Floristic survey of Elk City State Park in Montgomery County, Kansas.

Amelia J. Bristow,
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A FLORISTIC SURVEY OF ELK CITY STATE PARK IN MONTGOMERY COUNTY
KANSAS

A Thesis Submitted to the Graduate School
in Partial Fulfillment of the Requirements
for the Degree of
Master of Science

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Pittsburg, Kansas
July, 2014
A FLORISTIC SURVEY OF ELK CITY STATE PARK IN MONTGOMERY COUNTY
KANSAS

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DEDICATION

This thesis is dedicated to my friends and family. Without their support this would not have been possible. I extend a special thank you to Stephanie and Nathan for spending hours in the field keeping me company during the heat of summer as we explored the woods and fields looking for plants to add to the specimen collection. As always, I owe a sincere debt of gratitude to Catherine for always supporting me in my efforts to complete my education.
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I would like to take the time to thank the members of my thesis committee for their patience and guidance throughout this process. Their help has been invaluable. I would also like to thank the staff at Elk City State Park for their help with park information. I would like to thank the Montgomery County GIS office for providing me with access to historical aerial photos of the study area as well as GIS information for use in this project.
A FLORISTIC SURVEY OF ELK CITY STATE PARK IN MONTGOMERY COUNTY KANSAS

An Abstract of the Thesis by

Amelia J. Bristow

A floristic survey was conducted in Elk City State Park in Montgomery County, Kansas in order to accomplish three goals; (1) to document the vascular plant species present in Elk City State Park, (2) to assess the floristic quality of the area and (3) to suggest appropriate management strategies for the restoration or reconstruction of the natural areas within the study site.

The floristic survey was conducted over the course of two growing seasons starting in spring of 2011 and continuing through fall of 2012. A total of 259 species were identified representing 191 genera in 68 plant families. Floristic Quality Assessment calculations were made based on the species collected. The mean Coefficient of Conservatism for the study site was 3.02. The adjusted mean Coefficient of Conservatism was 2.46. These calculations indicate that the area within Elk City State Park has experienced a significant amount of disturbance since the arrival of European settlers.

Four species ranked S1 on the Kansas Natural Heritage Inventory were sampled within the study area; Cissus trifoliata (sorrel vine), Pluchea camphorata (camphorweed), Krigia biflora (false dandelion) and Sesbania herbacea (bigpod sesbania). These species are either rare or are in danger of extirpation in the state of Kansas.
Management recommendations for the study site include suggestions for the control of noxious weeds. Recommendations have been made for tallgrass prairie restoration in areas of the study site that retain many native species. Options for tallgrass prairie reconstruction are also outlined for implementation in areas of Elk City State Park that do not currently have a significant number of native plant species.

While restoration and reconstruction efforts cannot return the native landscape to pre-European conditions, efforts to increase the floral diversity within the study area will enhance the area for wildlife and will provide park patrons with the opportunity to experience and study a greater number of native species.
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1. Elk City State Park Collection Points
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Elk City State Park is situated in an area of Montgomery County where two physiographic regions occur. As a result, the park contains more than one ecosystem. Overall vascular plant diversity is expected to be higher as a reflection of the unique nature of this convergence zone. Because the physiographic region boundaries are not precise, species from neighboring ecosystems overlap into areas which provide adequate resources for survival (Omernik, 2004). This increased measure of diversity gives the overall appearance of ecosystem health. However, it is important to consider the level of diversity in the context of an ecotone where ecosystems overlap and a high diversity is a reflection of both ecosystems.
A literature review indicated that a floristic survey had not been conducted in this park previously. As Elk City State Park is a protected area, a floristic survey was warranted to accomplish the following goals:

(1) to document the species present in Elk City State Park (establishing a baseline will facilitate future studies and enable comparisons of the floristic quality of the site over time), (2) to assess the Floristic Quality Index of the park, (this will help ascertain the quality of the natural area, comparisons to this value will assist in the long-term monitoring of the area by park employees), (3) to suggest management goals to park employees for the restoration of the natural areas to a closer approximation of the historical vegetative community.
CHAPTER I

LITERATURE REVIEW

Tallgrass Prairie

The prairie biome which once stretched across the central plains from Texas in the south and north into the Canada has been mostly converted for agricultural use (Figure 1). It is estimated that in some areas of its former range, less than 1% remains (Foster et al., 2009; Higgins et al., 2001; McIndoe et al., 2008). Kansas retains approximately 18% of the tallgrass prairie that once covered the eastern third of the state (McIndoe et al., 2008; Samson & Knopf, 1994; Higgins et al., 2001). The conversion of the tallgrass prairie to agricultural use is the most serious threat to the biodiversity of the region (Cully et al., 2003; Fahrig, 2002; Fahrig, 2003; McGarigal & Cushman, 2002). The vegetative community that replaces the tallgrass prairie supports a different complement of species and has a significant negative impact on the biodiversity of the area (Cully et al., 2003; Fahrig, 2002; Higgins et al., 2001). This is certainly true of areas that are converted to row crops or are maintained as monocultures of introduced, C₃ grasses. The fragments of tallgrass prairie that remain
Original Extent of the Prairie Types

Figure 1. Extent of the prairie region in the United States prior to European settlement

Map Source: U.S. Fish and Wildlife Service Accessed: 3-31-2014
http://www.fws.gov/refuge/waubay/wildlife_and_habitat/native_prairie/article.html
after the widespread destruction of this ecosystem by conversion to agricultural use are frequently isolated from one another. A notable exception to this is the remaining tallgrass prairie situated in the Flint Hills physiographic region of Kansas and Oklahoma (Figure 2.). This largest, contiguous stretch of the tallgrass prairie ecosystem survived for use as rangeland as the rocky, shallow soil is not conducive to converting the landscape to row crops (Cully et al., 2003). This isolation of the remnants affects the successful dispersal of native species seed from patch to patch. The immigration of propagules from neighboring remnants helps to maintain biodiversity within the remnants (Foster et al., 2009; Rabinowitz & Rapp, 1980; Smith & Knapp, 2001; Tilman, 1997; Vellend, 2003).

With so many pressures on the native landscape it is imperative to identify and preserve the remaining tallgrass prairie remnants. These remnants provide habitat for threatened and endangered species and they provide a valuable propagule pool that helps to maintain biodiversity. With such a small percentage of the tallgrass prairie remaining, efforts to preserve and restore fragments are beneficial to the overall health of the ecosystem.
The Flint Hills Physiographic Region of Kansas

Figure 2: The Flint Hills region of Kansas retains the largest remaining continuous fragment of tallgrass prairie in the state

Source: Great Plains Nature Center; http://www.gpnc.org/meadow.htm
accessed 3-31-2014
The Cross Timbers Ecotone

The Cross Timbers is a transitional ecosystem or ecotone that lies between the eastern deciduous forest and the tallgrass prairie (Therrell et al., 1998; Engle et al., 2006). This ecotone covers portions of eastern Texas in the south; it is the primary forest cover in eastern/central Oklahoma and extends into southeast Kansas following the contours of the eco-region known as the Chautauqua Hills (Figure 3). The Cross Timbers are characterized by patches of deciduous forest characterized by a predominance of oak species interspersed with areas of tallgrass prairie (Bragg, 2012; Stahle et al., 2003). This transitional zone between the eastern deciduous forest to the east and the prairies to the west often reflects characteristics of the surrounding ecosystems (Bragg, 2012; Omernik, 2004; Stahle et al., 2003). Areas within the Cross Timbers form a conglomerate of patches including forest, glades and prairie (Bragg et al., 2012; Engle et al., 2006). The dominant genus found in the Cross Timbers forested areas is *Quercus* (oak). *Quercus stellata* (post oak), *Q. marilandica* (blackjack oak) are the characteristic oak species. Other commonly found *Quercus ssp.* include the following: *Q. muehlenbergii* (chinkapin oak), *Q. shumardii* (shumard oak) and *Q. macrocarpa* (bur oak). Other tree species found in the Cross Timbers include: *Cercis canadensis* (rebud), *Celtis occidentalis* (hackberry), *Carya tomentosa*
(mockernut hickory) and *Ulmus americana* (american elm). Understory species include *Cornus drummondii*, (rough-leaved dogwood), *Bumelia lanuginosa* (woolly buckthorn) *Smilax ssp.* (greenbriar), *Vitis ssp.* (grape), *Symphoricarpus orbiculatus* (buckbrush) and *Rubus ssp.* (blackberry) (Bragg, *et al*., 2012; Therrell *et al*., 1998; Engle *et al*., 2006; Myster, 2009).

Core dating measurements on the trees within the Cross Timbers indicate that some of the older trees have been dated from 200 to over 300 years old in some old growth stands (Bragg *et al*., 2012; Clark & Hallgren, 2003). The trees typically do not reach their growth potential and are frequently described as being stunted. This is due to limited rainfall and low soil nutrients (Clark & Hallgren, 2003; Stahle & Hehr, 1984; Therrell *et al*., 1998). This stunted growth limits the economic potential of logging within the Cross Timbers and as a result large tracts have been preserved. The Cross timbers still contain thousands of hectares of old growth forest which may not be appreciated as such due to the stature of the trees and the open, scrubby growth pattern (Therrell & Stahle, 1998). The Cross Timbers is a biodiverse region that is becoming increasingly fragmented. In the past, clearing had mainly been confined to areas level enough to support agriculture leaving large tracts intact on sandstone ridges and slopes too steep or rocky to be converted to row crops. The presence of oil reserves, conversion of areas from C₄ to C₃ grasses for ranching and the pressures of urban growth contribute to the continued
destruction of the Cross Timbers (Engle et al., 2006; Therrell & Stahle, 1998). Another pressure is the proliferation of Juniperus virginiana (eastern red cedar). Fire suppression allows for this species to quickly colonize tracts. The presence of large numbers of J. virginiana can change the nutrient cycling patterns within the forest (Bragg et al., 2012; Norris et al., 2007).
Map of The Ancient Cross Timbers

Figure 3.: Extent of the Cross Timbers Ecotone.

Source: University of Arkansas Tree Ring Laboratory
http://www.uark.edu/misc/xtimber/map/ accessed 3-31-2014
The Chautauqua Hills Physiographic Region

The Chautauqua Hills physiographic region occurs to the west of Elk City State Park. The dominant feature of Chautauqua Hills region is the thick layer of sandstone that is the remnant of alluvial deposits formed in an ancient riverbed that occurred here during the Pennsylvanian subperiod (KGS Geologic map of Mont. County). The Cross Timbers ecotone extends into southeast Kansas predominantly within the Chautauqua Hills physiographic region (KGS factsheet C.Hills) (Figure 4). Although there exists this close alignment of the physiographic region and the Cross Timbers ecotone, the Cross Timbers is not restricted to this region. There are many characteristics of the forest cover within Elk City Park that suggest that the Cross Timbers extends beyond the geologic parameters of the Chautauqua Hills and into the park (Figure 5).
Figure 4. Kansas Physiographic Regions The study site occurs in the Osage cuestas physiographic region. The Chatauqua Hills are to the west of the park.

Source: adapted from; Kansas Data Access and Support Center (KDASC) Kansas Biological Survey
Figure 5: Ecoregion and Physiographic region Boundaries in relation to Elk City State Park Boundaries. This shows the close alignment of the Cross Timbers ecoregion with the Chautauqua Hills physiographic region.

Source: adapted from; Kansas Data Access and Support Center; Kansas Physiographic regions, Kansas Geological Survey, Ecoregions, Kansas Biological Survey Photo Background, Farm Service Agency, Elk City State Park boundaries, Montgomery County GIS Office.
The Osage Cuestas Physiographic Region

The Study site lies within the physiographic region of Kansas known as the Osage Cuestas (Figure 4). The surface geology within the park is consistent with the pattern of alternating layers of limestone and shale found in the Osage Cuestas. These resources continue to be mined in areas outside of the park’s boundaries. There is an active quarry on the Tablemound Ridge north of the park entrance (Figure 6). The Tablemound Ridge formation is a series of limestone outcrops that border the northern end of the park and reservoir. The scenic overlook north of the park is situated on this ridge and is under the management of the U.S Army Corps of Engineers. The predominant stratigraphic groups date from the Upper Carboniferous Period also known as the Pennsylvanian sub-period which ended approximately 299 million years ago. The alternating layers of limestone and shale are from the Lansing and Kansas City groups. Alluvial deposits are also present and date from the later Quaternary Period. These riverbed deposits represent the most recent geologic activity within the park (Jewett, O’Connor & Zeller, 1964, KGS, Kansas Geologic Timetable).
Geology of Elk City State Park and Surroundings

Figure 6: Top; Ecoregions and geology surrounding Elk City State Park
Bottom: Closer view of section 16; active quarry outlined in blue
Source: adapted from; Kansas Data Access Center; Kansas Biological Survey and Kansas Geological Survey. Park outline: courtesy of Montgomery County GIS office
A custom soils report was completed for Elk City State Park in 2010. The report stated that the soils in the park are derived from the underlying shale and limestone and range from well drained to somewhat poorly drained. The soil report stated that the different soil types cannot be mapped with absolute precision where changes occur in close proximity. The map does include information on the dominant soils and minor soil classes.

The predominant soil class is Zaar silty clay, 1 to 3 percent slope which accounts for 24.1% of the acreage within Elk City State Park. The second most abundant soil class is Kenoma silt loam which accounts for 19.6%. Water accounts for the largest percent of acreage with 33% coverage. Aside from the Talihina-Shale outcrop complex which covers 53.30 hectares or 9.1% of the total acreage sampled the smaller map units are comprised of soils described as silt loam or silty clay weathered from shale (USDA-NRCS 2010)

The Effects of Fragmentation and Exotic Species Introduction

Ecosystem fragmentation increases vulnerability to invasion by exotic species. The surrounding matrix and edges of the remnant may hold an available seed pool of introduced and/or noxious species (Cully et al., 2003; Higgins et al., 2001; Smith &
Woody species that comprise the typical hedgerow encroach on the fragment in the absence of the traditional management techniques of periodic burning and selective grazing (Jog et al., 2006). One study indicated that a large available exotic species pool in the surrounding matrix overcame the effect that periodic burning had on the number of exotic species present in the fragment (Smith & Knapp, 2001). Exotic species richness increased with a large available exotic species pool present in the surroundings when compared to similar fragments that were surrounded with a small available exotic species pool (Smith & Knapp, 2001). Species that are present in the matrix surrounding fragmented habitat provide a readily available propagule pool in a disturbed landscape. Higher levels of disturbance allow for the establishment of species from the surroundings. The introduction of C₃ grasses for pastures and common weeds such as Lamium amplexicaule (henbit) and Morus alba (white mulberry) as well as the aggressive introductions; Convolvulus arvensis (field bindweed), Lespedeza cuneata (sericea lespedeza), Lonicera japonica (japanese honeysuckle) and Lonicera mackii (maack honeysuckle) among others have a negative impact on native species. Not only do these introduced species compete with native species for resources, (Higgins et al., 2001; Rabinowitz & Rapp, 1980) they have a homogenizing effect on the native landscape (McKinney, 2004). Temporal differences in the growth and reproductive cycles of cool season, C₃ and warm season, C₄ Grasses may favor the establishment of C₃ grasses in the tallgrass prairie. Cool season, C₃ grasses complete their reproductive cycles earlier than the native C₄ grasses. The clumped growth pattern and the later
maturation of the native, $C_4$ grasses allows $C_3$ grasses to utilize the available space, nutrients and light before the native species reach their full growth later in the season. This reduced competition for resources early in the growing season favors the establishment of the exotic $C_3$ grasses (Cully et al., 2003).

