Refuge on the banks of Island Pond, in Danville, KY, Perryville Battlefield State Historic Site off of Artillery Trail.

Eleocharis erythropoda Steud., #780, 808, 858, lakeshore and streambanks, frequent, Gwinn Island on rocky shore of Herrington Lake, Perryville Battlefield State Historic Site along edge of Doctor's Creek, on forested slope along Scrubgrass Branch, and near Mitchellsburg, KY.

Eleocharis obtusa (Willd.) Schultes, #262, 276, 281, 358, 436, 470, 893, streambanks, wet ditches and edges of ponds, frequent, Perryville Battlefield State Historic Site along Doctor's Creek, Central Kentucky Wildlife Refuge on the banks of Island Pond, and along Forkland Road.

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, #324, 541, along drainage in wet meadow, frequent, in Danville, KY.

Scirpus atrovirens Willd., #239, 326, 420, streambanks, along drainage in wet meadow, and in wet ditch, frequent, Perryville Battlefield State Historic Site off of Gravel Road, in Danville, KY, and along Forkland Road.

Scirpus cyperinus (L.) Kunth, #529, pond bank, frequent, Central Kentucky Wildlife Refuge on northern bank of Woodland Pond.

Scirpus georgianus Harper, M.E. Wharton #2932A, 30 June 1938 (KY), wet ground one mile west of Junction City, KY in the Black Shale Region of Kentucky.

Scirpus pendulus Muhl., #421, 848, wet ditch and streambank, frequent, Central Kentucky Wildlife Refuge along Forkland Rd and, forested area along Scrubgrass Branch near Mitchellsburg, KY.

Scirpus polyphyllus Vahl, #826, 866, along pond edge and streambank, infrequent, off of Phillips Lane, near Junction City, KY, and along Scrubgrass Branch near Mitchellsburg, KY.

Dioscoreaceae

****Dioscorea polystachya** Turcz., #303, 438, 868, wet meadow, wet ditch, and forested streambank, frequent, in Danville, KY, along Forkland Rd, and along Clarks Run on north-facing streambank.

Dioscorea villosa L., #148, 175, mesic woodland, frequent, Central Kentucky Wildlife Refuge along Circle Trail.

Hemerocallidaceae

****Hemerocallis fulva** (L.) Coville., #213, along roadside, infrequent, along Hwy 37.

Hyacinthaceae

Camassia scilloides (Raf.) Cory., #87, 109, in cow pasture about creek and mixed mesic woodland, infrequent, Forkland Area, and Central Kentucky Wildlife Refuge on Wildflower Trail in White Oak Forest.

Hypoxidaceae

Hypoxis hirsuta (L.) Coville, #857, sub-xeric, west-facing, forested slope midway up knob, infrequent, near Mitchellsburg, KY.

Iridaceae

Iris cristata Ait., #72, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

***Iris germanica** L., #212, disturbed roadside, infrequent, along Highway 37.

Sisyrinchium angustifolium P. Mill., #155, forested streambank and mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Brooks Hollow Trail.

Juncaceae

Juncus acuminatus Michx., #428, 821, 832, 856, wet ditch, bank of Island Pond, streambank, abundant, along Forkland Road, Central Kentucky Wildlife Refuge on Bluebird Trail, and near Mitchellsburg on western slope of knob along stream.

Juncus canadensis J. Gay ex Laharpe, #634, saturated mud flat next to pond, infrequent, Junction City, KY.

Juncus diffusissimus Buckl., M.E. Wharton #1025, 7/22/37 (KY), wet ground one and a half miles east of Parksville, KY in the Black Shale Region of Kentucky.

Juncus dudleyi Wieg., #287, 847, clumps growing on bedrock slabs and along creek in open area, in abandoned rock quarry along Highway 1856, and along Scrubgrass Branch near Mitchellsburg, KY.

Juncus effusus L. var. *solutus* Fern. & Wieg., #240, 325, 817, 865, streambanks, along drainage through wet meadow, surround pond, abundant, Perryville Battlefield State Historic Site off of Gravel Road, in Danville, KY, near Junction City, KY, and near Mitchellsburg, KY.

Juncus tenuis Willd., #354, 435, 444, 862, bank of pond, open, wet ditch, and in wet meadow, frequent, Central Kentucky Wildlife Refuge on the banks of Island Pond, along Forkland Road, along Knob Lick Road, and near Mitchellsburg, KY.

Luzula echinata (Small) F.J. Herm., #32, 136, 846, open rocky edge of Island Pond and mixed mesic woodland along Scrubrass Branch, frequent, Central Kentucky Wildlife Refuge on Bluebird Trail and near Mitchellsburg, KY.

Liliaceae

Erythronium americanum Ker-Gawl., #28, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Nartheciaceae

Aletris farinosa L., H. Garman, 19 June 1892 (UKAg), Junction City, KY.

Orchidaceae

!*Calopogon tuberosus* (L.) B.S.P., H. Garman 6/19/1892 (UKAg), Junction City, KY. Endangered.

!*Cypripedium parviflorum* Salisb., #834, mixed mesophytic forest, rare, Central Kentucky Wildlife Refuge along Blue Trail under large oak, no collection taken, photograph voucher. Possibly threatened.

Goodyera pubescens (Willd.) R.Br., #499, mixed mesophytic forest, frequent, Central Kentucky Wildlife Refuge along Circle Trail.

Spiranthes cernua (L.) Rich., M. Lenn, 20 September 1991 (EKY/Centre) Forkland Area.

Spiranthes vernalis Engelm. & A.Gray., #416, wet ditch, rare, along Forkland Road.

Tipularia discolor (Pursh) Nutt., #500, 522B, sub-xeric oak-hickory forest, infrequent, Central Kentucky Wildlife Refuge on Circle Trail (population of 30 plants), and on Fork Trail.

Poaceae

**Agrostis gigantea* Roth., #433, 558, limestone/dolomite prairie and wet ditch, abundant, along Forkland Rd and Perryville Battlefield State Historic Site off of Battlefield.

Andropogon gerardii Vitman., #412, limestone/dolomite prairie, frequent, Central Kentucky Wildlife Refuge on Bluebird Trail.

Andropogon ternarius Michx., #670, limestone/dolomite prairie, infrequent, Perryville Battlefield State Historic Site off of Artillery Trail.

Andropogon virginicus L. #720, open field surrounding pond, frequent, Perryville Battlefield State Historic Site at the Dye House, off of Battlefield Road.

**Anthoxanthum odoratum* L., #62, 154, meadow and mixed mesic forest, infrequent, Central Kentucky Wildlife Refuge off of Wildflower Trail and Brooks Hollow Trail.

Arundinaria gigantea (Walt.) Muhl., M.E. Wharton #10624, 13 October 1956 (KY), Mock's Branch, dry, open woods near Herrington Lake.

Brachyelytrum erectum (Schreb.) P.Beauv., #343, sub-xeric forest, frequent, Central Kentucky Wildlife Refuge along Bluebird Trail.

**Bromus commutatus* Schrad., #178, sub-xeric oak-hickory forest along trail, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

**Bromus japonicus* Thunb. ex Murr., #341C, disturbed areas along trails, frequent, Central Kentucky Wildlife Refuge.

Bromus pubescens Muhl. ex Willd., #372, forested bank of Island Pond, frequent, Central Kentucky Wildlife Refuge.

**Bromus sterilis* L., #132, 764, 783, disturbed areas, streamside, rocky lakeshore, frequent, Central Kentucky Wildlife Refuge along Carpenter Creek Road, near Junction City, KY, and Gwinn Island.

**Cynodon dactylon* (L.) Pers., #503, disturbed habitats, frequent, along KY 52 and US 150.

*_Dactylis glomerata_ L., #113, 131, 335, 752, disturbed areas, Central Kentucky Wildlife Refuge on Wildflower Trail, along Carpenter Creek Road, and Perryville Battlefield State Historic Site off of KY 1920.

Diarrhena americana Beauv., #347, open xeric forest, frequent and locally abundant on knob ridgetop, Central Kentucky Wildlife Refuge along Ridge Trail.

Dichanthelium acuminatum (Sw.) Gould & C.A. Clark, #342, 353, rocky bank of Island Pond, Central Kentucky Wildlife Refuge. Also collected by M.E. Wharton #2945, 30 June 1938 (KY), in open oak woods three quarter miles west of Junction City in the Black Shale Region of Kentucky.

Dichanthelium boscii (Poir.) Gould & C.A. Clark., #167, 341A, sub-xeric oak-hickory forest, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Dichanthelium clandestinum (L.) Gould., #244, 579, meadow and limestone prairie, Perryville Battlefield State Historic Site.

Dichanthelium dichotomum (L.) Gould., #388, open mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Waterfall Trail.

Dichanthelium linearifolium (Scribn. ex Nash) Gould. #815, open area on south-facing slope of Hanging Fork Creek, frequent, off of Hwy 590.

Dichanthelium polyanthes (Schultes) Mohlenbrock., #342B, disturbed area on edge of mixed mesic forest, infrequent, Central Kentucky Wildlife Refuge.

*_Digitaria sanguinalis_ (L.) Scop., Judith Johnson, 7 October 1991 (EKY/Centre), broken ground of intramural field, Centre College, Danville KY.

**_Echinochloa crus-galli_ (L.) Beauv., #311, 552, 567,639, wet meadow, limestone/dolomite prairie, open mud flat next to pond, frequent, in Danville, KY, Perryville Battlefield State Historic Site off of Battlefield, and off of Knob Lick Road in Junction City, KY.

Elymus hystrix L., #220, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Elymus macgregorium R.E. Brooks & J.J.N. Campb., #340, 806, wet meadow and eastern bank of Doctor's Creek in mixed mesic riparian forest, infrequent, Danville, KY and Perryville Battlefield State Historic Site.

Elymus riparius Wieg., #812, along Hanging Fork Creek in mesic woods, frequent, off of Hwy 590.

Elymus virginicus L., #260, along Doctor's Creek in mesic woods, frequent, Perryville Battlefield State Historic Site.

**Elytrigia repens* (L.) Desv. ex B.D. Jackson., #230, 561, disturbed habitat and fallow field, infrequent, Perryville Battlefield State Historic Site and off of Letton Drive.

***Eragrostis cilianensis* (All.) Vign. ex Janchen., D.K. Shankland #7, 7 September 1986 (EKY), open, disturbed area near swimming pool, yellow clay soil, Gwinn Island.

***Festuca arundinacea* Schreb., #804, fallow field east of Doctor's Creek, abundant, Perryville Battlefield State Historic Site.

Festuca subverticillata (Pers.) Alexeev., #378, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Hordeum pusillum Nutt., #133, 792, disturbed roadside, open disturbed field, infrequent, Central Kentucky Wildlife Refuge along Carpenter Creek Road, and on Gwinn Island.

Leersia oryzoides (L.) Sw., #685, open saturated mud flat next to pond, frequent, Junction City, KY off of Knob Lick Road.

Muhlenbergia sobolifera (Muhl. ex Willd.) Trin., J. Campbell, 14 October 1984 (KY), Central Kentucky Wildlife Refuge on limestone knob.

Panicum capillare L., D.K., Shankland #6A, 7 September 1986 (EKY), open, disturbed area near swimming pool; yellow clay soil, Gwinn Island.

Panicum flexile (Gattinger) Scribn., #589, recently mowed power-line corridor, frequent, off Chrisman Lane in Outer Bluegrass.

Panicum rigidulum Bosc ex Nees., M.E. Wharton #5738, 30 August 1940 (KY), edge of pond, a quarter mile west of Junction City in Black Shale Region of Kentucky.

Panicum verrucosum Muhl., #516, 683, northeastern bank of Green Heron Pond and open saturated mud flat next to pond, infrequent, Central Kentucky Wildlife Refuge on Brooks Hollow Trail and Junction City, KY off of Knob Lick Road.

Paspalum dissectum (L.) L., #577, limestone/dolomite prairie, infrequent, Perryville Battlefield State Historic Site off of Battlefield Road.

Paspalum floridanum Michx., #351, open bank of Island Pond, infrequent, Central Kentucky Wildlife Refuge.

Paspalum laeve Michx., #266, 434, fallow field around Hicklen Pond and in wet ditch, frequent, Perryville Battlefield State Historic Site and along Forkland Road.

Phalaris arundinacea L., #805, mixed mesic riparian forest falong Doctor's Creek, infrequent, Perryville Battlefield State Historic Site.

**Phleum pratense* L., #257, 264, 450, dry meadow, frequent, Perryville Battlefield State Historic Site along Hicklen Pond Trail.

Poa alsodes Gray., #845, mixed mesic woods, infrequent, near Mitchellsburg, KY.

***Poa compressa* L., #114, 355, mesic forest dominated by white oak on steep west-facing slope along Wildflower Trail and on open bank of Island Pond, frequent, Central Kentucky Wildlife Refuge.

***Poa pratensis* L., #130, roadside, abundant, along Carpenter Creek Road.

***Setaria faberi* Herrm., #563, limestone/dolomite prairie, frequent, Perryville Battlefield State Historic Site off of Battlefield Road.

**Setaria pumila* (Poir.) Roemer & Schultes, #458, 571, 875, in rock outcrop of limestone prairie, and mixed mesic forest on west-facing slope along Clarks Run, frequent, Perryville Battlefield State Historic Site off of Battlefield Road and off of Hwy 1805.

Sorghastrum nutans (L.) Nash., #564, 669, 721, limestone prairie, frequent, Perryville Battlefield State Historic Site off of Battlefield Road.

