Inventory of High-Quality Pollinator Habitat and Rare Plants Along Kentucky's Highways
2020-2024

TEAM KENTUCKY®

ENERGY AND ENVIRONMENT CABINET
OFFICE OF KENTUCKY NATURE PRESERVES

Prepared For: Kentucky Transportation Cabinet, April 2025

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Executive Summary

Pollinators play a critical role in maintaining healthy ecosystems and supporting agricultural productivity. Documented declines of important pollinator species, including charismatic species like the monarch butterfly (*Danaus plexippus*) and bumble bees (*Bombus sp.*), are a significant cause for concern. The decline and potential extinction of pollinating species threatens the integrity of our natural ecosystems as well as the productivity of our agricultural systems. In recent years, roadside and utility rights-of-way (ROW) have been increasingly recognized by biologists and land managers for their potential conservation value as pollinator habitat.

Within the Commonwealth of Kentucky, the Kentucky Transportation Cabinet (KYTC) is responsible for maintaining over 31,000 miles of roads and approximately 200,000 acres of ROW. KYTC has previously established a robust program of pollinator habitat creation through planting projects (KDA 2019). In addition to creating new habitat, KYTC recognized a need to manage already existing pollinator habitat along their ROW. The Office of Kentucky Nature Preserves (OKNP) collaborated with KYTC to develop a project to identify such habitat along Kentucky's roadsides.

It was also recognized by OKNP and KYTC that there is significant overlap between the habitat needs of common pollinating insects and many of Kentucky's rare insect and rare plant species. A combined effort to identify and document habitat for pollinators (including rare insect habitat), rare plant species, and their associated high-quality plant communities would help realize the full conservation value of Kentucky's state managed roadside ROW.

The project goals were defined as follows:

1. Identify and document high-quality habitat for pollinators, rare plant species, and high-quality native plant communities.
2. Designate identified habitats as Roadside Conservation Areas (RCAs) and provide management recommendations for the RCAs to KYTC to ensure protection of important natural resources from potential adverse effects of routine roadside maintenance operations.

Over 5 years (2020-2024), OKNP successfully surveyed over 31,000 miles of road. Surveyors evaluated roadside habitat at 374 locations throughout Kentucky. Of the evaluated sites, a total of 283 were determined to have significant conservation value and were designated as RCAs for the protection of pollinator habitat, rare plants, and native plant communities. These RCAs include over 440 acres of ROW habitat throughout the state.

OKNP documented 258 rare plant populations, including 93 different species on the state rare plant list, growing in ROW that KYTC manages. This includes three plant species that are listed as threatened or endangered under the federal Endangered Species Act.

In total, these RCAs represent less than 1-percent of the ROW that KYTC manages, which underscores their vulnerable state and need for careful management. OKNP has provided best management practice recommendations for all designated RCAs to help ensure their persistence on the landscape. A continued commitment to monitoring and management of the RCAs designated by this project will be necessary to ensure the long-term success of this project. OKNP recommends additional collaboration on issues related to ROW management of sensitive pollinator habitats and protection of these important RCAs.

Lists of Tables, Figures, Appendices, and Acronyms

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List of Acronyms
CSS – Conservation Site Scorecard
DBNF – Daniel Boone National Forest
ESA – Endangered Species Act
KG-RCA – Kentucky Gladecress RCA
KNHD – Kentucky Natural Heritage Database
KYTC – Kentucky Transportation Cabinet
MJV – Monarch Joint Venture
NAI – Kentucky Natural Area Inventory
OKNP – Office of Kentucky Nature Preserves
RARR – Rapid Assessment of Roadside Right-of-Ways Scorecard
RCA – Roadside Conservation Area
ROW – Rights-of-way
USFS – United States Forest Service
USFWS – United States Fish and Wildlife Service

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Cover photo
Wood lily (*Lilium philadelphicum var. philadelphicum*) by Tony Romano.

Introduction

Pollinators play a critical role in maintaining healthy ecosystems and supporting agricultural productivity. Documented declines of important pollinator species, including charismatic species like the monarch butterfly (*Danaus plexippus*) and bumble bees (*Bombus sp.*), are a significant cause for concern. The decline and potential extinction of pollinating species threatens the integrity of our natural ecosystems as well as the productivity of our agricultural systems. Habitat loss is one of the main drivers of these declines in pollinator species (Forister et al. 2019, Sanchez-Bayo and Wyckhuys 2019).

In recent years, roadside and utility rights-of-way have been increasingly recognized by biologists and land managers for their potential conservation value as pollinator habitat. Roadside vegetation can provide important resources (food, shelter, host plants, etc.) for many pollinators, including imperiled species like the monarch butterfly, rusty patched bumble bee, frosted elfin, and other rare or at-risk insect species. Nationwide, approximately 10 million acres of roadside rights-of-way are managed by state transportation departments, which represents a tremendous amount of potential habitat if successfully managed for pollinators (Forman et al. 2003).

A 2014 federal memo publicly addressed concerns over the monarch butterfly and directed federal agencies to increase or improve pollinator habitat nationwide (White House 2014); the Federal Highway Administration (FHA) responded in part by promoting the development of pollinator protection programs and publishing several documents outlining best management practices and restoration techniques for managing roadside rights-of-way to support native plant communities and pollinating insects (U.S. Department of Transportation, 2016).

The FHA also recognized that protecting and managing remnant habitat and existing stands of native vegetation is one of the best and most cost-effective management practices that can benefit pollinators (U.S Department of Transportation, 2016). This is because roadsides with diverse native vegetation support higher abundance and diversity of pollinating insects than roadsides dominated by non-native plants (Hopwood, 2008). In addition to pollinator benefits, roadside habitat can support remnants of rare native plant communities and populations of rare insect and plant species (OKNP 2025).

Within the Commonwealth of Kentucky, the Kentucky Transportation Cabinet (KYTC) is responsible for maintaining over 31,000 miles of roads and approximately 200,000 acres of rights-of-way (ROW), of which, KYTC estimates there are approximately 27,000 miles of ROW that may be suitable for pollinator habitat management. KYTC has previously established a robust program of pollinator habitat creation (KDA 2019). Since 2015, KYTC has seeded over 100 pollinator habitat sites along the state's interstates, parkways, and other state ROW (KYTC 2024). In addition to creating new habitat, KYTC recognized a need to identify and manage already existing pollinator habitat along their ROW. The Office of Kentucky Nature Preserves (OKNP) collaborated with KYTC to develop a project to identify such habitat along Kentucky's roadsides.

OKNP had previously partnered with KYTC on several limited roadside projects to improve roadside management for select rare plant species. Those initial projects formed the basis for collaboration between OKNP and KYTC and were a catalyst for the larger project described by this report. Initial collaboration, development, and scoping of this project began in 2016 (OKNP and KYTC 2017). The project was approved in 2019. Project activities conducted by OKNP commenced in 2020 and were concluded in the winter of 2024.

Project Goals

The project goals were driven by KYTC's commitment to improving pollinator habitat in the roadside environment. It was also recognized by OKNP and KYTC that there is significant overlap between the habitat needs of common pollinating insects and many of Kentucky's rare insect and plant species (OKNP 2025). A combined effort to identify and document habitat for pollinators (including rare insect habitat), rare plant species, and their associated high-quality plant communities would help realize the full conservation value of Kentucky's state managed roadside ROW.

The project goals were defined as follows:

1. Identify and document high quality habitat for pollinators, rare plant species, and high-quality native plant communities.
2. Designate identified habitats as Roadside Conservation Areas (RCAs) and provide RCA management recommendations to KYTC to ensure protection of important natural resources from potential adverse effects of routine roadside maintenance operations.

These goals are consistent with the Kentucky Monarch Conservation Plan (KDFWR 2018) and the Kentucky Pollinator Protection Plan, which call for greater collaboration between state agencies and partners to increase pollinator habitat throughout Kentucky and to implement best management practices for pollinators where applicable (KDA 2019).

Since the initiation of this project in 2016, the need for pollinator habitat restoration and protection has continued to grow as evidenced by the proposed listing of the monarch butterfly as threatened under the federal Endangered Species Act (ESA) by the U.S. Fish and Wildlife Service in 2024 (Endangered and Threatened Wildlife and Plants 2024). This document is the final project report discussing the project activities conducted by OKNP from 2020 through 2024 and the outcomes of these efforts.

Office of Kentucky Nature Preserves

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The Office of Kentucky Nature Preserves (OKNP), an agency under the Energy and Environment Cabinet, is the official state cooperator with U.S. Fish and Wildlife Service for the Section 6 of the Endangered Species Act's federally listed plant program. As such, OKNP employs a team of biologists that work on status assessments, conservation, and restoration of federally listed and at-risk plants across the state. OKNP is also the state's official natural heritage program and is statutorily obligated through KRS Rare Plant Recognition Act to maintain a list of threatened and endangered plants in Kentucky. OKNP is a Natureserve Network Program and utilizes the NatureServe Core Methodology and tools to collect, store, and analyze data on species and ecological communities. This process allows OKNP to maintain conservation status and conservation ranks for all plant and animal (including insect) species known to occur in Kentucky. Further, OKNP is also statutorily obligated to maintain a system of state nature preserves and natural areas for the conservation of plants and animals, environmental education, and passive recreation. Collaborating with KYTC is a natural extension of our existing statewide obligations.

The Importance of Kentucky's Roadside Habitat

The Roadside Rights-of-Way Environment

Kentucky's natural landscape is incredibly varied, from the bald-cypress swamps of western Kentucky to forested mountain expanses in the east, and the rolling fields of the Pennyroyal Plain in between, the natural communities of Kentucky support a unique wealth of geological and biological diversity. Much of this biological diversity can be found just a few feet off the pavement, growing in the ROW that travel throughout the Commonwealth. KYTC manages over 31,000 miles of road in Kentucky (Figure 1.) The road system maintained by KYTC includes our state highways, parkways, U.S. highways, and interstates. KYTC estimates that approximately 27,000 miles of ROW may be suitable for pollinator habitat management.

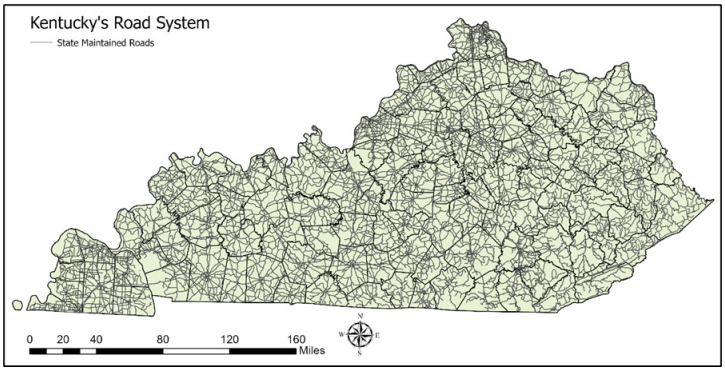


Figure 1. *The road system maintained by KYTC.*

Figure 2*. Examples of roadsides along the habitat quality spectrum. Low quality diversity dominated by pasture grasses, medium quality with increasing abundance of native forbs, high quality with high diversity of native forbs.*

Roadside ROW support a broad range of vegetation and potential habitats for pollinators, including rare insects, and rare plant species. The mowed grassy margins of crop fields, steep forested embankments, wet ditches, sheer rock cuts, and high-quality remnants of native prairies are all examples of habitat types that occur on Kentucky's roadsides. The quality and suitability of these habitats for pollinators occurs on a spectrum that depends largely on the diversity and abundance of the native plants that occur at the site, the size and connectivity to other habitats, and the degree to which they have been disturbed by human activities (Figure 2, Ries et al. 2001, Ebeling et al. 2008, Neumann et al. 2024).

Maintenance activities, such as mowing, are conducted along ROW to help maintain driver safety by keeping sight lines clear and to enable vehicles to safely get off the road during an emergency. These maintenance activities can also help suppress noxious weeds that may be spreading in the roadside environment.

However, too frequent mowing or the use of broadcast herbicide applications to control weeds can have unintended and potentially detrimental effects to pollinator habitat and desirable native vegetation occurring in the ROW (U.S. Department of Transportation, 2016). Identifying important habitats and working to improve management at these locations can help ensure that any detrimental effects of management are minimized while maintaining roadway safety.

The total area of impact of maintenance activities depends largely upon the size (width) of the ROW at any given location. The size of the roadside ROW varies from place to place but is typically between 15 and 30 feet from the edge of the pavement. Larger roads with 4 or more lanes usually have ROW that are at least 30 feet or wider from the edge of the pavement.

Fencelines and hedges of woody vegetation are often a good approximation of the roadside ROW boundary, and usually indicate the area where regular maintenance activities (e.g. mowing) stop. The topography of the land and other natural features such as steep slopes, waterways, wetlands, and rock outcrops can also dramatically reduce the area of active maintenance activities to a narrow strip immediately adjacent to the pavement (Figure 3).

Figure 3. *Examples of habitats that naturally limit ROW maintenance activities. From left to right: steep slopes, inundated wetlands, and rock outcrops.*

The Importance of Roadside Grasslands

Grasslands, broadly defined to include prairies, glades, barrens, and other open habitat types where grass and other graminoids (grass-like plants) form the dominant ground cover, are some of the most biologically diverse habitats in North America. Importantly, high-quality examples of native grasslands have been shown by researchers to be some of the best habitat for pollinators due to the high abundance and diversity of plant species that occur in these communities (Ries et al. 2001).

In Kentucky, and elsewhere in the southeastern United States, native grasslands (as opposed to pastures dominated by non-native cool season grasses) have dramatically declined and are an imperiled habitat type. Estimates of pre-settlement natural grassland communities in Kentucky range from 2.5 to 3 million acres, or between 9.5-11% of the state's land. Those grasslands are now nearly gone, with less than 1 percent of those native grasslands remaining today (Abernathy et al. 2010). Much of this loss can be attributed to direct conversion of habitat through agricultural and urban development. Additionally, our native grasslands developed under the pressures of drought, periodic fire, and the high intensity but low duration grazing pressure of migrating ungulates. The cessation of fire on the landscape, and significant changes in grazing patterns has allowed the few remaining native grasslands to be degraded and slowly converted into thickets and forests by woody succession. As grasslands declined, many of the native species associated with these communities have also declined and become rare in the state.

Roadsides have long been recognized as a repository of grasslands remnants in many states (Leopold 1949, Estes et al. 2016). Because these roadsides are maintained in an open state by mowing pressure, they have the potential to support remnants of native grassland communities that contain diverse and sometimes rare plant species. These high-quality roadside grassland remnants can also provide vital habitat for several rare insect species (OKNP 2025).

Figure 4. *An example of a high-quality roadside prairie remnant in Kentucky. This site has abundant Kentucky beardtongue (Penstemon tenuiflorus) pictured flowering. Two state rare plants, tansy rosinweed (Silphiun pinnatifidum) and white prairie clover (Dalea candida) also occur at this location.*

Some of the best remaining examples of native grassland habitat in Kentucky occur on our state roadsides (Figure 4). By recognizing and protecting these remaining grassland remnants, this project would simultaneously safeguard rare plant communities and support high-quality pollinator habitat.

Other Important Habitat Types

High-quality examples of forests, wetlands, and rock outcrops also contribute to pollinator habitat as well as provide habitat for a wide variety of other animal species. In parts of the state where grasslands were naturally less abundant, these other habitat types may take on increased importance for pollinators and rare insect species. The heavily forested eastern mountains support a suite of important and unique insect and plant species, many of which do not occur elsewhere in the state. For example, the Diana fritillary (*Argynnis diana*) is an uncommon butterfly in Kentucky that is restricted to the eastern forested regions, and Appalachian rosinweed (*Silphium wasiotense*) is a globally rare plant species that only occurs in forested areas of eastern Kentucky and Tennessee (Figure 5).