Species richness is another variable to consider when assessing the invasiveness of an ecosystem fragment. Species-rich fragments are thought to be more resistant to invasion due to the full utilization of limiting resources. Invasive species are less able to establish a foothold in a species rich community due to competition for space, water and nutrients (Quinn et al., 1995; Tilman, 1997). Conversely, species-impoverished sites are more vulnerable to the invasion of exotic species. Disturbed sites offer an opportunity for homogenization of the landscape with the introduction of exotic species (McKinney, 2004). This homogeneity, the replacement of native species with the same introduced species across a wide geographical area is a concern due to the loss of native species as well as the change in community dynamics that occurs. The increasing similarity of sites due to the introduction of exotic species further exacerbates the effects of habitat loss and fragmentation. Pristine ecosystems, when disturbed, begin to resemble adjacent disturbed ecosystems as highly conservative species are replaced by successful generalist and introduced species (Olden, 2006). The extent of some notorious invasive species is well known. *Pueraria lobata* (Kudzu) in the southeast,
*Lonicera mackii* (maack’s honeysuckle) and *Lonicera japonica* (japanese honeysuckle) reach farther into more temperate latitudes. Three invasive species listed as noxious weeds in the state of Kansas occur within the boundaries of Elk City State Park. These are: *Convolvulus arvensis* (field bindweed), *Sorghum halepense* (johnson grass) and *Lespedeza cuneata* (sericea lespedeza). *Lespedeza cuneata* has been reported to occur in most of the Eastern two thirds of Kansas (Figure 7). *Sorghum. halepense* (johnson grass) has been reported in all but eight counties in the state of Kansas. For the remaining eight counties no data is available (Figure 8) (Kansas noxious weed control program, 2011). Whether introduced for erosion control, forage, ornament or by accident, exotic species can have a significant adverse impact on an ecosystem. Adequate control of invasive species is a challenging consideration when planning management and restoration of a natural area.
Reported Distribution of *Lespedeza cuneata* (Sericea lespedeza) in the State of Kansas

Figure 7: Reported distribution of Sericea lespedeza in the state of Kansas as reported to the Kansas Department of Agriculture Noxious Weed Program.

Source: Kansas Noxious Weed Control Program  
Reported Distribution of Johnson Grass (S. halepense) in the State of Kansas

Figure 8: Distribution of Johnson grass in the state of Kansas.

Source: Kansas Noxious Weed Control Program
CHAPTER III

MATERIALS AND METHODS

History and Physical Description of Elk City State Park

Elk City Reservoir was the last of six reservoirs to be built in the Verdigris River Basin. The intent of the project was to control flooding in the drainage basin, to maintain a water supply, and to provide recreation for the surrounding areas (United States Army Corps of Engineers [USACE] Elk City Lake Pertinent Data, 2013). Although congress passed the law to establish these reservoirs in the Verdigris River Basin in 1941, construction on the reservoir projects was delayed until after the end of World War II when funding became more readily available for public service projects. Construction began in 1962 and the project was completed in 1966 (Kansas Water Office, 2011).

Elk City State Park was established when the U.S. Army Corps of Engineers agreed to lease approximately 445 hectares to the Kansas Department of Wildlife and Parks. Currently the park encompasses 343 hectares (Figure 9). In addition, approximately
Boundaries of Elk City State Park

Figure 9: Boundaries of Elk City State Park shaded blue showing numbered sections
Elk City Wildlife Area

Figure 10: Elk City State Park shaded in blue.
Elk City Wildlife Area shaded in pink
Location of Cross Timbers bordered in red in relation to park. Also visible is the close alignment of the Chautauqua Hills physiographic region in blue with the Cross Timbers ecoregion.

Source: adapted from; KDASC; photo background, FSA, Elk City Wildlife Area, Kansas Department of Wildlife and parks, Physiographic regions, KGS, Ecoregions, KBS, Elk City State Park outline Montgomery County GIS office
4,977 hectares surrounding the park is under the management of the Kansas Department of Wildlife and Parks as Elk City Wildlife Area. Public hunting access is permitted within these areas (Figure 10) (Kansas Department of Wildlife and Parks [KDWP], USACE Elk City Lake, 2014).

Description of the Study Site:

The forest vegetation within the park is representative of two similar types of upland forest cover. The first is the Cross Timbers ecosystem. This ecosystem is characterized by tallgrass prairie interspersed with stands of mixed timber. Common timber species include but are not limited to: *Quercus stellata* (post oak), *Quercus marilandica* (black jack oak), *Quercus muehlenbergii* (chinquapin oak) and *Celtis occidentalis* (hackberry) (Küchler, 1974). The second classification of woodland cover described in this region more recently is Oak-hickory forest (Lauver et al., 1999). This class of vegetation typically includes *Quercus alba*, (white oak) *Quercus velutina* (black oak), *Carya ovata* (shagbark hickory) and *Ostrya virginiana* (hop hornbeam). These classifications are similar and vegetation samples collected in the study area fall within both categories. Although the underlying limestone and shale geology of the area within the park is more suited to the oak-hickory type forest cover, the collected samples indicate the Cross Timbers ecotone extends into the boundaries of Elk City State Park. It is important to note that the areas where the Cross Timbers and the eastern deciduous forest meet on
the map are not discreet. The forest cover in Elk City State Park shows characteristics of both ecosystems (Omernik, 2004).

Remnants of unglaciated tallgrass prairie also known as southeastern Kansas tallgrass prairie remain in the park (Lauver et al., 1999). This area is located in section 21, south of the golf course and the Prairie Meadow Campground. The native grassland does not cover the entire section. Comparison of the current land cover to an aerial map dated from 1954 indicates that at least a portion of the section was converted to row crops or C₃, cool season grass hay meadows at the time of the photograph. This section also contains a length of the old railroad embankment that transected the property prior to the construction of the reservoir (Figure11). Hedgerows are visible on the 1954 aerial photograph and much of these remain further dividing the remnants of native grassland (Figure12).

Other areas of the park include disturbed old-field habitats that contain a mixture of native grasses and forbs as well as shrubs and trees. This vegetation provides food and cover for wildlife but is not representative of the pre-settlement landscape. This habitat borders the southeast end of the lake. The Squaw Creek South Trail winds through this area. Portions of the area are periodically flooded during the spring. The Kansas
Vegitation Classification developed by the Kansas Natural Heritage Inventory and the Kansas Biological Survey classifies the vegetation in this area as wet prairie or *Cephalanthus occidentalis* semi permanently flooded shrub land alliance (Lauver et al., 1999). The classification system was developed in part to facilitate ecological surveys and to assist in making sound conservation decisions (Lauver et al., 1999). Other examples of old field habitat contain a mixture of $C_3$ grasses, $C_4$ grasses and forbs both native and introduced. This second example of old-field habitat contains fewer shrubs and trees. Portions are mown regularly. The golf course, exercise trail and a few other small areas contain this more intensively managed old-field habitat.
Figure 11: Recent Elk City State Park aerial view showing intact hedgerows. An abandoned railroad embankment is visible starting SE in section 22 and continuing NW through section 21 highlighted in red.

The Squaw Creek trail, visible on this map in section 21 follows the contours of the southeast edge of the lake. There are disused campgrounds located in the southeast corner of section 20.

Sources: Kansas Data Access and Support Center; Farm Services Agency 2012 photo background Kansas Geological society, Public Land Survey System, Kansagis.org Elk City State Park boundaries courtesy of Montgomery County GIS Office
Figure 12: 2012 Map Comparison to 1954 Aerial Map.

hedgerows and railroad embankment visible in 1954 map remnants of these features remain and are visible in 2012 map.

Sources: 2012 map adapted from; Farm Services Agency; Kansas Data Access and Support Center. GIS data and access to historical map provided by Montgomery County GIS office
In considering the fragmented landscape within Elk City State Park several issues are readily apparent. First is the disturbance to the native habitat which has the most detrimental effect on the ecosystem. Species may become extinct locally simply due to disturbance and habitat loss (Cully, Cully & Hiebert, 2003; Van Calster et al., 2008). Second are the remaining habitat fragments; the quality of the remnants, the extent of their isolation and the presence of remaining potential propagule pools in the surrounding area to maintain biodiversity (Bever & Schultz, 2010; Cully et al., 2003; Foster et al., 2009; Middleton et al., 1980; Tilman, 1997). Third is the introduction of non-native species some of which are highly competitive, invasive species (Cully et al., 2003; Smith & Knapp, 2001). Most problematic of these is *Lespedeza cuneata* (sericea lespedeza) which covers large portions of the remaining grasslands in sections 16 and the northern portion of section 21. The vegetative cover in this area has been classified previously by The Kansas Applied Remote Sensing program as warm season grassland on the Kansas land cover patterns map level IV (Figure 13). The applied remote sensing program is a valuable means to assess natural areas. The ability to collect data remotely allows for large areas to be mapped. When used in conjunction with field studies more accurate assessments of natural areas can be compiled and used to refine classifications. Remote sensing has advantages in cases where lack of funding or lack of volunteers to sample natural areas exists.
Figure 13: The Kansas Land Cover Pattern Map level IV data compiled through remote sensing data shows most of Elk City State Park covered in warm-season grasses or woodland. Accessed 3-31-2014

Kansas Land Cover Pattern Map Level IV
Source: Kansas Biological Survey Google Earth format
Sampling Timeline and Procedure:

Sampling began in the spring of 2011 and continued through fall of 2011. Sampling resumed in spring of 2012 and continued through fall of 2012. The goal of sampling was to assemble a comprehensive list of vascular plants present in the park. This list serves as a baseline to document species present and as a basis for future comparisons. Specimens were collected, identified and pressed before being added to the Sperry Herbarium at Pittsburg State University. Nomenclature follows that of *The Flora of the Great Plains* (Great Plains Flora Association, 1986). This older text was chosen for its scope and breadth of coverage for the study area. In instances where a second flora was needed to identify a species as in the case of *Taxodium distichum* (bald cypress) and *Liquidambar styraciflua* (sweet gum) Steyermark’s *Flora of Missouri* revised edition Vol. 1 and 2 (Yatskievych, Mo. Dept of Conservation, 1999) and *Trees of Missouri* (Kurz, 2003) were used to identify specimens. Some species included in the list were observed but not collected. For example; *Baptisia australis* (blue wild indigo) was locally rare with fewer than 10 plants observed in one location. In an effort to preserve the small population an observational note appears on the plant list. Although abundant, *Toxicodendron radicans* (poison ivy) was omitted from the physical collection. It is included in the list of species with an observation note. Each collection point was
recorded with a GPS unit to facilitate mapping with ARC GIS software. A list of the
vascular plants present appears in the appendix. Each species was assigned a coefficient
of conservatism value in accordance with the Coefficients of Conservatism for Kansas
Vascular Plants (2012) list. This list is made available by The Kansas Natural Heritage
Inventory research program (Freeman, 2012). A Floristic Quality Assessment (FQA) was
conducted to determine the overall quality of the site. The Floristic Quality Index (FQI) is
the numerical calculation based on the assigned coefficients of conservatism for the
samples recorded. If there has been little change to the ecosystem since the arrival of
European settlers then the Floristic Quality Index (FQI) should be relatively high. Natural
areas that have undergone some disturbance will have FQI scores near 45. A score in
this range is representative of an area worthy of preservation as it retains much if not all
of the native vegetation (Swink and Wilhelm, 1979). Sites deemed of excellent floristic
quality may have an FQI score close to 60. A low number would indicate loss of quality
of the natural area due to human interference. Such influences include habitat loss,
habitat fragmentation or the introduction of non-native species (Higgins et al., 2001).
The Adjusted Floristic Quality Index (Adjusted FQI) calculates the Floristic Quality Index
with the addition of non-native species in the equation to account for the increase in
species richness that these species provide (USACE, 2009).
Upon initial observation of the study site it was apparent that there had been extensive fragmentation of the native landscape. Mature hedgerows still exist in areas of the park dividing the former privately owned lands. Remnants of a disused railroad embankment are further evidence of disturbance to the native landscape. The presence of introduced and exotic species throughout the park is another indicator of anthropogenic activity. These observations led to the formulation of the following hypothesis: If there had been substantial change in the area since the time of the arrival of European settlers then there would be little to no high quality native habitat fragments remaining within Elk City State Park. Floristic Quality Assessment scores would reflect these changes as a low FQI and a low mean coefficient of conservatism.

**Floristic Quality Assessment**

In an effort to objectively assess the quality of remaining habitat of an area, Swink and Wilhelm developed a method to identify high quality natural areas (Swink & Wilhelm, 1979). High quality, in this case, refers to the lack of anthropogenic interference or disturbance of a habitat (Freeman, 2012; McIndoe et al., 2008; Medley & Scozzafava, 2009; USACE, 2009). These pristine areas are increasingly rare and for reasons outlined previously, are worthy of preservation.
The development of the Floristic Quality Assessment (FQA) was originally tailored to assess natural areas in the Chicago region (Jog et al., 2006; Swink & Wilhelm, 1979; USACE, 2009). FQA has since been applied to many different regions and has proved to be a consistent indicator of the level of disturbance (Jog et al., 2006; McIndoe et al., 2008; Medley & Scozzafava, 2009; USACE, 2009). FQA has been applied to specific habitats with similar levels of accuracy (Jog et al. 2006). FQA has been refined since its inception and is used not only to identify high quality natural areas but it is used as a tool to measure restoration progress, to measure the effectiveness of preservation practices and they provide a basis for comparison between similar sites. FQA has proven to be reliable enough to base policy decisions on the results of these assessments (Freeman, 2012; McIndoe et al., 2008; USACE, 2009).

A Coefficient of Conservatism (C of C) is a measure of a plant’s tolerance to the level of disturbance in a natural area. Plants that do not tolerate disturbance are described as having a natural affinity or fidelity to pristine, high quality, natural habitats (Freeman 2012; McIndoe et al., 2008; Rocchio, 2007; USACE, 2009). These species are assigned a high Coefficient of Conservatism. Conversely, species that are tolerant of human disturbance to the natural habitat and can be found on disturbed ground have a low Coefficient of Conservatism. Introduced species are assigned a zero or null value. Each state or region that utilizes FQA has developed a comprehensive list of the species that
occur within that state or region. A panel of botanists and other experts then assigns a coefficient of conservatism to each species based on knowledge of the species occurrence and field observations (Freeman, 2012; McIndoe et al., 2008; Medley & Scozzafava, 2009; Rocchio, 2007). These efforts to carefully assign coefficients help to eliminate subjectivity in designating an area either high quality or low quality. The list of Coefficients of Conservatism also provides a measure of consistency when assessing natural communities. Two advantages to assessing an area using FQA are (1) eliminating the need to measure abundance or cover density and (2) the ability to eliminate fragment size as a variable in the assessment process (Swink & Wilhelm, 1979; Rocchio, 2007). This assessment tool is particularly suited to the study site due to the fragmented nature of the habitat and the extreme variation in size of comparable parcels of vegetative cover.

Calculating FQA:

Calculating FQA yields three measurements or indices. The first calculation, the mean C value, \( \bar{C} \) indicates the floristic quality of an area. Coefficients of Conservatism are assigned to each species and the sum is then divided by the number of native species.
The mean C value ($\bar{C}$). Where C equals the Coefficient of Conservatism number and N equals the number of native species in the sample.

$$\bar{C} = \frac{\sum C}{N}$$

This value quantifies the overall habitat quality. An area that has experienced disturbance would tend to have fewer species with high coefficients of conservatism. This loss of highly conservative species is reflected in a lower $\bar{C}$ (Higgins et al., 2001; McIndoe et al., 2008; Medley & Scozzafava, 2009; USACE, 2009).