***Sorghum halepense* (L.) Pers., #282, 302, roadside, disturbed field, frequent, Perryville Battlefield State Historic Site along Stewarts Street, and in Danville, KY.

Sphenopholis nitida (Biehler) Scribn., #243, 811, meadow and mixed mesic forested south-facing slope along hanging Fork Creek, frequent, Perryville Battlefield State Historic Site west of Gravel Road and off of Hwy 590.

Tridens flavus (L.) A.S. Hitchc., #466, 559, 881, limestone/dolomite prairie, open south-facing slope above Clarks Run, limestone prairie, frequent, Perryville Battlefield State Historic Site off of Battlefield Rd, and off of HWY 1805.

Potamogetonaceae

Potamogeton diversifolius Raf., M.E. Wharton #5739, 13 August 1940 (KY), in pond a quarter mile west of Junction City, KY in the Black Shale Region of Kentucky.

Potamogeton nodosus Poir., #822, in pond, frequent, off of Phillips Lane near Junction City, KY.

Smilacaceae

Smilax bona-nox L., #921, rocky limestone lakeshore, frequent, Gwinn Island. Also Collected by M.E. Wharton #10620 13 October 1956 (KY), in dry, open woods along Mock's Branch, near Herrington Lake.

Smilax ecirrata (Engelm. ex Kunth) S. Wats., #379, open mixed mesic forest, infrequent, Central Kentucky Wildlife Refuge on Waterfall Trail.

Smilax glauca Walt., #174, 692, sub-xeric oak-hickory forest, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Smilax rotundifolia L., #166, sub-xeric oak-hickory forest, Central Kentucky Wildlife Refuge on Circle Trail.

Trilliaceae

Trillium cuneatum Raf., Patricia McNamara, 8 April 1957 (EKY/Centre), Lexington Avenue in Danville, KY.

Trillium flexipes Raf., #82, mesic forest dominated by white oak, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Trillium grandiflorum (Michx.) Salisb., Dax Lane #27, 25 April 1999 (EKY), fertile steep hill in Gravelswitch, KY on Hwy 33.

Trillium sessile L. #47, 746, mesic forest dominated by white oak, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Typhaceae

Typha latifolia L., #454, 602, edge of Hinklen pond, and open saturated mud flat next to pond, frequent, Perryville Battlefield State Historic Site, and in Junction City, KY off of Knob Lick Road.

Uvulariacae

Prosartes lanuginosa (Michx.) D. Don, #380, 400, open mixed mesic forests, frequent, Central Kentucky Wildlife Refuge on Waterfall Trail and Circle Trail.

MAGNOLIOPHYTA: DICOTYLEDONAE (Dicots)

Acanthaceae

Justicia americana (L.) Vahl, #256, sand bar in Doctor's Creek, frequent, Perryville Battlefield State Historic Site.

Ruellia caroliniensis (J.F. Gmel.) Steud., #463, 510, limestone prairie and roadside, infrequent, Perryville Battlefield State Historic Site off of Hwy 1920 and along Perryville Road.

Ruellia strepens L., #189, 430, 771, roadside and along Doctor's Creek in meadow, frequent, Hwy 34 & Gun Range Road, Central Kentucky Wildlife Refuge on Forkland Rd, Perryville Battlefield State Historic Site.

Aceraceae

Acer negundo L., M.E. Wharton #10925, 20 June 1957 (EKY), bank of Spears Creek.

Acer nigrum F.Michx., T.J. Weckman, and J.E. Weckman #5694 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops, upper reach of Spears Creek, a tributary of Herrington Lake.

Acer rubrum L., #204, city park, frequent, Lexington Avenue Park.

Acer saccharinum L., #716, surrounding pond, frequent, Perryville Battlefield State Historic Site at the Dye House site.

Acer saccharum Marsh., M.E. Wharton #10923 20 June 1957 (KY), bank of Spear's Creek.

Amaranthaceae

**Amaranthus hybridus* L., #673, disturbed area between road and limestone prairie, frequent, Perryville Battlefield State Historic Site off of battlefield Road.

Anacardiaceae

Rhus aromatica Ait., #794, open woodland on east-facing slope of Herrington Lake with limestone outcroppings, infrequent, Gwinn Island.

Rhus copallinum L., #481, railroad corridor, frequent, crossing on Knob Lick Road in Junction City, KY.

Rhus glabra L., #451, in disturbed roadside thicket, frequent, KY 52 and US 150.

Rhus typhina L., #297, mesic forest dominated by white oak on steep west-facing slope, rare, Central Kentucky Wildlife Refuge on Wildflower Trail.

Toxicodendron radicans (L.) Kuntze., #912, growing on *Fraxinus americana*, abundant, along Hwy 1822.

Annonaceae

Asimina triloba (L.) Dunal, #365, forested north-facing slope above Island Pond, frequent, Central Kentucky Wildlife Refuge around Island Pond.

Apiaceae

Chaerophyllum tainturieri Hook., #59, 169, mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Blue Trail.

****Conium maculatum** L., #179, open disturbed field, frequent, Central Kentucky Wildlife Refuge on Brooks Hollow Trail.

Cryptotaenia canadensis (L.) DC., #218, 450, mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

****Daucus carota** L., #226, 424, disturbed habitat and railroad corridor, frequent, along Forkland Road and the RR junction with Knob Lick Road.

Erigenia bulbosa (Michx.) Nutt., #12, 729, mesic forest dominated by white oak on west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Osmorhiza claytonii (Michx.) C.B. Clarke, #71, 106, mesic forest dominated by white oak on west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Osmorhiza longistylis (Torr.) DC., T.J. Weckman, J.E. Weckman #5700, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops, upper reaches of Spears Creek, a tributary of Herrington Lake.

****Pastinaca sativa** L., #210, 884, fallow field, frequent, along Hwy 34 and in Danville, KY.

!Perideridia americana (Nutt. Ex DC.) Reichenb., #801, mixed mesic riparian forest transitioning into open limestone prairie on the eastern bank of Doctor's Creek, rare, Perryville Battlefield State Historic Site. Kentucky Threatened Species.

Sanicula canadensis L., #363, 876, forested slope above Island Pond and open thicket on slope above Clarks Run, frequent, Central Kentucky Wildlife Refuge and Danville, KY.

Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe, #157, 184, streamside and in mixed mesic woodland, frequent, Central Kentucky Wildlife Refuge on Brooks Hollow Trail and Circle Trail.

Sanicula trifoliata Bickn., R. Hannan #7230, 19 June 1981 (EKY), woods along creek, Gee Branch just north of Casey-Boyle county line.

Taenidia integerrima (L.) Drude, #122, 448, sub-xeric to mesic forest, frequent, Central Kentucky Wildlife Refuge on Yellow Trail and Waterfall Trail.

Thaspium barbinode (Michx.) Nutt., #397, open xeric forest on southeast-facing slope near knob apex, frequent, Central Kentucky Wildlife Refuge.

**Torilis arvensis* (Huds.) Link., #531,709, roadside and disturbed field, infrequent, Danville, KY.

Apocynaceae

Apocynum cannabinum L., #251, 609, dry to wet mud flats, frequent, Perryville Battlefield State Historic Site and in Junction City, KY on Knob Lick Road.

***Vinca minor* L., #924, roadside under large pine, infrequent, Gwinn Island Road.

Aquifoliaceae

Ilex opaca Ait., #928, open dry woods on edge of wed mud flat next to pond, frequent, in Junction City, KY off of Knob Lick Road.

Araliaceae

Aralia racemosa L., #399, mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Aralia spinosa L., #695, sub-xeric oak-hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

***Hedera helix* L., T.J. Weckman #9117, 15 April 2005 (EKY), steep northwest-facing oak-buckeye-maple mixed-wooded slope above Mocks Branch, at Hwy 33 (east side of highway).

Panax quinquefolius L., #119, mixed mesic forest, locally frequent, county-wide rare, Central Kentucky Wildlife Refuge on Waterfall Trail, no collection taken, study being done of population, photograph voucher.

Aristolochiaceae

Asarum canadense L., T.J. Weckman, J.E. Weckman #5713, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops, upper reaches of Spears Creek.

Asclepiadaceae

Ampelamus albidus (Nutt.) Britt., #460, 562, limestone/dolomite prairie, frequent, Perryville Battlefield State Historic Site off of Artillery Trail.

Asclepias incarnata L., #453, open wet bank of Hinklen Pond, infrequent, Perryville Battlefield State Historic Site.

Asclepias purpurascens L., #833, along path of mixed mesic forest in open area, infrequent, Central Kentucky Wildlife Refuge on Bluebird Trail.

Asclepias quadrifolia Jacq., #143, ridgetop of open sub-xeric oak-hickory forest, frequent, Central Kentucky Wildlife Refuge on ridge trail.

Asclepias syriaca L. #225, 271, 305, 374, tall-grass prairie, streamside in thicket, railroad corridor, disturbed field, frequent, Central Kentucky Wildlife Refuge on Bluebird Trail, Perryville Battlefield State Historic Site along Doctor's Creek, Junction City, KY, and in Danville, KY.

Asclepias tuberosa L., #249, open fallow fields, frequent, Perryville Battlefield State Historic Site.

Asclepias variegata L., H. Garman, 19 June 1982 (UKAg), Junction City, KY.

Asclepias viridis Walt. #245, 459, 839, open fields, frequent, Perryville Battlefield State Historic Site off of gravel road and near Mitchellsburg, KY.

Asteraceae

Achillea millefolium L., #103, railroad corridor, frequent, intersecting with Knob Lick Road.

Ageratina altissima (L.) R.M.King & H.Rob. #549, 645, meadow and mixed mesic woodland, frequent, Danville, KY and Central Kentucky Wildlife Refuge.

Ambrosia artemisiifolia L. #199, 537, 588, powerline corridor, disturbed roadside thicket, open field, abundant, Danville, KY.

Ambrosia trifida L. #536, 591, 874, powerline corridor, mesic forest, disturbed field, abundant, Danville, KY.

Antennaria neglecta Greene, W. Settle, 17 April 1961 (EKY/Centre), Parksville, KY.

Antennaria plantaginifolia (L.) Richards., #34, 842, open xeric forest near knob apex, frequent, Central Kentucky Wildlife Refuge and near Mitchellsburg, KY.

***Arctium minus** Bernh. #535, disturbed field, frequent, Danville, KY.

Arnoglossum muehlenbergii (Schultz-Bip.) H.Rob., #295, lowland mixed mesic woodland, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail by North Rolling Fork.

Bidens aristosa (Michx.) Britt., D. Heller #3, 19 September 1994 (EKY/Centre), on bank of drainage ditch along Danville Bypass and in front of Boyle County Fairgrounds.

Bidens bipinnata L., #595, 614, open xeric forest and disturbed habitat, frequent, Danville, KY.

Bidens cernua L., #718, in field around pond, frequent, Perryville Battlefield State Historic Site at Dye House site.

Bidens frondosa L., #684, wet open mud flat next to pond, frequent, Junction City, KY.

Bidens polylepis S.F.Blake., #630, 681, wet field, frequent, Danville, KY.

Bidens tripartita (Gray) Wieg., M.E. Wharton #10633, 13 October 1956 (KY), damp ground by Spear's Creek.

Bidens vulgata Greene., #660, limestone/dolomite prairie, infrequent, Perryville Battlefield State Historic Site off of artillery Trail.

Brickellia eupatorioides (L.) Shinners, M.E. Wharton #10627, 13 October 1956 (KY), along Waterworks Road near Danville, KY.

***Carduus nutans** L., #191, 555, disturbed field and roadside, abundant, Danville, KY.

**Centaurea maculosa* Lam. #95, 440, roadside, frequent, Junction City, KY and Forkland Area.

**Centaurea transalpina* Schleich. ex DC., #687, alongside road in rock outcrop, rare, Forkland Area.

***Chrysanthemum leucanthemum** L., #127, 187, disturbed area along path and roadside, abundant, Central Kentucky Wildlife Refuge on Bluebird Trail and in Danville, KY.

***Cichorium intybus** L., #231, 476, disturbed habitats, abundant, Danville, KY.

***Cirsium arvense** (L.) Scop., #449, 621, disturbed habitats, frequent, Danville, KY.

Cirsium discolor (Muhl. ex Willd.) Spreng., #502, roadside, frequent, Danville, KY.

***Cirsium vulgare* (Savi) Ten., #560, 613, 640, roadside and wet mud flat next to pond, frequent, Perryville Battelfield State Historic Site and Junction City, KY.

Conoclinium coelestinum (L.) DC., #636, wet mud flat next to pond, infrequent, Junction City, KY. Also collected by J. O'Connor, 5 October 1986 (EKY/Centre), in a field surrounded by forest at the Central Kentucky Wildlife Refuge.

Conyza canadensis (L.) Cronquist. #615, 664, disturbed habitats, abundant, Danville, KY and Perryville Battlefield State Historic Site.

**Coreopsis grandiflora* Hogg., #329, 352, 572, 672, 726, limestone/dolomite prairie and edge of Island Pond, frequent, Perryville Battlefield State Historic Site off of artillery trail and Central Kentucky Wildlife Refuge.

Coreopsis major Walt. #385, 443, edge of forest and open field and roadside, frequent, Central Kentucky Wildlife Refuge and Forkland Area.

Doellingeria infirma (Michx.) Greene, #698, mixed mesic forest, infrequent, Central Kentucky Wildlife Refuge on Circle Trail.

Echinacea purpurea (L.) Moench, #334, 728, limestone/dolomite prairie, frequent, Perryville Battlefield State Historic Site off of Artillery Trail.