Figure 5*. Diana fritillary (left) and Appalachian rosinweed (right), both rare species restricted to forest habitats of eastern Kentucky.*

Another example is the frosted elfin (*Callophyrs irus*) which is a globally rare butterfly that is a candidate for listing under the federal Endangered Species Act (ESA). The frosted elfin has previously been found in remnant high-quality pine barrens habitat located near a roadside in eastern Kentucky (OKNP 2025). Frosted elfin is dependent on yellow wild indigo (*Baptisia tinctoria*) as a host plant. Yellow wild indigo is itself a rare plant species (state threatened) that is also dependent on high-quality pine barrens habitat found in portions of eastern Kentucky.

Wetland habitats, most abundant in far western Kentucky, provide their own unique contribution to pollinator habitat and ecosystem health. Many wetland types may also be classified as grasslands, but others such as bald-cypress and buttonbush swamps and frequently flooded bottomland

forests, are equally important to health of our environment and provide habitat for a wide variety of pollinating insects and rare plant species.

In developing the project aims and goal, grasslands were a critical focus, but all high-quality native plant communities were considered important for their conservation value and contribution to pollinator and rare insect habitat in Kentucky.

"Old Fields" and Other Lower Quality Habitats

During development of the project goals, it was determined that the project would not attempt to document or evaluate various types of lower quality habitats, which are commonly seen on the margins of crop fields, along tree lines, or in agricultural fields and ROW that have been left fallow or unmanaged (often referred to simply as "old fields"). These habitats have generally been significantly impacted by past disturbances, and as a consequence are characterized by low diversity of native plant species, and often an abundance of non-native invasive plants. The native species that do occur in these habitats are limited to those with a high degree of tolerance to human disturbances such as mowing, herbicide applications, and soil disturbances. This includes common species such as tall goldenrod (*Solidago altissima*), ironweed (*Vernonia sp.*), Joe-pyeweed (*Eutrochium fistulosum*), hemp dogbane (*Apocynum cannabinum*), and common milkweed (*Asclepias syriaca*).

Figure 6. *An example of the "old field" community type. This habitat is often a relatively low diversity mix of native and non-native plant species.*

While these lower quality habitats do provide some food and shelter resources for generalist pollinators (particularly when compared to sod-forming monocultures of non-native cool season grasses), the legacy effects of past disturbances contribute to diminished floral diversity and lower suitability for more specialist pollinator species (Ries et al. 2001, Hopwood 2008). Instead, the goals of this project focused on identifying the highest quality native habitats, which are much rarer in the ROW environment (and Kentucky more generally), are more vulnerable to disturbance caused by human activity, and are largely irreplaceable on the landscape.

Rare Plants and Roadsides

OKNP maintains the states natural heritage database, a repository of location and population information for all rare species that occur in Kentucky (OKNP 2025). Rare plants refers to those species listed on the Kentucky Rare Plant list maintained and published by OKNP (Rodgers et. al., 2022). The Kentucky Natural Heritage Database (KNHD) includes records of rare plant species gathered and consolidated from a variety of sources and dating back many decades to the turn of the 20th century. Review of the KNHD indicated that approximately 200 rare plant species had been previously documented from along or near roadsides in Kentucky (OKNP 2025). In some drastic cases, such as royal catchfly (*Silene regia*) and wood lily (*Lilium philadelphicum var. philadelphicum*), the only verified populations of these plants in Kentucky come from roadside ROW locations.

Furthermore, several plants listed as threatened or endangered under the federal ESA are known to occur in the vicinity of roadside ROW. These federally protected plants require special attention and careful management to ensure the viability of their populations.

Many of these roadside rare plants are associated with the same high-quality native plant communities that benefit and support pollinators and several rare insect species (OKNP 2025). Identifying roadside rare plant populations to assess and improve management practices at those locations would directly support and compliment efforts to identify and support habitat for pollinators.

Protecting Habitat is Key

Native plant communities provide key insect resources such as food, shelter, and important host species that many insects require for reproduction (the monarch butterfly's dependence on milkweed being the most widely known example). Habitat loss is one of the critical factors driving population declines of both insects and plant species. For rare species, habitat loss can become an existential threat to their continued persistence in the environment. Rare insects often occupy the same high-quality native plant communities where rare plants are found (OKNP 2025). Working to identify and manage these high-quality habitats is an important and cost-effective way to protect important pollinators and imperiled insects and plants in Kentucky (U.S. Department of Transportation, 2016).

The Plight of Royal Catchfly

Royal catchfly (*Silene regia*) is a prairie dependent plant with bold, firecracker red, flowers that bloom at the height of the summer in July. This species is globally rare (G3) and broadly distributed across central and southeast North America, where it occurs in remnant grasslands from Illinois to Alabama. However, this species has declined across its entire range due to habitat loss, as over the past few centuries, natural grasslands were converted to agricultural fields and pastures. Except for Missouri, royal catchfly is considered rare in all other states where it occurs. Within Kentucky, it is state endangered, and the only verified populations of naturally occurring plants are in ROW of state highways and some local roads in central Kentucky. Documenting these populations and working to protect them is vital to ensure their persistence in Kentucky.

Methods

Project Area

The project area includes over 31,000 miles of roads and associated ROW that are maintained by KYTC (Figure 1). The project area includes state highways, parkways, U.S. highways, and interstates. Approximately 30 miles of the Woodlands Trace National Scenic Byway, located in Land Between the Lakes National Recreation Area, were also included in the project area. Other local and county level roads were not surveyed for this project.

Survey Organization

Habitat surveys of all roads in the project area took place over 5 years from 2020 to 2024. KYTC divides the state into 12 management districts (Districts) each consisting of 8 to 12 counties. Groups of Districts were selected to define the annual survey area (Figure 7). Neighboring Districts were grouped together to aid in project logistics and scheduling. An attempt was made to group Districts together that roughly corresponded to important natural region boundaries.

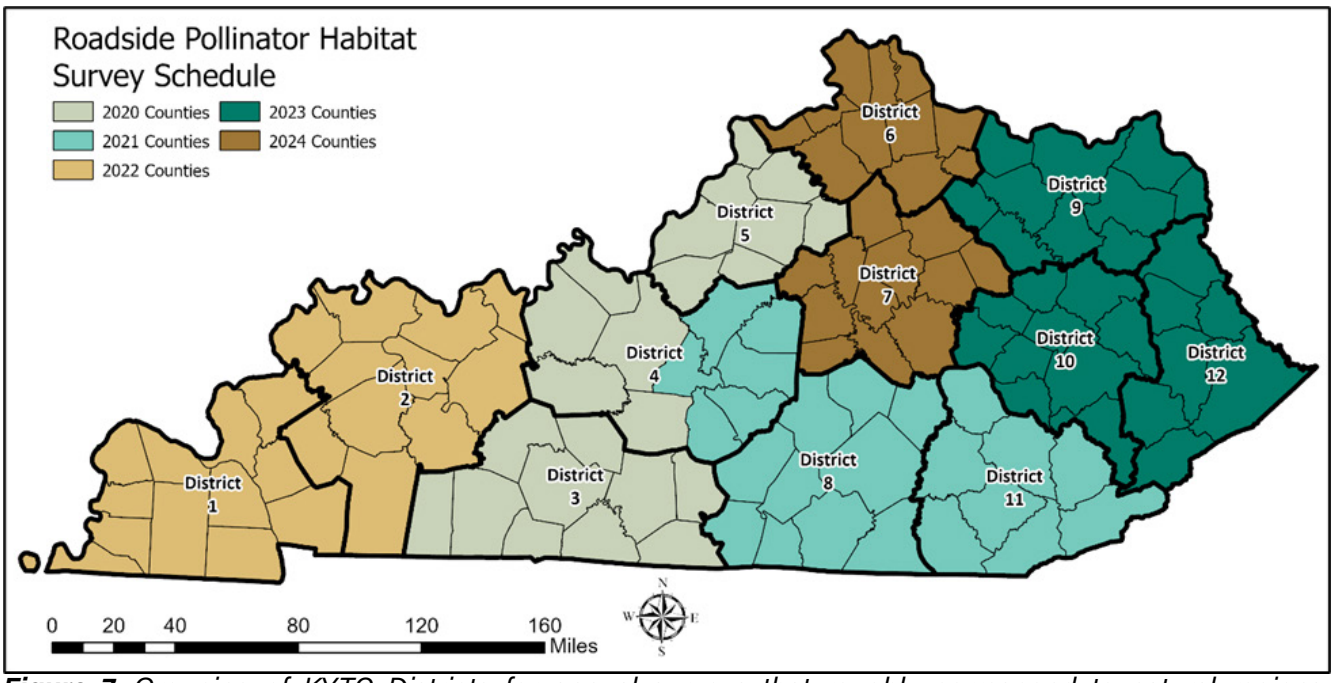


Figure 7. *Grouping of KYTC Districts for annual surveys that roughly correspond to natural regions. Compare to the natural region map of Abernathy et al. 2010 reproduced below (Figure 8).*

Natural regions (alternatively called "ecoregions") are geographic units used to define areas of similar natural features such as geology, topography, soils, climate, watersheds, and dominant vegetation patterns. Various authors have developed natural region maps for the United States and Kentucky.

Most have broad similarities and differ primarily in the degree of detail they employ. When grouping Districts for surveys, OKNP largely referred to the natural region boundaries described by Abernathy et al. (2010, Figure 8) and consulted the Level IV ecoregion map of Kentucky developed by the Environmental Protection Agency (EPA) when more detail was desired (EPA 2013). The EPA Level IV ecoregions, developed in collaboration with other federal and state agencies, are a widely accepted framework for conducting ecological research and monitoring projects.

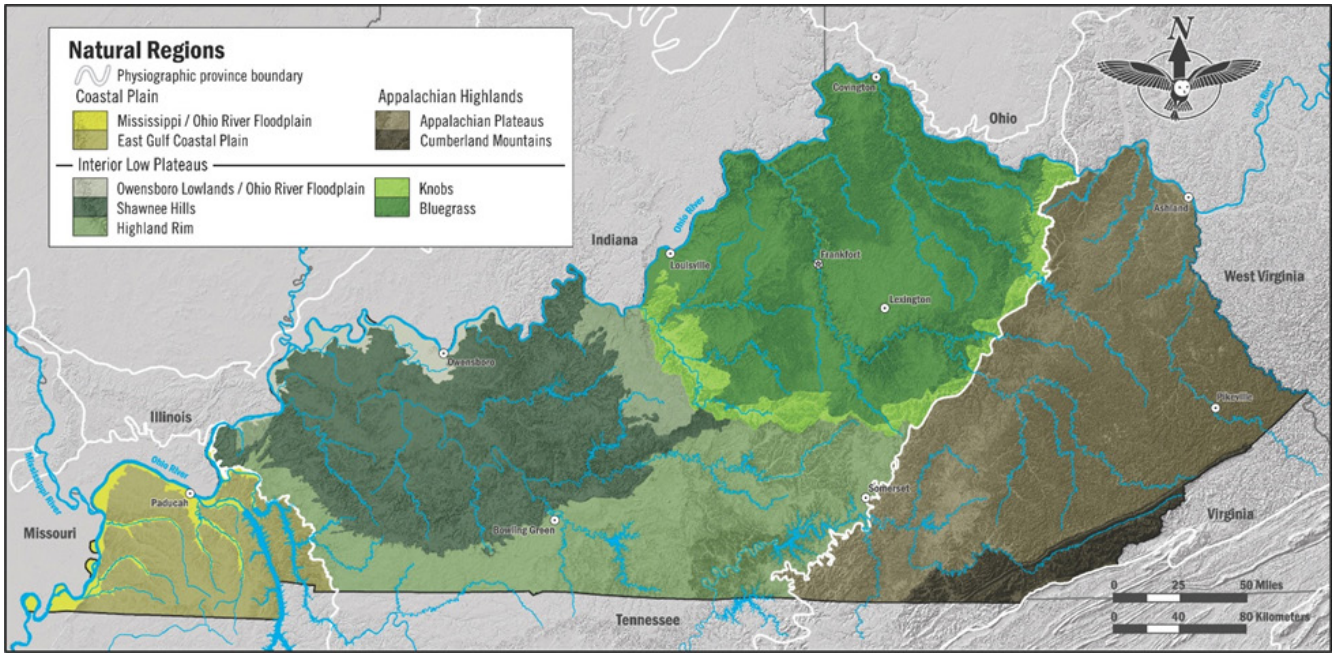


Figure 8. *Natural Regions of Kentucky reproduced with permission from Abernathy et al. 2010*

KYTC Districts are based on county boundaries and typically do not follow ecological boundaries. When grouping Districts, to the degree it was possible, an attempt was made to ensure that surveys of important natural regions would be completed during a single calendar year. Except for District 4, all other Districts were surveyed during a single calendar year. District 4 was divided in half and surveyed over two years due to the total size and number of counties involved in the first two years of surveys (2020-2021). The District 4 counties included in each year of surveys were chosen to reflect natural region boundaries to the degree possible.

Desktop Survey Prioritization

A desktop review for each annual survey area was conducted prior to conducting fieldwork. A combination of satellite imagery, Streetview imagery, rare plant data, and natural areas inventory data were utilized to develop the annual survey schedule and to identify important routes where high-quality roadside habitat was strongly anticipated to occur. A simple scheme of high, medium, and low priority was assigned to road segments indicating the degree to which surveyors should focus attention on those areas

A few brief notes regarding scientific names of plants, reference to NatureServe conservation ranks, and software programs used for this project.

- **Taxonomy and scientific nomenclature of vascular plants largely follow Weakley, A.S. Flora of the Southeastern United States, 2022 edition.**
- **Reference is made in this report to the global (G-Rank) and state (S-Rank) conservation ranks for plants and natural communities as defined by NatureServe. Please see Appendix A for complete definitions of the NatureServe conservation rank system.**
- **Spatial data analysis and mapping was conducted using the ArcPro GIS software, all other data analysis was conducted in Microsoft Excel. Field data collection was conducted with the Survey123 software published by ESRI.**

Review of Satellite Imagery and Streetview

General desktop review included visual inspection of aerial photography for each road in the survey area. The structure and color signature of vegetation and potential hydrology of roadsides were assessed for indicators of natural communities such as dominance of native warm season grasses or presence of visibly saturated soils (an indicator of wetlands). Where available, the Streetview functionality of Google Earth Pro was used to check roadside conditions of routes with potential for high-quality habitat (Google, 2020). Roads that abut, cross, or are otherwise near public lands that are managed as natural areas were flagged as potential areas of interest and carefully inspected for additional indicators of habitat conditions. Several specialized datasets developed and managed by OKNP were consulted to identify areas of high interest as described below.

Review of Rare Plant Records

The KNHD contains nearly 9,000 records of rare plant occurrences in Kentucky (OKNP 2025). Rare plant records from the KNHD were overlayed onto the project area road system to identify records occurring within a fifty-meter buffer (from center) of state-maintained roads. A total of 548 records (including over 200 species) were identified occurring near roadsides. A map of these records was created and visually inspected for clustering of roadside rare plant records. These cluster "hot spots" were used to identify priority routes and regions where the timing of surveys would be prioritized and repeated if necessary (in the event the target area was recently mowed during initial surveys). Surveyors would attempt to verify all roadside rare plant records during field surveys.

Focal Species

The list of roadside rare plant records was reviewed for each survey year and used to select focal species that would help guide survey efforts and scheduling (Figure 9). Focal species were selected based on their degree of rarity and ecoregion specificity, with selection favoring species that are globally rare (G3 or rarer), very rare in Kentucky (S2 or rarer), and species included in the State Wildlife Action Plan (KDFWR 2024). See Appendix A for a description of G- and S-Ranks as defined by NatureServe.

In addition to rarity, focal species were chosen that have restricted or specific blooming periods where they would be most detectable while driving. The blooming periods of focal species were used to determine the survey schedule of specific counties and regions of each District. Species that were physically tall or otherwise conspicuous were ideal focal species used to target surveyor efforts. Detection of a focal species was one of the main ways that surveyors selected sites for habitat evaluation. See Appendix B for a complete list of focal species.