A second formula, the Floristic Quality Index (FQI), has been developed in order to offset the influence of fragment size on the value of $\bar{C}$. Larger fragments tend have a greater number of species (Loring, et al., 2005; Rocchio, 2007; Rothrock, 2011; Taft, et al., 1997). This increased species richness may or may not be reflected in the value of $\bar{C}$. A formula that incorporates the measure of species richness helps to differentiate $\bar{C}$ values that occur when assessing fragments of dissimilar size.

$$FQI = \bar{C} \times \sqrt{N \text{ native species}}$$

To assess the effects of non-native, introduced species on the FQI, they are incorporated in the formula for analysis. This allows one to address (1) that introduced species contribute to the richness of the study area albeit not in a manner that is considered ecologically sound (McIndoe et al., 2008; McKinney, 2004). (2) Non-native,
introduced species lower the quality or level of conservatism of the study site. Since introduced species are always assigned a value of zero this will be reflected in the adjusted FQI value. It is worthwhile to calculate both the FQI and the adjusted FQI of an area (McIndoe et al., 2008; Taft, 1997; USACE, 2009).

The adjusted Floristic Quality Index formula:

$$\text{Adjusted FQI} = \bar{C} \text{ All Species} \times \sqrt{N_{all \ species}}$$
CHAPTER IV

RESULTS

Descriptive Analysis and FQA

The floristic survey conducted within Elk City State Park yielded 259 species of vascular plants. The sample included 191 genera representative of 68 plant families. Of the 259 species, 211 species were native (81.4%). The remaining 48 species were non-native (18.5%). The mean coefficient of conservatism ($C$) for the native species sampled was 3.02. The majority of the specimens collected from Elk City State Park have coefficients of conservatism below a rank of five which represents species that will tolerate an intermediate level of disturbance (value 5) to species that are assigned a zero or one. These species, the weediest and least conservative, thrive on disturbed sites. This group includes introduced species and species that are native to the United States but have been introduced to the state of Kansas. These latter classifications carry
a null value. Species with a rank of four and below comprised 76.6% of the collected specimens. Specimens with a coefficient of conservation ranging from (5) to the specimen with highest coefficient of conservation (8) represented just 23.07% of the species sampled.

The Floristic Quality Index for the study area was 43.9 (Table 1). This number indicates a relatively intact site (Swink and Wilhelm, 1979; Higgins et al., 2001). When analyzing the study site it is apparent that the moderate FQI may be a reflection of the diverse ecosystems within the park. Because there are areas representative of an oak-hickory type forest, the Cross Timbers ecotone as well as disturbed, successional habitat the FQI value may be a measure of the greater number of species found where transition zones exist rather than an indicator of little disturbance or an intact site.

The Adjusted Floristic Quality Index (Adj FQI) is a measure that includes the introduced species. This has the effect of lowering the mean $\bar{C}$. Since the introduced species carry a null value they decrease the FQI. In this way, the greater biodiversity of the site is recorded in a way that more accurately identifies the level of disturbance. The mean $\bar{C}$ for the adjusted FQI was 2.46 (Table 2). The adjusted FQI for the study site was 39.6. This number is similar to other sites that have experienced a significant level of disturbance (Higgins et al., 2001). In its original inception, the Floristic Quality
Assessment categorized sites with an FQI of 35 or less as unlikely candidates for successful restoration (Swink and Wilhelm, 1979; Higgins et al., 2001).
Floristic Quality Assessment Calculations

Table 1
Floristic Quality Index

<table>
<thead>
<tr>
<th>Sum of coefficient of conservatism all species</th>
<th>637</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of native species</td>
<td>211</td>
</tr>
<tr>
<td>Mean C of C (637 ÷ 211)</td>
<td>3.02</td>
</tr>
<tr>
<td>Square root of native species</td>
<td>14.5</td>
</tr>
<tr>
<td>FQI (3.02 X 14.5)</td>
<td>43.9</td>
</tr>
</tbody>
</table>

Table 2
Adjusted Floristic Quality Index

<table>
<thead>
<tr>
<th>Sum of coefficient of conservatism all species</th>
<th>637</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of all species</td>
<td>259</td>
</tr>
<tr>
<td>Mean C of C all species (637 ÷ 259)</td>
<td>2.46</td>
</tr>
<tr>
<td>Square root of all species</td>
<td>16.1</td>
</tr>
<tr>
<td>Adjusted FQI (2.46 X 16.1)</td>
<td>39.6</td>
</tr>
</tbody>
</table>
Table 3
Percentage of Samples by Coefficient of Conservatism Values

<table>
<thead>
<tr>
<th>Coefficient of Conservatism</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>22.4%</td>
</tr>
<tr>
<td>0</td>
<td>12.4%</td>
</tr>
<tr>
<td>1</td>
<td>8.8%</td>
</tr>
<tr>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>4</td>
<td>11%</td>
</tr>
<tr>
<td>5</td>
<td>9.6%</td>
</tr>
<tr>
<td>6</td>
<td>7.3%</td>
</tr>
<tr>
<td>7</td>
<td>5.4%</td>
</tr>
<tr>
<td>8</td>
<td>.77%</td>
</tr>
<tr>
<td>9</td>
<td>0%</td>
</tr>
<tr>
<td>10</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>99.67%</td>
</tr>
</tbody>
</table>
Analysis of the Three Most Abundant Plant Families

The three taxonomic plant families with the greatest number of representatives are Poaceae with 44 representative species which is 17% of the total species sampled, Asteraceae with 32 representative samples which comprises 12.4% of the total samples taken and Fabaceae with 21 representative samples which is 8% of the total specimens collected (Table 3). Since the study area shows signs of disturbance it is worthwhile to examine the percentages of both the introduced species as well as the species with the lowest coefficient of conservatism values also labeled the weediest species in the three most abundant plant families. In the Poaceae family, 15 of 44 species sampled are introduced species (Table 4). This is 34% of the total number of specimens sampled from this family. An additional eight species fall into the weediest category with a coefficient of conservatism value of zero or one. This is 18% of the total number of specimens from this family (Table 5). In all, 52% of the Poaceae family, are either introduced or suited to the most disturbed habitats. In the Asteraceae family there is only one introduced species. However, 31% of the Asteraceae family sampled falls into the least conservative category. In the Fabaceae family, six species are introduced and only one species falls into the weediest category. This sum represents 33% of the Fabaceae family.
That the Poaceae family is the most frequently sampled family in the grassland areas of the park is not surprising. With a closer examination of the ratio of introduced species and species with the lowest Coefficient of Conservatism (C of C) it becomes clear that these areas have experienced a significant amount of disturbance. The same is true when examining the ratio of introduced and low C of C species in the Asteraceae and Fabaceae family samples. These findings, when combined with the absence of typical indicator species, as well as the lack of highly conservative species present in Elk City State Park clearly indicate significant change has taken place in these natural areas post-European settlement.
Table 4

Three Plant Families with the Greatest Number of Samples

<table>
<thead>
<tr>
<th>Plant Family</th>
<th>Number of representatives</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poaceae</td>
<td>44</td>
<td>17%</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>32</td>
<td>12.4%</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>21</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
<td>37.4%</td>
</tr>
</tbody>
</table>

Table 5

Percent of Introduced Species in the Three Most Abundant Plant Families

<table>
<thead>
<tr>
<th></th>
<th>Poaceae</th>
<th>Asteraceae</th>
<th>Fabaceae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Representatives</td>
<td>44</td>
<td>32</td>
<td>21</td>
</tr>
<tr>
<td>Number of Introduced species</td>
<td>15</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Percent of total family = Introduced Species</td>
<td>34%</td>
<td>0.03%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Table 6

Percent of Weediest Species in the Three Most Abundant Plant Families

<table>
<thead>
<tr>
<th></th>
<th>Poaceae</th>
<th>Asteraceae</th>
<th>Fabaceae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Representatives</td>
<td>44</td>
<td>32</td>
<td>21</td>
</tr>
<tr>
<td>Number of Zero C of C value</td>
<td>6</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Number of (1) C of C value</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total: weediest natives (0, 1 value)</td>
<td>8</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Percent of total representatives = Weediest Species</td>
<td>18%</td>
<td>31.2%</td>
<td>.04%</td>
</tr>
</tbody>
</table>
General Floristic Description

Three plants listed as noxious weeds in the state of Kansas occur within Elk City State Park: *Convolvulus arvensis* (field bindweed), *Sorghum halepense* (Johnson grass), and *Lespedeza cuneata* (sericea lespedeza). The last two species are widespread in some areas of the park. *L. cuneata* is particularly abundant on the golf course which is situated in the southeast corner of section 16. In the northeast corner of section 21 the abundant cover of *L. cuneata* makes navigation of the area on foot difficult.

There were few highly conservative species found during the sampling time frame. *Houstonia longifolia* (slender leaf bluet) was the most highly conservative species sampled during the study period. With a coefficient of conservatism of 8, this species tolerates little disturbance. The collection site for this species is noteworthy as it contains a high concentration of native species not found in other areas of the park. This potential propagule pool is situated within the loop of the Green Thumb hiking trail. This small clearing is visible in the 1954 aerial photo. A comparison to recent aerial photos shows there has been some change in the size of the clearing. Trees from the surrounding matrix have not fully colonized this site (Figure 13). Another indicator of little disturbance to this area is the concentration of native species found throughout.
two growing seasons. The clearing’s small size and its situation on an otherwise wooded slope are hindrances to human disturbance. Lacking size, level ground to build on and deep soil to cultivate the intact flora may simply be a result of the inherent unprofitability of the site.

Four species listed as critically imperiled on the Kansas Natural Heritage Inventory were collected from the study site. This includes: *Krigia biflora* (false dandelion), *Pluchea camphorata* (camphorweed), *Sesbania exaltata* syn *Sesbania herbacea* (bigpod sesbania) and *Cissus incisa* syn *Cissus trifoliata* (sorrel vine). These species ranked S1 are listed as critically imperiled either due to rarity within the state of Kansas or vulnerability to extirpation from the state. It is important to note that these are not highly conservative species. Only *Cissus incisa*, with a C ofC of 7 and *Krigia biflora*, ranked with a C ofC of 6 indicate that these do tolerate low to intermediate levels of disturbance to the habitat. *Sesbania exaltata* and *Pluchea camphorata* are ranked with coefficients of conservatism of 3 and 4 respectively indicating that these species, although rare in the state of Kansas, will tolerate disturbance to the habitat.

There is convincing evidence of anthropogenic disturbance within the boundaries of Elk City State Park. The density of invasive species cover, the evidence of past disturbance as seen in the aerial photos taken in 1954 as well as the lack of highly conservative species typically found in a tallgrass prairie ecosystem all indicates varying
degrees of habitat degradation. In addition to these factors, there is a noticeable absence of indicator species usually found in the tallgrass prairie. *Andropogon gerardii*, (big bluestem) *Sisyrinchium scoparium* (little bluestem) and *Sorghastrum nutans* (indian grass) were not sampled from the grasslands in the study area. These species do occur in an isolated clearing within the loop of the Green Thumb Trail which lies just outside of the park border (Figure 14).

The presence and abundance of three species of noxious weeds are a particular concern for any conservation efforts conducted within the study area. *Lespedeza cuneata* (sericia lespedeza), *Sorghum halepense* (johnson grass) and *Convolvulus arvensis* (field bindweed) are all present in Elk City State Park. These species out-compete the native flora for space and nutrients. Without control efforts there is a risk to the less vigorous native species.
Comparison of Clearing in 1954 and 2012

Figure 14: The location (in red) of clearing containing a high number of native species. This area lies within the loop of the Green Thumb hiking trail just outside of the park borders.

1954 photo: Montgomery County GIS Office

2012 photo adapted from; Farm Service Agency via KDASC 3-31-2014

Park boundaries courtesy of Montgomery County GIS Office

.5 miles
Chapter V

MANAGEMENT RECOMMENDATIONS

Invasive Species Control

The degradation of the original habitat within ELK City State Park combined with the need to manage the noxious weeds *Lespedeza cuneata* (sericea lespedeza) and *Sorghum halepense* (johnson grass) in Elk City State Park are primary management concerns. Habitat loss and the introduction of noxious weeds are the biggest threats to the biodiversity within the study area (Higgins *et al.*, 2001). Although *Convolvulus arvensis* (field bindweed) and *Lonicera japonica* (Japanese honeysuckle) also occur in the study area, *L. cuneata* and *S. halepense* have invaded to a much larger extent.

Abundant weed cover impacts the native species richness in the immediate vicinity and without control measures, the percentage of land covered with *L. cuneata* will increase rapidly to the further detriment of native species. Established stands of *L. cuneata* produce as many as 6000 seeds per plant each year (Wong *et al.*, 2012). With the abundant seed production and aggressive growth pattern *L. cuneata* has had a negative impact on the grassland areas within the park. These changes in diversity
happen quickly once *L. cuneata* becomes established. One study reported a significant drop in the number of native species from 27 to eight species in less than seven years (Eddy & Moore, 1998). Controlling *L. cuneata* is a challenge for land managers. Herbicides, burning and grazing have all been utilized but no single control method yields consistent results. Another obstacle to aggressively treating the infestation of *L. cuneata* within Elk City State Park is the location of the weed cover. The golf course has areas with extensive cover of *L. cuneata*. This area is frequented by visitors to the park. Annual or biennial burning coupled with heavy herbicide applications detract from recreational use of the site. The second area with a large stand of *L. cuneata* is less frequented by visitors to the park. Although livestock has been suggested as a means of controlling *L. cuneata* the fencing requirements necessary to contain goats rule out grazing as a biological means to control dense stands of *L. cuneata*. Other livestock avoid *L. cuneata* due to the high tannin content which makes the forage unpalatable (Rutherford, 2011). The Kansas Noxious Weed Control Program indicates that there are no effective biological controls available. The need to eliminate stands of noxious weeds in order to increase biodiversity and improve the health of the ecosystem must be balanced with the need to attract visitors and revenue to the park.

Marginally successful *L. cuneata* reduction regimens employ several control methods. Burning has little effect on mature *L. cuneata* which will readily re-grow from the robust rootstock after exposure to fire (Wong *et al.*, 2012). A combination of herbicide
applications to mature plants and adopting a burn regimen to control *L. cuneata* in the seedling stage has been more successful than herbicide applications or burning alone (Wong *et al.*, 2012). This study indicated that fire was positively correlated with an increased germination rate in *L. cuneata* seeds. By manipulating the timing of the burns it was found that burning late in the season had the most negative impact on seedling survivorship. Fire late in the season combined with the subsequent flush of germination produced a large number of *L. cuneata* seedlings very late in the growing season. The short growth window gives the tender seedlings little time to accumulate the reserves necessary to survive winter (Wong *et al.*, 2012).

Fall burning may be riskier than spring burning due to the annual accumulation of dry material combined with a lack of precipitation late in the season. Fire bans under extremely dry conditions would limit the opportunities to implement this strategy. However, the technique shouldn’t be ruled out if conditions allow for safely implementing a controlled burn in an area heavily infested with *L. cuneata*. Frequent mowing has been used with some effectiveness to reduce the vigor of *L. cuneata* but frequent mowing has a negative impact on less vigorous native species. (Wong, *et al.*, 2012)
With well established stands of *L. cuneata* present in Elk City State Park complete elimination may be an impossible goal to achieve. Focusing on reducing the population through selective herbicide application to established plants combined with a mowing regimen aimed at reducing seed production and to prevent the establishment of seedlings may be a more practical goal.