Eclipta prostrata (L.) L., #892, edge of pond, infrequent, Junction City, KY.

Elephantopus carolinianus Raeusch., #511, 644, roadside and mixed mesic forest, frequent, Perryville Rd Central Kentucky Wildlife Refuge.

Elephantopus tomentosus L., #479, railroad corridor, rare, off of Knob Lick Road in Junction City, KY.

Erigeron annuus (L.) Pers., #785, 852, rocky lakeshore and open mowed field, frequent, Gwinn Island and near Mitchellsburg, KY.

Erigeron philadelphicus L., #64, open meadow recently mowed, frequent, Central Kentucky Wildlife Refuge off of Wildflower Trail.

Erigeron strigosus Muhl. Ex Willd., #232, 533, 624, 704, 425, 611, 840, disturbed habitats, frequent, Danville, KY Forkland Area, Junction City, KY, Mitchellsburg, KY.

Eupatorium altissimum L., #625, 680, roadside thicket and field with rock outcrops, infrequent, along Old KY 52 and Letton Drive.

Eupatorium fistulosum Barratt, #527, 605, tall-grass prairie and wet mud flat next to pond, frequent, Central Kentucky Wildlife Refuge on Bluebird Trail and in Junction City, KY off of Knob Lick Road.

Eupatorium perfoliatum L., #601, 635, 896, edge of pond and wet mud flat next to pond, frequent, Junction City, KY off of Knob Lick Road.

Eupatorium purpureum L., #401, sub-xeric oak-hickory forest along open path, Central Kentucky Wildlife Refuge on Circle Trail.

Eupatorium serotinum Michx., #620, roadside in field, frequent, on KY 52 near Danville, KY.

Eurybia surculosa (Michx.) Nesom., #694, sub-xeric oak-hickory forest along open path, infrequent, Central Kentucky Wildlife Refuge on Circle Trail.

Euthamia graminifolia (L.) Nutt., #642, railroad corridor, frequent, intersecting Knob Lick Road.

Fleischmannia incarnata (Walt.) King & H.Rob., M.E. Wharton #10641, 13 October 1956 (KY), thicket in damp ground by Spear's Creek.

Gaillardia pulchella Foug., #337, 671, limestone/dolomite prairie, infrequent, Perryville Battlefield State Historic Site off of Artillery Trail.

**Galinsoga quadriradiata* Cav., M.E. Wharton #10634, 13 October 1956 (KY), damp ground by Spear's Creek.

Helenium autumnale L., #633, 675, 873, mixed mesic riparian forest along Doctor's Creek and Clark's Run and in a thicket in a wet ditch, infrequent, Perryville Battlefield State Historic Site and in Danville, KY.

Helenium flexuosum Raf., #427, 523, roadside and tall-grass prairie, infrequent, Forkland Road and Central Kentucky Wildlife Refuge on Bluebird Trail.

**Helianthus annuus* L., #580, 883, limestone/dolomite prairie and fallow field, infrequent, Perryville Battlefield State Historic Site off of Artillery Trail and in Danville, KY.

Helianthus divaricatus L., #431, 492, forested roadside and in sub-xeric oak-hickory forest, frequent, Forkland Area and Central Kentucky Wildlife Refuge off of Circle Trail.

Helianthus microcephalus Torr. & Gray., T. Hill, 12 September 1990 (EKY/Centre), open sunny area near path at the Central Kentucky Wildlife Refuge.

Helianthus tuberosus L., #674, 774, edge of open field along path and along Doctor's Creek, frequent, Perryville Battlefield State Historic Site.

Hieracium gronovii L., #519, open sandy bank of Green Heron Pond, frequent, Central Kentucky Wildlife Refuge.

Hieracium venosum L., M.E. Wharton #670, 3 July 1937 (KY), dry upland pine woods two miles west of Junction City, KY.

Krigia biflora (Walt.) Blake, 115, 172, 843, ridgetop in open sub-xeric oak-hickory forest and in open field, frequent, Central Kentucky Wildlife Refuge and near Mitchellsburg, KY.

**Lactuca serriola* L., M.E. Wharton #1000, 22 July 1937 (KY), roadside two miles west of Parksville, KY.

**Matricaria discoidea* DC., T.J. Weckman #5710, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops on upper reaches of Spears Creek, a tributary of Herrington Lake.

Packera anonyma (Wood) W.A. Weber & A. Löve., #137, open rock outcrop along edge of Island Pond margin, frequent, Central Kentucky Wildlife Refuge along Island Pond.

Packera aurea (L.) A.& D. Löve, #761, along stream in mesic forest, frequent, Junction City, KY.

Packera glabella (Poir) C. Jeffrey., #762, along stream in mesic forest, infrequent, Junction City, KY.

Packera obovata (Muhl. Ex Willd.) W.A. Weber & A. Löve., #26, 58, mesic white oak forest on west-facing slope near limestone outcrops, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Polymnia canadensis L., #296, mesic white oak forest, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Prenanthes serpentaria Pursh, #693, sub-xeric oak-hickory forest with beech understory, frequent Central Kentucky Wildlife Refuge on Circle Trail.

Pseudognaphalium obtusifolium (L.) Hilliard & Burtt, J. Bruner, 12 September 1990 (EKY/Centre), in open meadow at the Central Kentucky Wildlife Refuge.

Pyrrhopappus carolinianus (Walt.) DC., T. Scobee, 5 October 1986 (EKY/Centre), field at the Central Kentucky Wildlife Refuge.

Ratibida pinnata (Vent.) Barnh. #456, limestone/dolomite prairie, infrequent, Perryville Battlefield State Historic Site off of Artillery Trail.

Rudbeckia fulgida Aiton var. *fulgida*, #702, sub-xeric oak-hickory forest with beech understory, along open path, infrequent, Central Kentucky Wildlife Refuge on Circle Trail.

Rudbeckia hirta L. #215, 268, 336, 665, 668, 723, 727, limestone/dolomite prairie, roadside and open rocky area on pond margin, very frequent, Perryville Battlefield State Historic Site off of Artillery Trail and around Hinklen Pond, and Forkland Area.

Rudbeckia triloba L., #467, 566, 677, 725, limestone/dolomite prairie, open field along stream, Perryville Battlefield State Historic Site off of Artillery Trail and east of Doctor's Creek.

Sericocarpus asteroides (L.) B.S.P., #389, 489, open xeric forest along knob ridgetop and along margin of mesic forest and field, infrequent, Central Kentucky Wildlife Refuge on Ridge Trail and off of Wildflower Tail.

Silphium perfoliatum L., #474, riparian forest in disturbed area along creek, infrequent, in Danville, KY near Recycling Center.

Silphium trifoliatum L. #422, 507, roadside, frequent, in Forkland Area and off of Perryville Road.

Smallanthus uvedalius (L.) Mackenzie ex Small., #461, margin of riparian forest and limestone prairie, frequent, Perryville Battlefield State Historic Site.

Solidago bicolor L., M.E. Wharton #5876, 12 October 1940 (KY), dry open pine woods one mile west of Junction City, KY.

Solidago caesia L., #689, sub-xeric woodland, frequent, Central Kentucky Wildlife Refuge.

Solidago canadensis L. # 619, 631, 653, 703, open riverbank on limestone outcroppings, limestone/dolomite prairie, and disturbed habitats, abundant, along Dix River near Hwy 52 Bridge, and Perryville Battlefield State Historic Site off of Artillery Trail.

Solidago gigantea Ait., #504, 606, 770, 773, streamside, open wet mud flat next to pond and in a wet ditch, frequent, in Junction City, KY off of Knob Lick Road, and Perryville Battlefield State Historic Site along Doctor's Creek and Perryville Road.

Solidago hispida Muhl. Ex Willd., #690, 696, open sub-xeric forest, infrequent, Central Kentucky Wildlife Refuge on Circle Trail.

Solidago nemoralis Ait., J. Johnson, 20 September 1991 (EKY), primary trail of Central Kentucky Wildlife Refuge.

Solidago speciosa Nutt. J. Campbell, 6 September 1986 (KY), on Devonian Shale, off of Knob Lick Road, near Junction City, KY.

Solidago sphacelata Raf., M.E. Wharton #10623, 13 October 1956 (KY), dry open woods by Mock's Branch, near Herrington Lake.

Solidago ulmifolia Muhl. Ex Willd., M.E. Wharton #5873, 12 October 1940 (KY), dry open woods one mile west of Junction City, KY.

***Sonchus asper* (L.) Hill, #705, Dix riverbank on limestone outcroppings, infrequent, near Hwy 52 Bridge.

Symphyotrichum dumosum (L.) Nesom, E.E.S., 23 September 1991 (EKY/Centre), open field, Central Kentucky Wildlife Refuge.

Symphyotrichum laeve (L.) A.& D. Löve, T. Scobee, 5 October 1986 (EKY), field, Danville, KY.

Symphyotrichum lanceolatum (Willd.) Nesom, M. Hamilton, 12 September 1990 (EKY), meadow at edge of woods, Central Kentucky Wildlife Refuge.

Symphyotrichum lateriflorum (L.) A.& D. Löve, #713, roadside, frequent, along Hwy 52.

Symphyotrichum lowrieanum (Porter) Nesom, #708, thicket on Dix riverbank on limestone outcroppings, infrequent, near Hwy 52 Bridge. Also collected by J. Campbell, 14 October 1984 (KY), Central Kentucky Wildlife Refuge.

Symphyotrichum oblongifolium (Nutt.) Nesom, M.E. Wharton #10643, 13 October 1956 (KY), on sunny limestone ledge along Mock's Branch, near Herrington Lake.

Symphyotrichum ontarione (Wieg.) Nesom, J. Campbell, 14 October 1984 (KY), Central Kentucky Wildlife Refuge.

Symphyotrichum pilosum (Willd.) Nesom, #663, 706, limestone/dolomite prairie and open forested riverbank on limestone outcroppings, abundant, Perryville Battlefield State Historic Site off of Artillery Trail, and Dix River near Hwy 52 bridge.

Symphyotrichum racemosum (Ell.) Nesom, #682, roadside, frequent, along Hwy 127.

Symphyotrichum shortii (Lindl.) Nesom, #707, thicket on Dix riverbank on limestone outcroppings, frequent, near Hwy 52 Bridge.

Symphyotrichum undulatum (L.) Nesom, #688; 697, sub-xeric oak-hickory forest with beech understory along open path and roadside on rock outcrop, Central Kentucky Wildlife Refuge on Circle Trail, and Forkland Area.

*_Taraxacum officinale_ G.H. Weber ex Wiggers, B. Pesci #9, 6 May 1977 (EKY), weedy area along roadside at the corner of Lexington Avenue and Barbee Way.

*_Tragopogon dubius_ Scop., #306, wet disturbed field, frequent, Danville, KY.

Verbesina alternifolia (L.) Britt. Ex Kearney, #521, wet field/thicket along margin of riparian forest of North Rolling Fork, frequent, Central Kentucky Wildlife Refuge on Fork Trail.

Verbesina virginica L., #473, 768, roadside and along Doctor's Creek, frequent, along Hwy 52 near bridge and Perryville Battlefield State Historic Site.

Vernonia gigantea (Walt.) Trel., #489, sub-xeric oak-hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Xanthium strumarium L. var. _glabratum_ (DC.) Cronq. #657, thicket in fallow field, frequent, Perryville Battlefield State Historic Site.

Balsaminaceae

Impatiens capensis Meerb., #277, 486, 632, along Doctor's Creek, on forested south-facing slope overlooking Island Pond, and thicket in wet ditch, Perryville Battlefield State Historic Site, Central Kentucky Wildlife Refuge, and Junction City, KY.

Impatiens pallida Nutt. #414, wet ditch alongside road, frequent, Carpenter's Creek Road.

Berberidaceae

Caulophyllum thalictroides (L.) Michx., #142, xeric forest on knob ridgetop but more commonly found in mesic forests, frequent, Central Kentucky Wildlife Refuge along ridge trail.

Jeffersonia diphylla (L.) Pers., #49, mesic white oak forest on west-facing slope amongst limestone outcrops, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Podophyllum peltatum L. Loetscher, #126 mesic white oak forest on west-facing slope amongst limestone outcrops, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Betulaceae

Carpinus caroliniana Walt., #181, 431, on margin of tall-grass prairie and sub-xeric forest, frequent, Central Kentucky Wildlife Refuge on Bluebird Trail.

Corylus americana Walt., #10, forested floodplain on edge of mesic forest, infrequent, Central Kentucky Wildlife Refuge on Brooks Hollow Trail.

Ostrya virginiana (P. Mill.) K. Koch, M.E. Wharton #10921, 20 June 1957 (KY), on limestone bluff near Spear's Creek.

Bignoniaceae

Campsis radicans (L.) Seem. ex Bureau, #208, alongside road, frequent, in Mitchellsburg, KY along Hwy 34.

Catalpa speciosa (Warder) Warder ex Engelm., #628, wet area alongside road, infrequent, Junction City, KY on Hwy 127.

****Paulownia tomentosa** (Thunb.) Steud., Carr #423, 10 September 1935 (MDKY), Danville, KY.

Boraginaceae

***Buglossoides arvensis** (L.) I.M. Johnston, #134, alongside road, frequent, Forkland Road.

Cynoglossum virginianum L. #116, open mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Waterfall Trail.

Lithospermum latifolium Michx., #140, xeric forest on knob ridgetop, infrequent, Central Kentucky Wildlife Refuge on Ridge Trail.