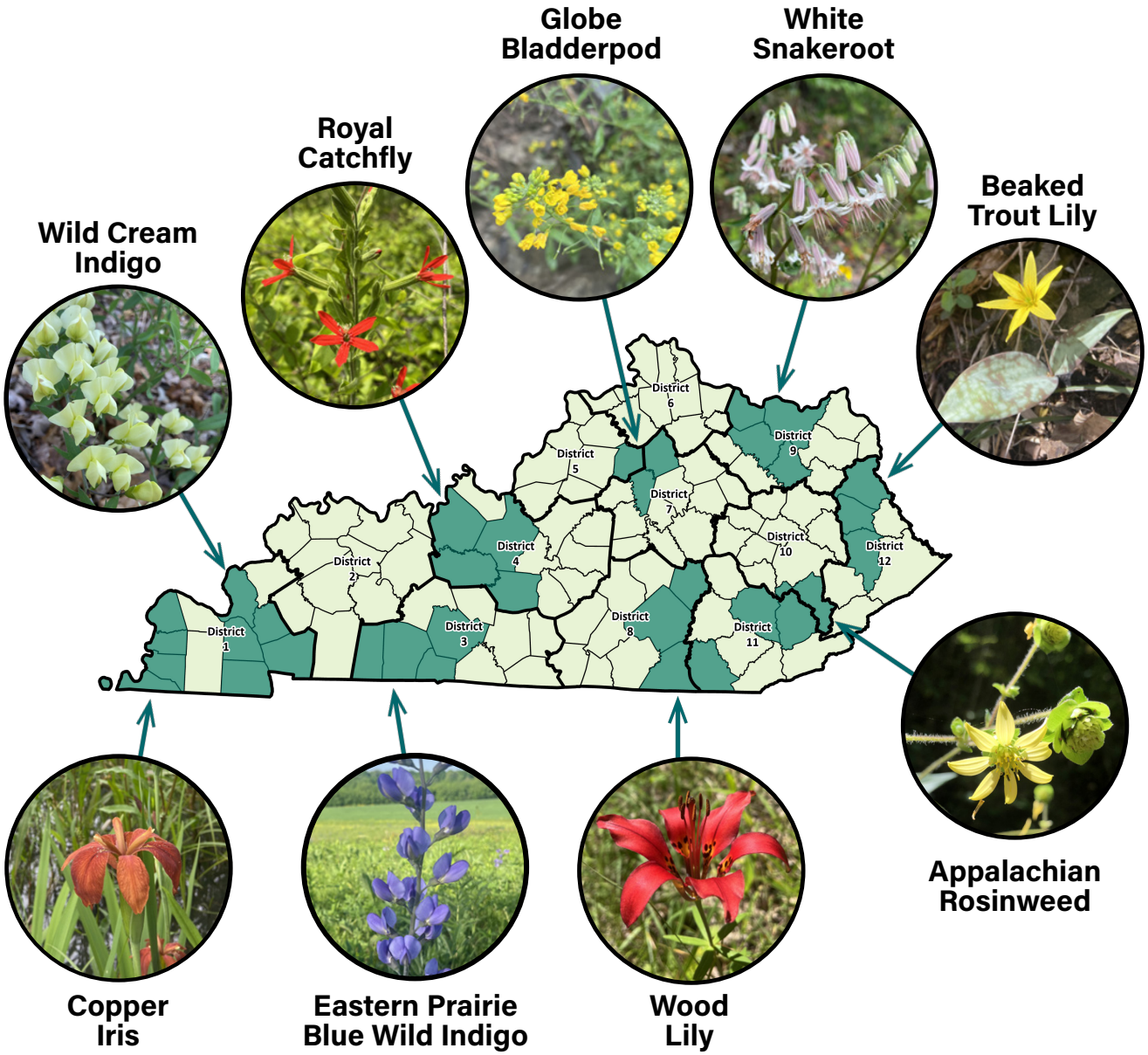


Figure 9. *Examples of focal species used to focus efforts and develop the survey schedule for each District. Species clockwise from top left are cream wild indigo, royal catchfly, globe bladderpod, white snakeroot, beaked trout lily, Appalachian rosinweed, wood lily, eastern prairie blue wild indigo, copper iris.*

Kentucky Natural Area Inventory

The Kentucky Natural Area Inventory (NAI) is a dataset built and maintained by OKNP that contains the highest quality natural areas in each county that have been identified throughout the state. The NAI provides a prioritization list of these natural area sites for conservation and protection efforts. The sites included in the NAI were identified through a variety of methods such as ground surveys, helicopter surveys, and desktop analysis conducted by OKNP and our partners. The resulting dataset thus includes potential natural areas in need of investigation along with investigated sites that were either verified natural areas or eliminated from consideration. Roads that occur in the vicinity of lands identified by the NAI were flagged as potential areas of interest and carefully inspected for additional indicators of habitat conditions.

Road Prioritization Scheme

High priority routes were afforded ample time to be investigated thoroughly as they frequently included existing rare plant records, were previously identified from NAI efforts, or otherwise showed strong indicators of potential habitat from other lines of desktop evidence. High priority routes were also given greater consideration during scheduling, and in some cases additional surveys were planned outside of the normal survey schedule (typically May to the end of September) to check for rare plants that may be blooming at unusual times. For example, in 2023, preliminary surveys of select high priority routes were conducted in March in Districts 10 and 12 to search for the very early blooming beaked trout lily (*Erythronium rostratum*), a rare plant restricted to eastern Kentucky (Figure 10). High priority roads were also prioritized for resurveys if they had been recently mowed at the time of the initial survey.

Figure 10. *Beaked trout lily (Erythronium rostratum) a rare species restricted to eastern Kentucky. Seen here blooming on a forested slope along a state highway.*

Medium priority routes were given similar consideration to high priority routes, but there was less certainty in the occurrence of good habitat, and available information was viewed as less reliable, often due to age (e.g. very old rare plant records that have not been verified in many decades) or low precision information regarding location details.

Low priority roads showed no detectable evidence of high-quality habitat or rare plant occurrences and received no additional scheduling consideration outside of the broader county or district level survey schedule. Low priority roads were typically surveyed once during the growing season and typically not given priority for any planned resurveys.

Field Survey Site Selection

Site selection criteria were of critical importance to the success of the project. The criteria would indicate desirable sites for surveyors to stop and collect ecological data. Surveyors, working independently or in pairs, would drive all roads within the annual survey area. When a roadside area was observed that appeared to meet any of the site criteria defined below, surveyors would park and evaluate the site on foot and collect ecological data. Site selection criteria were carefully chosen to meet the project goals of protecting the highest quality pollinator, rare plant, and natural community habitats remaining along Kentucky's roadsides.

Site selection criteria were:

1. General Indicators – High-quality habitat indicators including abundance and diversity of native forbs, dominance of native warm season grasses, thin, rocky soils and large rock exposures, stunted trees and red cedars (*Juniperus virginiana*), or adjacent high-quality habitat.
2. Rare Natural Communities - The KNHD includes a list of rare natural communities, and surveyors were trained and instructed to search for these rare community types (those ranked S1-S3) while conducting road surveys. A complete list of rare natural community types is provided in Appendix B.
3. Indicator Plant Species – These plant species are not necessarily rare; however, they are sensitive to site conditions and show high fidelity to high-quality native plant communities. Their presence is often a strong indicator of the habitat quality. See Appendix B for a complete list of indicator species identified for the project.
4. Rare Plant Species (includes Focal Species) – Surveyors would attempt to verify existing rare plant records identified during desktop review, and searching for additional new populations of these species was an important method used by surveyors to select sites for habitat evaluation.

The General Indicators described above often acted as a good first alert to surveyors who could then slow down, and if necessary, inspect the site on foot to determine if additional selection criteria were present. Accurate site selection was critical to the success of the project and was highly dependent on the botanical and ecological expertise of OKNP staff.

Data Collection

Once a site was selected, habitat evaluations were based on the area within the boundaries of the roadside ROW. A map showing the complete boundaries of all state ROW was not available to OKNP. Surveyors estimated the boundaries of the ROW based on visual markers at the sites such as fence lines or linear woody hedges where maintenance activity appeared to stop. Data was collected using Survey123 forms installed on iPhones. The data collection process consisted of two habitat evaluation forms described below.

Data Collection at a Glance

Field surveys and data collection followed this step-by-step process.

1. Surveyor observes a roadside area that appears to meet the site selection criteria of the project and stops for on foot evaluation.
2. Surveyor completes the RARR form collecting basic location and floristic information and evaluating pollinator habitat.
3. Surveyor evaluates the sites RARR score and assesses additional site conditions to make the decision to proceed to the CSS form or to reject the site from further field consideration.
4. Surveyor completes the CSS to collect more complete floristic and ecological data.

A surveyor assesses habitat in a roadside wet meadow.

Pollinator Habitat Evaluation

At every location where surveyors stopped to perform habitat evaluations of the ROW, they would complete a Rapid Assessment of Roadside Right-of-Ways (RARR) scorecard developed by Monarch Joint Venture (MJV) (Cariveau et. al. 2019). The RARR was a preliminary step, and the minimum requirement, for onsite data collection. Based on the results of the RARR, and the surveyor's professional judgement of the site selection criteria, the surveyor would decide to proceed with the second habitat assessment form (see Conservation Site Evaluation below) or to reject the site from further data collection.

The RARR collects data on environmental variables including landscape context, maintenance activities, and floristic resources to generate a numerical pollinator habitat score from 1-100 with 100 being the highest score theoretically possible (referred to as 'RARR score' hereafter). Key ecological variables of the RARR include the presence and abundance of native nectar plants (defined broadly to include all angiosperms except for graminoids), presence and abundance of milkweed (*Asclepias*) species, and the presence and abundance of noxious weed species. OKNP defined noxious weeds as those listed by the Kentucky Exotic Pest Plant Council (KYEPPC) as an exotic invasive plant. This is a more expansive list of exotic pest species than those currently regulated by state statute and includes additional species that pose a significant threat to the integrity of native habitats (KYEPPC 2013).

OKNP followed the field protocols for sampling at random locations described by Cariveau et al. (2019). Habitat location and boundary information would be collected as part of completing the RARR scorecard. Additional details on how the RARR scorecard was configured for the project and an example RARR scorecard are provided in Appendix C.

Identifying a Meaningful Pollinator Score

After completing the first year of surveys in 2020, OKNP determined that a threshold RARR score was needed to help characterize and sort sites with higher quality pollinator habitat from those with lower quality habitat.

The 75th percentile of the RARR scores collected in 2020, which correspond to a score of 60, was chosen as a potential threshold value for indicating high-quality pollinator habitat. To check if this threshold was ecologically meaningful, the floristic variables that contribute to the total pollinator score were compared using score ranges along ten-point increments. Among the floristic variables examined, the estimated number of milkweed stems per site, had the largest and most well-defined difference between adjacent score ranges.

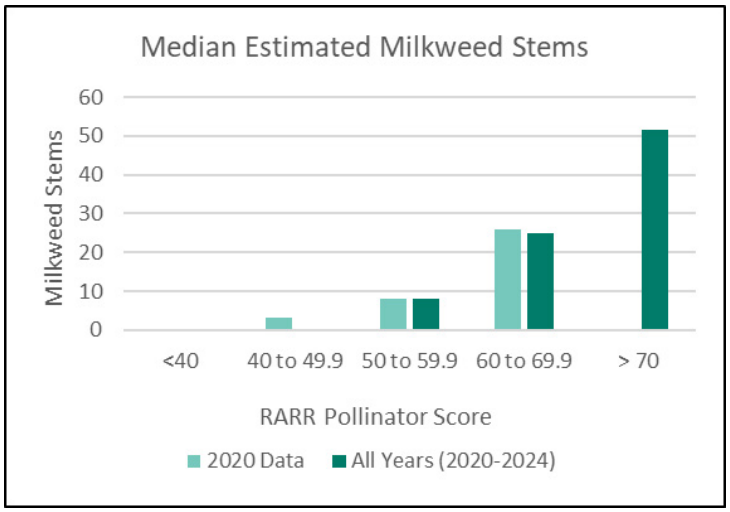


Figure 11. *Comparison of RARR scores and median estimated milkweed stems in 2020 and for all years combined.*

When plotted, a natural break occurs between the score intervals of 50-59.9 and 60-69.9 (Figure 11). Given the importance of milkweed to the monarch lifecycle, and as a species of interest to this project, this natural break in the data was determined to be sufficient justification to move forward using 60 as a threshold value indicative of high-quality pollinator habitat.

A follow-up analysis was conducted after all 5 years of the survey data were collected. The findings were consistent with the initial analysis. Sites with a RARR score of 60 or higher tend to have three times the number of milkweed stems than those with a score below 60 (Figure 11). Confidence that our choice of a threshold value of 60 was ecologically meaningful was strengthened by this follow-up analysis.

Conservation Site Evaluation

The RARR efficiently addresses pollinator habitat quality but excludes important information about other ecological resources of interest to the project goals. OKNP developed a rapid assessment Conservation Site Scorecard (CSS) to address potential deficiencies in the information collected by the RARR and to aid in separating the highest quality sites from the lowest quality sites that were identified by surveyors. The CSS was designed to collect more complete floristic information (including graminoids and gymnosperms), and site characteristic data consistent with methods developed by NatureServe for assessing habitat quality (NatureServe 2002, Faber-Langendoen et al. 2016).

The CSS is a modified version of a previous habitat assessment tool developed by OKNP for a grassland mapping project in the Interior Low Plateau region of Kentucky (Yahn 2011). The CSS is completed quickly in the field and calculates a simple habitat quality index that can be used to rank sites into different habitat quality categories. The scorecard works by evaluating six key ecological factors at each site and assigning them a numerical value from 1 to 5. The six ecological variables are:

1. *Size of habitat* – Quantifies the size of the site.
2. *Surrounding landscape context* – Defines the habitat that is abutting and adjacent to the site.
3. *Vegetation structure* – Evaluates the vegetation structure as compared to a high-quality representative of the same type (if the site is a grassland, wetland, forest, how does the structure compare to a high-quality reference site.)
4. *Quality (biodiversity and stability)* – Assesses the composition of the plant community including abundance of native species. Considers threats and apparent management.
5. *Species Rarity* – Assesses presence of rare plant species and abundance of indicator species.
6. *Invasive Species* – Assesses percent cover of non-native invasive species.

The Quality, Species Rarity, and Invasive Species variables were considered critical factors in determining the conservation value of the habitat, these variables were weighted (x2) to account for their importance. All the factor scores are added together and divided by six to determine the final CSS score for the site. The CSS score ranges from 1.5 to 7.5 where lower scores are indicative of higher habitat quality. See Appendix D for an example CSS form. Interpretation of the CSS scores are discussed in the following section (Habitat Quality Categorization).

The CSS was only completed for sites that met at least one of the following selection criteria:

- The RARR scorecard result was favorable with a pollinator habitat score of 60 or greater.
- A rare plant species was detected at the site (regardless of all other site characteristics).
- The site appeared to have characters consistent with a rare natural community type (See list of rare natural communities in Appendix B).
- The site otherwise appeared to be high-quality habitat based on the presence of indicator species, diverse warm season grasses, high diversity of forb species, and low abundance of noxious weeds.

During the 2020 field season, the results of the RARR score were not used to determine if a CSS should be completed (see *Identifying a Meaningful Pollinator Score*). Instead, surveyors relied on the alternative CSS criteria listed above to decide. The RARR score criteria (60 or greater), in addition to the other criteria listed, were utilized in all other survey years (2021-2024).

Sites with a completed CSS were considered candidates for being designated as a Roadside Conservation Area. Roadside Conservation Area (RCA) is the formal designation for sites identified by this project with significant conservation value and to which management recommendations would apply (see *Management Recommendations*).