Johnson grass (*Sorghum halepense*) is another noxious weed found within the study area. Like *L. cuneata*, *S. halepense* is an introduced species that has become a noxious weed in many parts of its range. This species produces large amounts of seed and an extensive system of rhizomes. (Riar, *et al.*, 2011). Controlling *S. halepense* requires more than one method. Frequent cultivation, eliminating chances to set seed and herbicide application have proven successful in eradicating stands of *S. halepense* in crop producing fields (Riar, *et al.*, 2011). Frequent cultivation is recommended to weaken the rhizomes of *S. halepense*. A 14-day cultivation regimen is recommended to weaken the plant. This method has limitations when applied to restoration settings. The treatment risks eradicating desirable species before noxious weeds are eliminated. A combination of removing top growth and spot application of herbicide may be more suited to areas where *S. halepense* exists in close proximity to native species. Herbicide resistant strains of *S. halepense* have been identified. Herbicide resistance occurs more frequently as herbicide is routinely applied to commercial crops. Alternating herbicides
may prove more effective and may reduce resistance (Riar, et al., 2011; Kansas Noxious Weed Control Program, 2014).

Eliminating seed production in these noxious weeds is especially challenging. Both S. halepense and L. cuneata produce large amounts of seed each growing season. L. cuneata produces seed for an extended period during the growing season making control of seed production difficult (Wong, et al., 2012). Removal of top growth will prevent seed formation and will reduce root reserves weakening the plant (Riar, et al., 2011; Wong, et al., 2012). The difficulty in implementing an aggressive eradication or reduction program is primarily due to a lack of funding for enough park employees to carry out the necessary treatment regimen.

Prairie Restoration and Reconstruction

Despite the challenges imposed by the level of invasive species cover in Elk City State Park, restoring sections of the study area to native species would be beneficial. (1) Along with the characteristic woody species, native grasses and forbs are an integral part of the Cross Timbers ecosystem. As such, restoration or reconstruction would better support the native species that depend on them. (2) Elk City State Park is a protected natural area. Attempts to restore or reconstruct a tallgrass prairie would
allow visitors to the park to enjoy the beauty of this threatened ecosystem. (3) Re-introducing C₄ grasses and forbs would provide a propagule pool which would have the potential to increase biodiversity to the surrounding fragments of grassland (Middleton, et al., 2010).

The choice to restore native prairie or to reconstruct native prairie depends on the location within the study area the treatment would be applied. In areas that have an abundance of C₃ grasses and annual weeds, reconstruction may be the better choice (Rowe, 2010; Middleton et al., 2010). The most successful reconstructions involve utilizing crop land that has been seeded to Glycine max (soybeans). Preparation of the site before the introduction of the crop helps to eliminate the cover of undesirable species. After harvesting the crop a forb-rich grass blend is broadcast over the crop residue. The timing of seed application has an impact on the success of reconstruction. Fall seeding allows the seed to experience the temperature fluctuations necessary to break dormancy (Rowe, 2010). This combination of cultivation to reduce competition and fall application of seed has been a successful method of introducing and establishing a native species pool. There are areas in Elk City State Park that have been used for crop production. In section 21, oil seed sunflowers were grown in 2010. This location is small however that may be advantageous considering budget constraints and the demands on labor that a reconstruction project entails. There is an added benefit as
the site has been cultivated and the introduced species have been greatly reduced by mechanical or chemical means.

Another method to establish prairie species is through restoration. Restoration involves broadcast seeding an area that has vegetative cover. This has some disadvantages to reconstruction methods. Competition with established species reduces the success rate. Burning prior to seeding increases seed-soil contact by reducing the litter on the ground (Wong, et al., 2012). Ideally the burn would be scheduled in fall in order to reduce the number of *L. cuneata* seedlings but the opportunity to safely burn during fall may not occur. Fall seeding is preferred for the stratifying effect that temperature fluctuations have on the seeds (Rowe, 2012). There are areas within Elk City State Park where restoration efforts would be appropriate. The advantage to this method is it requires little disruption to park services while restoration activities take place. Success rates increase with a biannual burn schedule (Middleton, *et al.*, 2010)

Efforts to improve the old field habitats through restoration or reconstruction would improve Elk City State Park. Although the reconstructed and restored sites would only be an approximation of the original tallgrass prairie ecosystem, the increase in native species and the resulting biodiversity would be an improvement on the species impoverished areas the park now contains.
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LITERATURE CITED


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APPENDIX
Figure 15: Elk City State Park boundaries shaded light blue

Sources: Kansas Data Access and Support Center (KDASC): Photo background, Farm Services Agency, Public Land Survey System, Kansasgis.org Elk City State Park boundaries courtesy of The Montgomery County GIS Office
### Appendix 2