Mertensia virginica (L.) Pers. Ex Link, #29, 45, 79A, mixed mesic bottomland forest along North Rolling Fork, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

***Symphytum officinale** L., B. Pesci #40, 5 May 1977 (EKY), grassy field by Waterworks Road near Herrington Lake.

Brassicaceae

****Alliaria petiolata** (Bieb.) Cavara & Grande, #77, in mixed mesic bottomland forest along Norht Rolling Fork, frequent, Central Kentucky Wildlife Refuge along Wildflower Trail.

Arabis laevigata (Muhl. ex Willd.) Poir. var. *laevigata*, #55, mesic white oak forest on west-facing slope amongst limestone outcrops, frequent, Central Kentucky Wildlife Refuge along Wildflower Trail.

***Barbarea vulgaris* Ait. F., R.L.Thompson #104, 6 May 2007 (BEREA), in grassy road shoulder on US 150, mile 3 marker from county line, near Old Orchard Road.

**Brassica nigra* (L.) W.D.J. Koch., M.E. Wharton #2951, 30 June 1938 (KY), waste ground one mile west of Junction City, KY.

**Cardamine hirsuta* L. #7, 16, 732, 734, forested limestone cliffline along Doctor's Creek, open field, and roadside, frequent, Perryville Battlefield State Historic Site, in Junction City, and in Danville, KY.

Cardamine rhomboidea (Pers.) DC., M.E. Wharton #1796, 16 April 1938 (KY), wet ground by brook in Junction City, KY in the Black Shale Region of Kentucky.

Dentaria diphylla Michx., #84, mesic white oak forest on west-facing slope amongst limestone outcrops, infrequent, Central Kentucky Wildlife Refuge along Wildflower Trail.

Dentaria heterophylla Nutt., #31, 743, sub-xeric oak-hickory forest, infrequent, Central Kentucky Wildlife Refuge and near Junction City, KY.

Dentaria laciniata Muhl. Ex Willd., #25 mesic white oak forest on west-facing slope amongst limestone outcrops, frequent, Central Kentucky Wildlife Refuge along Wildflower Trail.

**Draba verna* L., #3, 17, 730, limestone/dolomite prairie in rock outcrop and in open fields, frequent, Perryville Battlefield State Historic off of Artillery Trail and in Danville, KY.

***Hesperis matronalis* L., #129, disturbed roadside, infrequent, on Forkland Road.

Iodanthus pinnatifidus (Michx.) Steud., #274, 758, along Doctor's Creek and forested stream, frequent, Perryville Battlefield State Historic Site and in Junction City, KY.

**Lepidium campestre* (L.) Ait. F., #731, limestone outcrop in prairie, frequent, Perryville Battlefield State Historic Site off of Artillery Trail.

Lepidium virginicum L., #714, 786, 877, rocky lakeshore, roadside, and Dix riverbank, frequent, Gwinn Island, along Hwy 52, and in Danville, KY.

***Nasturtium officinale* Ait. F., #198, 539, disturbed wet field, roadside, infrequent, Danville, KY.

Rorippa sessiliflora (Nutt.) A.S. Hitchc., M.E. Wharton #10652, 13 October 1956 (KY), weedy field by Spear's Creek.

*_Sisymbrium officinale_ (L.) Scop., #272, 809, along path in fallow field, infrequent, Perryville Battlefield State Historic Site east of Doctor's Creek.

**_Thlaspi alliaceum_ L. #23, 99, 757, roadside, infrequent, in Danville and Junction City, KY and on Hwy 52 near Dix River bridge.

**_Thlaspi perfoliatum_ (L.) F.K. Mey., R.L. Thompson #105, 6 May 2007 (BEREA), in grassy road shoulder on US 150, mile 3 marker from county line, near Old Orchard Road.

Buddlejaceae

**_Buddleja davidii_ Franch., #338, open area near nature center, rare, Perryville Battlefield State Historic Site.

Cactaceae

Opuntia humifusa (Raf.) Raf., #299, in ditch alongside road, rare, near abandoned limestone rock quarry in Perryville, KY along Hwy 150.

Campanulaceae

Campanulastrum americanum (L.) Small, #391, open xeric forest on knob ridgetop, more commonly found in mesic forests, frequent, Central Kentucky Wildlife Refuge.

Lobelia cardinalis L., #890, pond margin, infrequent, Junction City, KY.

Lobelia inflata L., #360, 485, mixed mesic forested north-facing slope overlooking Island Pond, frequent, Central Kentucky Wildlife Refuge.

Lobelia siphilitica L. #699, 772, mixed mesic forest and along Doctor's Creek, frequent, Central Kentucky Wildlife Refuge on Circle Trail and Perryville Battlefield State Historic Site.

Lobelia spicata Lam., #828, sub-xeric oak-hickory forest, frequent, Junction City, KY.

Triodanis perfoliata (L.) Nieuwl. var. _perfoliata_, #168, 788, 182, sub-xeric oak-hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail; rocky bank of Island Pond and lakeshore, frequent, Central Kentucky Wildlife Refuge and Gwinn Island.

Cannabaceae

*_Cannabis sativa_ L., D. Waller, #5, 22 September 1984 (EKY), in yard of house over 150 years old in sunny area. Yard of farm 1.5 miles north of Danville, KY on Maple Avenue.

Caprifoliaceae

****Lonicera fragrantissima** Lindl. & Paxton, #922, rocky limestone bank of Herrington Lake, infrequent, Gwinn Island.

****Lonicera japonica** Thunb. #488, disturbed areas, abundant, Danville, KY.

****Lonicera maackii** (Rupr.) Herder., #102, disturbed areas, railroad corridor, abundant, Junction City, KY.

Sambucus canadensis L., #209, margin of forest and cultivated field, frequent, near Danville, KY along Hwy 34.

Symphoricarpos orbiculatus Moench., #18, fallow field, frequent, along Hwy 52.

Viburnum acerifolium L., #139, sub-xeric oak-hickory forest with beech understory on south-facing mid-slope of knob, frequent, Central Kentucky Wildlife Refuge on Ridge Trail.

!*Viburnum molle* Michx., #941, 942, 943, north-facing slope of Clarks Run in sub-xeric oak-hickory forest near limestone ledge overlooking stream, 8 plants located, encroachment of site by thicket of *Lonicera mackii*. State listed species: Special Concern.

Viburnum prunifolium L., T.J. Weckman #8418, 29 October 1923 (EKY), wooded north-facing slopes and ledges along Clark's Run, Danville, KY.

Viburnum rafinesquianum Schultes, T.J. Weckman #1176, 29 October 2003 (EKY), disturbed woods along limestone cliffs on Gwinn Island.

Viburnum rufidulum Raf., T.J. Weckman #5677, 23 October 2003 (EKY), common in disturbed woods along limestone cliffs of Gwinn Island.

Caryophyllaceae

****Arenaria serpyllifolia** L., #267, fallow field surrounding Hinklen Pond, infrequent, Perryville Battlefield State Historic Site.

***Cerastium glomeratum** Thuill., J. Russell #30, 20 April 1996 (EKY), growing along edge of driveway next to winter wheat field, on Mill Creek Road off of Hwy 1856.

***Dianthus armeria** L., #183, 194, sub-xeric oak-hickory forest along path and roadside, frequent, Central Kentucky Wildlife Refuge on Circle Trail and Danville, KY.

Minuartia patula (Michx.) Mattf., #799, rock outcrop near limestone cliffs above Herrington Lake, rare, Gwinn Island.

Paronychia canadensis (L.) Wood, #384, mesic white oak forest, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Paronychia fastigiata (Raf.) Fern. var. *fastigiata*, M.E. Wharton #2910, 30 June, 1938 (KY), oak-hickory woods one mile west of Junction City, KY.

**Saponaria officinalis* L., #280, 415, roadside and disturbed areas, abundant, Forkland Road and in Danville, KY.

**Silene latifolia* (P. Mill.) Britten & Rendle, non Poir., #202, 754, along rocky shore of Herrington Lake and disturbed roadsides, infrequent, along Hwy 52 near bridge and off of Kings Mill Road along lakeshore.

**Silene noctiflora* L., #192, 328, fallow field and roadside, infrequent, Danville, KY.

Silene stellata (L.) Ait. F., T.J. Weckman #5685, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops on west-facing slope along Taylor Creek, a tributary to Herrington Lake.

Silene virginica L., #798, limestone outcrop near cliffs overlooking Herrington Lake, infrequent, Gwinn Island.

Stellaria corei Shinners, D.Nance #25, 23 April 1977 (EKY), dispersed throughout trees on Gwinn Island.

***Stellaria media* (L.) Vill., #5, disturbed open field in cemetery, abundant, in Junction City, KY.

Stellaria pubera Michx., #741, 38, in open mixed mesic forest along tributary of Carpenter Fork, frequent, Central Kentucky Wildlife Refuge off of Brooks Hollow Trail.

Celastraceae

Celastrus scandens L., M.E. Wharton #688, 3 July 1937 (KY), in dry oak-hickory woods near Parksville, KY.

***Euonymus alatus* (Thunb.) Siebold., #930, open wet woods, infrequent, Junction City, KY. Also collected by T.J. Weckman 9114, 15 April 2005 (EKY), steep northwest-facing oak-buckeye-maple mixed wooded slope above Mocks Branch at Hwy 33 (East side of highway).

Euonymus atropurpureus Jacq., #356, 816, forested bank of Island Pond and mixed mesic forested east-facing slope above Hanging Fork Creek, infrequent, Central Kentucky Wildlife Refuge and off of Hwy 590.

***Euonymus fortunei* (Turcz.) Hand.-Mazz., #205, on trees in park and disturbed areas, abundant, Lexington Avenue Park.

Chenopodiaceae

***Chenopodium album* L., B. Hamilton, 20 October 1986 (EKY/Centre), in grassy wet lot on Centre College campus, Danville, KY.

Chenopodium standleyanum Aellen., J. Campbell, 12 October 1984 (KY), Central Kentucky Wildlife Refuge.

Cistaceae

Lechea racemulosa Michx., M.E. Wharton #2949, 1 July 1938 (KY), open oak woods one mile west of Junction City, KY in the Black Shale Region of Kentucky.

Clusiaceae

Hypericum dolabriforme Vent., #255, mixed mesic riparian woods along Doctor's Creek, infrequent, Perryville Battlefield State Historic Site.

Hypericum mutilum L., #895, open pond margin, infrequent, near Junction City, KY.

***Hypericum perforatum* L., #250, 464, 569, open meadow and in limestone/dolomite prairie, frequent, Perryville Battlefield State Historic Site.

Hypericum punctatum Lam., #344, mixed mesic forest, frequent, Central Kentucky Wildlife Refuge.

Hypericum stragulum P. Adams & Robson, #517, rock-outcrop on eastern bank of Green Heron Pond with sparse red cedar coverage, infrequent, Central Kentucky Wildlife Refuge on Brooks Hollow Trail.

Convolvulaceae

Calystegia sepium (L.) R. Br., #475, 238, 259, wet ditch, frequent, outside recycling center in Danville, KY; fallow field, frequent, Hwy 190B and Letton Drive and Perryville Battlefield State Historic Site.

***Convolvulus arvensis* L., C. Stevens, 11 September 1986 (EKY/Centre), fields, roadsides, and waste places in Danville, KY on US 34.

***Ipomoea hederacea** Jacq., C. Gambill, 12 September 1991 (EKY/Centre), meadow in Central Kentucky Wildlife Refuge.

Ipomoea lacunosa L., #629, disturbed habitat, frequent, Hwy 127 & Hwy 301.

Ipomoea pandurata (L.) G.F.W. Mey., #462, limestone/dolomite prairie near stream, frequent, Perryville Battlefield State Historic Site off of Hwy 1920.

***Ipomoea purpurea* (L.) Roth, #686, 710, roadside, frequent, along White Oak Road and Hwy 52.

Cornaceae

Cornus drummondii C.A. Mey., #224, 844, 929, railroad corridor, margin of meadow and thicket along mud flat next to pond, frequent, intersecting with Knob Lick Road and off of Hwy 1856.

Cornus florida L., #85, mixed mesic riparian forest along Carpenter Fork, frequent, in Forkland area.

Crassulaceae

**Sedum acre* L., #290, on limestone bedrock in abandoned rock quarry, infrequent, off of Hwy 1856 near Perryville, KY.

Sedum pulchellum Michx., #781, 782, rocky (limestone) lakeshore, infrequent, Gwinn Island.

**Sedum sarmentosum* Bunge, #288, on limestone bedrock in abandoned rock quarry, infrequent, off of Hwy 1856 near Perryville, KY.

Sedum ternatum Michx., #107, mesic white oak forest on limestone cliffs along steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Cucurbitaceae

Sicyos angulatus L., #676, 711, mixed mesic riparian forest of Doctor's Creek and roadside, frequent, Perryville Battlefield State Historic Site and along Hwy 52.

Cuscutaceae

Cuscuta gronovii Willd. ex Schultes, #308, 581, wet disturbed field, growing on *Solidago spp.*, infrequent, Danville, KY.

Dipsacaceae

**Dipsacus fullonum* L., #190, 229, 585, roadside and in power line corridor recently mowed, frequent, Hwy 34 & Gun Range Road, Hwy 190B and Letton Drive, and off of Chrisman Lane in power line corridor.

***Dipsacus laciniatus* L., #594, pipeline corridor at the top of hill, infrequent, off of Chrisman Lane.

Elaeagnaceae

***Elaeagnus umbellata* Thunb., #348, 491, edge of forest in disturbed area and edge of prairie, frequent, Central Kentucky Wildlife Refuge.