Data Analysis

Habitat Quality Categorization

Results of the RARR and CSS forms were used to assign each site into three habitat quality categories. The habitat quality of these sites occurs on a spectrum with some sites potentially supporting more pollinator habitat or rare plant species than others. The categorization process was developed with the goal of separating the best (highest quality) sites from those of lesser quality. This was a necessary step to aid in designation of RCAs and the prioritization of conservation management actions at RCAs. A simple high, medium, and low categorization scheme was developed with each category described in Table 1.

Table 1. *Habitat quality categories, associated RCA management category, and their descriptions.*

Habitat Quality Category	RCA Management Category	Description
High Quality	High Quality	Sites in this category are healthy native plant communities with high diversity of native species and abundant indicator species. Rare plant species are almost always present at these sites, and they provide excellent resources of pollinator species. These sites are often larger and have better connectivity to adjacent habitat outside of the rights-of-way boundary. Noxious weeds or other exotic pest species may occur at the site, but at low levels. Minimal management is required to maintain these sites in good condition. These sites could serve as "reference" or "baseline" communities for comparison to restoration projects.
Medium Quality	Restoration Potential	These sites contain significant conservation resources including several elements of a high-quality native plant community (i.e. presence of a rare plant species, presence of some indicator species, high diversity of graminoids and forbs). Sites in this category often have little buffer or connectivity with larger areas of natural habitat and may occur isolated or scattered patches in the broader landscape context beyond the right-of-way. The health of these sites may be impeded by noxious weeds, non-native pasture grasses or other exotic pest species, but there is a high potential to improve with moderate management. Because these sites contain valuable components of the native flora, they are strong candidates for restoration activities.
Low Quality	Seed Source	These sites contain some elements of conservation significance which may include native plant communities or a rare species, but they have been significantly degraded by noxious weeds, non-native pasture grasses, woody encroachment (in the case of grassland sites), erosion, or other factors that would impede restoration. Low quality sites would require extensive management that would be costly and time intensive.
Eliminate	N/A	These sites may meet some of the general indicators for site selection, but they were ultimately determined to be of poor natural quality or too degraded to warrant conservation significance. These sites are maintained in the project database but otherwise removed from further consideration.

Assigning evaluated sites to habitat quality categories used a step-by-step process to review data collected by the RARR and CSS tools. The CSS was the most heavily weighted component of the habitat quality categorization process. The results of the CSS set the initial habitat category of the site which could then be modified and adjusted based on the results of the RARR, the presence of a rare plant species, or other ecological considerations. The step-by-step process is described in detail below, and a flowchart is provided to illustrate the process (Figure 12).

Step 1. Conservation Site Scorecard Review

A CSS score interpretation index was used to assign sites an initial habitat quality category based on their CSS score (Table 2). Sites that scored a 5 or greater were placed in the Eliminate category and would be rejected as RCAs unless mitigating factors were identified in subsequent steps

Table 2. *The CSS habitat interpretation index as revised in 2021 and utilized from 2021-2024.*

Conservation Site Score	Initial Habitat Quality Category	Associated Management Category
5 or greater	Eliminate	Eliminate
4.99 - 4.5	Low Quality	Seed Source
4.49 - 3.7	Medium Quality	Restoration Potential
Less than 3.7	High Quality	High Quality

Sites between 4.5 and 4.99 were initially assigned to the Low Quality category. Sites with a score of 3.7 to 4.49 were assigned Medium Quality. Sites with a score of less than 3.7 were considered High Quality and were typically of statewide, or even regional, significance for conservation. Refer to Table 1 above for descriptions of each habitat quality category.

The CSS interpretation index was developed based on review of the methods and data from a previous grassland mapping project (Yahn 2011), initial testing of the CSS at previously known high-quality roadside reference sites, and review of the CSS data collected during the 2020 and 2021 field seasons.

A slightly different version of the CSS interpretation index, with fewer habitat quality categories, was used to categorize habitats identified in 2020. It was revised in 2021 based on review of both years of collected data and feedback from the surveyors who assessed the sites. The revised interpretation index provided above (Table 2) was used for all subsequent years (2021-2024). The RCAs designated in 2020 under the original interpretation index were “grand fathered” in and not reassigned habitat quality categories based on this revision. See Appendix D for more details on how the CSS interpretation index was modified from 2020, and how an adaptive approach was used to assess and improve our tools based on the collected data.

Step 2. Rare Plant Check

After the initial habitat quality was assigned, the plant species lists for each site were checked, if a rare plant species occurred at a site assigned to the Eliminate category, that site would be automatically reassigned to the Low Quality category before proceeding. This step functioned as a safety net to prevent any sites with a rare species population from being eliminated from further evaluation.

Step 3. Pollinator Score Review

The RARR score for each site was then reviewed, a score of 60 or greater would allow for increasing the habitat quality category by one level. This step acted as a check against pollinator habitat "blind spots" that the CSS may not be sensitive to. In most instances, a pollinator score of 60 was sufficient justification for increasing the assigned habitat category (see *Identifying a Meaningful Pollinator Score*).

Step 4. Final Site Review and Assign Adjusted Habitat Quality

Ecological scorecard tools like the RARR and CSS are imperfect attempts to quantify dynamic and highly variable natural systems. They can potentially be sensitive to the timing of surveys (both seasonally timing and in relationship to recent management activities like mowing) and differences in the type of habitat that is being assessed. This step was intended to mitigate against potential short comings of the RARR and CSS tools.

A final review of each site was conducted to consider any mitigating information that may justify adjusting a site to a higher habitat quality category. This step was applied to all sites but was performed more thoroughly for edge cases or those sites relying on the threshold criteria described in Steps 2 and 3 to reach higher quality categories.

Important variables that were considered included the specific landscape context, abundance of noxious weeds, the conservation ranks of any rare plants found there (how rare or threatened the species is), and the composition of the site's flora (such as the abundance of indicator species). Many of these variables, such as noxious weed abundance, are captured and integrated into both the RARR and CSS. However, for edge cases it was often useful at this step to review the site-specific information. For example, the specific noxious weed species observed at the site could help with making a final determination. Some noxious weeds like Johnsongrass (*Sorghum halapense*) are far more detrimental to restoration efforts than other weed species such as wild carrot (*Daucus carota*).

In addition to reviewing the site data in detail, surveyors were also afforded to the opportunity to provide feedback and comments for each site with regards to the final habitat quality categorization. In making a final determination, the conservation significance of resources at the site, and the perceived potential for the site to improve with better informed management were of primary importance to this final review and any adjustments to the final habitat quality category of each site.

Habitat Characterization Workflow

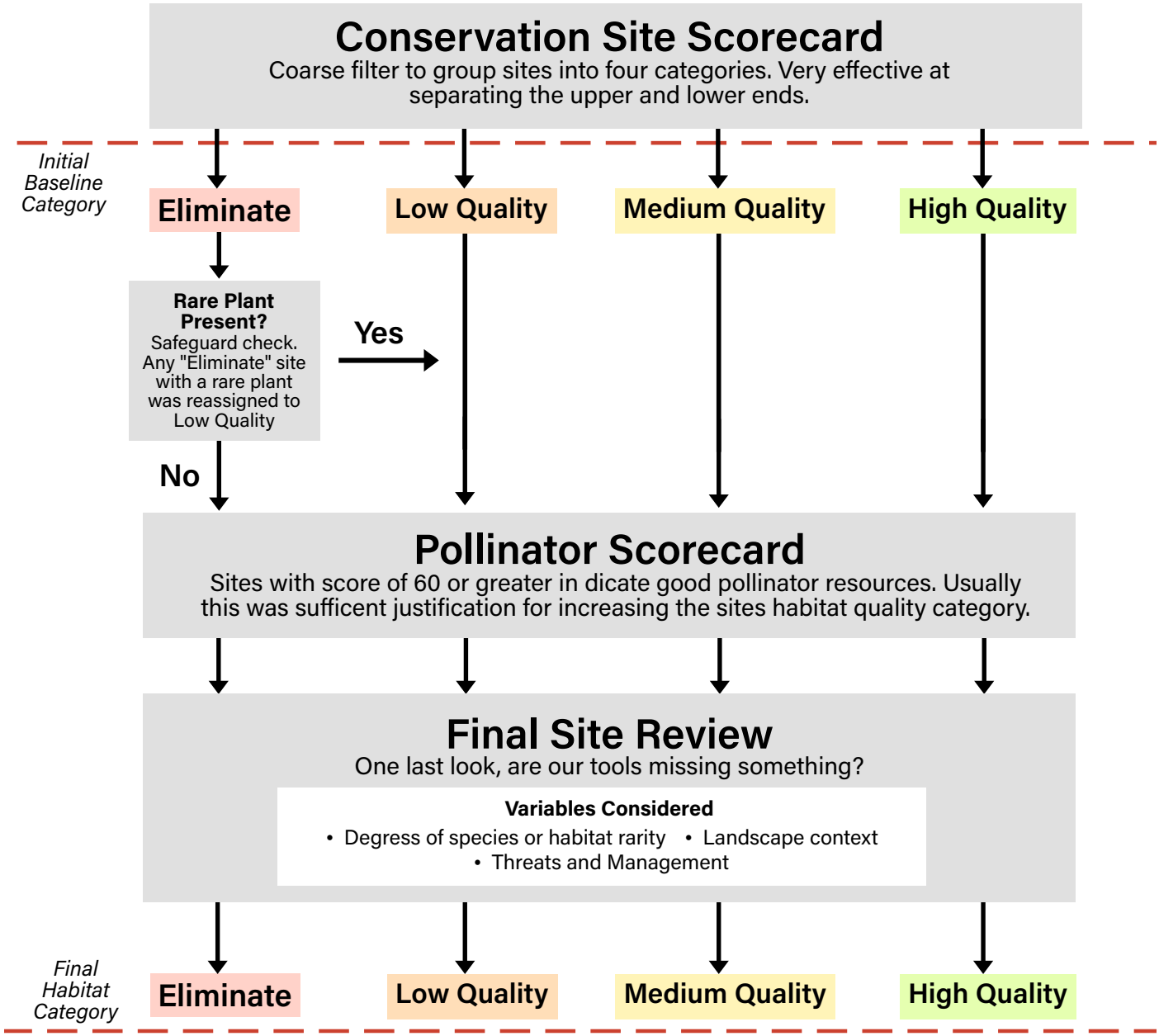


Figure 12. *Habitat quality categorization process flowchart.*

Management Category Designations

Once a final habitat quality was assigned to all the evaluated sites, the habitat quality categories were cross walked to corresponding management categories (refer to Table 1 for descriptions) and the sites were designated as RCAs. The management category would define the status of each RCA and be used to prescribe management recommendations when communicating with KYTC. See *Management Recommendations* section for discussions of management recommendations for each category.

The habitat quality and management category of RCAs were defined separately because the former describes the ecological conditions of the site whereas the management category communicates more information regarding prioritization and potential management activities and can also include regulatory considerations independent of habitat quality (e.g. federally listed species).

In most instances, the habitat quality was directly cross walked to the corresponding management category, however, a handful of special cases, such as a Low Quality site that included the presence of a federally listed species, warranted adjusting the assigned management category of the RCA.

Assessing Kentucky Gladecress Habitat

Kentucky gladecress (*Leavenworthia exigua var. laciniata*) is listed as threatened under the ESA and is endemic to the remnant dolomite glades of Bullitt and Jefferson counties in Kentucky. This species is known to occur at many roadside ROW locations in these counties. Kentucky gladecress is a disturbance tolerant species that can persist in degraded habitats if competition and cover of other plant species is low. In the roadside environment, it benefits from frequent mowing which reduces competition from other plant species (Figure 13).

As a winter annual, Kentucky gladecress will germinate in the late fall, overwinter as a diminutive rosette, and then begin to flower in March. By the end of April, it will have set seed and begun to die back. By mid-May it can be completely undetectable. Due to its unique life history, seasonal timing, and habitat, it was determined that the RARR and CSS tools would not accurately assess the conservation value of Kentucky gladecress habitat.

Figure 13. *Kentucky gladecress (left) and an example of its roadside habitat (right).*

OKNP annually monitors populations of Kentucky gladecress as part of a separate program in partnership with the U.S. Fish and Wildlife Service (USFWS) and keeps detailed records of where this species occurs. KYTC also previously designated several "no-spray" corridors in 2016 to help protect this species from unintended effects of management activities. For this project, OKNP reviewed the boundaries of KYTC's designated no-spray zones and field verified that Kentucky gladecress, or potentially suitable habitat, was present within these locations. Kentucky gladecress was also verified at three additional roadside locations outside of the previously designated no-spray zones. The 2016 no-spray zones, and the three additional areas verified in 2020, were incorporated directly into this project and designated as Kentucky gladecress RCAs (KG-RCAs), which are reported as a separate management category in addition to the standard RCAs. See *Results* and *Management Recommendations* sections for further discussion.

Results

Designated Roadside Conservation Areas

OKNP successfully surveyed over 31,000 miles of road from 2020 through 2024 (Table 3). Surveyors evaluated roadside habitat at 374 locations throughout Kentucky (Figure 14). Of the evaluated sites, a total of 268 were determined to have significant conservation value and were designated as RCAs for the protection of pollinator habitat, rare plants, and native plant communities.

Year	Miles Surveyed	Sites Evaluated
2020	7,000	101
2021	6,159	89
2022	6,898	91
2023	6,322	70
2024	4,903	23
Total	**31,282**	**374**