Elk City State Park Species List Alphabetically by Family

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific Name</th>
<th>Author</th>
<th>Common Name</th>
<th>CC</th>
<th>Native</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acanthaceae</td>
<td>Justicia americana</td>
<td>(L.) Vahl.</td>
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<td>L48N</td>
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<td>Acanthaceae</td>
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<td>Limestone ruellia</td>
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<td>Aiton (Green) Rehdr</td>
<td>Aromatic sumac</td>
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<td>Smooth Sumac</td>
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<td>(L.) Crantz</td>
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<td>Apiaceae</td>
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<td>Queen Anne's Lace</td>
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<td>Apiaceae</td>
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<td>(D.C.) Britton</td>
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<td>Apiaceae</td>
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<td>S. F. Blake</td>
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<td>Cirsiwm altissimum</td>
<td>(L.) Spreng, USDA: (L.) Hill</td>
<td>Tall Thistle</td>
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<td>Torr.</td>
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<tr>
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<td>Lonicera maackii</td>
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<td>Author</td>
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<td>Ivy leaf morning glory</td>
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<td>Big root morning glory</td>
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<td>Cuscutaceae</td>
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<td>Bicknell's sedge</td>
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<td>Bicknell's sedge</td>
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<td>Carex davisi</td>
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<tr>
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<td>L.</td>
<td>Straw colored flat sedge</td>
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<tr>
<td>Cyperaceae</td>
<td>Eleocharis compressa</td>
<td>Sullivan</td>
<td>Flat-stem spike rush</td>
<td>6</td>
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<tr>
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<td>(L.) Kunth. Ex C.B. Clark</td>
<td>Densetuf hair sedge</td>
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<td>Fimbristylis vahii</td>
<td>(lam.) Link</td>
<td>Vahl's fimbry</td>
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<td>Pendant bulrush</td>
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<tr>
<td>Euphorbiaceae</td>
<td>Chamaesyce nutans</td>
<td>(Lag.) Small</td>
<td>Nodding spurge</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Euphorbiaceae</td>
<td>Croton capitatus</td>
<td>Michx.</td>
<td>Wooly Croton</td>
<td>1</td>
<td>L48N</td>
</tr>
<tr>
<td>Euphorbiaceae</td>
<td>Croton texensis</td>
<td>(J.F. Klutzh) Muell. Arg.</td>
<td>Texas Croton</td>
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<tr>
<td>Euphorbiaceae</td>
<td>Euphorbia corollata</td>
<td>L.</td>
<td>Flowering spurge</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Euphorbiaceae</td>
<td>Euphorbia dentata var. Dentata</td>
<td>Michx.</td>
<td>Toothed spurge</td>
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<tr>
<td>Fabaceae</td>
<td>Amorpha canescens</td>
<td>Pursh.</td>
<td>Lead Plant</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Amorpha fruticosa</td>
<td>L.</td>
<td>False indigo</td>
<td>6</td>
<td>L48N</td>
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<tr>
<td>Fabaceae</td>
<td>Astragalus crassicarpus var. crassicarpus</td>
<td>Nutt.</td>
<td>Ground plum milk vetch</td>
<td>7</td>
<td>L48N</td>
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<tr>
<td>Fabaceae</td>
<td>Baptisia australis</td>
<td>(L.) R. Br.</td>
<td>Wild blue indigo</td>
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<tr>
<td>Fabaceae</td>
<td>Chamaecrista fasciculata Var. fasciculata</td>
<td>(Michx.) Greene</td>
<td>Showy partridge pea</td>
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<td>L48 N</td>
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<tr>
<td>Fabaceae</td>
<td>Dalea purpurea</td>
<td>Vent.</td>
<td>Purple Prairie Clover</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Desmanthus illinoensis</td>
<td>(Michx.) Macmill. Ex B.L. Robinson &amp; Fernald</td>
<td>Illinois bundle flower</td>
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<tr>
<td>Fabaceae</td>
<td>Desmodium glutinosum</td>
<td>(Muhl. Ex Willd.) Wood - or Alph. Wood.</td>
<td>Large flowered tick clover</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Desmodium illinoense</td>
<td>A. Gray</td>
<td>Illinois tick clover</td>
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<td>Fabaceae</td>
<td>Gleditsia triacanthos</td>
<td>L.</td>
<td>Honey locust</td>
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<tr>
<td>Fabaceae</td>
<td>Gymnocladus dioicus</td>
<td>(L.) K. Koch</td>
<td>Kentucky coffee tree</td>
<td>4</td>
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</tr>
<tr>
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<td>Scientific Name</td>
<td>Author</td>
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<td>Fabaceae</td>
<td>Kummerowia striata</td>
<td>(Thunb.) H &amp; A USDA: (Thunb.) Schindl.</td>
<td>Japanese clover</td>
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<td>Fabaceae</td>
<td>Lathyrus latifolius</td>
<td>L.</td>
<td>Perrenial sweet pea</td>
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<tr>
<td>Fabaceae</td>
<td>Lespedeza virginica</td>
<td>(L.) Britton</td>
<td>Slender Bush Clover</td>
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<tr>
<td>Fabaceae</td>
<td>Lespedeza capitata</td>
<td>Michx.</td>
<td>Round headed bush clover</td>
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<tr>
<td>Fabaceae</td>
<td>Lespedeza cuneata</td>
<td>(Dumont G. Don USDA: (Dum. Cours.) G. Don)</td>
<td>Sericea lespedeza</td>
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<tr>
<td>Fabaceae</td>
<td>Medicago lupulina</td>
<td>L.</td>
<td>Black medick</td>
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<tr>
<td>Fabaceae</td>
<td>Mellilotus alba</td>
<td>Mich.</td>
<td>White sweet clover</td>
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</tr>
<tr>
<td>Fabaceae</td>
<td>Mellilotus officinalis</td>
<td>(L.) Pall. / (L.) Lam.</td>
<td>Yellow sweet clover</td>
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<tr>
<td>Fabaceae</td>
<td>Pediomelum digitatum</td>
<td>(Nutt.ex Torr. &amp; A. Gray) Isely</td>
<td>Palm leaf scurf pea</td>
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<td>Fabaceae</td>
<td>Sesbania herbacea</td>
<td>(Mill.) McVaugh.</td>
<td>Big pod sesbania</td>
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<td>Quercus macrocarpa var. macrocarpa</td>
<td>MichX.</td>
<td>Bur Oak</td>
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<td>Fabaceae</td>
<td>Quercus mughlenbergii</td>
<td>Engelm.</td>
<td>Chinkapin oak</td>
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<tr>
<td>Fabaceae</td>
<td>Quercus palustris</td>
<td>Muench</td>
<td>Pin oak</td>
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<tr>
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<td>Quercus rubra</td>
<td>L.</td>
<td>Northern Red Oak</td>
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<tr>
<td>Fabaceae</td>
<td>Quercus shumardii var. shumardii</td>
<td>Buckley</td>
<td>Shumard oak</td>
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<td>L48N</td>
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<td>Fabaceae</td>
<td>Quercus stellata</td>
<td>Wangenhi</td>
<td>Post-oak</td>
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<td>Fabaceae</td>
<td>Quercus var. shumardii</td>
<td>Buckley</td>
<td>Shumard oak</td>
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<td>L48N</td>
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<td>Geranium carolinianum var. carolinanum</td>
<td>L.</td>
<td>Carolina crane's bill</td>
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<td>Hamamelidae</td>
<td>Liquidambar styraciflua</td>
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<td>Sweetgum</td>
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<td>Hydrophyllaceae</td>
<td>Ellis nystelea</td>
<td>L.</td>
<td>Aunt lucy, waterpod</td>
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<tr>
<td>Iridaceae</td>
<td>Solidinium campestre</td>
<td>Bicknell</td>
<td>Prairie blue eyed grass</td>
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<td>Juglandaceae</td>
<td>Carya ovata</td>
<td>(Mill.) K. Koch</td>
<td>Shagbark hickory</td>
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<td>Juncaceae</td>
<td>Juncus interior var. interior</td>
<td>Weigand</td>
<td>Inland rush</td>
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<tr>
<td>Lamiaceae</td>
<td>Girschoma hederae</td>
<td>L.</td>
<td>Ground ivy</td>
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<td>L48 I</td>
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<tr>
<td>Lamiaceae</td>
<td>Lamium amplexicaule</td>
<td>L.</td>
<td>Henbit</td>
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<tr>
<td>Lamiaceae</td>
<td>Monarda fistulosa ssp. Fistulosa</td>
<td>L.</td>
<td>Wild Bergamot, Bee Balm</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Lamiaceae</td>
<td>Monarda punctata Vear. Occidentalis</td>
<td>(Epling) Palmer &amp; Steyermark</td>
<td>Western spotted bee blam</td>
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<td>L48 N</td>
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<td>Lamiaceae</td>
<td>Prunella vulgaris ssp lanceolata</td>
<td>(L.) (W. Bartram) Hulten</td>
<td>Lance leaf self-heal</td>
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<td>L48 I</td>
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<td>Lamiaceae</td>
<td>Pycnanthemum tenuifolium</td>
<td>Schrad.</td>
<td>Slender Mountain Mint</td>
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<td>L48N</td>
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<td>Lamiaceae</td>
<td>Salvia azurea</td>
<td>Michx. Ex lam.</td>
<td>Blue Sage</td>
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<td>L48N</td>
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<tr>
<td>Lamiaceae</td>
<td>Scutellaria parvula Var. missouriensis</td>
<td>var. (Torr.) Goodman &amp; C. A. Lawson</td>
<td>Leonard's Skullcap</td>
<td>5</td>
<td>L48 N</td>
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<td>Lamiaceae</td>
<td>Teucrium canadense Var. canadense</td>
<td>L.</td>
<td>American germander</td>
<td>1</td>
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<tr>
<td>Liliaceae</td>
<td>Allium canadense Var. canadense</td>
<td>L.</td>
<td>Wild onion</td>
<td>2</td>
<td>L48 N</td>
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<tr>
<td>Liliaceae</td>
<td>Nothoscordium bivale</td>
<td>(L.) Britton</td>
<td>False wild garlic</td>
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<tr>
<td>Losaceae</td>
<td>Mentzelia oligosperma</td>
<td>Nutt.</td>
<td>Stick leaf</td>
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<td>L48N</td>
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<tr>
<td>Lythraceae</td>
<td>Ammannia coccinea</td>
<td>Rottb.</td>
<td>Scarlet tooth cup</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Malvaceae</td>
<td>Abutilon theophrasti</td>
<td>Medik.</td>
<td>Velvet leaf</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Malvaceae</td>
<td>Hibiscus moschatus</td>
<td>L.</td>
<td>Rose mallow</td>
<td>4</td>
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</tr>
<tr>
<td>Family</td>
<td>Scientific Name</td>
<td>Author</td>
<td>Common Name</td>
<td>CC</td>
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<tr>
<td>Malvaceae</td>
<td>Hibiscus trionum</td>
<td>L.</td>
<td>Flower an hour</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Moraceae</td>
<td>Maclura pumifera</td>
<td>(Raf.) C.K. Schneid.</td>
<td>Osage Orange</td>
<td>*</td>
<td>L48 I</td>
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<tr>
<td>Moraceae</td>
<td>Morus alba</td>
<td>L.</td>
<td>White mulberry</td>
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<tr>
<td>Moraceae</td>
<td>Morus rubra var. rubra</td>
<td>L.</td>
<td>Red mulberry</td>
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<tr>
<td>Oleaceae</td>
<td>Elaeagnus angustifolium</td>
<td>Lindl.</td>
<td>Greenstem forsythia</td>
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<td>L48 I</td>
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<tr>
<td>Oleaceae</td>
<td>Forsythia viridissima</td>
<td>Lindl.</td>
<td></td>
<td>7</td>
<td>L48 N</td>
</tr>
<tr>
<td>Oleaceae</td>
<td>Fraxinus americana</td>
<td>L.</td>
<td>White ash</td>
<td>7</td>
<td>L48 N</td>
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<tr>
<td>Onagraceae</td>
<td>Gauna longiflora</td>
<td>Thunb.</td>
<td>Large flowered gaura</td>
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<td>Oenothera speciosa</td>
<td>Nutt.</td>
<td>Showy evening primrose</td>
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<td>Botrychium dissectum</td>
<td>Spreng.</td>
<td>Cut leaved Gape Fern</td>
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<td>L48 N</td>
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<tr>
<td>Orchidaceae</td>
<td>Spiranthus magnicamporum</td>
<td>Sheviak.</td>
<td>Great plains lady's tresses</td>
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<td>L48N</td>
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<tr>
<td>Oxalidaceae</td>
<td>Oxalis dilenii</td>
<td>Jacq.</td>
<td>Gray-green wood sorrel</td>
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<td>L48N</td>
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<td>Oxalis violacea</td>
<td>L.</td>
<td>Violet wood sorrel</td>
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<td>L48N</td>
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<tr>
<td>Passifloraceae</td>
<td>Passiflora incarnata</td>
<td>L.</td>
<td>Purple passion flower, maypop</td>
<td>4</td>
<td>L48 N</td>
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<tr>
<td>Phytolaccaceae</td>
<td>Physolacca americana</td>
<td>L.</td>
<td>Common pokeweed</td>
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<td>L48N</td>
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<tr>
<td>Plantaginaceae</td>
<td>Plantago patagonica Var. patagonica</td>
<td>Jacq.</td>
<td>Wooly plantain</td>
<td>1</td>
<td>L48 N</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Agrastis Hyemalis</td>
<td>(Walter) Britton, Sterns, &amp; Poggenb.</td>
<td>Hair grass</td>
<td>2</td>
<td>L48N</td>
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<tr>
<td>Poaceae</td>
<td>Alopecurus carolinianus</td>
<td>Walters</td>
<td>Carolina foxtail</td>
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<td>L48N</td>
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<tr>
<td>Poaceae</td>
<td>Andropogon gerardii</td>
<td>Vitton</td>
<td>Big Bluestem</td>
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<tr>
<td>Poaceae</td>
<td>Andropogon virginicus</td>
<td>L.</td>
<td>Broomsedge bluestem</td>
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<td>L48N</td>
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<td>Poaceae</td>
<td>Aristida oligantha</td>
<td>Michx.</td>
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<td>Bothriochloa saccharoides</td>
<td>(S.W.) Rydb</td>
<td>Silver bluestem</td>
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<tr>
<td>Poaceae</td>
<td>Bouteloua curtipendula Var. curtipendula</td>
<td>(Michx.) Torr.</td>
<td>Side oats grama</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Bouteloua dactyloides</td>
<td>(Nutt.) Engel. (Buchloe dactyloides)</td>
<td>Buffalo grass</td>
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<tr>
<td>Poaceae</td>
<td>Bouteloua hirsuta ssp hirsuta</td>
<td>Lag.</td>
<td>Hairy grama</td>
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<tr>
<td>Poaceae</td>
<td>Bromus inermis</td>
<td>Layss.</td>
<td>Smooth Brome</td>
<td>*</td>
<td>L48N</td>
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<tr>
<td>Poaceae</td>
<td>Bromus inermis</td>
<td>Layss.</td>
<td>Smooth Brome</td>
<td>*</td>
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<tr>
<td>Poaceae</td>
<td>Bromus racemosus</td>
<td>L.</td>
<td>Hairy chess</td>
<td>*</td>
<td>L48I</td>
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<td>Chasmanthium latifolium</td>
<td>(Michx.) Yates</td>
<td>Broad leaf Wood oats</td>
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<td>L48 N</td>
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<td>Poaceae</td>
<td>Cynodon dactylon</td>
<td>(L.) Pers.</td>
<td>Bermuda grass</td>
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<td>L48 I</td>
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<tr>
<td>Poaceae</td>
<td>Dactylis glomerata</td>
<td>L.</td>
<td>Orchard grass</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Dichanthelium acuminatum Var. Lindheimer</td>
<td>(S.W.) Gould &amp; C. A. Clark (Nash) Gould &amp; C.A. Clark</td>
<td>Linderheimer panic grass</td>
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<td>L48 N</td>
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<tr>
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<td>Dichanthelium oligosanthes var. scriberianum</td>
<td>(Schult.) Gould var. (Nash) Gould</td>
<td>Scriber's panic grass</td>
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<td>Poaceae</td>
<td>Digitaria ciliaris</td>
<td>(Retz.) Koeler</td>
<td>Southern crab grass</td>
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<td>Digitaria filiformis</td>
<td>(L.) koeler</td>
<td>slender crab grass</td>
<td>2</td>
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<td>Poaceae</td>
<td>Digitaria ischaemum</td>
<td>(Schreb.) Schreb ex. Muhl.</td>
<td>Smooth Crab Grass</td>
<td>*</td>
<td>L48 I</td>
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<tr>
<td>Family</td>
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<td>Author</td>
<td>Common Name</td>
<td>CC</td>
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<td>Poaceae</td>
<td>Digitaria sanguinalis</td>
<td>(L.) Scop</td>
<td>Hairy crabgrass</td>
<td>*</td>
<td>L48I</td>
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<tr>
<td>Poaceae</td>
<td>Echinochloa muricata var. microstachya</td>
<td>[Beauv.] Fern var. Weigand</td>
<td>Rough barnyard grass</td>
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<td>L48N</td>
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<td>Elymus virginicus Var. virginicus</td>
<td>L.</td>
<td>Virginia wild rye</td>
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<td>Eragrostis capillaris</td>
<td>(L.) Nees.</td>
<td>Lace grass</td>
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<td>Eragrostis spectabilis</td>
<td>(Persh) Steud.</td>
<td>Purple love grass</td>
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<td>Hordeum pusillum</td>
<td>Nutt.</td>
<td>Little Barley</td>
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<td>Poaceae</td>
<td>Leptochloa panicea ssp. Muconata</td>
<td>(Retz.) Ohwi.</td>
<td>Red sprangletop</td>
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<tr>
<td>Poaceae</td>
<td>Panicum acuminatum</td>
<td>Sw.</td>
<td>Panic grass</td>
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<td>Poaceae</td>
<td>Panicum philadelphicum</td>
<td>Bernh. Ex Trin</td>
<td>Philadelphia panic grass</td>
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<td>Poaceae</td>
<td>Paspalum dilatatum</td>
<td>Poir.</td>
<td>Dallis grass</td>
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<td>L48I</td>
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<tr>
<td>Poaceae</td>
<td>Paspalum setaceum var. ciliatifolium</td>
<td>(Michx.) Vasey</td>
<td>Thin paspalum</td>
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<tr>
<td>Poaceae</td>
<td>Poa annua</td>
<td>L.</td>
<td>Annual bluegrass</td>
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<td>Poaceae</td>
<td>Schizachne purpurascens</td>
<td>(Torr.) Swallen</td>
<td>False melic</td>
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<td>Poaceae</td>
<td>Setaria faberi</td>
<td>Herrn.</td>
<td>Chinese foxtail</td>
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<td>Poaceae</td>
<td>Setaria parviflora</td>
<td>(Poir.) kerguelen</td>
<td>Knot root yellow foxtail</td>
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<tr>
<td>Poaceae</td>
<td>Setaria pumila</td>
<td>(Poir.) Roem. &amp; J. A. Schultes</td>
<td>Yellow foxtail</td>
<td>*</td>
<td>L48I</td>
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<tr>
<td>Poaceae</td>
<td>Sorghastrum nutans</td>
<td>(L.) Nash</td>
<td>Indian grass</td>
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<td>poaceae</td>
<td>Sorghum halepense</td>
<td>(L.) Pers.</td>
<td>Johnson grass</td>
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<td>Poaceae</td>
<td>Sporobolus compositus</td>
<td>(L.) Hitchcock</td>
<td>Purpletop tridens</td>
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<td>Poaceae</td>
<td>Tripsacum dactyloides</td>
<td>(L.) L.</td>
<td>Eastern gamagrass</td>
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<td>Polygonaceae</td>
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<td>Pink smartweed</td>
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<td>Polygonaceae</td>
<td>Polygonum persicaria</td>
<td>L.</td>
<td>Spotted lady's thumb</td>
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<tr>
<td>Polygonaceae</td>
<td>Polygonum punctatum</td>
<td>Elliott</td>
<td>Dotted smart weed</td>