Ericaceae

Gaylussacia baccata (Wangenh.) K. Koch., #90, sub-xeric oak-hickory forest with ericaeous understory on northeast-facing slope of knob, frequent, in Forkland Area.

Oxydendrum arboreum (L.) DC., #933, sub-xeric oak-hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Rhododendron cumberlandense E.L. Braun, H. Garman, 19 June 1892 (KY), Junction City, KY.

Vaccinium corymbosum L., #89, sub-xeric oak-hickory forest with ericaceous understory on northeast-facing slope of knob, frequent, in Forkland Area.

Vaccinium pallidum Ait., #376, sub-xeric oak-hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Vaccinium stamineum L., #88, 138, 861, sub-xeric oak-hickory forest with beech understory and in silstone/shale glade on very open ridgetop of knob, frequent, Central Kentucky Wildlife Refuge on Circle Trail and knob near Mitchellsburg, KY.

Euphorbiaceae

Acalypha ostryifolia Riddell., #472, 556, limestone/dolomite prairie and disturbed roadside, infrequent, Perryville Battlefield State Historic Site off of Battlefield Rd and Hwy 52 near bridge.

Acalypha virginica L., J. Campbell, 14 October 1989 (KY), Central Kentucky Wildlife Refuge.

Croton capitatus Michx., F.T. McFarland #105, 24 August 1949 (KY), field on US 68 five miles south of Perryville, KY.

Croton monanthogynus Michx., #573, limestone outcrop in limestone/dolomite prairie, frequent, Perryville Battlefield State Historic Site off of Battlefield Rd.

Euphorbia corollata L. var. *mollis* Millsp., #505, roadside, frequent, along Perryville Rd.

Euphorbia dentata Michx., #557, 622, limestone/dolomite prairie and roadside disturbed thicket, frequent, Perryville Battlefield State Historic Site and on Old KY 52.

Euphorbia nutans Lag., #553, 592, pipeline corridor and disturbed wet field, frequent, off of Chrisman Lane and in Danville, KY.

Fabaceae

****Albizia julibrissin** Durazz., #185, roadside, infrequent, intersection of Hwy 1805 and Kempler Lane.

Amphicarpaea bracteata (L.) Fern., #646, mesic white oak forest on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Apios americana Medik., #526, 891, mixed mesic forest with beech understory and wet woods surrounding pond, Central Kentucky Wildlife Refuge on Brooks Hollow Trail and near Junction City, KY.

Cercis canadensis L., #61, edge of meadow, frequent, Central Kentucky Wildlife Refuge off of Wildflower Trail.

Chamaecrista fasciculata (Michx.) Greene, #477, 888, along railroad tracks, frequent, near junction of Knob Lick Rd and Lucas Street.

Cladrastis kentukea (Dum.-Cours.) Rudd., T.J. Weckman and J.E. Weckman #9051, 25 September 2004 (EKY), mixed woods on north-facing slopes and ledges, at mouth of Spears Creek at dix River/Herrington Lake impoundment.

****Coronilla varia** L., #193, 445, wet ditch and roadside, abundant, Knob Lick Road and Hwy 34 & Gun Range Road.

Desmodium canescens (L.) DC., #487, tall-grass prairie and saturated mud flat next to pond, frequent, Central Kentucky Wildlife Refuge on the Circle Trail and in Junction City, KY on Knob Lick Road.

Desmodium ciliare (Muhl. ex Willd.) DC., #666, limestone/dolomite prairie, infrequent, Perryville Battlefield State Historic Site off of Artillery Trail.

Desmodium glutinosum (Muhl. ex Willd.), #407, 498, sub-xeric oak-hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle trail.

Desmodium nudiflorum (L.) DC., #387, 496, on streambank of Carpenter Fork and in mesic white oak forest, frequent, Central Kentucky Wildlife Refuge off of Wildflower Trail and Waterfall Trail.

Desmodium paniculatum (L.) DC., #534, 656, disturbed wet field and limestone/dolomite prairie, frequent, in Danville, KY and Perryville Battlefield State Historic Site off of Artillery Trail.

Galactia volubilis (L.) Britt., T. Harper and P. Keesee, 21 September 1990 (EKY/Centre), open wooded area in Central Kentucky Wildlife Refuge.

Gleditsia triacanthos L., T.J. Weckman, JE. Weckman #5661, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops on west-facing slope along Taylor Creek, tributary to Herrington Lake.

Gymnocladus dioicus (L.) K. Koch, #910, meadow along roadside, infrequent, Hwy 1805 and Goglin Lane.

**Lathyrus latifolius* L., #211, roadside thicket, frequent, Hwy 37 in Danville, KY.

***Lespedeza bicolor* Turcz., #889, roadside thicket, infrequent, Hwy 37 in Danville, KY.

***Lespedeza cuneata* (Dum.Cours.) G. Don., #599, 882, fallow field and on margins of saturated mud flat next to pond, off of Knob Lick Road and off of Bypass 150.

Lespedeza intermedia (S.Watson.) Britton., #528, thicket in forest opening, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Lespedeza procumbens Michx., H. Garman, 19 June 1892 (UKAg), Junction City, KY.

Lespedeza repens (L.) W. Bart., Y. Moore, 21 September 1991 (EKY/Centre), open meadow at the Central Kentucky Wildlife Refuge.

***Lespedeza stipulacea* Maxim., #885, fallow field, frequent, off of Bypass 150 in Danville, KY.

***Lespedeza striata* (Thunb.) Hook. & Arn., #518, eastern bank of Green Heron Pond, frequent, Central Kentucky Wildlife Refuge off of Brooks Hollow Trail.

***Medicago lupulina* L., M.E. Wharton #935, 21 July 1937 (KY), pasture half a mile west of Parksville in the Black Shale Region of Kentucky.

*_Medicago sativa_ L., #298, 554, median of highway and disturbed wet field, frequent, Danville, KY.

**_Melilotus alba_ Medik., #188, 236, 465, meadow and roadside, frequent, Danville and Perryville, KY.

Orbexilum pedunculatum (P. Mill.) Rydb., open dry dirt flat along edge of pond, frequent, near Junction City, KY.

Robinia pseudoacacia L., B. Pesci #15, 6 June 1977 (EKY), grassy field near roadside of Waterworks Road near Herrington Lake.

Senna hebecarpa (Fern.) Irwin & Barneby., R.L. Thompson and E.W. FitzGerald #345, 28 July 1993 (BEREA), on upper alluvial floodplain along riparian mixed hardwood. Rare. Clifton Road, 1.4 mi north from junction with KY 52.

Senna marilandica (L.) Link, #593, pipeline corridor at the top of hill, frequent, off of Chrisman Lane.

Strophostyles helvula (L.) Ell., #607, dry mud flat next to pond, frequent, Junction City, KY.

Tephrosia virginiana (L.) Pers., #860, siltstone/shale glade on open ridgetop running north to south with cliff along eastern face, barrens/xeric woods along western face, frequent, off Hwy 1856 near Mitchellsburg, KY.

**_Trifolium campestre_ Schreb., #98, disturbed field, frequent, in cemetery on Knob Lick Road.

*_Trifolium hybridum_ L., #886, open fallow field, frequent, off of BYP 150 in Danville, KY.

**_Trifolium pratense_ L., #96, disturbed field, frequent, in cemetery on Knob Lick Road.

**_Trifolium repens_ L., #789, 813, rocky lakeshore and pasture, frequent, Gwinn Island and along Hwy 590.

**_Vicia sativa_ L., #79, mesic forest dominated by white oak, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

**_Vicia villosa_ Roth, #252, open dirt patch along road, frequent, Oscar Bradley Road in Perryville, KY.

Fagaceae

!*Castanea dentata* (Marsh.) Borkh., R. Hannan and L.R. Phillipe #7231, 19 June 1981 (EKY), root sprouts in upland dry woods, Gee Branch just north of Casey-Boyle County line. Endangered.

Fagus grandifolia Ehrh., #524, in sub-xeric oak-hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Brooks Hollow Trail.

Quercus alba L., #923, dry calcareous upland, frequent, Gwinn Island.

Quercus coccinea Muenchh., #932, in sub-xeric oak-hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Quercus falcata Michx., #920, dry calcareous upland, frequent, Gwinn Island.

Quercus imbricaria Michx., #375, on the edge of a prairie and sub-xeric oak-hickory forest, frequent, Central Kentucky Wildlife Refuge along Bluebird trail.

Quercus macrocarpa Michx., #925, old open oak savannah, frequent, on the estate of the Berney Home Historic Site. Also collected by H. Garman, 19 June 1892 (UKAg), in Junction City, KY.

Quercus montana Willd., #934, oak-hickory forest with Beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Quercus muhlenbergii Engelm., #797, dry calcareous upland, frequent, Gwinn Island. Also collected by M.E. Wharton #10914, 20 June 1957 (EKY), in pasture two miles northeast of Danville, KY.

Quercus palustris Muenchh., #926, old open oak savannah, infrequent, on the estate of the Berney Home Historic Site.

Quercus rubra L., M.E. Wharton #10626, 13 October 1956 (EKY), dry open woods on Mock's Branch, near Herrington Lake.

Quercus shumardii Buckl., M.E. Wharton #10625, 13 October 1956 (KY), dry open woods on Mock's Branch, near Herrington Lake.

Quercus stellata Wangenh., #938, meadow along Carpenter's Fork, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Quercus velutina Lam., #916, dry calcareous upland, frequent. Also Collected by M.E. Wharton #1019, 22 July 1937 (KY), roadside near Mitchellsburg in the Black Shale Region of Kentucky.

Fumariaceae

Corydalis flavula (Raf.) DC. #48, mesic forest dominated by white oak, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Dicentra canadensis (Goldie) Walp., #44, mesic forest dominated by white oak, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Dicentra cucullaria (L.) Bernh., #748 mesic forest dominated by white oak, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Gentianaceae

Obolaria virginica L., P. McNamara, 15 April 1957 (EKY/Centre), Parksville Lake.

Geraniaceae

Geranium carolinianum L., #850, meadow, frequent, off Hwy 1856.

**Geranium dissectum* L., #128, 165, roadside and meadow, infrequent, Central Kentucky Wildlife Refuge along Carpenter Creek Road and off of Wildflower Trail.

**Geranium maculatum* L., #81, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

**Geranium molle* L., #307, 851, dry mud patch alongside dirt road and meadow, infrequent, Danville, KY and off of Hwy 1856.

**Geranium pusillum* L., #787, rocky lakeshore, infrequent, Gwinn Island.

Grossulariaceae

Itea virginica L., H. Garman, 19 June 1892 (UKAg), Junction City, KY.

Hamamelidaceae

Hamamelis virginiana L., R. Hannan and L.R. Phillipe #7250, 19 June 1981 (EKY), small tree along creek, Gee Branch just north of Casey-Boyle County line.

Liquidambar styraciflua L., #927, old open oak savannah, frequent, on the estate of the Berney Home Historic Site.

Hippocastanaceae

Aesculus flava Ait., #919, dry calcareous upland, frequent, Gwinn Island.

Aesculus glabra Willd., #937, lowland mixed mesic forest along North Rolling Fork with limestone outcrops, Central Kentucky Wildlife Refuge on Wildflower Trail. Twigs had skunky odor.

Hydrangeaceae

Hydrangea arborescens L., #219, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Hydrophyllaceae

Hydrophyllum appendiculatum Michx., #111, 867, mesic forest dominated by white oak and forested roadside at base of cliffs, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail and along Hwy 1856.

Hydrophyllum macrophyllum Nutt., #159, mesic forest dominated by white oak on west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Phacelia purshii Buckley., #78, 110, mesic forest dominated by white oak on west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Juglandaceae

Carya cordiformis (Wangenh.) K. Koch, #914, 936, dry calcareous upland and mixed mesic forest, frequent, Gwinn Island and Central Kentucky Wildlife Refuge.

Carya glabra (P. Mill.) Sweet, #918, dry calcareous upland, frequent, Gwinn Island.

Carya laciniosa (Michx. f.) G. Don., A. Mojsejenko #10, 17 April 1981 (EKY), forested knobs near Turkey Creek, four miles west of Perryville, KY on US 150.

Carya ovalis (Wangenh.) Sarg., #915, dry calcareous upland, infrequent, Gwinn Island. Bark similar to shagbark hickory but husk very thin akin to pignut hickory.

Carya ovata (P. Mill.) K. Koch., #917, dry calcareous upland, frequent, Gwinn Island.

Carya pallida (Ashe) Engl. & Graebn., T.J. Weckman and J.E. Weckman #9044, 25 September 2004 (EKY), mixed woods on north-facing slopes and ledges of Mock's Branch, a tributary of Dix River.

Carya tomentosa (Lam. ex Poir.) Nutt., #935, edge of sub-xeric oak-hickory forest, frequent, Central Kentucky Wildlife Refuge along Bluebird Trail.

Juglans nigra L., #319, on margin of meadow in tree line, frequent, Danville, KY.

Lamiaceae

Collinsonia canadensis L., #643, along railroad tracks, infrequent, intersects with Knob Lick Road, Junction City, KY.

******Glechoma hederacea* L., #24, roadside, frequent, along Kings Mill Road, Danville, KY.

Isanthus brachiatus (L.) B.S.P., #570, limestone outcrop in prairie, frequent, Perryville Battlefield State Historic Site, off of Battlefield Road.