***Table 3**. Total miles surveyed, and number of sites evaluated each year.*

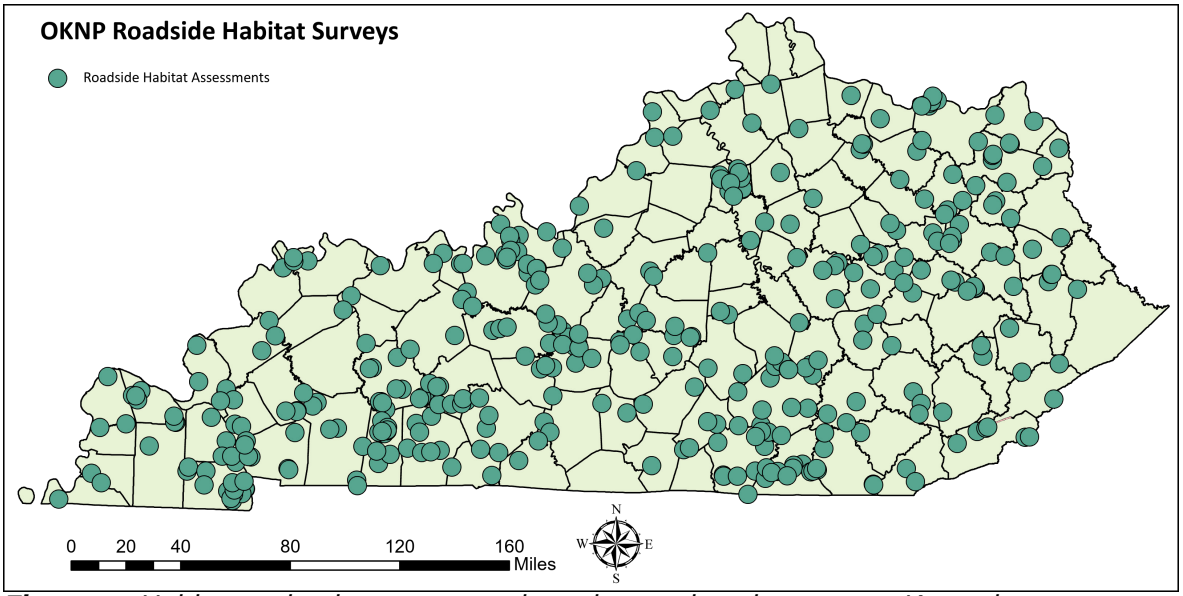


***Figure 14.** Habitat evaluations were conducted at 374 locations across Kentucky.*

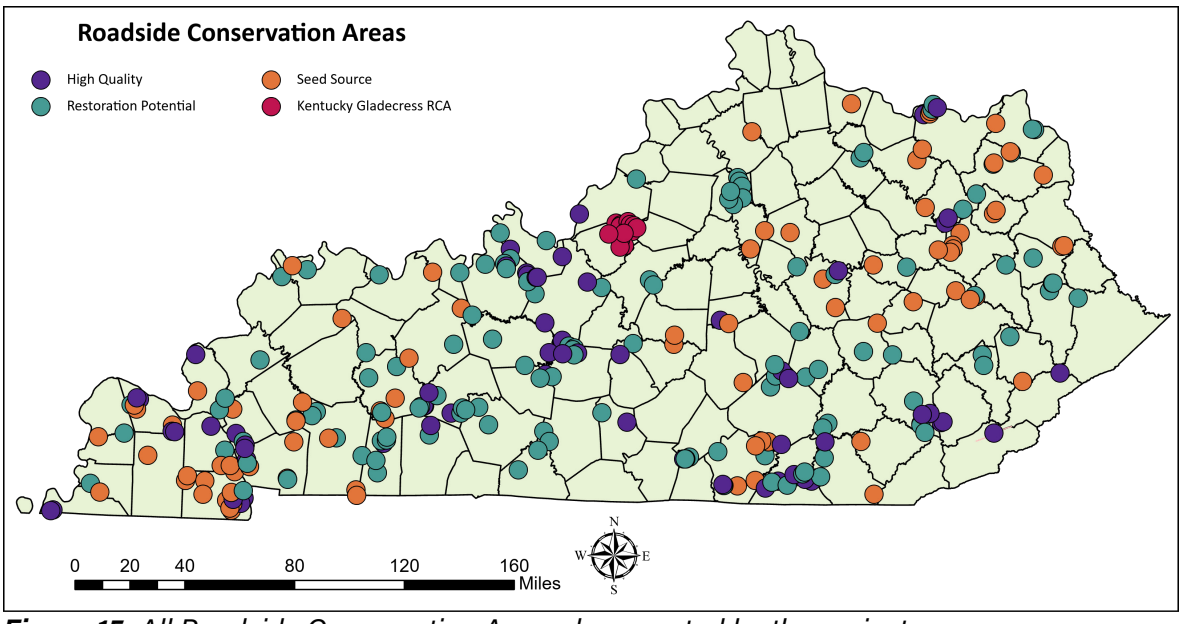


***Figure 15.** All Roadside Conservation Areas documented by the project.*

RCA habitats include remnant prairies and glades, woodlands, forest edge communities, various wetland types, and rocky outcrops and cliffs. Of the designated RCAs, 65 were categorized as High Quality, 124 Restoration Potential, and 79 as Seed Source sites (Figure 15, Table 4). An additional 15 Kentucky Gladecress sites were designated as KG-RCAs; these sites were evaluated under a separate protocol and are given a different management category (see *Methods* section).

Table 4. *Total number of RCAs designated by the project.*

RCA Management Category	Number of Sites
High Quality	65
Restoration Potential	124
Seed Source	79
Standard RCAs Total:	**268**
Kentucky Gladecress RCA	15
Combined Total:	**283**

Table 5. *Designated RCAs by KYTC District.*

District	High Quality	Restoration Potential	Seed Source	KG-RCA	District Total
1	16	12	24	0	52
2	2	16	12	0	30
3	5	19	0	0	24
4	15	19	2	0	36
5	1	8	0	15	24
6	0	0	2	0	2
7	2	3	6	0	11
8	12	16	6	0	34
9	4	11	11	0	26
10	0	5	10	0	15
11	7	9	3	0	19
12	1	6	3	0	10
Totals:	**65**	**124**	**79**	**15**	**283**

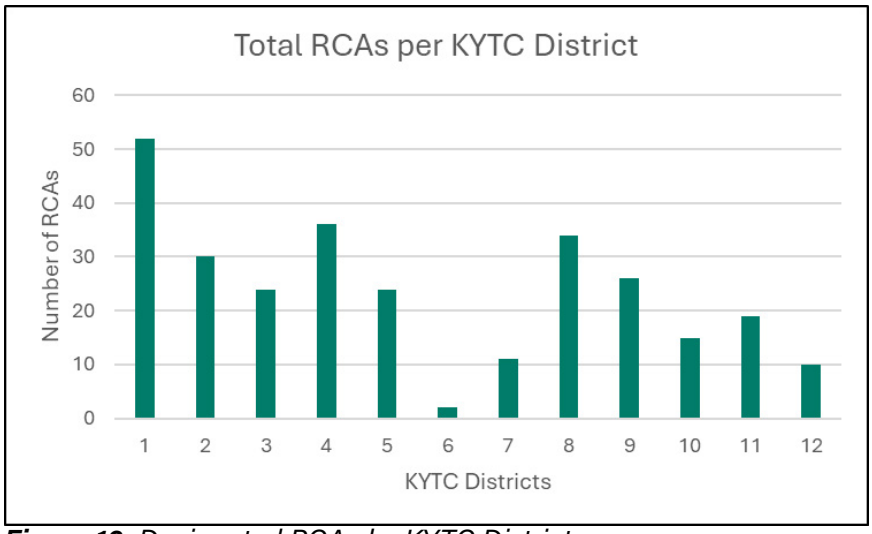


Figure 16. *Designated RCAs by KYTC District.*

The number of RCAs located in each District are provided in Table 5 and Figure 16 (below). District 1 has the most RCAs with a total of 52 sites. Districts 1, 4, and 8 are the Districts where the most High Quality RCAs occur (Table 5).

A total of 442.10 acres of RCA habitat (including KG-RCAs) were mapped throughout the state. The mapped acreage for each management category is provided in Table 6. The linear habitat of each designated RCA was calculated to determine the total length of roadway potentially affected by OKNP's management recommendations. OKNP mapped 127.71 linear miles of habitat throughout the state (Table 6). This value represents less than 1% of the 31,000 miles of roads, and associated ROW, managed by KYTC that may be affected by OKNP's RCA management recommendations.

Table 6*. Total mapped acreage and linear miles of RCAs for each Management Category.*

Management Category	Habitat Acreage	Linear Habitat (Miles)
High Quality	200.77	50.6
Restoration Potential	103.53	30.5
Seed Source	39.99	19.71
*Kentucky Gladecress RCA	97.81	26.9
Total:	**442.10**	**127.71**

**Kentucky Gladecress RCAs were not evaluated or mapped following the same protocols as standard RCAs (see Methods), the acreage of KG-RCAs was estimated based on the linear distance of the designated RCA boundaries and an assumed 15-foot-wide ROW on both sides of the road. This estimate represents the approximate acreage expected to be affected by OKNP's management recommendations.*

The median size of RCAs was 0.33 acres, indicating that most of the documented sites are small fragments of once larger habitats. This calculation excludes KG-RCAs and several unusually large "outlier" sites which were associated with substantial tracts of public lands, including the Daniel Boone National Forest, large segments of the Little Shepherd Trail (KY-1679) along the ridge of Pine Mountain in Letcher and Harlan Counties, and large segments of the Wilderness Trace Scenic Byway in The Land Between the Lakes Scenic Recreation Area. Size calculations were based on the apparent boundaries of the ROW. In many cases the observed habitat extended beyond the ROW and into adjacent lands, this important factor (total habitat size and landscape context) was considered for the habitat quality evaluations.

Plant Discoveries

General Observations

Over 3,000 species of plants grow wildly in Kentucky (Weakley et al. 2022). OKNP surveyors observed over 1,100 plants species growing in roadside ROW (see Appendix E for complete species list). Representing approximately 37 percent of Kentucky's wild botanical life, this underscores the importance of ROW as habitat for an enormous diversity of plants. It is important to note, that the species observed by OKNP are only those recorded from sites where data was collected, the true percentage of plant species that occupy our states roadside ROW is likely much higher than the figure reported here.

Milkweeds

The monarch butterfly was a pollinating insect species of special interest to this project, and it was proposed for listing by the USFWS as federally threatened under the ESA in December 2024 (Endangered and Threatened Wildlife and Plants 2024). The RARR tool was chosen in part because of its emphasis on habitat suitability for monarchs. Milkweeds are a critical host plant for the monarch butterfly. Monarch's deposit their eggs on milkweed, and the larvae feed exclusively on milkweed to grow to maturity. Currently, 13 native species of milkweed are known to occur in Kentucky. Some species are quite common and occur frequently on the margins of crop fields, pastures, and ROW. These familiar species include common milkweed and the aptly named butterfly milkweed (*Asclepias tuberosa*, Figure 17).

Figure 17. *Butterfly milkweed being visited by three species of butterfly.*

Other milkweed species have more specialized habitat requirements such as shaded forests (*Asclepias quadrifolia*) or saturated wetland soils (*Asclepias perennis*). Two species are currently considered rare in Kentucky, tall green milkweed (*Asclepias hirtella*), dependent on remnant prairies, and purple milkweed (*Asclepias purpurascens*) which is found on the sunny edges of forests and woodlands. OKNP observed all 13 of Kentucky's milkweed occurring in ROW during this project. Surveyors verified two populations of the rare tall green milkweed and documented one new population. OKNP also documented 21 new populations of the rare purple milkweed (Figure 18).

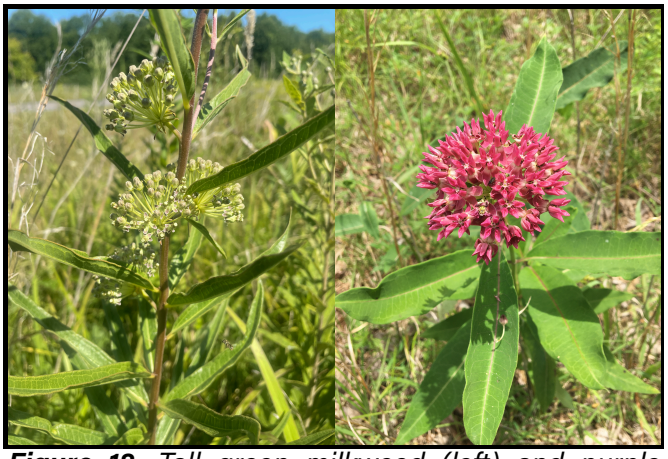


Figure 18. *Tall green milkweed (left) and purple milkweed (right), two rare species in Kentucky*

Noxious Weeds

OKNP defined noxious weeds as those listed by the Kentucky Exotic Pest Plant Council (KYEPPC) as an exotic invasive plant. This is a more expansive list of exotic pest species than those currently regulated by state statute and includes additional species that pose a significant threat to the integrity of native habitats (KYEPPC 2013). OKNP observed 98 noxious weed species (including subspecies) in state road ROW. The most frequently observed species were tall fescue (*Lolium arundinaceum*), wild carrot (*Daucus carota*), Japanese honeysuckle (*Lonicera japonica*), Sericea lespedeza (*Lespedeza cuneata*), Japanese stiltgrass (*Microstegium vimineum*), and Johnsongrass (*Sorghum halepense*).

Rare Plants

Surveyors observed 258 rare plant populations throughout Kentucky's roadside ROW. Of those, 142 populations were known from previous records and OKNP was able to verify that they are still extant. An additional 116 new populations were documented for the first time as part of this project (Figures 19 and 20).

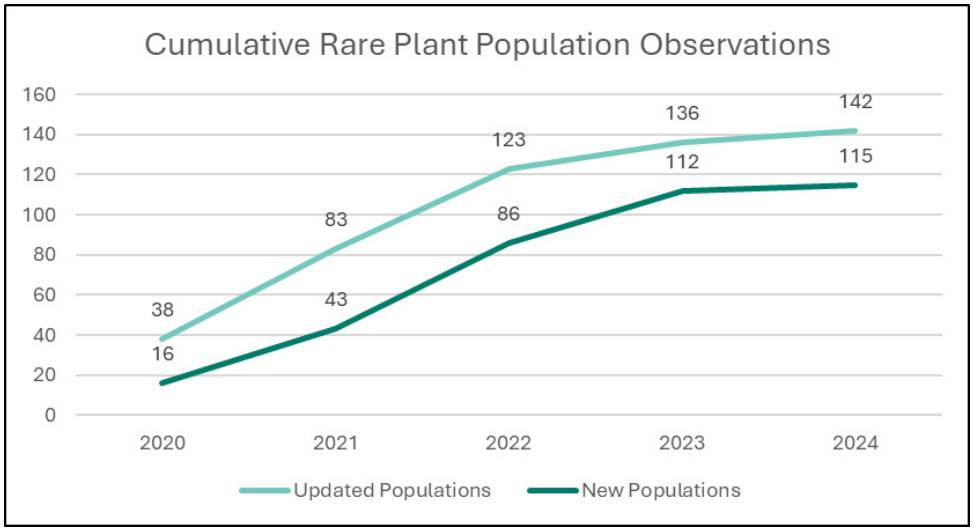


***Figure 19**. Cumulative rare plant population observations.*

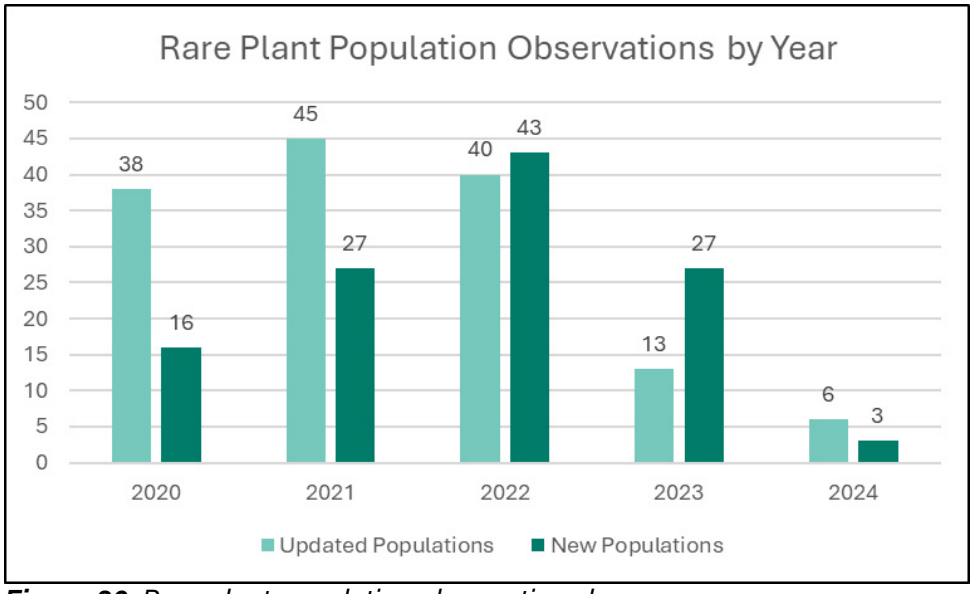


***Figure 20**. Rare plant population observations by survey year.*

In total, 93 rare plant species were observed throughout the project area, including 12 species that are globally rare (Table 7), of which, three species are federally listed as threatened or endangered under the federal ESA. Refer to Appendix E for a complete list of rare plant species documented by the project.