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<td>Rumex crispus ssp. Crispus</td>
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<td>Curly dock</td>
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<tr>
<td>Polygodialae</td>
<td>Notholaena dealbata Agyrochosma</td>
<td>(Pers.) Kunze.</td>
<td>Powdery false cloak fern</td>
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<td>Portulacaea</td>
<td>Claytonia virginica</td>
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<td>Spring Beauty</td>
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<td>Primulaceae</td>
<td>Anagallis arvensis (L.) ssp foemina</td>
<td>(Mill.) Schinz &amp; Thell.</td>
<td>Poorman's weather glass</td>
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<td>Ranunculaceae</td>
<td>Aquilegia canadensis</td>
<td>L.</td>
<td>Wild columbine</td>
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<td>Ranunculaceae</td>
<td>Clematis pitcheri</td>
<td>Torr &amp; A. Gray</td>
<td>Pitcher's clematis</td>
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<td>Myosurus minimus</td>
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<td>Ranunculus abortivus</td>
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<tr>
<td>Ranunculaceae</td>
<td>Ranunculus sceleratus var. sceleratus</td>
<td>L.</td>
<td>Cursed buttercup</td>
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<td>Geum canadense</td>
<td>Jacq.</td>
<td>White avens</td>
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<td>Rosaceae</td>
<td>Malus ioensis var. ioensis</td>
<td>(Wood) Britton</td>
<td>Prairie crabapple</td>
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<td>Rosaceae</td>
<td>Prunus americana</td>
<td>Marsh.</td>
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<td>L48 N</td>
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<td>Rosaceae</td>
<td>Rubus alleghenensis</td>
<td>Porter</td>
<td>Common blackberry</td>
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<tr>
<td>Family</td>
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<td>Author</td>
<td>Common Name</td>
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<td>Rubiaceae</td>
<td>Cephalanthus occidentalis</td>
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<td>Common Button Bush</td>
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<td>Rubiaceae</td>
<td>Galium circaeans var circaeans</td>
<td>Michx</td>
<td>Lonicere bedstraw</td>
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<td>L48 N</td>
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<td>Rubiaceae</td>
<td>Galium triflorum</td>
<td>Michx</td>
<td>Sweet scented bedstraw</td>
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<td>Rubiaceae</td>
<td>Houstonia longifolia</td>
<td>(Gaertn.) Hook.</td>
<td>Slender leaf bluet</td>
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<tr>
<td>Rutaceae</td>
<td>Petrea trifoliata SSP. Trifoliata</td>
<td>L.</td>
<td>Hop tree, Wafer Ash</td>
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<td>L48 N</td>
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<tr>
<td>Salicaceae</td>
<td>Populus deltoides ssp. Trifoliata</td>
<td>Bartram ex Marshall</td>
<td>Eastern cottonwood</td>
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<td>L48 N</td>
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<tr>
<td>Salicaceae</td>
<td>Populus deltoides ssp. Monilifera</td>
<td>W. Bartram ex Marsh ssp. (Alton) Eckenwalder</td>
<td>Plains Cottonwood</td>
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<td>Salix nigra</td>
<td>Marsh.</td>
<td>Black willow</td>
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<tr>
<td>Sapindaceae</td>
<td>Cardiospermum haticacabum</td>
<td>L.</td>
<td>Common Balloon Vine</td>
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<tr>
<td>Scrophulariaceae</td>
<td>Agalinis tenuifolia</td>
<td>(Vahl.) Raf.</td>
<td>Slender girardia</td>
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<tr>
<td>Scrophulariaceae</td>
<td>Penstemon cobaee</td>
<td>Nutt.</td>
<td>Cobae penstemon</td>
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<td>Scrophulariaceae</td>
<td>Penstemon tubiflorus Var. tubiflorus</td>
<td>Nutt.</td>
<td>White tube beardtongue</td>
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<td>Scrophulariaceae</td>
<td>Verbascum thapsus</td>
<td>L.</td>
<td>Common mullein</td>
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<td>L48 I</td>
</tr>
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<td>Ulmaceae</td>
<td>Smilax cernifera</td>
<td>Glabrescens</td>
<td>Greenbriar</td>
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<td>Physalis heterophylla var. heterophylla</td>
<td>Nees.</td>
<td>Clammy ground cherry</td>
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<td>Solanaceae</td>
<td>Physalis pumilla var. hispida</td>
<td>(Waterfall) Hinton</td>
<td>Prairie ground cherry</td>
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<tr>
<td>Solanaceae</td>
<td>Solanum carolinense var. carolinense</td>
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<td>Carolina horse-nettle</td>
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<td>Typhaceae</td>
<td>Typha angustifolia</td>
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<td>Willd.</td>
<td>Sugarberry</td>
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<td>Ulmaceae</td>
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<td>Hackberry</td>
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<td>Ulmaceae</td>
<td>Ulmus rubra</td>
<td>Muhl.</td>
<td>Red elm, slippery elm</td>
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<td>L48 N</td>
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<td>Valerianaceae</td>
<td>Valerianella radiata</td>
<td>(L.)Oufr.</td>
<td>Corn salad</td>
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<td>L48 N</td>
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<tr>
<td>Verbenaceae</td>
<td>Glandularia bipinnatifida Var. ciliata</td>
<td>(Nutt.) Nutt var. (Benth) B.L. Turner</td>
<td>Dakota vervain</td>
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<tr>
<td>Verbenaceae</td>
<td>Phyla lanceolata</td>
<td>(Michx.) Greene</td>
<td>Northern fog fruit</td>
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<tr>
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<td>Verbena bracteata</td>
<td>Lag. &amp; Rodr.</td>
<td>Prostrate vervain</td>
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<td>Verbena hastata</td>
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<td>Swamp verbena</td>
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<td>Verbena simplex</td>
<td>Lehrm.</td>
<td>Narrow leaved vervain</td>
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<td>Verbenaceae</td>
<td>Verbena stricta</td>
<td>Vent.</td>
<td>Hoary vervain</td>
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<tr>
<td>Violaceae</td>
<td>Viola sororia</td>
<td>Willd.</td>
<td>Downy blue violet</td>
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<td>Viola bicolor</td>
<td>Pursh.</td>
<td>Johnny jump up</td>
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<td>L48 N</td>
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<tr>
<td>Vitaceae</td>
<td>Cissus incisa</td>
<td>(Nutt) Des. Moul.</td>
<td>Marine ivy</td>
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</tr>
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<td>Vitaceae</td>
<td>Parthenocissus quinquefolia</td>
<td>(L.) Planchon</td>
<td>Virginia creeper</td>
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<td>Vitaceae</td>
<td>Vitis riparia</td>
<td>Michx</td>
<td>Riverbank grape</td>
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<td>L48 N</td>
</tr>
<tr>
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<td>Family</td>
<td>Author</td>
<td>Common Name</td>
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<tr>
<td>Abutilon theophrasti</td>
<td>Malvaceae</td>
<td>Medik.</td>
<td>Velvet leaf</td>
<td>*</td>
<td>L48 I</td>
</tr>
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<td>Achillea millefolium ssp. Occidentalis D. C</td>
<td>Asteraceae</td>
<td>L.</td>
<td>Western yarrow</td>
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<tr>
<td>Agalinis tenuifolia</td>
<td>Scrophulariaceae</td>
<td>(Vahl.) Raf.</td>
<td>Slender girardia</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Agrostis Hyemalis</td>
<td>Poaceae</td>
<td>(Walter) Britton, Sterns, &amp; Poggenb.</td>
<td>Hair grass</td>
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</tr>
<tr>
<td>Alliaria petiolata</td>
<td>Brassicaceae</td>
<td>(Bieb.) Cavara &amp; Grande.</td>
<td>Garlic mustard</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Allium canadense Var. canadense</td>
<td>Liliaceae</td>
<td>L.</td>
<td>Wild onion</td>
<td>2</td>
<td>L48 N</td>
</tr>
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<td>Alopecurus carolinanus</td>
<td>Poaceae</td>
<td>Walters</td>
<td>Carolina foxtail</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Amaranthus tuberculatus</td>
<td>Amaranthaceae</td>
<td>(Moq.) J. D. Sauer</td>
<td>Tall water hemp</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Ambrosia artemisifolia</td>
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<td>L.</td>
<td>Common ragweed</td>
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<td>L48 N</td>
</tr>
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<td>Ambrosia trifida</td>
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<td>L.</td>
<td>Giant ragweed</td>
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</tr>
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<td>Ammanna coccinea</td>
<td>Lythraceae</td>
<td>Rottb.</td>
<td>Scarlet tooth cup</td>
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<td>Amorpha canescens</td>
<td>Fabaceae</td>
<td>Pursh</td>
<td>Lead Plant</td>
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<td>Amorpha fruticosa</td>
<td>Fabaceae</td>
<td>L.</td>
<td>False indigo</td>
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<td>(D.C.) Blake</td>
<td>Broomweed</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Anagallis arvensis (L.) ssp foemina</td>
<td>Primulaceae</td>
<td>(Mill.) Schinz &amp; Thell.</td>
<td>Poorman's weather glass</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Andropogon gerardii</td>
<td>Poaceae</td>
<td>Vitton</td>
<td>Big Bluestem</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Andropogon virginicus</td>
<td>Poaceae</td>
<td>L.</td>
<td>Broomsedge bluestem</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Antennaria neglecta</td>
<td>Asteraceae</td>
<td>Green</td>
<td>Field pussystoes</td>
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<td>L48 N</td>
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<tr>
<td>Apocynum cannabinum</td>
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<td>L.</td>
<td>Dogbane, indian hemp</td>
<td>0</td>
<td>L48 N</td>
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<td>Aquilegia canadensis</td>
<td>Ranunculaceae</td>
<td>L.</td>
<td>Wild columbine</td>
<td>7</td>
<td>L48 N</td>
</tr>
<tr>
<td>Arisaema dracontium</td>
<td>Araceae</td>
<td>(L.) Schott.</td>
<td>Green Dragon</td>
<td>7</td>
<td>L48 N</td>
</tr>
<tr>
<td>Aristida oligantha</td>
<td>Poaceae</td>
<td>Michx</td>
<td>Old field three awn</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Arnoglossum plantagineum</td>
<td>Asteraceae</td>
<td>Raf. (Syn. Calacia plantaginea (raf.) Shinners)</td>
<td>(tuberous)Indian Plantain</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Asclepias tuberosa ssp. Interior</td>
<td>Asclepidaceae</td>
<td>L.</td>
<td>Butterfly milkweed</td>
<td>6</td>
<td>L48 N</td>
</tr>
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<td>Asclepias viridiflora</td>
<td>Asclepidaceae</td>
<td>Raf.</td>
<td>Green Milkweed</td>
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<td>L48 N</td>
</tr>
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<td>Asclepias asperula ssp. Capricornu</td>
<td>Asclepidaceae</td>
<td>Capricornu (Woodson)</td>
<td>Spider antelopehorn</td>
<td>5</td>
<td>L48 N</td>
</tr>
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<td>Asclepias verticillata</td>
<td>Asclepidaceae</td>
<td>L.</td>
<td>Whorled milkweed</td>
<td>1</td>
<td>L48 N</td>
</tr>
<tr>
<td>Astragalus crassicarpus var. crassicarpus</td>
<td>Fabaceae</td>
<td>Nutt.</td>
<td>Ground plum milk vetch</td>
<td>7</td>
<td>L48 N</td>
</tr>
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<td>Baptisia australis</td>
<td>Fabaceae</td>
<td>(L.) R. Br.</td>
<td>Wild blue indigo</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Scientific Name</td>
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<td>Author</td>
<td>Common Name</td>
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<td>Barbarea vulgaris</td>
<td>Brassicaceae</td>
<td>W. T. Aiton</td>
<td>Yellow Rocket,</td>
<td>*</td>
<td>L48 I</td>
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<tr>
<td>Bidens polylepis</td>
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<td>S. F. Blake</td>
<td>Begger’s ticks</td>
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<td>Bothriochloa saccharoides</td>
<td>Poaceae</td>
<td>(S.W.) Rydb</td>
<td>Silver bluestem</td>
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<td>L48 N</td>
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<td>Botrychium dissectum</td>
<td>Ophioglossaceae</td>
<td>Spreng.</td>
<td>Cut leaved Gape Fern</td>
<td>7</td>
<td>I48 N</td>
</tr>
<tr>
<td>Bouteloua curtipendula</td>
<td>Poaceae</td>
<td>(Michx.) Torr.</td>
<td>Side oats grama</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Bouteloua dactyloides</td>
<td>Poaceae</td>
<td>(Nutt.) Engel. (Buchloe dactyl)</td>
<td>Buffalo grass</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Bouteloua hirsuta ssp. hirsuta</td>
<td>Poaceae</td>
<td>Lag.</td>
<td>Hairy grama</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Bromus inermis</td>
<td>Poaceae</td>
<td>Layss.</td>
<td>Smooth Brome</td>
<td>*</td>
<td>L48 N</td>
</tr>
<tr>
<td>Bromus racemosus</td>
<td>Poaceae</td>
<td>L.</td>
<td>Hairy chess</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Cardiospermum halicocabum</td>
<td>Sapindaceae</td>
<td>L.</td>
<td>Common Balloon Vine</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Carex bicknelli</td>
<td>Cyperaceae</td>
<td>Britton</td>
<td>Bicknell’s sedge</td>
<td>8</td>
<td>L48 N</td>
</tr>
<tr>
<td>Carex davisi</td>
<td>Cyperaceae</td>
<td>Schwein &amp; Torr.</td>
<td>Davis’ sedge</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Carex hystericina</td>
<td>Cyperaceae</td>
<td>Muhl. Ex Willd.</td>
<td>Bottlebrush sedge</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Carex vulpinoida var. vulpinoida</td>
<td>Cyperaceae</td>
<td>Michx.</td>
<td>Fox sedge</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Carya ovata</td>
<td>Juglandaceae</td>
<td>(Mill.) K. Koch</td>
<td>Shagbark hickory</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Celtis laevigata</td>
<td>Ulmaceae</td>
<td>Willd.</td>
<td>Sugarberry</td>
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</tr>
<tr>
<td>Celtis occidentalis</td>
<td>Ulmaceae</td>
<td>L.</td>
<td>Hackberry</td>
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<tr>
<td>Cephalanthus occidentalis</td>
<td>Rubiaceae</td>
<td>L.</td>
<td>Common Button Bush</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Chaerophyllum procumbens</td>
<td>Apiaceae</td>
<td>(L.) Crantz</td>
<td>Wild chervil</td>
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<tr>
<td>Chaerophyllum tainturieri</td>
<td>Apiaceae</td>
<td>Hook</td>
<td>Chervil</td>
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<tr>
<td>Chamaecrista fasciculata Var.</td>
<td>Fabaceae</td>
<td>(Michx.) Greene</td>
<td>Showy partridge pea</td>
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<td>L48 N</td>
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<tr>
<td>Chamaesyce nutans</td>
<td>Euphorbiaceae</td>
<td>(Lag.) Small</td>
<td>Nodding spurge</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Chasmanthium latifolium</td>
<td>Poaceae</td>
<td>(Michx.) Yates</td>
<td>Broad leaf Wood oats</td>
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</tr>
<tr>
<td>Cirsisum altissimum</td>
<td>Asteraceae</td>
<td>(L.) Spreng. USDA: (L.) Hill</td>
<td>Tall Thistle</td>
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<td>L48 N</td>
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<td>Cissus incisa</td>
<td>Vitaceae</td>
<td>(Nutt) Des. Moul.</td>
<td>Marine ivy</td>
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<td>L48 N</td>
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<tr>
<td>Claytonia virginica</td>
<td>Portulacaceae</td>
<td>L.</td>
<td>Spring Beauty</td>
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<td>L48 N</td>
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<tr>
<td>Clematis pitcheri</td>
<td>Ranunculaceae</td>
<td>Torr &amp; A. Gray</td>
<td>Pitcher’s clematis</td>
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<td>L48 N</td>
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<tr>
<td>Commelina communis</td>
<td>Commelinaceae</td>
<td>L.</td>
<td>Dayflower</td>
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</tr>
<tr>
<td>Convolvulus arvensis</td>
<td>Convolvulaceae</td>
<td>L.</td>
<td>Field bindweed</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Conyza canadensis</td>
<td>Asteraceae</td>
<td>(L.) Cronq</td>
<td>Horse Weed</td>
<td>0</td>
<td>L48 N</td>
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<tr>
<td>Coreopsis tinctoria</td>
<td>Asteraceae</td>
<td>Nutt.</td>
<td>Plains coreopsis</td>
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</tr>
<tr>
<td>Cornus drummondii</td>
<td>cornaceae</td>
<td>Thunb.</td>
<td>Rough leaved dogwood</td>
<td>1</td>
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<tr>
<td>Croton capitatus</td>
<td>Euphorbiaceae</td>
<td>Michx</td>
<td>Wooly Croton</td>
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</tr>
<tr>
<td>Croton texensis</td>
<td>Euphorbiaceae</td>
<td>(J.F. Klutzs) Muell. Arg.</td>
<td>Texas Croton</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Cuscuta cuspidata</td>
<td>Cuscutaceae</td>
<td></td>
<td>Cusp dodder</td>
<td></td>
<td>L48 N</td>
</tr>
<tr>
<td>Cynanchum laeve</td>
<td>Asclepiadaceae</td>
<td>(Michx.) Pers.</td>
<td>Honeyvine milkweed</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Family</td>
<td>Author</td>
<td>Common Name</td>
<td>CC</td>
<td>Native</td>
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<tr>
<td>Cynodon dactylon</td>
<td>Poaceae</td>
<td>(L.) Pers.</td>
<td>Bermudagrass</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Cyperus strigosus</td>
<td>Cyperaceae</td>
<td>L.</td>
<td>Straw colored flat sedge</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Dactylis glomerata</td>
<td>Poaceae</td>
<td>L.</td>
<td>Orchard grass</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Dalea purpurea</td>
<td>Fabaceae</td>
<td>Vent.</td>
<td>Purple Prairie Clover</td>
<td>7</td>
<td>L48 N</td>
</tr>
<tr>
<td>Daucus carota</td>
<td>Apiaceae</td>
<td>L.</td>
<td>Queen Anne's Lace</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Descurainia pinnata ssp. brachycarpa</td>
<td>Brassicaceae</td>
<td>(Walter) Britton ssp. (Richardson) Detling</td>
<td>Western Tansy Mustard</td>
<td>1</td>
<td>L48 N</td>
</tr>
<tr>
<td>Desmanthus illinoensis</td>
<td>Fabaceae</td>
<td>(Michx.) Macmill. Ex B.L. Robinson &amp; Fernald</td>
<td>Illinois bundle flower</td>
<td>2</td>
<td>L48 N</td>
</tr>
<tr>
<td>Desmodium glutinosum</td>
<td>Fabaceae</td>
<td>(Muhl. Ex Willd.) Wood or Alph. Wood.</td>
<td>Large flowered tick clover</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Desmodium illinoense</td>
<td>Fabaceae</td>
<td>A. Gray</td>
<td>Illinois tick clover</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Dianthus armeria</td>
<td>Caryophyllaceae</td>
<td>L.</td>
<td>Deptford Pink</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Dichanthelium acuminatum Var. Lindheimer</td>
<td>Poaceae</td>
<td>(S.W.) Gould &amp; C. A. Clark (Nash) Gould &amp; C.A. Clark</td>
<td>Linderheimer panic grass</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Dichanthelium oligosanthes var. scribnerianum</td>
<td>Poaceae</td>
<td>(Schult.) Gould var. (Nash) Gould</td>
<td>Scribner's panic grass</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Digitaria ciliaris</td>
<td>Poaceae</td>
<td>(Retz.) Koeler</td>
<td>Southern crab grass</td>
<td>2</td>
<td>L48 N</td>
</tr>
<tr>
<td>Digitaria filiformis</td>
<td>Poaceae</td>
<td>(L.) koeler</td>
<td>Slender crab grass</td>
<td>2</td>
<td>L48 N</td>
</tr>
<tr>
<td>Digitaria ischaemum</td>
<td>Poaceae</td>
<td>(Schreb.) Koeler ex. Muhl.</td>
<td>Smooth Crab Grass</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Digitaria sanguinalis</td>
<td>Poaceae</td>
<td>(L.) Scop</td>
<td>Hairy crabgrass</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Diospyros virginiana</td>
<td>Ebenaceae</td>
<td>L.</td>
<td>American persimmon</td>
<td>2</td>
<td>L48 N</td>
</tr>
<tr>
<td>Draba cuneifolia</td>
<td>Brassicaceae</td>
<td>Nutt.</td>
<td>Wedge leaf draba</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Dracopis amplexicaulis</td>
<td>Asteraceae</td>
<td>(Vahl) Cass.</td>
<td>Clasping cone flower</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Echinacea pallida</td>
<td>Asteraceae</td>
<td>(Nutt.) Nutt.</td>
<td>Pale purple cone flower</td>
<td>7</td>
<td>L48 N</td>
</tr>
<tr>
<td>Echinocloa muricata var. microstachya</td>
<td>Poaceae</td>
<td>(Beauv.) Fern var. Weigand</td>
<td>Rough barnyard grass</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Eclipta prostrata</td>
<td>Asteraceae</td>
<td>(L.) L.</td>
<td>Yerba de Tajo</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Elaeagnus angustifolia</td>
<td>Oleaceae</td>
<td>L.</td>
<td>Russian olive</td>
<td>*</td>
<td>L49 I</td>
</tr>
<tr>