******Lamium amplexicaule* L., #22, open field, frequent, near junction of Hwy 1805 & 57.

******Lamium purpureum* L.,#14, open field and disturbed roadside, frequent, Central Kentucky Wildlife Refuge on the Wildflower Trail and near the intersection of Hwy 52 & 1273.

Lycopus americanus Muhl. ex W. Bart., #543, 603, wet meadow and saturated mud flat next to pond, frequent, Danville, KY and off of Knob Lick Rd in Junction City, KY.

Lycopus virginicus L., #898, wet mud flat on edge of pond, frequent, near Junction City, KY.

******Mentha ×piperita* L., M.E. Wharton #5736, 13 August 1940 (UK), edge of pond a quarter mile from Junction City in the Black Shale Region of Kentucky.

******Mentha spicata* L. #339, 584, along drainage in wet meadow, infrequent, Danville, KY.

Monarda clinopodia L., #398, dense mixed mesic forest near tributary to North Rolling Fork on northeast-facing slope, infrequent, Central Kentucky Wildlife Refuge on Circle trail.

Monarda fistulosa L., #419, 442, 903, forested roadside and mixed mesic forest along North Rolling Fork, frequent, Central Kentucky Wildlife Refuge off of Wildflower Trail and along Forkland Road; forested roadside, frequent, Forkland Road.

******Nepeta cataria* L., M.E. Wharton #931, 21 July 1937 (UK), pasture half a mile west of Parksville, in the Black Shale Region of Kentucky.

Physostegia virginiana (L.) Benth., Carr #422, 8 September 1935 (MDKY), Danville, KY.

Prunella vulgaris L., #361, 586, bank of Island Pond and in power-line corridor, frequent, Central Kentucky Wildlife Refuge and off of Chrisman Lane.

Pycnanthemum incanum (L.) Michx., #506, dry ditch alongside road, infrequent, Perryville Road.

Pycnanthemum tenuifolium Schrad., #293, 411, 610, roadside, thicket in forest gap, and wet woods, frequent, along Hwy 37, Central Kentucky Wildlife Refuge, and off of Knob Lick Road.

Salvia lyrata L., #153, weedy area in mesic forest gap, frequent, Central Kentucky Wildlife Refuge at junction of Circle Trail and Brooks Hollow Trail

Scutellaria elliptica Muhl. ex Spreng., R. Hannan and L.R. Phillipe #7235, 19 June 1981 (EKY), wooded slope near creek, Gee Branch just north of Casey-Boyle County line.

Scutellaria incana Biehler, #410, weedy area in mesic forest gap, frequent, Central Kentucky Wildlife Refuge at junction of Circle trail and Brooks Hollow Trail.

Scutellaria lateriflora L., M.E. Wharton #5735, 13 August 1940, (UK), edge of pond a quarter miles west of Junction City in the Black Shale Region of Kentucky.

Scutellaria nervosa Pursh., #151, mixed mesic forest on lower slopes of knob near tributary of North Rolling Fork, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Scutellaria ovata Hill., J. Campbell, 14 October 1984 (UKAg), Central Kentucky Wildlife Refuge.

Stachys cordata Riddell., #409, mixed mesic forest on lower slopes of knob near tributary of North Rolling Fork, Central Kentucky Wildlife Refuge on Circle trail.

Synandra hispidula (Michx.) Baill., #105, bottomland mesic forest along North Rolling Fork, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail.
Teucrium canadense L., #310, 582, wet meadow, frequent, Danville, KY.

Trichostema dichotomum L., M. McKenna, 12 September 1990 (EKY/Centre), rocky pond border, Central Kentucky Wildlife Refuge.

Lauraceae

Lindera benzoin (L.) Blume., #404, mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Sassafras albidum (Nutt.) Nees, #740, railroad corridor, frequent Knob Lick Road along railroad tracks, N37° 34' 46.8" W84° 47' 52.44".

Lythraceae

Cuphea petiolata (L.) Koehne., Carr #414, 8 September 1935 (MDKY), Danville, KY.

Magnoliaceae

Liriodendron tulipifera L., #170, mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Blue Trail.

Malvaceae

Hibiscus moscheutos L., #480, growing in wet drainage in thicket, frequent, along Hwy 37.

***Hibiscus syriacus* L., #471, 887, roadside, infrequent, along Hwy 52 near bridge and along Knob Lick Road near railroad junction.

**Sida spinosa* L., C. Stevens, 21 September 1986 (EKY/Centre), open woods, thickets, and old fields, on US 34, 1.75 miles north of Centre College in Danville, KY.

Melastomataceae

Rhexia virginica L., #515, 600, saturated mud flat next to pond, frequent, off of Knob Lick Road in Junction City, KY; saturated mud on northeastern bank of Green Heron Pond, frequent, Central Kentucky Wildlife Refuge off of Brooks Hollow Trail.

Menispermaceae

Cocculus carolinus (L.) DC., M.E. Wharton #10657, 13 October 1956 (KY), dry thicket, three miles southeast of Burgin, KY.

Menispermum canadense L., #402, mixed mesic forest on lower northeast-facing slope of knob, near tributary of North Rolling Fork, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Molluginaceae

**Mollugo verticillata* L., M.E. Wharton #10637, 13 October 1956 (KY), weedy ground by Spear's Creek, near Harrington Lake.

Monotropaceae

Monotropa uniflora L., #495, open xeric forest on knob ridgetop, infrequent, Central Kentucky Wildlife Refuge on Ridge Trail. Only one plant found, no collection, photograph voucher.

Moraceae

**Maclura pomifera* (Raf.) Schneid., #318, edge of meadow in tree line, frequent, Danville, KY.

***Morus alba* L., #203, thicket of weedy species in city park, frequent, Lexington Avenue Park.

Morus rubra L., #349, mixed mesic forest, frequent, Central Kentucky Wildlife Refuge.

Nyctaginaceae

**Mirabilis nyctaginea* (Michx.) MacM., #452, 618, roadside in disturbed field and thicket, infrequent, along KY 52 & US 150 and along Old KY 52.

Nyssaceae

Nyssa sylvatica Marsh., #931, sub-xeric oak hickory forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Oleaceae

**Forsythia viridissima* Lindl., #20, alongside road, on Old Bridge Road.

Fraxinus americana L., #913, alongside road in calcareous upland, along Hwy 1822.

Fraxinus pennsylvanica Marsh., #278, along Doctor's Creek in mixed mesic riparian forest, Perryville Battlefield State Historic Site.

Fraxinus quadrangulata Michx., R.C. Clark #24394 (EKY), mesic south-facing woods over limestone along Dix River below limestone cliff, along Dix River just downstream from KY Hwy 52 bridge.

**Ligustrum obtusifolium* Sieb. & Zucc., #880, sunny area in disturbed thicket on northern bank of Clarks Run, infrequent, off of Hwy 1805.

***Ligustrum sinense* Lour., #289, in abandoned limestone quarry along piles of rock, frequent, along Hwy 1856.

Onagraceae

Circaea lutetiana L., #382, open mixed mesic forest, Central Kentucky Wildlife Refuge on Waterfall Trail.

Epilobium coloratum Biehler., #661, limestone/dolomite prairie, Perryville Battlefield State Historic Site off of Artillery Trail.

Ludwigia alternifolia L., #513, 899, in woodland pond on the northern bank, frequent, Central Kentucky Wildlife Refuge on Woodland Pond Trail.

Ludwigia peploides (HBK) P.H.Raven ssp. *glabrescens* (Kuntze) Shinners., #263, in Doctor's Creek, frequent, Perryville Battlefield State Historic Site.

Oenothera biennis L., #478, 522A, 538, 617, railroad corridor, limestone/dolomite prairie, disturbed habitat, frequent, off of Knob Lick Road, along Stanford Avenue, Central Kentucky Wildlife Refuge along Fork Trail and in Danville, KY.

Oenothera fruticosa L., #216, 831, alongside road, infrequent, along Hwy 37.

**Oenothera speciosa* Nutt., #270, along fencerow, infrequent, along KY 1920.

Orobanchaceae

Conopholis americana (L.) Wallr., #121, open mixed mesic forest on northwest-facing mid-slope of knob, infrequent, Central Kentucky Wildlife Refuge on Waterfall Trail.

Epifagus virginiana (L.) W. Bart., #701, mixed mesic forest with beech understory along tributary of North Rolling Fork, infrequent, Central Kentucky Wildlife Refuge on Circle Trail.

Orobanche uniflora L., #147, open xeric forest on knob ridge top under large oak, rare, Central Kentucky Wildlife Refuge on Ridge Trail. Only one plant found, no collection, photograph voucher.

Oxalidaceae

Oxalis grandis Small., #144, open xeric forest on knob ridge top, infrequent, Central Kentucky Wildlife Refuge on Ridge Trail.

Oxalis stricta L., #101, railroad corridor, frequent, off of Knob Lick Road.

Oxalis violacea L.#83, 117, open mixed mesic forest, frequent, Central Kentucky Wildlife Refuge, Waterfall Trail and Wildflower trail along North Rolling Fork.

Papaveraceae

Sanguinaria canadensis L., #27, mesic forest dominated by white oak on steep northwest-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Stylophorum diphyllum (Michx.) Nutt., #46, 747, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Passifloraceae

Passiflora incarnata L., #333, limestone/dolomite prairie, frequent, Perryville Battlefield State Historic Site along Artillery Trail.

Passiflora lutea L., T.J. Weckman and J.E. Weckman, #5690, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops on west-facing slope along Taylor Creek, a tributary to Herrington Lake.

Phrymaceae

Phryma leptostachya L., #381, open mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Waterfall Trail.

Phytolaccaceae

Phytolacca americana L., #235, thicket in fallow field, frequent, Hwy 190B and Letton Drive.

Plantaginaceae

**Plantago lanceolata* L., #97, 186, 565, 753, 784, open field, roadside, limestone/dolomite prairie, rocky lakeshore, frequent, off of Knob Lick Road, Hwy 1805, Perryville Battlefield State Historic Site off of Battlefield Rd, and on Gwinn Island.

Plantago rugelii Dcne., #315, 879, streambank and wet meadow, abundant, along Clarks Run off of HWY 1805 and in Danville, KY.

Plantago virginica L., #800, limestone outcrop near cliffs looking down onto Lake Herrington, abundant, Gwinn Island.

Platanaceae

Platanus occidentalis L., #911, roadside, frequent, along Hwy 1822.

Polemonaceae

Phlox divaricata L., 43, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Phlox maculata L., #897, on edge of pond, frequent, near Junction City, KY off of Phillips Lane.

Phlox paniculata L., #292, roadside, frequent, along Hwy 37.

Polemonium reptans L., 52 mesic forest dominated by white oak on northwest-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Polygalaceae

Polygala ambigua Nutt., M.E. Wharton #2914, 30 June 1938 (KY), opening in oak-hickory woods one mile west of Junction City in the Black Shale Region of Kentucky.

Polygala sanguinea L., #520, northern bank of Green Heron Pond on dry dirt flat with sparse red cedar coverage, infrequent, Central Kentucky Wildlife Refuge off of Brooks Hollow Trail.

Polygonaceae

***Polygonum caespitosum* Blume var. *longisetum* (de Bruyn) A.N. Steward, #273, 316, 469, 546, 648, 767, 871, wet disturbed areas, frequent, throughout Boyle County.

**Polygonum convolvulus L.*, #418, roadside, infrequent, Forkland Road.

***Polygonum cuspidatum* Sieb. & Zucc., #616, roadside thicket, infrequent, on Old KY 52.

Polygonum erectum L., #447, wet ditch, frequent, along Forkland Road.

Polygonum hydropiperoides Michx., #285, on limestone bedrock in abandoned rock quarry, frequent, off of Hwy 1856 near Perryville, KY.

Polygonum lapathifolium L., #769, along Doctor's Creek, frequent, Perryville Battlefield State Historic Site.

Polygonum pensylvanicum L., #547, along drainage in wet meadow, frequent, in Danville, KY.

***Polygonum persicaria* L., #658, in wet depression of prairie, streambank, edge of pond, and in disturbed habitat, frequent, Perryville Battlefield State Historic Site, off of York Lane, and Hwy 1805 along Clarks Run.

Polygonum punctatum Ell., #468, 514, 575, 878, streambank, edge of pond, and in wet depression of prairie, frequent, Central Kentucky Wildlife Refuge around

Woodland Pond, along Clarks Run, and Perryville Battlefield State Historic Site around Hinklen Pond and in prairie.

Polygonum sagittatum L., #608, saturated open mud flat next to pond, infrequent, in Junction City, KY on Knob Lick Road.

Polygonum scandens L., #393, 678, open xeric forest on southeast-facing slope near apex of knob and along Doctor's Creek, frequent, Central Kentucky Wildlife Refuge on Ridge Trail and Perryville Battlefield State Historic Site.

Polygonum virginianum L., #509, 650, disturbed habitat and in mesic forest dominated by white oak, frequent, along Perryville Road and in Central Kentucky Wildlife Refuge on Wildflower Trail.

****Rumex acetosella*** L., #91, meadow along dirt road, abundant, Forkland Area.

Rumex altissimus Wood., #627, wet roadside thicket, frequent, along Old KY 52.

Rumex conglomeratus Murr., #253, along Doctor's Creek, frequent, Perryville Battlefield State Historic Site.

Rumex crispus L., #163 254, 312, along Carpenters Creek, Doctor's Creek and in disturbed field, abundant, Central Kentucky Wildlife Refuge, Perryville Battlefield State Historic Site, and in Danville, KY.

Rumex obtusifolius L.. M.E. Wharton #942, 21 July 1937 (KY), pasture half a mile west of Parksville in the Black Shale Region of Kentucky.