Table 7. *Globally rare plants documented by the project.*

Common Name	Scientific Name	G-Rank	S-Rank	Federal Status	State Status
Appalachian Rosinweed	*Silphium wasiotense*	G3	S2		Threatened
Cutleaf Meadow-parsnip	*Thaspium pinnatifidum*	G2G3	S2S3		Threatened
Eastern Prairie Blue Wild Indigo	*Baptisia aberrans*	G2	S1		Endangered
Eggert's Sunflower	*Helianthus eggertii*	G3	S3	Delisted	Special Concern
Globe Bladderpod	*Physaria globosa*	G2	S1	Endangered	Endangered
Kentucky gladecress*	*Leavenworthia exigua var. laciniata*	G4T1T2	S1S2	Threatened	Endangered
Royal Catchfly	*Silene regia*	G3	S1		Endangered
Running Buffalo Clover	*Trifolium stoloniferum*	G3	S2S3	Delisted	Threatened
Short's Goldenrod	*Solidago shortii*	G1	S1	Endangered	Endangered
Stone Mountainmint	*Pycnanthemum curvipes*	G3	S1		Endangered
Svenson's Wildrye	*Elymus svensonii*	G3	S2S3		Endangered
Tansy Rosinweed	*Silphium pinnatifidum*	G3Q	S3		Special Concern
Water Stitchwort	*Sabulina fontinalis*	G3	S1S2	At-Risk	Endangered

**Kentucky gladecress is a globally rare variety of the broader Leavenworthia exigua species concept.*

Clockwise from top left: Stone mountainmint flower, plant habit, the plants roadside habitat. Photo credits: Vanessa Voelker, OKNP.

Discovery of Stone Mountainmint

In August 2022, OKNP botanists made a significant discovery of a new state record species in Muhlenberg County. Discovered in a roadside remnant grassland by OKNP botanist, Vanessa Voelker, Stone Mountainmint (*Pycnanthemum curvipes*), is an exciting new addition to Kentucky's state flora! Stone Mountainmint is globally rare species known from just four other southeastern states, including Alabama, Georgia, North Carolina, and Tennessee. It is considered rare or vulnerable in each of those states. It has been given a state status of Endangered with a state rank of S1 (Extremely Rare) in Kentucky.

A second state record species, four-angled sabatia (*Sabatia quadrangula*, not pictured), was discovered along a roadside wet meadow in Pulaski County in 2020 by senior OKNP botanist and ecologist, Tara Littlefield. This species has also been given a state status of Endangered with a state rank of S1 in Kentucky.

Federally Listed Plants

Three species of federally threatened or endangered plants were observed growing in ROW managed by KYTC. These species were globe bladderpod (*Physaria globosa*), Short's goldenrod (*Solidago shortii*), and Kentucky gladecress (*Leavenworthia exigua var. laciniata*). Populations of these species were found in five counties in Districts 5 and 9 (Table 8). Except for Kentucky gladecress sites, habitat for all other sites with federally listed plants were assessed following the standard methodology described in this report (see *Methods*). Further discussion of federally listed species, including their listing status, locations where found, and management recommendations are provided in the *Management Recommendations* section of this report.

Table 8. *List of RCAs where federally threatened or endangered plants occur.*

District	County	Route and Site Name	Common Name	Scientific Name
5	Franklin	US-421	Globe bladderpod	*Physaria globosa*
5	Jefferson	Multiple	Kentucky gladecress	*Leavenworthia exigua var. laciniata*
5	Bullitt	Multiple	Kentucky gladecress	*Leavenworthia exigua var. laciniata*
9	Nicholas	US-68 B	Short's goldenrod	*Solidago shortii*
9	Fleming	US-68 A	Short's goldenrod	*Solidago shortii*

Management Recommendations

To develop management recommendations for all RCAs, OKNP reviewed Best Management Practices (BMPs) for managing roadside habitat for pollinators published by the FHA, Xerces Society, the Monarch Joint Venture (FHA 2016). OKNP also sought input from our land management staff who oversee management of the Kentucky State Nature Preserve system.

Our recommendations were developed to be as clear, concise, and applicable to as many habitat types and conditions as possible. Recommended BMPs are described below and are applicable to all standard RCAs designated as High Quality and Restoration Potential (KG-RCAs are treated separately). Additional recommendations specific to each management category and notes regarding federally listed species are described in the subsequent sections.

Best Management Practices

The following BMPs are intended to improve pollinator resources and habitat by increasing cover of native forbs, allowing native plants to set seed, and providing continuous food and reproductive resources (host plants) for pollinating insects. The primary BMPs listed below should be implemented at all RCAs designated as High Quality or Restoration Potential. The secondary BMPs listed below are additional recommendations that may further enhance pollinator habitat protection and improve management of the RCAs. They may not be applicable to all sites and are presented here for the consideration of KYTC's maintenance managers.

<u>Primary BMPs</u>

- No broadcast herbicide applications. Reduce herbicide use to spot spray applications as needed with selective herbicides. Time applications to the most vulnerable life stage of the target species.
- Reduce regular growing season mowing to the safety zone (8-feet-wide or less where possible) for driver visibility.
- Mow the full width of the ROW once per year after October 15 to prevent woody encroachment and promote growth of native forb species (MJV, 2016).
- Install RCA signs at the boundaries of all sites categorized as High Quality and Restoration Potential. Include indicator arrows on the signs to clarify where the RCAs begin and end (Figure 21).

Figure 21. Examples of RCA signs installed at High Quality sites. Example on right includes directional arrow which is recommended to clarify the RCA boundaries.

Secondary BMPs

- If rocky terrain prevents use of conventional mowers, conduct woody removal biannually with brush cutters or other minimally invasive equipment. Remove cut woody debris from site.
- Reducing mower speed, high swath heights (8-inches or higher), and use of flushing bars may reduce mortality of pollinating insects as well as birds and small mammals.
- Using dedicated mowing equipment for RCAs can reduce spread of noxious weeds and make restoration actions more effective over time. If dedicated equipment is not possible, power washing equipment prior to use in these areas is strongly recommended.
- Minimize use of heavy equipment which can disturb and compact soil which can negatively affect native plant communities.
- Use integrated weed management methods where possible including biocontrol agents and spot mowing of target species where appropriate.

A table with all RCA locations (including recommended start and end mile points), county, district, management category, and simplified primary BMPs are provided in Appendix F. The BMPs may not be applicable to all sites. For example, some RCAs consist of steep rock cuts or slopes where mowing is already minimal, and our only recommendation is to designate the area as a no broadcast spray zone. An example management table is provided below (Table 9).

The recommended mile start and end points of RCAs sometimes differ from the observed habitat area (Figure 22 below). An attempt was made to conform the start and end points of RCAs to 0.1-mile road increments with the intent of reducing potential confusion about where site boundaries are located or where potential signage should be placed. In general, where the boundaries of observed habitat fell between 0.1-mile points, the recommended start and end point were increased to the nearest 0.1-mile location. In most cases this has resulted in small buffer areas occurring at the ends of each RCAs which may provide additional conservation benefits. The acreage of identified habitats referenced in this report refers to the observed habitat that was mapped as polygons (Figure 22) and not the area of land occurring in between the recommended start and end mile points.

Table 9. *Example habitat management recommendation table. Blank boxes indicate no recommended change from current practices.*

District	County	Route	Mile Start	Mile End	Side	Category	ROW Full Width Mow	Safety Zone Mow	Herbicide Application
7	Boyle	KY-1108	1.4	1.6	North Bound	High Quality	Once per year after Oct 15	3 times a year, single pass	No broadcast, spot spray only
7	Fayette	KY-169	0.1	0.4	North Bound	Restoration Potential			No broadcast, spot spray only
7	Garrard	KY-3246	3	3.1	North Bound	Restoration Potential	Once per year after Oct 15	3 times a year, single pass	No broadcast, spot spray only
7	Madison	KY-1956 B	6.7	6.9	North Bound	Restoration Potential	Once per year after Oct 15	3 times a year, single pass	No broadcast, spot spray only
6	Bracken	KY-19	10.3	10.5	Both Sides	Seed Source			

**Compare mile start point to mapped habitat area depicted in Figure 22 below.*

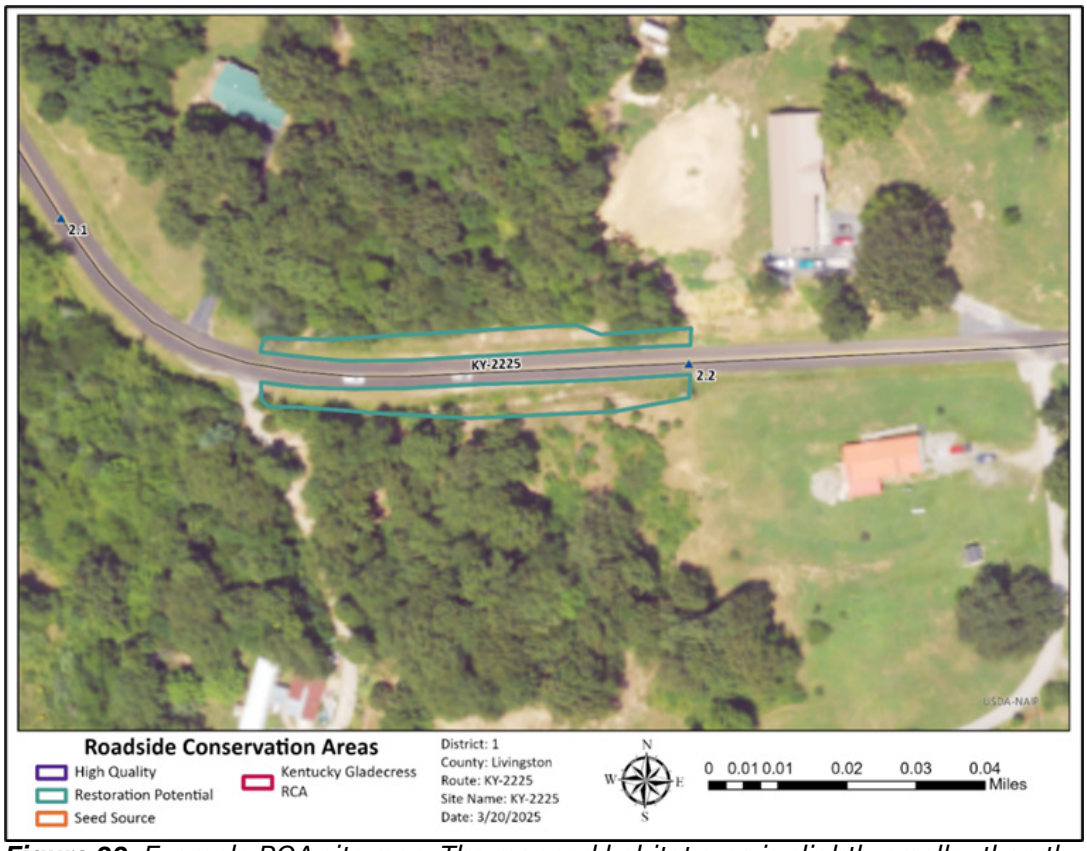


Figure 22. *Example RCA site map. The mapped habitat area is slightly smaller than the recommended mile start and mile end points described for this site in Table 9 (mile 2.1 to 2.2).*

Individual site reports for all standard RCAs, including a map, management category, management recommendations, and a list of rare plants, milkweeds, and noxious weed species observed at each site are provided in Appendix G.

High Quality Habitat

At present, these sites appeared in good condition and minor management changes can maintain and improve their habitat. High Quality sites should be prioritized when implementing recommended management changes or when deploying signage to mark RCAs. These sites should serve as "reference" or "baseline" communities for comparison to restoration projects. Continued monitoring of these sites is recommended to ensure they do not degrade.

Noxious weeds, non-native pasture grasses, and other exotic pest species are often present at these sites, but their cover and abundance are currently low. Monitoring and careful spot treatment of noxious weeds can suppress and prevent their spread at these sites. Reduced mowing can improve quality of these sites by allowing native forbs to set seed. These sites can potentially serve as seed collection sources for other restoration projects. In addition to the above BMPs, management recommendations include:

- Seed collection for additional restoration projects.
- Regular monitoring of site conditions including noxious weeds, non-native pasture grasses, woody encroachment, and erosion issues.

Restoration Potential

These sites contain at least some characteristics of valuable native plant communities but have been degraded by noxious weeds, non-native pasture grasses, and other exotic pest species. Because these sites contain significant components of the native flora, they are strong candidates for restoration activities. Active management of non-native grasses and noxious weeds, reduced mowing to promote growth of native forbs, and supplemental seeding could help maintain or improve the quality of habitat at these sites. These sites can serve as starting points for larger restoration projects that incorporate adjacent roadsides. In addition to the above BMPs, management recommendations include:

- Seed collection from rare plant species if present.
- Select specific sites for active restoration projects, including targeted weed management and supplemental seeding of native plants.

Seed Source

These sites support some valuable native plants, including rare species, but have significant management challenges including small size and heavy infestation of noxious weeds. The abundance of noxious weed species will inhibit restoration activities. Current mowing practices likely provide some suppression of noxious weeds at these sites and alteration of mowing practices may further degrade the sites. We recommend continuing current management practices at these sites. These locations have been identified as potential seed collection sources for OKNP, KYTC, and our partners to use in restoration projects at more suitable locations.

Management of Federally Listed Species

The management recommendations provided in this report are compatible with management of the federally listed species observed in roadside ROW. Risk of non-target damage from non-selective broadcast herbicide treatments is the primary threat to the observed federally listed species. Federally threatened or endangered plants were observed at sites in 5 counties, affecting 2 districts (Table 8 – *Results* section). Management recommendations for these sites, that are designated as standard RCAs, are provided in their associated management tables (Appendix F) and site reports (Appendix G) for the relevant districts. Brief discussions of management for each species is provided below. Management of KG-RCAs are discussed in the next section.

<u>*Globe Bladderpod*</u>

Globe bladderpod (*Physaria globosa*) is a federally endangered species that was observed growing in the state ROW at one location in Franklin County (District 5). There, it co-occurred with the globally rare and state endangered (but not federally listed) Svenson's wildrye (*Elymus svensonii*). The site is a large limestone rock cut (Figure 23). The habitat for these plants is restricted to the sheer cliff face and scree piles that accumulate at the base of the cliff. Globe bladderpod was previously known to occur from this site on the top of the cliff but was not observed below in the roadside ROW during a 2020 habitat evaluation. Plants were subsequently observed growing on the cliff face and in the shale piles below the cliff during a 2024 follow-up visit to the site (Figure 23). The presence of globe bladderpod on the face and the base of the cliff may fluctuate from year to year as seed migrates down from the clifftop, but it is OKNPs recommendation to always manage the area as occupied habitat. Mowing activity is very limited at the site and unlikely to affect the rare resources at this location. The primary management concern is potential harmful effects from broadcast herbicide treatments, and OKNP recommends managing this area as a no-spray zone, with only spot spray treatments of noxious weeds as necessary.

Figure 23*. Globe bladderpod habitat (left), growth habit (center), and flowers (right).*

Short's Goldenrod

Short's goldenrod is a federally endangered species that was observed growing in the state ROW at 3 locations at the northeast boundary of Nicholas and Fleming counties (District 9). Short's goldenrod is a grassland dependent species that occurs on historic remnants of bison traces (migration paths) in the vicinity of Bluelicks Battlefield State Park. It was observed at locations vulnerable to high frequency mowing and also on steep rock cut embankments where the only management concern would be the application of broadcast herbicide applications (Figure 24). The Primary BMPs recommended in this report are compatible with management for Short's goldenrod populations.

Figure 24. *Short's goldenrod occurs along the top and face of this rock cut and is vulnerable to broadcast herbicide applications (left). Close up of Short's goldenrod plant (right).*

Kentucky Gladecress RCAs

Kentucky gladecress RCAs were designated as an additional management category. Kentucky gladecress is a federally threatened species that is endemic to the remnants of dolomite glades in Bullitt and Jefferson counties within District 5 and it occurs at several roadside locations in these counties (Figure 25, Table 10). Print friendly versions of Table 10 and Figure 25, as well as additional maps of KG-RCAs are provided in Appendix H.

In the roadside environment, Kentucky gladecress benefits from frequent mowing which reduces competition from other plant species. OKNP recommends continuing regular mowing activities in Kentucky gladecress sites. The primary management concern is potential injury to Kentucky gladecress from broadcast herbicide applications, particularly those which may have pre-emergent properties. OKNP recommends prohibiting broadcast herbicide applications from KG-RCAs.