<td>Eleocharis compressa</td>
<td>Cyperaceae</td>
<td>Sullivan</td>
<td>Flat-stem spike rush</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Ellisia nyctelea</td>
<td>Hydrophyllaceae</td>
<td>L.</td>
<td>Aunt lucy, waterpod</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Elymus virginicus Var. virginicus</td>
<td>Poaceae</td>
<td>L.</td>
<td>Virginia wild rye</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Eragrostis capillaris</td>
<td>Poaceae</td>
<td>(L.) Nees.</td>
<td>Lace grass</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Eragrostis spectabilis</td>
<td>Poaceae</td>
<td>(Persch) Steud.</td>
<td>Purple love grass</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Erigeron annuus</td>
<td>Asteraceae</td>
<td>(L.) Pers.</td>
<td>Annual fleabane</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Erigeron strictosus var. strictosus</td>
<td>Asteraceae</td>
<td>Muhl. Ex. Willd.</td>
<td>Daisy Fleabane</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Eryngium repandum</td>
<td>Brassicaceae</td>
<td>L.</td>
<td>Bushy wallflower</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Eupatorium serotinum</td>
<td>Asteraceae</td>
<td>Michx.</td>
<td>Late eupatorium</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Eupatorium altissimum</td>
<td>Asteraceae</td>
<td>(L.)</td>
<td>White snakeroot</td>
<td>2</td>
<td>L48 N</td>
</tr>
<tr>
<td>Euphorbia corollata</td>
<td>Euphorbiaceae</td>
<td>L.</td>
<td>Flowering spurge</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Euphorbia dentata var. Dentata</td>
<td>Euphorbiaceae</td>
<td>Michx.</td>
<td>Toothed spurge</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Scientific Name</td>
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<td>Author</td>
<td>Common Name</td>
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<tr>
<td>Fimbristylis capillaris ssp capillaris</td>
<td>Cyperaceae</td>
<td>(L.) Kunth. Ex C.B. Clark</td>
<td>Densetuft hair sedge</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Fimbristylis Vahlii</td>
<td>Cyperaceae</td>
<td>(lam.) Link</td>
<td>Vahl’s fimbry</td>
<td>5</td>
<td>L48N</td>
</tr>
<tr>
<td>Forsythia viridissima</td>
<td>Oleaceae</td>
<td>Lindl.</td>
<td>Greenstem forsythia</td>
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<tr>
<td>Fraxinus americana</td>
<td>Oleaceae</td>
<td>L.</td>
<td>White ash</td>
<td>7</td>
<td>L48 N</td>
</tr>
<tr>
<td>Galium circeaeanus var circeaeanus</td>
<td>Rubiaceae</td>
<td>Michx</td>
<td>Licorice bedstraw</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Galium triformum</td>
<td>Rubiaceae</td>
<td>Michx</td>
<td>Sweet scented bedstraw</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Gaura longiflora</td>
<td>Onagraceae</td>
<td>Spach</td>
<td>Large flowered gaura</td>
<td></td>
<td>L48 N</td>
</tr>
<tr>
<td>Geranium carolinaeum var carolinaeum</td>
<td>Geraniaceae</td>
<td>L.</td>
<td>Carolina crane’s bill</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Geum canadense</td>
<td>Rosaceae</td>
<td>Jacq.</td>
<td>White avens</td>
<td>1</td>
<td>L48 N</td>
</tr>
<tr>
<td>Glandularia bipinatafida Var. ciliata</td>
<td>Verbenaceae</td>
<td>(Nutt.) Nutt var. (Benth) B.L Turner</td>
<td>Dakota vervain</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Glechoma hederacea</td>
<td>Lamiaceae</td>
<td>L.</td>
<td>Ground ivy</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Glechoma triacanthos</td>
<td>Fabaceae</td>
<td>L.</td>
<td>Honey locust</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Gymnoladus dioicus</td>
<td>Fabaceae</td>
<td>(L.) K. Koch</td>
<td>Kentucky coffee tree</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Helianthus annuus</td>
<td>Asteraceae</td>
<td>L.</td>
<td>Common sunflower</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Heliotropium indicum</td>
<td>Boraginaceae</td>
<td>L.</td>
<td>Indian heliotrope</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Heliotropium tenellum</td>
<td>Boraginaceae</td>
<td>(Nutt) Torr.</td>
<td>Pasture heliotrope</td>
<td>7</td>
<td>L48 N</td>
</tr>
<tr>
<td>Hibiscus moscheutos</td>
<td>Malvaceae</td>
<td>L.</td>
<td>Rose mallow</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Hibiscus trionum</td>
<td>Malvaceae</td>
<td>L.</td>
<td>Flower an hour</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Hieracium longilimum</td>
<td>Asteraceae</td>
<td>Torr.</td>
<td>Long bearded hawkweed</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Hordeum pusillum</td>
<td>Poaceae</td>
<td>Nutt.</td>
<td>Little Barley</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Houstonia longifolia</td>
<td>Rubiaceae</td>
<td>(Gaertn.) Hook.</td>
<td>Slender leaf bluet</td>
<td>8</td>
<td>L48 N</td>
</tr>
<tr>
<td>Ipomoea hederacea</td>
<td>Convolvulaceae</td>
<td>Jacq.</td>
<td>Ivy leaf morning glory</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Ipomoea pandurata</td>
<td>Convolvulaceae</td>
<td>L.</td>
<td>Big root morning glory</td>
<td>2</td>
<td>L48 N</td>
</tr>
<tr>
<td>Juncus interior var. interior</td>
<td>Juncaceae</td>
<td>Weigand</td>
<td>Inland rush</td>
<td>2</td>
<td>L48 N</td>
</tr>
<tr>
<td>Juniperus virginiana var. virginiana</td>
<td>Cupressaceae</td>
<td>L.</td>
<td>Eastern Red cedar</td>
<td>1</td>
<td>L48 N</td>
</tr>
<tr>
<td>Justicia americana</td>
<td>Acanthaceae</td>
<td>(L.) Vahl.</td>
<td>American water willow</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Krigia biflora</td>
<td>Asteraceae</td>
<td>(Walt.) Blake</td>
<td>False dandelion</td>
<td>6</td>
<td>L48 N</td>
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<tr>
<td>Krigia coesiptosa</td>
<td>Asteraceae</td>
<td>(Raf.) Chambers</td>
<td>Weedy dandelion</td>
<td>4</td>
<td>L48 N</td>
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<tr>
<td>Kummerowia striata</td>
<td>fabaceae</td>
<td>(Thunb.) H &amp; A USDA: (Thunb.) Schindl.</td>
<td>Japanese clover</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Lactuca serriola</td>
<td>Asteraceae</td>
<td>L.</td>
<td>Prickly Lettuce</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Lamium amplexicaule</td>
<td>Lamiaceae</td>
<td>L.</td>
<td>Henbit</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Lathyrus latifolius</td>
<td>fabaceae</td>
<td>L.</td>
<td>Perrenial sweet pea</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Leptochloa panicea ssp. Micronata</td>
<td>Poaceae</td>
<td>(Retz) Ohwi.</td>
<td>Red sprangletop</td>
<td>0</td>
<td>L48 N</td>
</tr>
<tr>
<td>Lespedeza virginica</td>
<td>Fabaceae</td>
<td>(L.) Britton</td>
<td>Slender Bush Clover</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Lespedeza capitata</td>
<td>Fabaceae</td>
<td>Michx.</td>
<td>Round headed bush clover</td>
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</tr>
<tr>
<td>Lespedeza cuneata</td>
<td>Fabaceae</td>
<td>(Dumont G. Don USDA: (Dumont. Cours.) G. Don</td>
<td>Sericea lespedea</td>
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<td>Liquidambar styraciflua</td>
<td>Hamamelidaceae</td>
<td>L.</td>
<td>Sweetgum</td>
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<td>L48 N</td>
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<tr>
<td>Lonicera japonica</td>
<td>Caprifoliaceae</td>
<td>Thunb.</td>
<td>Japanese honeysuckle</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Lonicera maackii</td>
<td>Caprifoliaceae</td>
<td>(Rupr.) Herder FGP: Maxim</td>
<td>Maack's honeysuckle</td>
<td>*</td>
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</tr>
<tr>
<td>Maclura pomifera</td>
<td>Moraceae</td>
<td>(Raf.) C.K. Schneid.</td>
<td>Osage orange</td>
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<tr>
<td>Malus ioensis var. ioensis</td>
<td>Rosaceae</td>
<td>(Wood) Britton</td>
<td>Prairie crabapple</td>
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<td>L48 N</td>
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<tr>
<td>Medicago lupulina</td>
<td>Fabaceae</td>
<td>L.</td>
<td>Black medick</td>
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<tr>
<td>Mellilotus alba</td>
<td>Fabaceae</td>
<td>Medic.</td>
<td>White sweet clover</td>
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<td>L48 I</td>
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<tr>
<td>Mellilotus officinalis</td>
<td>Fabaceae</td>
<td>(L.) Pall. / (L.) Lam.</td>
<td>Yellow sweet clover</td>
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<tr>
<td>Mentzelia oligosperma</td>
<td>Losaceae</td>
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<td>Stick leaf</td>
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<tr>
<td>Monarda fistulosa ssp. Fistulosa</td>
<td>Lamiaceae</td>
<td>L.</td>
<td>Wild bergamot, Bee balm</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Monarda punctata Vear. Occidentalis</td>
<td>Lamiaceae</td>
<td>(Epling) Palmer &amp; Steyermark</td>
<td>Western spotted bee balm</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Morus alba</td>
<td>Moraceae</td>
<td>L.</td>
<td>White mulberry</td>
<td>*</td>
<td>L48 I</td>
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<tr>
<td>Morus rubra var. rubra</td>
<td>Moraceae</td>
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<td>Red mulberry</td>
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<td>Myosurus minimus</td>
<td>Ranunculaceae</td>
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<td>Mouse-tail</td>
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<tr>
<td>Noltholea dealbata</td>
<td>Caprifoliaceae</td>
<td>(Pers.) Kunze.</td>
<td>Powdery false cloak fern</td>
<td>7</td>
<td>L48 N</td>
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<tr>
<td>Nothoscordum bivolve</td>
<td>Liliaceae</td>
<td>(L.) Britton</td>
<td>False wild garlic</td>
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</tr>
<tr>
<td>Oenothera speciosa</td>
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<td>Nutt.</td>
<td>Showy evening primrose</td>
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<tr>
<td>Oenothera villosa var. villosa</td>
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<td>Thunb.</td>
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<tr>
<td>Opuntia macrocarpa Var. macrocarpa</td>
<td>Cactaceae</td>
<td>Engelm.</td>
<td>Plains prickly pear</td>
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<td>L48 N</td>
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<tr>
<td>Oxalis dillenii</td>
<td>Oxalidaceae</td>
<td>Jacq.</td>
<td>Gray-green wood sorrel</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Oxalis violacea</td>
<td>Oxalidaceae</td>
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<td>Violet wood sorrel</td>
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<tr>
<td>Panicum acuminatum</td>
<td>Poaceae</td>
<td>Sw.</td>
<td>Panic grass</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Panicum philadelphicum</td>
<td>Poaceae</td>
<td>Bernh. Ex Trin</td>
<td>Philadelphia panic grass</td>
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<tr>
<td>Parthenocissus quinquefolia</td>
<td>Vitaceae</td>
<td>(L.) Planchon</td>
<td>Virginia creeper</td>
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<tr>
<td>Paspalum dilatatum</td>
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<td>Poir.</td>
<td>Dallis grass</td>
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<tr>
<td>Paspalum setaceum var. ciliatifolium</td>
<td>Poaceae</td>
<td>(Michx.) Vasey</td>
<td>Thin paspalum</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Passiflora incarnata</td>
<td>Passifloraceae</td>
<td>L.</td>
<td>Purple passion flower, maypop</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Pediomelum digitatum</td>
<td>Fabaceae</td>
<td>(Nutt.ex Torr. &amp; A. Gray)</td>
<td>Palm leaf scurf pea</td>
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<td>L48 N</td>
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<tr>
<td>Penstemon cobae</td>
<td>Scrophulariaceae</td>
<td>Nutt.</td>
<td>Cobae penstemon</td>
<td>5</td>
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<tr>
<td>Penstemon tubiflorus Var. tubiflorus</td>
<td>Scrophulariaceae</td>
<td>Nutt.</td>
<td>White tube beardtongue</td>
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<td>L48 N</td>
</tr>
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<td>Penthorum sedoides</td>
<td>Crassulaceae</td>
<td>L.</td>
<td>Ditch stonecrop</td>
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<td>L48 N</td>
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<tr>
<td>Phyla lanceolata</td>
<td>Verbenaceae</td>
<td>(Michx.) Greene</td>
<td>Northern fog fruit</td>
<td>1</td>
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<td>Physalis heterophylla var. heterophylla</td>
<td>Solanaceae</td>
<td>Nees.</td>
<td>Clammy ground cherry</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Physalis pumilla var. hispida</td>
<td>Solanaceae</td>
<td>(Waterfall) Hinton</td>
<td>Prairie ground cherry</td>
<td>4</td>
<td>L48 N</td>
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<tr>
<td>Phytolacca americana</td>
<td>Phytolaccaceae</td>
<td>L.</td>
<td>Common pokeweed</td>
<td>0</td>
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</tr>
<tr>
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<td>Family</td>
<td>Author</td>
<td>Common Name</td>
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<td>Plantago patagonica Var. patagonica</td>
<td>Plantaginaceae</td>
<td>Jacq.</td>
<td>Wooly plantain</td>
<td>1</td>
<td>L48 N</td>
</tr>
<tr>
<td>Pluchea camphorata</td>
<td>Asteraceae</td>
<td>(L.) D.C.</td>
<td>Camphorweed</td>
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</tr>
<tr>
<td>Poa annua</td>
<td>Poaceae</td>
<td>L.</td>
<td>Annual bluegrass</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Polanisia dodecandra ssp. Trachysperma(T&amp;G)</td>
<td>Capparaceae</td>
<td>(L.) DC.</td>
<td>Clammy weed</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Polygonum pennsylvanicum</td>
<td>Polygonaceae</td>
<td>L.</td>
<td>Pink smartweed</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Polygonum persicaria</td>
<td>Polygonaceae</td>
<td>L.</td>
<td>Spotted lady'sthumb</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Polygonum punctatum</td>
<td>Polygonaceae</td>
<td>Elliott</td>
<td>Dotted smart weed</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Po p. deltoides</td>
<td>Salicaceae</td>
<td>Bartram ex Marshall</td>
<td>Eastern cottonwood</td>
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<td>L48 N</td>
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<tr>
<td>Prunella vulgaris ssp lanceolata</td>
<td>Lamiaceae</td>
<td>(L.) (W. Bartram) Hulten</td>
<td>Lance leaf self-heal</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Prunus americana</td>
<td>Rosaceae</td>
<td>Marsh.</td>
<td>Wild plum american plum</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Ptelea trifoliata SSP. Trifoliata</td>
<td>Rutaceae</td>
<td>L.</td>
<td>Hop tree, Wafer Ash</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Ptilimium nutallii</td>
<td>Apiaceae</td>
<td>(D.C.) Britton</td>
<td>Mock bishop's weed</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Pycnanthemum tenuifolium</td>
<td>Lamiaceae</td>
<td>Schrad.</td>
<td>Slender Mountain Mint</td>
<td>7</td>
<td>L48 N</td>
</tr>
<tr>
<td>Pyrrhopappus grandiflorus</td>
<td>Asteraceae</td>
<td>(Nutt.) Nutt.</td>
<td>Tuber False Dandelion</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Quercus macrocarpa var. macrocarpa</td>
<td>Fagaceae</td>
<td>MichX.</td>
<td>Bur Oak</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Quercus muhlenbergii</td>
<td>Fagaceae</td>
<td>Engelm.</td>
<td>Chinkapin oak</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Quercus palustris</td>
<td>Fagaceae</td>
<td>Muench</td>
<td>Pin oak</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Quercus rubra</td>
<td>Fagaceae</td>
<td>L.</td>
<td>Northern Red Oak</td>
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<td>L48 N</td>
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<tr>
<td>Quercus shumardii var. shumardii</td>
<td>Fagaceae</td>
<td>Buckley</td>
<td>Shumard oak</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Quercus stellata</td>
<td>Fagaceae</td>
<td>Wangenh</td>
<td>Post-oak</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Quercus var. shumardii</td>
<td>Fagaceae</td>
<td>Buckley</td>
<td>Shumard oak</td>
<td>6</td>
<td>L48 N</td>
</tr>
<tr>
<td>Ranunculus abortivus</td>
<td>Ranunculaceae</td>
<td>L.</td>
<td>Little leaf buttercup</td>
<td>1</td>
<td>L48 N</td>
</tr>
<tr>
<td>Ranunculus scleratus var. scleratus</td>
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<td>L.</td>
<td>Cursed butercup</td>
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<tr>
<td>Rhus aromatica Var. serotina</td>
<td>Anacardiaceae</td>
<td>Aiton (Green) Rehdr</td>
<td>Aromatic sumac</td>
<td>3</td>
<td>L48 N</td>
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<tr>
<td>Rhus glabra</td>
<td>Anacardiaceae</td>
<td>L.</td>
<td>Smooth Sumac</td>
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<td>L48 N</td>
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<tr>
<td>Rorippa palustris ssp. Fernaldiana</td>
<td>Brassicaceae</td>
<td>(L.) Besser ssp (Butters &amp; Abbe) Jonsell</td>
<td>Bog yellow cress</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Rubus alleghenensis</td>
<td>Rosaceae</td>
<td>Porter</td>
<td>Common blackberry</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Rudbeckia hirta</td>
<td>Asteraceae</td>
<td>L.</td>
<td>Black eyed susan</td>
<td>2</td>
<td>L48 N</td>
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<tr>
<td>Ruellia humilis</td>
<td>Acanthaceae</td>
<td>Nutt.</td>
<td>Hairy ruellia</td>
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<td>Ruellia strepens</td>
<td>Acanthaceae</td>
<td>L.</td>
<td>Limestone ruellia</td>
<td>4</td>
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</tr>
<tr>
<td>Rumex crispus ssp. Crispus</td>
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<td>L.</td>
<td>Curly dock</td>
<td>*</td>
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<tr>
<td>Sagittaria latifolia</td>
<td>Alismataceae</td>
<td>Wild.</td>
<td>Broad leaf arrowhead</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>Salix nigra</td>
<td>Salicaceae</td>
<td>Marsh.</td>
<td>Black willow</td>
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<td>L48 N</td>
</tr>
<tr>
<td>Salvia azur eal</td>
<td>Lamiaceae</td>
<td>Michx. Ex lam.</td>
<td>Blue Sage</td>
<td>5</td>
<td>L48 N</td>
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<tr>
<td>Schizochne purpurascens</td>
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<td>(Torr.) Swallen</td>
<td>False melic</td>
<td>1</td>
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<td>Scirpus pendulus</td>
<td>Cyperaceae</td>
<td>Muhl.</td>
<td>Pendant bulrush</td>
<td>3</td>
<td>L48 N</td>
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<tr>
<td>Scutellaria parvula var.</td>
<td>Lamiaceae</td>
<td>var. (Torr.) Goodman &amp; C. A.</td>
<td>Leonard’s Skullcap</td>
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<td>L48 N</td>
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<tr>
<td>missouriensis</td>
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<td>Lawson</td>
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<td>Sesbania herbacea</td>
<td>Fabaceae</td>
<td>(MILL.) McVaugh.</td>
<td>Big pod sesbania</td>
<td>3</td>
<td>L48 N</td>
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<tr>
<td>Setaria faberi</td>
<td>Poaceae</td>
<td>Herrn.</td>
<td>Chinese foxtail</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Setaria parviflora</td>
<td>Poaceae</td>
<td>(Poir.) kerguelen</td>
<td>knot root yellow foxtail</td>
<td>3</td>
<td>L48 I</td>
</tr>
<tr>
<td>Setaria viridis var viridis</td>
<td>Poaceae</td>
<td>(L.) P. Beauv</td>
<td>Green foxtail</td>
<td>*</td>
<td>L48 I</td>
</tr>
<tr>
<td>Solidago canadensis Var.</td>
<td>Asteraceae</td>
<td>(L.) Rydb.</td>
<td>Short hair goldenrod</td>
<td>2</td>
<td>L48 N</td>
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<td>gilvocanescens</td>
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<td>Solidago ulmifolia Var.</td>
<td>Asteraceae</td>
<td>(L.) Ex Willd.</td>
<td>Elm leaved goldenrod</td>
<td>4</td>
<td>L48 N</td>
</tr>
<tr>
<td>ulmifolia</td>
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<tr>
<td>Sorghastrum nutans</td>
<td>Poaceae</td>
<td>(L.) Nash</td>
<td>Indian grass</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Sorghum halepense</td>
<td>Poaceae</td>
<td>(L.) Pers.</td>
<td>Johnson grass</td>
<td>*</td>
<td>L48 I</td>
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<tr>
<td>Spiranthes magnicamporum</td>
<td>Orchidaceae</td>
<td>Sheviak.</td>
<td>Great plains lady’s tresses</td>
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<tr>
<td>Sporobolus compositus</td>
<td>Poaceae</td>
<td>(Poir.) Merr.</td>
<td>Rough dropseed</td>
<td>3</td>
<td>L48 N</td>
</tr>
<tr>
<td>Stellaria media ssp. media</td>
<td>Caryophyllaceae</td>
<td>(L.) VII. FGP (L.) Cyr.</td>
<td>Common chickweed</td>
<td>*</td>
<td>L48 I</td>
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<tr>
<td>Symphyotrichum oblongifolium</td>
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<td>(Nutt.) G.L. Nesom</td>
<td>Aromatic aster</td>
<td>5</td>
<td>L48 N</td>
</tr>
<tr>
<td>Symphyotrichum pilosum</td>
<td>Asteraceae</td>
<td>(Willd) G.L. Nesom</td>
<td>White heath aster</td>
<td>0</td>
<td>L48 N</td>
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<tr>
<td>Symphoricarpus arboiculatus</td>
<td>Caprifoliaceae</td>
<td>Moench.</td>
<td>Coral berry, buckbrush</td>
<td>1</td>
<td>L48 N</td>
</tr>
<tr>
<td>Symphyotrichum ericoides Var.</td>
<td>Asteraceae</td>
<td>(L.) G.L. Nesom Syn. Aster</td>
<td>White heath aster</td>
<td>5</td>
<td>L48 N</td>
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<tr>
<td>ericoides</td>
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### Appendix 4