Portulacaceae

Claytonia virginica L., #11, mesic forest dominated by white oak on steep west-facing slope, in wet mud flat and in open disturbed field, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail and off of Knob Lick Road.

Primulaceae

Anagallis arvensis L., P. Dalton #1257, 29 June 1985 (UKAg), plants growing in a fallow field in dry soil.

Dodecatheon meadia L., R.C. Clark #24396, 19 June 1999 (EKY), mesic south-facing woods over limestone along Dix River below south-facing limestone cliff, just downstream from KY Hwy 52 bridge.

Lysimachia lanceolata Walt., #386, open mixed mesic forest, Central Kentucky Wildlife Refuge on Waterfall Trail.

*_Lysimachia nummularia_ L., #810, along forested Hanging Fork Creek, frequent, off of HWY 590.

Lysimachia quadriflora Sims., #217, 827, sub-xeric open oak-hickory forest on south-facing slope and roadside, infrequent, off of Phillips Lane, near Junction City, KY and along Hwy 37.

Samolus floribundus Kunth., M.E. Wharton, #2907, 30 June 1938 (KY), low, sunny ground one miles west of Junction City in the Black Shale Region of Kentucky.

Pyrolaceae

Chimaphila maculata (L.) Pursh., open mixed mesic forest, frequent, Central Kentucky Wildlife Refuge near nature center.

Ranunculaceae

Actaea pachypoda Ell., #406, dense mixed mesic woods with beech understory near a tributary to North Rolling Fork, Central Kentucky Wildlife Refuge on Circle Trail.

Anemone virginiana L., 426, 587, roadside, and along forested path, frequent, Forkland Rd and off Chrisman Lane.

Anemonella thalictroides (L.) Spach., #40, open mixed mesic forest along tributary of North Rolling Fork, frequent, Central Kentucky Wildlife Refuge off of Brooks Hollow Trail. Also collected by B. Pesci #8, 3 Aprill 1977 (UKAg) hillside on Waterworks Road near Herrington Lake, 2.5 miles east of Lexington Road.

Aquilegia canadensis L., D. Nance #27, 23 April 1977 (EKY), dispersed throughout trees on Gwinn Island.

**_Clematis terniflora_ DC., #596, edge of lawn in forested thicket along stream, infrequent, off of Chrisman Lane.

Clematis viorna L., #417, in forest along roadside, infrequent, Forkland Road.

Clematis virginiana L., #525, 904, open mixed mesic forest along tributary and North Rolling Fork, frequent, Central Kentucky Wildlife Refuge on Brooks Hollow Trail and Wildflower Trail.

*_Consolida ajacis_ (L.) Schur, M.E. Wharton #10915, 20 June 1957 (KY), pasture two miles northeast of Danville, KY.

Delphinium tricorne Michx., #57, 745, on mesic forest dominated by white oak on west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Enemion biternatum Raf., #13, mesic forest dominated by white oak on west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Hepatica acutiloba DC., T.J. Weckman and J.E. Weckman #5689, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops on west-facing slope along Taylor Creek, a tributary of Herrington Lake.

Hydrastis canadensis L., #60, mesic forest dominated by white oak on steep west-facing slope near limestone outcrops, rare, Central Kentucky Wildlife Refuge on Wildflower Trail. Population of 10 plants, no collection taken, photograph voucher.

**Ranunculus acris* L., #227, fallow field, infrequent, along Letton Drive in Danville, KY.

Ranunculus hispidus Michx. var. *hispidus*, #76, 455, 717. 803, edge of ponds and along Doctor's Creek, frequent, Perryville Battlefield State Historic Site; mesic forest dominated by white oak, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Ranunculus hispidus Michx. var. *nitidus* (Elliott) T. Duncan, #490, roadside, frequent, along Old KY 52.

Ranunculus micranthus Nutt., #33, 73, mixed mesic forests, frequent, Central Kentucky Wildlife Refuge.

Thalictrum dioicum L., M. Didlake, 27 May 1928 (KY), knobs beyond Danville, KY.

Rhamnaceae

Rhamnus caroliniana Walt., #395, open xeric forest on southeast-facing slope near apex of knob, infrequent, Central Kentucky Wildlife Refuge on Ridge Trail.

Rosaceae

Agrimonia parviflora Ait., #327, wet meadow, frequent, in Danville, KY.

Agrimonia pubescens Wallr., M.E. Wharton #1021, 22 July 1937 (KY), by path through beech maple woods near Mitchellsburg in the Black Shale Region of Kentucky.

Agrimonia rostellata Wallr., #497, 651, mixed mesic forests, frequent, Central Kentucky Wildlife Refuge on Circle Trail and Wildflower Trail.

Amelanchier arborea (Michx. f.) Fern., #37, 93, mixed mesic to sub-xeric forests, frequent, Central Kentucky Wildlife Refuge and in Forkland Area.

Crataegus calpodendron (Ehrh.) Medik., 86, 160, mixed mesic forest and along Carpenters Fork in riparian forest, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail and in Forkland Area.

Crataegus crus-galli L., T.J. Weckman and R. Roessler #9081, 9 October 2004 (EKY), wooded north-facing slopes and ledges along Clark's Run, a tributary of Dix River.

Crataegus pruinosa (Wendl. f.) K. Koch., A. Mojsejenko #51, 4 April 1981 (EKY), forested knob in proximity of Turkey Creek four miles west of Perryville on U.S. 150.

****Duchesnea indica*** (Andr.) Focke., #80, meadow, frequent, Central Kentucky Wildlife Refuge off of Wildflower Trail.

Fragaria virginiana Duchesne., #739, open woodland next to wet mud flat and pond, frequent, off of Knob Lick Road.

Geum canadense Jacq., #362, 394, banks of Island Pond and open xeric forest on southeast-facing slope near apex of knob, frequent, Central Kentucky Wildlife Refuge on Island Pond and Ridge Trail.

Geum vernum (Raf.) Torr. & Gray., #75, mesic forest dominated by white oak on steep west-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Geum virginianum L., #246, meadow, frequent, Perryville Battlefield State Historic Site west of Gravel Road.

Malus coronaria (L.) P. Mill., M.E. Wharton #2957, 30 June 1938 (KY), in pine woods three-quarters of a mile west of Junction city in the Black Shale Region of Kentucky.

Malus pumila P. Mill., #50, roadside, Houstonville Road.

Porteranthus stipulatus (Muhl. ex Willd.) Britt., #171, 214, 823, open xeric forest, edge of pond and roadside, frequent, Central Kentucky Wildlife Refuge on Ridge Trail, near Junction City, KY and along Hwy 37.

Potentilla canadensis L., M.B. Myers, 17 April, 1971 (EKY/Centre), Cream Ridge.

Potentilla norvegica L., T.J. Weckman and J.E. Weckman #5656 (EKY), second growth deciduous woods with limestone outcrops on west facing slope along Taylor Creek, a tributary to Herrington Lake.

****Potentilla recta*** L., #457, limestone prairie and meadow, frequent, Perryville Battlefield State Historic Site.

Potentilla simplex Michx., #180, open mixed mesic forest, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Prunus angustifolia Marsh., #63, meadow, infrequent, Central Kentucky Wildlife Refuge off of Wildflower Trail.

Prunus serotina Ehrh., #206, city park on edge of disturbed thicket, frequent, Lexington Avenue Park in Danville.

****Pyrus calleryana*** Dcne., 530, disturbed field along dirt road, in Danville, KY.

****Rosa multiflora*** Thunb. ex Murr., #164, mesic forest and disturbed thicket alongside road, frequent, Central Kentucky Wildlife Refuge along Wildflower Trail and along Old KY 52.

Rosa setigera Michx., #247, thicket surrounding large tree in meadow, frequent, Perryville Battlefield State Historic Site west of Gravel Road.

Rosa wichuraiana Crép., #221, railroad corridor, infrequent, off of Knob Lick Road.

Rubus allegheniensis Porter., #123, open sub-xeric oak-hickory forest, frequent, Central Kentucky Wildlife Refuge on Blue Trail.

Rubus argutus Link., #719 ,755, edge of pond and disturbed thicket/wet field alongside road, frequent, Perryville Battlefield State Historic Site and along Old KY 52.

Rubus flagellaris Willd., #383, mesic forest dominated by white oak on steep west-facing slope, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Rubus occidentalis L., #197, roadside in thicket, frequent, along HWY 34.

****Spiraea japonica*** L.f., #294, mesic forest dominated by white oak on steep west-facing slope, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Rubiaceae

Diodia teres Walt., #641, open woods next to saturated mud flat and pond, off of Knob Lick Road.

Galium aparine L., #51, 807, mesic forest dominated by white oak and in mesic riparian forest on eastern bank of Doctor's Creek, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail, Perryville Battlefield State Historic Site.

Galium circaezans Michx., #173 483, open xeric to mesic forests, frequent, Central Kentucky Wildlife Refuge on ridge trail and near nature center.

Galium lanceolatum Torr., T.J. Weckman, J.E. Weckman #5669 (EKY), second growth deciduous woods with limestone outcrops on west facing slope along Taylor Creek, a tributary of Herrington Lake.

****Galium pedemontanum** (Bellardi) All., wet meadow, infrequent, Danville, KY.

Galium tinctorium L., #604, saturated mud flat, infrequent, along Knob Lick Road.

Houstonia caerulea L., #36, open mixed mesic forest, frequent, Central Kentucky Wildlife Refuge.

Houstonia canadensis Willd. ex Roemer & Schultes, #120, 441, open mixed mesic forest and dry dirt patch on roadside, Central Kentucky Wildlife Refuge on Waterfall Trail and along Forkland Road.

Rutaceae

Ptelea trifoliata L., T.J. Weckman and J.E. Weckman #5654, 30 May 2000 (EKY), disturbed woods at roadside at Gwinn Island boat dock.

Salicaceae

****Populus alba** L., #322, wet meadow along stream, infrequent, in Danville, KY.

***Salix alba** L., K. Bowmer, 3 October 1984 (EKY/Centre), in backyard of 137 Beatty Avenue, approximately half a mile west of downtown Danville, KY.

Salix exigua Nutt., #261, streambank of Doctor's Creek, frequent, Perryville Battlefield State Historic Site.

Salix humilis Marsh., #825, surrounding pond, infrequent, Junction City, KY.

Salix nigra Marsh., 200, 870, roadside and north-facing streambank of Clarks Run in mesic forest, frequent, along Hwy 34 and off of HWY 1805.

Sapindaceae

****Koelreuteria paniculata** Laxm., #300, roadside, infrequent, Danville, KY.

Saxifragaceae

Heuchera americana L., #161, 795, mesic forest dominated by white oak on steep west-facing slope near limestone outcrops and along limestone cliffs of Herrington Lake, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail and Gwinn Island.

Heuchera parviflora Bartl., R.C. Clark #24400, 16 May 1999 (EKY), shaded south-facing limestone cliffs just downstream from KY Hwy 52 crossing of Dix River.

Saxifraga virginiensis Michx., #733, along Doctor's Creek on forested cliffline, frequent, Perryville Battlefield State Historic Site.

Scrophulariaceae

Aureolaria virginica (L.) Pennell., #493, xeric forest on southeast-facing slope, frequent, Central Kentucky Wildlife Refuge on Ridge Trail.

**Chaenorhinum minus* (L.) Lange., R.L. Thompson and K.R. Thompson #297, 4 July 2014 (BEREA), limestone rip-rap between road and asphalt parking lot at junction of Bypass 150 & KY 34.

Collinsia verna Nutt., N. Kriener #39, 30 April 1952 (EKY/Centre), Parksville Lake, KY.

Leucospora multifida (Michx.) Nutt., R.L. Thompson and K.R. Thompson #296, 4 July 2014 (BEREA), imbedded in asphalt parking lot at junction of Bypass 150 & KY 34.

Lindernia dubia (L.) Pennell, #286, on limestone bedrock in abandoned rock quarry, infrequent, off of Hwy 1856 near Perryville, KY.

Mimulus alatus Ait., #900, surrounding pond, infrequent, near Junction City, KY.

Mimulus ringens L., Carr, #415, 2 September 1935 (MDKY), Danville, KY.

Pedicularis canadensis L., D. Lane #24 (EKY), on hillside 15 feet from road in Gravelswitch, KY on Hwy 33.

Penstemon canescens (Britt.) Britt., #749B, mesic forest dominated by white oak on steep west-facing slope on limestone ledges, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Penstemon digitalis Nutt. ex Sims, #177, open mixed mesic woods, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Penstemon hirsutus (L.) Willd., #859, siltstone/shale glade on open ridgetop of knob, infrequent, off Hwy 1856.

Penstemon laevigatus Ait., 446, roadside, frequent, Forkland Rd.

Penstemon pallidus Small., #100, railroad corridor, infrequent, off of Knob Lick Road in Junction City, KY.

*_Verbascum blattaria_ L., #283, 291, 590, roadsides and power-line corridor, frequent, along Stewarts St, Hwy 37, and off of Chrisman Lane.

**_Verbascum thapsus_ L., #234, fallow field, frequent, off of Letton Drive in Danville, KY.

*_Veronica agrestis_ L., #2, 6, 790, 853, disturbed areas, off Hwy 1856, Hwy 52, Hwy 1805 and on Gwinn Island.

*_Veronica arvensis_ L., #176, grassy forest opening, frequent, in Central Kentucky Wildlife Refuge at junction of Circle Trail and Blue Trail.