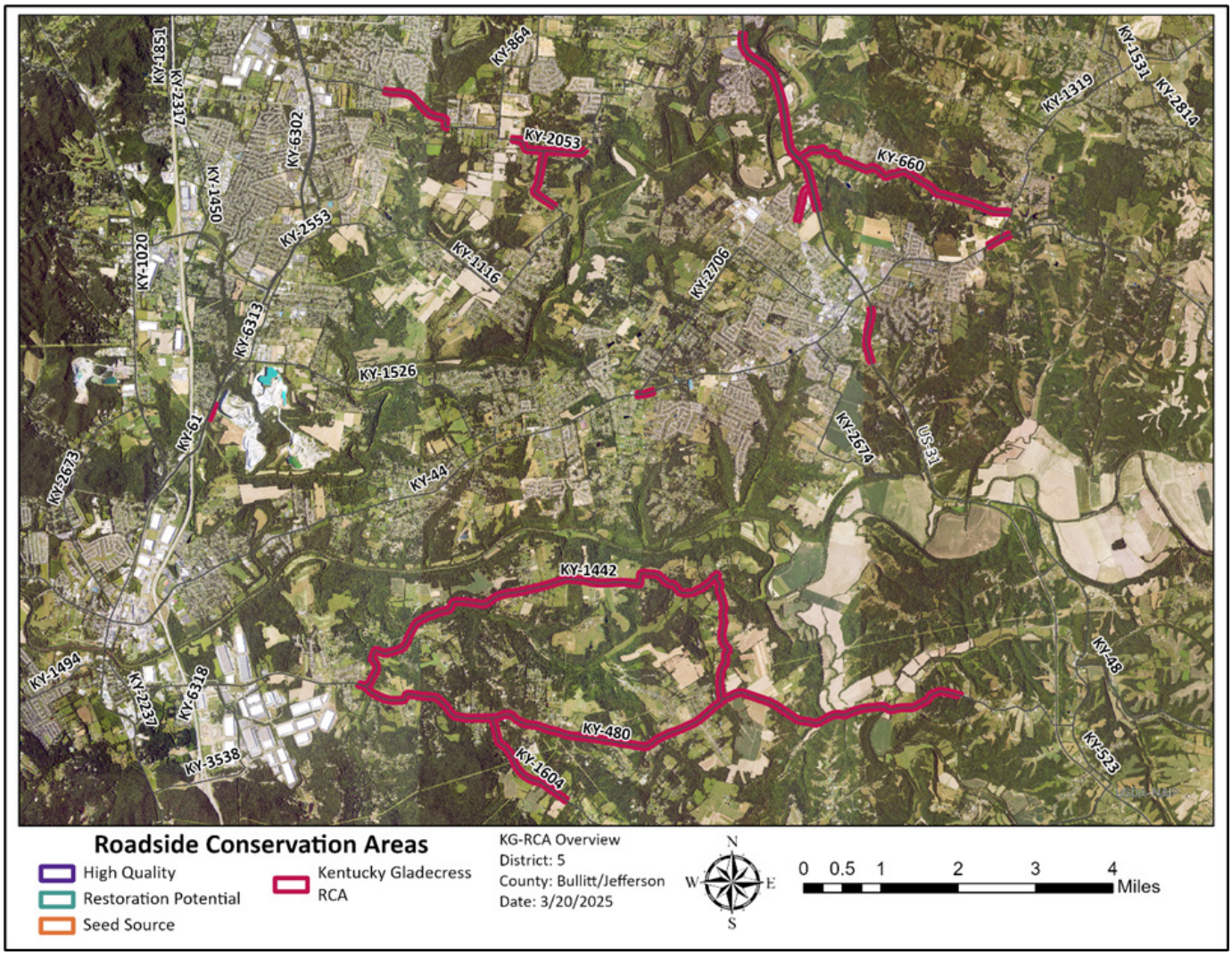


Figure 25. *Overview of Kentucky gladecress RCAs in District 5.*

Table 10. *List of KG-RCA no-spray zones in District 5.*

County	District	Route	Mile Start	Start Description	End Mile	End Description
Jefferson	5	KY-2053	1.00		2.00	
Jefferson	5	KY-2053	3.00		4.00	
Bullitt	5	KY-1116	5.00		5.80	Intersection with KY-2053
Jefferson	5	US-31E	0.00	County Line	1.90	Intersection with KY-2053
Bullitt	5	US-31E	2.60	Intersection with US-31EX	3.30	Intersection w. KY-44
Bullitt	5	US-31E	4.80		5.10	County Line
Bullitt	5	US-31EX	2.00		2.40	Intersection w. US-31E
Jefferson	5	KY-660	0.00	Intersection with US-31E	0.40	County Line
Bullitt	5	KY-660	0.00	County Line	2.60	Intersection w. KY-1319
Bullitt	5	KY-480	3.30	Intersection w. KY-1442	11.70	County Line
Bullitt	5	KY-1442	0.00	Intersection w. KY-480	7.30	Intersection w. KY-480
Bullitt	5	KY-1604	4.30		5.70	Intersection w. KY-480
Bullitt	5	KY-44	25.10		25.40	Intersection w. KY-1319
Bullitt	5	KY-44	19.90	Intersection w. KY-2706	20.10	
Bullitt	5	XX-61	0.50		0.70	

In 2023, the first RCA signs were installed to mark the boundaries of these important Kentucky gladecress habitats (Figures 26). Adding directional arrows to RCA signs is recommended to clarify boundaries of the RCA to maintenance crews (see example in Figure 21).

Other Federally Listed Plants

No other federally listed plants were observed within state-maintained ROW, however, the KNHD contains multiple records for several federally listed species that occur in the vicinity of state-maintained roads. These records include additional locations of globe bladderpod and records of Braun's rockress (*Borodinia perstellata*), a federally threatened species. Future road construction, realignment, or expansion has potential to impact several of these populations.

Figure 26. *Some of the first RCA signs installed as part of this project were located at KG-RCA locations.*

Price's potato-bean (*Apios priceana*) is a federally threatened species that was previously documented along some state highways in the past, but those populations have since been extirpated (OKNP 2025). This plant is currently known to occur in roadside habitat along some local and county level roads (not included in the project) in western Kentucky. While not documented by this project, or currently known to occur along state highways, there is potentially suitable habitat along state highway ROW in several counties where Price's potato-bean occurs.

OKNP recommends further coordination with KYTC to share information regarding federally listed plant locations and developing site specific management plans to address potential maintenance activities or road development projects that may affect these populations.

Further Collaboration on Federal Lands

Many of the RCAs documented by the project occur along federal public lands managed by U.S. Forest Service (USFS) or other federal entities. Many of these sites associated with USFS lands have been previously identified by OKNP and USFS staff and there has been a long history of collaboration between USFS and KYTC to manage mowing and restrict uses of herbicide along these routes. OKNP recommends continued collaboration with USFS and deferment to their roadside management policies and recommendations.

OKNP has recommended the installation of RCA signs for High Quality and Restoration Potential sites. Where these sites occur in association with federal lands, OKNP recommends coordinating with the relevant agency to get agreement for sign installation.

Future Maintenance Needs

The RCAs identified in this report, are still vulnerable to potential degradation from both ecological threats, such as noxious weeds and woody encroachment, and potential deleterious effects from maintenance activities. Most of the identified sites are small (median size 0.3 acres), isolated, and surrounded by areas of lower quality habitat. Even the highest quality RCAs documented by the project are subject to pressures from non-native species and noxious weeds that may occur onsite or immediately adjacent to the desirable habitat.

Ecological research has shown that intact native plant communities with a high diversity of native plants can have greater resistance to degradation from noxious weeds, but this ecological resistance has limits that can be overcome with persistent propagule pressure, especially in the case of isolated habitat fragments (Von Holle and Simberloff, 2005). Furthermore, roads are known to be dispersal corridors for propagules of noxious weeds and can provide a steady supply of novel seed introductions into RCAs (Christen and Matlack 2009). In other words, even the highest quality RCAs are under continuous pressure from noxious weeds which may overtime degrade the conservation value of these sites. OKNP strongly recommends continued monitoring of these sites for noxious weed species and follow-up spot treatment of noxious weeds as necessary.

Additionally, while we have strived to provide recommendations that minimize the risk of harm, it is possible that reductions in mowing frequency at some RCAs may result in undesirable spread of non-native species. Continued monitoring of RCAs and assessment of their response to management changes is strongly recommended. Adaptive management that is responsive to changing conditions is a necessary component of successful conservation land management.

Systemic Management for Pollinator Habitat

This project focused on identifying the highest quality pollinator habitat. While less than 1-percent of the state ROW were designated as RCAs, OKNP strongly cautions against interpreting this to mean that the remaining 99-percent of ROW are non-habitat for pollinators. As previously noted, pollinator habitat and native plant communities occur on a spectrum of quality. This project focused

on the best habitat available and on habitat types that are irreplaceable on that landscape. A great deal of lower quality habitat was observed during surveys, typically in the character of the "old field" community type previously described (see *"Old Fields" and Other Lower Quality Habitats* section).

These remaining roadsides can potentially benefit from systemic approaches to ROW management that may include reducing mowing pressure, rotational mowing, altering mowing timing, and applying herbicide treatments in a more targeted manner to avoid impacts to potentially valuable stands of milkweeds and other native plant species.

Reducing the frequency and surface area of mowing can promote increased richness of native forbs and grasses that support pollinating insects (Entsminger et al. 2018). A combined approach of protecting RCAs, creating restoration plantings, and improving general management practices of the remaining roadside environment will provide the most cohesive approach to managing Kentucky's roadsides for ecological and pollinator health.

Future Collaboration with OKNP

This project emphasized identification of high-quality pollinator habitat (including habitat for rare insects), rare plant populations, and rare native plant communities. Additional long-term monitoring of the identified resources would be beneficial to inform management and make changes as necessary and help ensure the long-term success of this project.

The habitat needs of common pollinating insects have significant overlap with many rare insect and plant species. Occurrence data from the KNHD of rare insects and rare plants indicate that these species frequently occupy the same high-quality habitats (OKNP 2025). For this project, OKNP largely relied on habitat quality (as described and defined in this report) as a proxy for potential rare insect habitat.

However, without conducting insect surveys, OKNP cannot confirm if specific rare insect species (including federally listed or candidate species) are occupying roadside ROW. Further collaboration with KYTC to conduct targeted insect surveys of state-maintained ROW is an outstanding research and management need. The RCA sites identified by this project, and the plant species lists (indicating important host plants) generated for each site would greatly facilitate targeted and efficient surveys for important pollinators and rare insects. Thorough insect surveys would greatly improve our knowledge and ability to successfully manage these habitats for important pollinators and rare insects.

Conclusion

The Office of Kentucky Nature Preserves collaborated with the Kentucky Transportation Cabinet to develop a five-year project for the identification of high-quality pollinator habitat, rare insect and rare plant species along Kentucky's road system. OKNP successfully surveyed over 31,000 miles of roads from 2020 through 2024 and designated a total of 283 Roadside Conservation Areas (including KG-RCAs), consisting of over 440 acres of habitat, that support native plant communities, important pollinator resources, and rare plant species. In total, these RCAs represent less than 1-percent of the ROW that KYTC manages, which underscore their vulnerable state and need for enhanced protection. OKNP has provided best management practice recommendations for all designated RCAs to help ensure their persistence on the landscape. A continued commitment to monitoring and management of the RCAs designated by this project will be necessary to ensure the long-term success of this project. OKNP recommends additional collaboration on issues related to ROW management of sensitive habitats and protection of these critical RCAs

References

Abernathy, G., D. White, E. L. Laudermilk, and M. Evans, editors. 2010. Kentucky's Natural Heritage: An Illustrated Guide to Biodiversity. University Press of Kentucky, Lexington, KY., USA.

Cariveau, A.B, E. Anderson, K. Baum, J. Hopwood, E. Lonsdorf, C. Nootenboom, K. Tuerk, K. Oberhauser,

and Emilie Snell-Rood. 2019. Rapid assessment of roadsides as potential habitat for monarch and other pollinators. Frontiers in Ecology and Evolution. 7:386.

Christen, D.C., and G.R. Matlack. 2009. The habitat and conduit functions of roads in the spread of three invasive plant species. Biological Invasions 11:453-465.

Ebeling, A., A. Klein, J. Schumacher, W.W. Weisser, and T. Tscharntke. 2008. How does plant richness affect pollinator richness and temporal stability of flower visits? Oikos 117:1808-1815.

Endangered and Threatened Wildlife and Plants; Threatened Species Status with Section 4(d) Rule for Monarch Butterfly and Designation of Critical Habitat. 89 Fed. Reg. 100662 (proposed December 12, 2024) (to be codified at 50 C.F.R. part 17).

Entsminger, E.D., Guyton, J.W., Iglay, R.B., and J.C. Jones. 2018. Highway Right-of-Way Mowing Regimens in Northeastern Mississippi. In Southeastern Grasslands. Edited by Hill, J.G., and J. A. Barone. The University of Alabama Press. 2018. Pp. 256-263.

Estes, D., M. Brock, M. Homoya, and A. Dattila. 2016. A Guide to the Grasslands of the Mid-South. Published by the Natural Resource Conservation Service, Tennessee Valley Authority, Austin Peay State University and the Botanical Research Institute of Texas.

Faber-Langendoen, D., W. Nichols, J. Rocchio, K. Walz, and J. Lemly. 2016. An Introduction to NatureServe's Ecological Integrity Assessment Method. NatureServe, Arlington, VA.

Forister, M.L., Pelton, E.M., and S.H. Black. 2019. Declines in insect abundance and diversity: We know enough to act now. Conservation Science and Practice 1:e80.

Forman, R. T. T., D. Sperling, J.A. Bissonette, A. P. Clevenger, C.D. Cutshall, V.H. Dale, L. Fahrig, R. France, C. R. Goldman, K. Heanue, J.A. Jones, F.J. Swanson, T. Turrentine, and T.C. Winter. 2003. Road Ecology: Science and Solutions. Washington, D.C.: Island Press.

Google. 2020. Google Earth Pro [computer software]

Hopwood, J. 2008. The contribution of roadside grassland restorations to native bee conservation. Biological Conservation. 141.

Kentucky Department of Agriculture. 2019. Kentucky Pollinator Protection Plan. Available at: https://www.kyagr.com/statevet/documents/OSV_Bee_KY-Pollinator-Pro-Plan.pdf. Accessed: October 2021.

Kentucky Department of Fish and Wildlife Resources. 2018. Kentucky Monarch Conservation Plan. Frankfort, KY. Available at: https://fw.ky.gov/Wildlife/Documents/ky_monarch_plan.pdf. Accessed: January 2025.

Kentucky Department of Fish and Wildlife Resources. 2023. Kentucky's State Wildlife Action Plan. Frankfort, KY. Available at: https://fw.ky.gov/WAP/Documents/2023_SWAP_PublicComment_AR02.pdf. Last accessed: 10/1/2023.

Kentucky Exotic Pest Plant Council (KYEPPC). 2013. Exotic Invasive Plants of Kentucky. Available at: https://www.se-eppc.org/ky/list.htm. Last accessed: 1/8/2022.

Kentucky Transportation Cabinet (KYTC). 2024. Kentucky's Highway Roadsides Protect Pollinators [Press release]. https://transportation.ky.gov/NewsRoom/2024-06-17%20Pollinator%20Week.pdf. Accessed: January 2025.

Leopold, Aldo. 1949. A Sand County Almanac and Sketches Here and There. Oxford University Press, Inc. New York.

Monarch Joint Venture (MJV). 2016. Mowing and Management: Best Practices for Monarch. Brochure. Available at: https://monarchjointventure.org/resources/downloads-and-links. Last accessed: 2/22/2020.

NatureServe. 2002. Element Occurrence Data Standard. NatureServe. Arlington, VA. Available at: https:// https://help.natureserve.org/biotics/Content/Methodology/EO_DataStandard.pdf. Last accessed 11/20/2020.