Elk City State Park Collection GPS Coordinates

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<th>Sub Species ssp.</th>
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84
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<td>236</td>
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<td>cornaceae</td>
<td>Cornus</td>
<td>drummondii</td>
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<td>Thumb.</td>
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<td>Lonicera</td>
<td>maackii</td>
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<td>(Rupr.) Herder FGP: Maxim</td>
<td>Amur honeysuckle, Maack's honeysuckle</td>
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<td>shumardii</td>
<td>var. shumardii no acorn</td>
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<td>muehlenbergii</td>
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<td>Engelm.</td>
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<td>Viburnum</td>
<td>rufidulum</td>
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<td>245</td>
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<td>W 095 46 34.86</td>
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<td>Cissus</td>
<td>trifoliata</td>
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<td>(L.) L.</td>
<td>Marine vine, possum grape, sorrel vine</td>
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<td>246</td>
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<td>W 095 46 37.89</td>
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<td>Specific epithet</td>
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<td>quinquefolia</td>
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<td>rubra</td>
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<td>Pediomelum</td>
<td>digitatum</td>
<td>syn. Psoralea digitata</td>
<td>(Nutt.ex Torr. &amp; A. Gray) Isely</td>
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<td>longifolia</td>
<td>(Gaertn.) Hook.</td>
<td>Slender leaf bluet, longleaf summer bluet</td>
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<td>Galium</td>
<td>circaezans</td>
<td>var circaezans</td>
<td>Michx</td>
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<td>(Nutt.) Nutt.</td>
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<td>W 095 46 55.45</td>
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<td>amplexicaulis</td>
<td>(Vahl) Cass.</td>
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<td>Lactuca</td>
<td>serriola</td>
<td>L.</td>
<td>Prickly Lettuce, Wild Lettuce</td>
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<tr>
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<td>N 37 15 01.92</td>
<td>W 095 46 40.53</td>
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<td>Amaranthus</td>
<td>tuberulatus</td>
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<td>(Moq.) J. D. Sauer</td>
<td>Tall water hemp, rough fruit amaranth</td>
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<td>270</td>
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<td>Verbena</td>
<td>bracteata</td>
<td>Lag. &amp; Rodr.</td>
<td>Prostrate vervain, big bract vervain</td>
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<td>racemosus</td>
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<td>Hairy chess, bald brome</td>
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<td>W 095 46 24.81</td>
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<td>purpuroscens</td>
<td>(Torr.) Swallen</td>
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<td>Genus</td>
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<td>N 37 15 16.82</td>
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<td>Agrostis</td>
<td>Hyemalis</td>
<td>(Walter) Britton, Sterns, &amp; Poggenb.</td>
<td>Hair grass, tickle grass, winter bentgrass</td>
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<tr>
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<td>N 37 15 17.13</td>
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<td>Weigand</td>
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<td>N 37 15 36.05</td>
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<td>Bromus</td>
<td>racemosus Syn. B. commutatus</td>
<td>L.</td>
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<td>Dianthus</td>
<td>armeria</td>
<td>(L.) (W. Bartram) Hulten</td>
<td>Lance leaf self heal, heal all</td>
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<tr>
<td>278</td>
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<td>vulgaris ssp lanceolata</td>
<td>(L.) (W. Bartram) Hulten</td>
<td>Lance leaf self heal, heal all</td>
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<td>macrocarpa Var. macrocarpa</td>
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<td>(Gaertn.) Hook.</td>
<td>Slender leaf bluets long leaf summer bluet</td>
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<td>Syn. Calacila plantaginea</td>
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<td>N 37 15 11.61</td>
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<td>Asclepias</td>
<td>viridiflora</td>
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<td>pallida</td>
<td>(Nutt.) Nutt.</td>
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<td>Poaceae</td>
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<td>Hyemalis</td>
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<td>Eragrostis</td>
<td>spectabilis</td>
<td>(Pursh) Steud.</td>
<td>Purple love grass</td>
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<td>hystericina</td>
<td>Muhl. Ex Willd.</td>
<td>Bottlebrush sedge, porcupine sedge</td>
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<td>vulpinoida var. vulpinoida</td>
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<td>obtusata</td>
<td>(Michx.) Scribn.</td>
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<td>Layss.</td>
<td>Smooth Brome</td>
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<td>Muhl.</td>
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<td>racemosus</td>
<td>Syn. B. commutatus</td>
<td>L.</td>
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<td>aromatica</td>
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<td>Aiton (Green) Rehdr</td>
<td>Aromatic sumac</td>
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<td>L.</td>
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<td>viridis</td>
<td>var viridis</td>
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<td>Ptiliuminum</td>
<td>nutallii</td>
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<td>(D.C.) Britton</td>
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<td>pomifera</td>
<td>(Ref.) C.K. Schneid.</td>
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<td>(Vahl.) Cass.</td>
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<td>Passiflora</td>
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<td>ssp baldwinii</td>
<td>Torr.</td>
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<td>ssp. Monilifera</td>
<td>W. Bartram ex Marshall, Eckenwalder</td>
<td>Plains Cottonwood</td>
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<td>Lactuca</td>
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<td>virginicus</td>
<td>Var. virginicus</td>
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<td>Conyza</td>
<td>canadensis</td>
<td>(L.) Cronq</td>
<td>Horse Weed, canada fleabane</td>
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<td>Sorghum</td>
<td>halepense</td>
<td>(L.) Pers.</td>
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<td>Croton</td>
<td>texensis</td>
<td>(J.F. Klutzsch) Muell. Arg.</td>
<td>Texas Croton, Skunkweed, Dove weed</td>
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<td>(J.F. Klutzsch) Muell. Arg.</td>
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<td>Polansia</td>
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<td>ssp. Trachysperma(T&amp;G)</td>
<td>(L.) DC.</td>
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<td>Ammannia</td>
<td>coccinea</td>
<td>Rottb.</td>
<td>Scarlet tooth cup, tooth cup</td>
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<td>Cyperus</td>
<td>strigosus</td>
<td>L.</td>
<td>Straw colored flat sedge, false nutgrass, umbrella sedge</td>
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<td>indicum</td>
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<td>ssp. Mucronata</td>
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<td>vahlii</td>
<td>ssp capillaris</td>
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<td>sweet scented bedstraw</td>
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<td>Sagittaria</td>
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<td>(L.) P. Beau</td>
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<td>Amaranthus</td>
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<td>Syn Amaranthus rudis Sauer</td>
<td>(Moq.) J. D. Sauer</td>
<td>Tall water hemp, rough fruit amaranth</td>
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<td>(L.) D.C.</td>
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<td>strigosus</td>
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<td>(S.W.) Rydb</td>
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<td>Aristida</td>
<td>oligantha</td>
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<td>Michx.</td>
<td>Old field three awn, prairie three awm</td>
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<td>449</td>
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<td>dracunculoides</td>
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<td>(D.C.) Blake</td>
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<td>Thunb.</td>
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<td>serotinum</td>
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<td>Michx.</td>
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<td>Malvaceae</td>
<td>Hibiscus</td>
<td>trionum</td>
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<td>L.</td>
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<td>ssp capillaris</td>
<td>(L.) Kunth. Ex C.B. Clark</td>
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<td>(lam.) Link</td>
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<td>arvensis (L.)</td>
<td>ssp foemina Syn Anagallis caerulea</td>
<td>(Mill.) Schinz &amp; Thell.</td>
<td>Poorman’s weather glass</td>
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<td>(Michx.) Pers.</td>
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<td>(Lag.) Small</td>
<td>Nodding spurge, eye bane</td>
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<td>heterophylla</td>
<td>var. heterophylla</td>
<td>Nees.</td>
<td>Clammy ground cherry</td>
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<td>Sesbania</td>
<td>herbacea</td>
<td>syn. Exaltata</td>
<td>(Mill.) McVaugh.</td>
<td>Big pod sesbania, pea tree</td>
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<td>464</td>
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<td>(L.) Spreng. USDA: (L.) Hill</td>
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<td>longiflora</td>
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<td>Spach</td>
<td>Large flowered gaura, long flower bee blossom</td>
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<td>W 095 46 43.44</td>
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<td>Lespedeza</td>
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<td>(Dumont G. Don USDA: (Dum. Cours.) G. Don</td>
<td>Chinese bush clover, sericea lespedeza</td>
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<td>469</td>
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<td>(L.) G. L. Nesom Syn. Aster ericoides</td>
<td>White heath aster</td>
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<td>(Mill.) McVaugh.</td>
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