Veronica peregrina L. ssp. _peregrina_, #854, wet meadow recently mowed, off of Hwy 1856.

*_Veronica persica_ Poir., #15, meadow, frequent, Central Kentucky Wildlife Refuge off of Wildflower Trail.

Solanaceae

*_Datura stramonium_ L., M.E. Wharton #2969, 1 July 1938 (KY), fallow field one mile west of Parksville in the Black Shale Region of Kentucky.

Physalis heterophylla Nees, #279, 568, 576, limestone/dolomite prairie, frequent, Perryville Battlefield State Historic Site off of Battlefield Rd.

Physalis longifolia Nutt., #545, 623, 654, open fields and roadside, frequent, in Danville, KY and Perryville Battlefield State Historic Site.

Solanum carolinense L., #223, 228, railroad corridor and fallow field, frequent, off of Knob Lick Road and off of Letton Drive.

Staphyleaceae

Staphylea trifolia L., #74, mesic forest dominated by white oak on steep northwest-facing slope, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Tiliaceae

Tilia americana L. var. _americana,_ T.J. Weckman and J.E. Weckman #5702, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops on west-facing slope along Taylor Creek, a tributary to Herrington Lake.

Tilia americana L. var. _heterophylla_ (Vent.) Loudon, #201, riverbank of Herrington Lake, infrequent. Also collected by M.E. Wharton #10900, 20 June 1957 (KY), riverbank of Clark's Run.

Ulmaceae

Celtis occidentalis L., #265, 712, 724, in field around Hinklen Pond and along edge of limestone prairie, frequent, Perryville Battlefield State Historic Site,

Ulmus alata Michx., #574, limestone/dolomite prairie, infrequent, Perryville Battlefield State Historic Site off of Artillery Trail.

Ulmus americana L., M.E. Wharton #699, 3 July 1937(KY), in beech-maple woods one and a half miles east of Parksville in the Black Shale Region of Kentucky.

Ulmus rubra Muhl., T.J. Weckman and J.E. Weckman #5684, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops on west-facing slope along Taylor Creek, a tributary to Herrington Lake.

Urticaceae

Boehmeria cylindrica (L.) Sw., #364, bank of Island Pond in mesic forest, frequent and locally abundant, Central Kentucky Wildlife Refuge.

Laportea canadensis (L.) Weddell, #403, dense mixed mesic forest with beech understory, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Pilea pumila (L.) Gray, #550, wet meadow, frequent, Danville, KY.

Valerianaceae

Valeriana pauciflora Michx., #104, 760 mesic forest dominated by white oak on steep west-facing slope and along North Rolling Fork, infrequent, Central Kentucky Wildlife Refuge off of Wildflower Trail.

Valerianella radiata (L.) Dufr., #152, along paths of mesic forest, frequent, Central Kentucky Wildlife Refuge on Circle Trail.

Verbenaceae

**Callicarpa dichotoma* (Lour.) K. Koch, T. Smith #14, 8 October 1984 (EKY/Centre), moist bank along Hwy 34.

Phyla lanceolata (Michx.) Greene, #551, wet meadow, frequent, Danville, KY.

Verbena canadensis (L.) Britt., F. Rootes, 6 May 1957 (EKY/Centre), Junction City, KY.

Verbena simplex Lehm., #195, 223, 667, roadside and open fields, frequent, along HWY 34, Letton Drive and Perryville Battlefield State Historic Site.

Verbena urticifolia L., #320, 512, 544, Dix riverbank, roadside and wet meadow, frequent, off of Hwy 52 near bridge, along Perryville Rd, and in Danville, KY.

Violaceae

Hybanthus concolor (T.F. Forst.) Spreng., #145, in open xeric forest on knob ridgetop, infrequent, Central Kentucky Wildlife Refuge on Ridge Trail.

Viola blanda Willd., C. Babbin, 2 April 1952 (EKY/Centre), Danville, KY.

Viola canadensis L., #65, mesic forest dominated by white oak, infrequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Viola hirsutula Brainerd., M.E. Wharton #1799, 16 April, 1938 (EKY), one mile west of Junction City, KY.

Viola palmata L., E. Rowe #43, 1 May 1952 (EKY/Centre), Parksville Lake, KY.

Viola pedata L., #92, red cedar glade on rock outcrops, infrequent, Forkland Area.

Viola primulifolia, #737, saturated mud flat next to pond, rare, off of Knob Lick Road in Junction City, KY.

Viola pubescens Ait., #39, open mixed mesic forest along tributary of North Rolling Fork, infrequent, Central Kentucky Wildlife Refuge off of Brooks Hollow Trail.

Viola rafinesquei Greene, #146, 750, open xeric forest on knob ridgetop, infrequent, Central Kentucky Wildlife Refuge on Ridge Trail.

Viola rostrata Pursh, #41, 751, open mixed mesic forest along tributary of North Rolling Fork, infrequent, Central Kentucky Wildlife Refuge off of Brooks Hollow Trail.

Viola sororia Willd., #42, mesic forest dominated by white oak, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail.

Viola striata Ait., #54, 759, mesic forest dominated by white oak and along stream in sub-xeric oak-hickory forest, frequent, Central Kentucky Wildlife Refuge on Wildflower Trail and in Junction City, KY.

Viscaceae

Phoradendron leucarpum (Raf.) Reveal & M.C. Johnston, #19, found in open field, had fallen off of tree, frequent, near junction of Hwy 1805 & 52 in Danville, KY.

Vitaceae

Parthenocissus quinquefolia (L.) Planch., T.J. Weckman and J.E. Weckman #5680, 30 May 2000 (EKY), second growth deciduous woods with limestone outcrops on west-facing slope along Taylor Creek, a tributary to Herrington Lake.

Vitis vulpina L., #207, on a thicket of disturbed shrubbery, frequent, Lexington Avenue Park in Danville, KY.

APPENDIX II

Exotic Pest Plants of Kentucky in Boyle County

Invasive species in Boyle County, Kentucky with designations determined by the Kentucky Exotic Pest Plant Council (2013).

Severe Threat	Significant Threat	Moderate Threat	Watch List
Alliaria petiolata	*Albizia julibrissin*	*Allium vineale*	*Eragrostis cilianensis*
Carduus nutans	*Chrysanthemum leucanthemum*	*Arctium minus*	*Hibiscus syriacus*
Cirsium arvense	*Cirsium vulgare*	*Arenaria serpyllifolia*	*Koelreuteria paniculata*
Clematis terniflora	*Daucus carota*	*Barbarea vulgaris*	*Sonchus asper*
Conium maculatum	*Dipsacus laciniatus*	*Buddleja davidii*	*Trifolium campestre*
Coronilla varia	*Echinochloa crus-galli*	*Chenopodium album*	*Trifolium pratense*
Dioscorea polystachya	*Galium pedemontanum*	*Cichorium intybus*	*Trifolium repens*
Elaeagnus umbellata	*Hedera helix*	*Commelina communis*	*Vicia sativa*
Euonymus alatus	*Hemerocallis fulva*	*Convolvulus arvensis*	*Vicia villosa*
Euonymus fortunei	*Lespedeza bicolor*	*Duchesnea indica*	
Festuca arundinacea	*Lespedeza striata*	*Hesperis matronalis*	
Glechoma hederacea	*Medicago lupulina*	*Hypericum perforatum*	
Lespedeza cuneata	*Mentha ×piperita*	*Ipomoea hederacea*	
Lespedeza stipulacea	*Morus alba*	*Ipomoea purpurea*	
Ligustrum sinense	*Nasturtium officinale*	*Lamium amplexicaule*	
Lonicera fragrantissima	*Pastinaca sativa*	*Lamium purpureum*	
Lonicera japonica	*Poa compressa*	*Mentha spicata*	
Lonicera maackii	*Poa pratensis*	*Nepeta cataria*	
Melilotus alba	*Polygonum caespitosum*	*Potentilla recta*	
Paulownia tomentosa	*Polygonum persicaria*	*Rumex acetosella*	
Polygonum cuspidatum	*Populus alba*	*Thlaspi perfoliatum*	
Pyrus calleryana	*Setaria faberi*		
Rosa multiflora	*Spiraea japonica*		
Sorghum halepense	*Thlaspi alliaceum*		
Stellaria media	*Verbascum thapsus*		
	Vinca minor		

APPENDIX III

Photographs

Figure 10. *Arisaema drcontium*, photographed on July 8, 2013 at the Central Kentucky Wildlife Refuge off of the Waterfall Trail.

Figure 11. Bark of *Carya ovalis*, photographed on February 13, 2015 at the Gwinn Island Fishing Resort.

Figure 12. Fruit husks of *Carya ovalis*, photographed on February 13, 2015 at the Gwinn Island Fishing Resort.

Figure 13. *Cypripedium parviflorum*, photographed on June 10, 2014 at the Central Kentucky Wildlife Refuge on Circle Trail.

Figure 14. *Hydrastis canandensis*, photographed on April 23, 2013 at the Central Kentucky Wildlife Refuge off of the Wildflower Trail.

Figure 15. *Monotropa uniflora*, photographed on July 26, 2013 at the Central Kentucky Wildlife Refuge on the Circle Trail.

Figure 16. *Orobanche uniflora*, photographed on May 21, 2013 at the Central Kentucky Wildlife Refuge on the Ridge Trail.

Figure 17. *Panax quinquefolius*, photographed on May 14, 2013 at the Central Kentucky Wildlife Refuge on the Wildflower Trail.

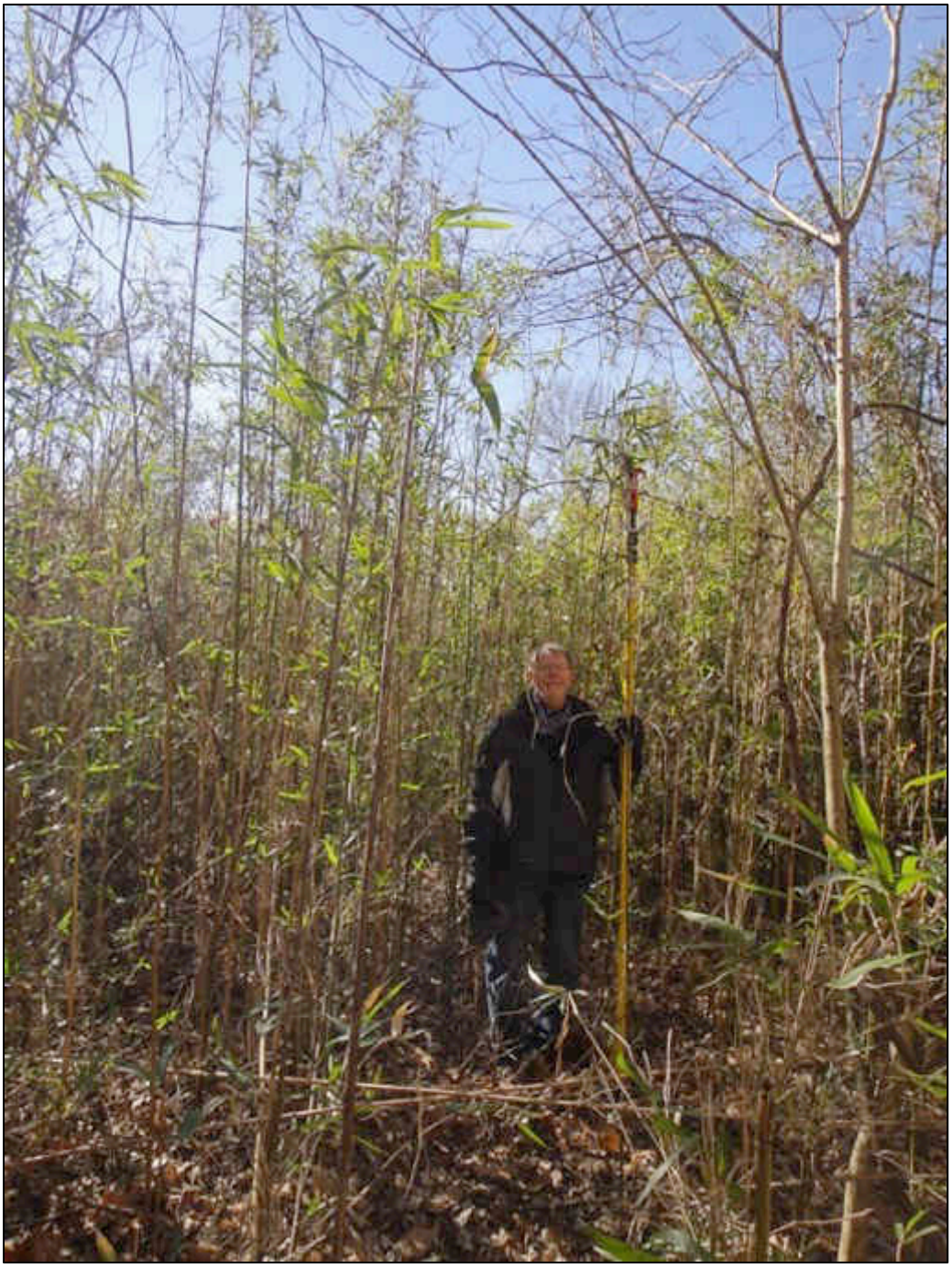

Figure 18. Large stand of *Arundinaria gigantea,* photographed on February 13, 2015 at the Central Kentucky Wildlife Refuge along the Wildflower Trail.

Figure 19. Large *Aesculus glabra,* photographed on February 13, 2015 at the Central Kentucky Wildlife Refuge along the Wilflower Trail.