Neumann, A.E., F. Conitz, S. Karlebowski, U. Sturm, J.M. Schmack, and M. Egerer. 2024. Flower richnes is key to pollinator abundance: The role of garden features in cities. Basic and Applied Ecology 79:102-113.

Office of Kentucky Nature Preserves (OKNP). 2025. Kentucky Natural Heritage Database. Office of Kentucky Nature Preserves, Frankfort, KY.

Office of Kentucky Nature Preserves (OKNP), and Kentucky Transportation Cabinet (KYTC). 2017. KYTC Pollinator Initiative Overview. Office of Kentucky Nature Preserves, Frankfort, KY.

Ries, L., Debinski, D.M., and M.L. Wieland. 2001. Conservation value of roadside prairie restoration to butterfly communities. Conservation Biology. 15(2).

Rodgers, D., T. Littlefield, and K. McDonald. 2022. Kentucky Rare Plant List, 2022 edition. Energy and Environment Cabinet, Office of Kentucky Nature Preserves, Frankfort, Kentucky.

Sánchez-Bayo, F., and K.A.G. Wyckhuys. 2019. Worldwide decline of the entomofauna: A review of its drivers. Biological Conservation 232: 8-27.

Von Holle, D., and D. Simberloff. 2005. Ecological resistance to biological invasion overwhelmed by propagule pressure. Ecology 86: 3212-3218.

U.S. Department of Transportation, Federal Highway Administration. 2016. Pollinators and Roadsides: Best Management Practices for Managers and Decision Makers. Available: https://www.environment.fhwa.dot.gov/env_topics/ecosystems/Pollinators_Roadsides/BMPs_pollinators_roadsides.pdf. Accessed: October 2021.

U.S. Environmental Protection Agency. 2013. Level III and IV ecoregions of the continental United States: Corvallis, Oregon. U.S. EPA. National Health and Environmental Effects Research Laboratory. Map scale 1:3,000,000. https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states.

Weakley, A.S., and Southeastern Flora Team. 2022. Flora of the southeastern United States. University of North Carolina Herbarium, North Carolina Botanical Garden.

White House Office of Press Secretary. 2014. "2014 Pollinator Presidential Memo." Available: https://www.nps.gov/subjects/pollinators/presidential-memo.htm. Accessed: October 2021.

Yahn, Brian. 2011. Natural Grassland Survey of the Interior Low Plateau Karst Priority Conservation Area August 2011, Final Report. Kentucky State Nature Preserve Commission. Frankfort, KY

Appendix A. NatureServe Global and State Conservation Status Ranks

Listed below are definitions for interpreting NatureServe's global (range-wide) and state (within Kentucky) conservation status ranks. Global conservation status ranks are assigned by NatureServe scientists or by a designated lead office in the NatureServe Network. Global ranks (G-ranks) and state rank (S-ranks) often differ because the latter only assess the status of the species within the designated state and do not consider the total global population of the species. A species may be rare in Kentucky but otherwise more common in the United States or globally. Additional explanation of NatureServe's conservation status ranks can be found at www.natureserve.org.

Table A1. *Global and state conservation rank definitions.*

Global or State Rank	Definition
G1, S1	**Critically Imperiled** — At very high risk of extinction or collapse due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2, S2	**Imperiled** — At high risk of extinction or collapse due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3, S3	**Vulnerable** — At moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4, S4	**Apparently Secure** — At fairly low risk of extinction or collapse due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5, S5	**Secure** — At very low risk or extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
GX, SX	**Presumed Extinct (species)** — Not located despite intensive searches and virtually no likelihood of rediscovery
GH, SH	**Possibly Extinct (species) or Possibly Collapsed (ecosystem)** — Known from only historical occurrences but still some hope of rediscovery. Examples of evidence include (1) that a species has not been documented in approximately 20-40 years in human-dominated landscapes despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is extinct or collapsed throughout its range.

Table A2. *Global and state conservation rank qualifier symbols and definitions.*

Global and State Rank Qualifiers	
Global or State Rank	**Definition**
G#G#, S#S#	**Range Rank** — A numeric range rank (e.g., G2G3, S1S3) is used to indicate uncertainty about the exact status of a taxon or ecosystem type. Ranges cannot skip more than two ranks (e.g., GU should be used rather than G1G4).
GU, SU	**Unrankable** — Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.
GNR, SNR	**Unranked** — Global rank not yet assessed.
?	**Inexact Numeric Rank** — Denotes inexact numeric rank; this should not be used with any of the Variant Global Conservation Status Ranks or GX or GH.
GNA, SNA	**Not Applicable** — A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities. A global conservation status rank may be not applicable for several reasons, related to its relevance as a conservation target. For species, typically the species is a hybrid without conservation value, or of domestic origin. For ecosystems, the type is typically non-native (e.g. many ruderal vegetation types), agricultural (e.g. pasture, orchard) or developed (e.g. lawn, garden, golf course).
Q	**Questionable taxonomy that may reduce conservation priority** — Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The “Q” modifier is only used at a global level and not at a national or subnational level.
C	**Captive or Cultivated Only** — Taxon or ecosystem at present is presumed or possibly extinct or eliminated in the wild across their entire native range but is extant in cultivation, in captivity, as a naturalized population (or populations) outside their native range, or as a reintroduced population or ecosystem restoration, not yet established. The "C" modifier is only used at a global level and not at a national or subnational level. Possible ranks are GXC or GHC. This is equivalent to "Extinct in the Wild (EW) in IUCN’s Red List terminology (IUCN 2001).
T#	**Infraspecific Taxon (trinomial)** — The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T subrank cannot imply the subspecies or variety is more abundant than the species, for example, a G1T2 subrank should not occur. A vertebrate animal population (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific taxon and given a T rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status.

Appendix B. Survey Planning and Site Selection Criteria Lists

Focal Species, Indicator Genera/Species, and Rare Community lists were developed and utilized for survey planning and scheduling and site selection criteria. Federal status refers to the Federal Endangered Species Act. State Status refers to the Kentucky Rare Plant List (E=endangered, T=threatened, S=Special Concern, W=Watchlist). Refer to Appendix A for explanation of G- and S-Ranks. See Methods for definition and application of each list.

Table B1. *Focal species list.*

Survey Year	Scientific Name	Common Name	Federal Status	State Status	G-Rank	S-Rank
3	*Aesculus pavia var. pavia*	Red Buckeye		T	G5T5	S2
2	*Agalinis decemloba*	Ten-lobed False Foxglove	At-risk	E	G3G4	S1
3	*Baptisia aberrans*	Eastern Prairie Blue Wild Indigo		E	G2	S1
1	*Baptisia leucophaea var. leucophaea*	Cream Wild Indigo		S	G4G5T4T5	S3
2	*Baptisia tinctoria*	Yellow Wild Indigo		T	G5	S1S2
4	*Carex fraseriana*	Fraser's sedge		E	G4	S1
3	*Clematis crispa*	Blue Jasmine Leather-flower		T	G5	S2
1, 2	*Delphinium carolinianum ssp. calciphilum*	Glade larkspur		T	G5T2T4	S1S2
4	*Erythronium rostratum*	Yellow Troutlily		S	G5	S3
2	*Euphorbia mercurialina*	Mercury Spurge		S	G4	S3
3	*Eurybia hemispherica*	Tennessee Aster		E	G4	S1
3	*Iris brevicaulis*	Zigzag Iris		T	G4	S1S2
3	*Iris fulva*	Copper Iris		E	G5	S1
4	*Juncus articulatus*	Jointed Rush		S	G5	S2S3
1	*Leavenworthia torulosa*	Necklace Gladecress		T	G4	S2
4	*Liatris cylindracea*	Slender Blazingstar		E	G5	S2
2, 4	*Lilium philadelphicum var. philadelphicum*	Wood Lily		T	G5T4T5	S2S3
4	*Nabalus albus*	White Rattlesnake-root		T	G5	S2
3	*Phacelia ranunculacea*	Blue Scorpion-weed		S	G4	S3
4	*Phlox subulata*	Moss Phlox		S	G5	S3
1, 5	*Physaria globosa*	Globe Bladderpod	LE	E	G2	S1
3	*Rorippa aquatica*	Lakecress		T	G4?	S1S2
5	*Sabulina fontinalis*	Water Stitchwort		E	G3	S1S2
1	*Silene regia*	Royal Catchfly		E	G3	S1
3	*Silphium integrifolium*	Rosinweed		W	G5	S3S4
1, 2	*Silphium laciniatum*	Compassplant		T	G5	S2
1, 2, 3	*Silphium pinnatifidum*	Tansy Rosinweed		S	G3Q	S3
2, 4	*Silphium wasiotense*	Appalachian Rosinweed		T	G3	S2
3	*Solidago buckleyi*	Buckley's Goldenrod		S	G4	S3
4, 5	*Solidago shortii*	Short's Goldenrod	LE	E	G1	S1

Table B1. *Focal species list. (cont.)*

Survey Year	Scientific Name	Common Name	Federal Status	State Status	G-Rank	S-Rank
4	*Thaspium pinnatifidum*	Cutleaf Meadow-parsnip		T	G2G3	S2S3
5	*Trifolium stoloniferum*	Running Buffalo Clover	Delisted	T	G3	S2S3

Table B2. *Indicator Genera List.*

Scientific Name	Common Name
Agalinis sp.	False Foxglove
Aureolaria sp.	False Foxglove
Baptisia sp.	Wild Indigo
Crataegus sp.	Hawthorn
Doellingeria sp.	Aster
Liatris sp.	Blazing Star
Lithospermum sp.	Gromwell
Opuntia sp.	Prickly Pear
Orbexilum sp.	French Grass
Rhexia sp.	Meadow Beauty
Rhynchospora sp.	Beakrush
Sericocarpus sp.	Aster

Table B3. *Indicator Species List.*

Habitat Indicator Species			
Scientific Name	**Common Name**	**G-Rank**	**S-Rank**
Agave virginica	False Aloe	G5	S4
Aletris farinosa	White-tubed Colicroot	G5	S3S4
Andropogon gerardii	Big Bluestem	G5	S5
Andropogon glomeratus	Bushy Bluestem	G5	S4?
Andropogon ternarius	Silver Bluestem	G5	S4
Asclepias amplexicaulis	Clasping Milkweed	G5	S4
Asclepias perennis	Aquatic Milkweed	G5	S4
Asclepias verticillata	Whorled Milkweed	G5	S4?
Blephilia ciliata	Downy Woodmint	G5	S4
Brickellia eupatorioides	A Thoroughwort Brickellbush	G5T5	S4
Carex meadii	Mead's Sedge	G5	S4?
Ceanothus americana	Common New Jersey Tea	G5T5?	S5
Chrysopsis mariana	Maryland Golden Aster	G5	S4
Comandra umbellata var. umbellata	Eastern Comandra	G5T5	S4
Coreopsis tripteris	Tall Tickseed	G5	S5
Croton monanthogynus	Prairie-tea	G5	S5
Dasistoma macrophyllum	Mullein Foxglove	G4	S4?
Desmodium ciliare	Hairy Small-leaved Tick-trefoil	G5	SNR

Table B3. *Indicator Species List. (cont.)*

Habitat Indicator Species			
Scientific Name	**Common Name**	**G-Rank**	**S-Rank**
Desmodium marilandicum	Maryland Tick-trefoil	G5	S5
Desmodium sessilifolium	Sessile-leaf Tick-trefoil	G5	SNR
Echinacea simulata	Wavy-leaf Purple-coneflower	G4	S3S4
Elymus glabriflorus var. australis	Southeastern Wild-rye	G5T4?	S5
Epilobium coloratum	Purple-leaf Willow-herb	G5	S4?
Eryngium yuccifolium var. yuccifolium	Rattlesnake-master	G5T5	S3S4
Eupatorium pilosum	Vervain Thoroughwort	G5	S5?
Eupatorium rotundifolium	Round-leaf Thorough-wort	G5	S5
Euploca tenella	Slender Heliotrope	G5	S5
Euthamia graminifolia var. nuttallii	Grass-leaved Goldenrod	G5T5?Q	S5
Helianthus atrorubens	Purple-disk Sunflower	G5	S4
Helianthus mollis	Ashy Sunflower	G4G5	S5
Hypericum dolabriforme	Straggling St. John's-wort	G4	S4
Hypericum frondosum	Golden St. John's-wort	G4	S5
Hypoxis hirsuta	Eastern Yellow Stargrass	G5	S5
Ionactis linariifolia	Flaxleaf Aster	G5	S5
Lespedeza hirta var. hirta	Hairy Lespedeza	G5T5	S5
Lespedeza virginica	Slender Bush-clover	G5	S5
Lobelia puberula	Downy Lobelia	G5	S4
Lobelia spicata	Pale-spiked Lobelia	G5	S4S5
Malus angustifolia	Southern Crabapple	G5?	S3S4
Mimosa microphylla	Little-leaf Sensitive-briars	G5T5	S4S5
Monarda fistulosa var. fistulosa	Appalachian Bergamot	G5T5	S5
Muhlenbergia capillaris	Long-awn Hairgrass	G5	S3S4
Nothoscordum bivalve	Crow-poison	G4	S5
Oenothera filipes	Slender-stalked Gaura	G5	S5
Osmunda spectabilis	Royal Fern	G5	S4S5
Osmundastrum cinnamomeum	Cinnamon Fern	G5	S5
Parthenium integrifolium var. integrifolium	Common Wild Quinne	G5T5	S4
Penstemon tenuiflorus	White-flower Beardtongue	G4?	S4?
Phlox maculata	Meadow Phlox	G5T4T5	S5
Phlox pilosa ssp. pilosa	Downy Phlox	G5T5	S5
Physostegia virginiana ssp. praemorsa	False Dragon-head	G5T4T5Q	S4
Pityopsis nervosa	Narrowleaf Silkgrass	GNR	S5
Primula meadia	Shootingstar	G5	S5
Pycnanthemum tenuifolium	Slender Mountain-mint	G5	S5
Quercus marilandica var. marilandica	Blackjack Oak	G5T4T5	S5
Ratibida pinnata	Gray-head Prairie Coneflower	G5	S4
Rhus aromatica var. aromatica	Fragrant Sumac	G5T5	S5
Rosa carolina ssp. carolina	Carolina Rose	G5T5	S5
Rosa palustris	Swamp Rose	G5	S5
Rosa setigera	Prairie Rose	G5	S5
Salvia azurea var. grandiflora	Blue Sage	G4G5T4?	S4S5

Table B4. *Rare native plant community types.*

Rare Native Plant Communities		
Community Scientific Name	**Community Common Name**	**S-Rank**
Acer saccharum - Carya cordiformis / Asimina triloba Floodplain Forest	Bottomland ridge/terrace forest	S1
Andropogon gerardii - (*Sorghastrum nutans*) Kentucky Grassland	Tallgrass prairie	S1
Betula alleghaniensis - (*Tsuga canadensis*) / *Rhododendron maximum* / (*Leucothoe fontanesiana*) Forest	Hemlock-yellow birch forest	S1
Calamagrostis coarctata - Lespedeza capitata - Drosera (*brevifolia, intermedia*) - *Salix humilis* Xero-hydric Grassland	Eastern Highland Rim xerohydric meadow	S1
Carex lurida - Carex leptalea - Parnassia grandifolia - Juncus brachycephalus - (*Xyris tennesseensis*) Seepage Fen	Calcareous seep	S1
Fraxinus quadrangulata - Quercus macrocarpa - Quercus muehlenbergii / Arundinaria gigantea / Elymus spp. Woodland	Bluegrass savanna	S1
Juniperus virginiana / Schizachyrium scoparium - Silphium terebinthinaceum var. *luciae-brauniae - Carex juniperorum - Castilleja coccinea* Wooded Grassland	Bluegrass Cat Prairie	S1
Panicum virgatum - Tripsacum dactyloides Grand Prairie/Big Barrens Grassland	Western Kentucky wet prairie	S1
Pinus echinata / Schizachyrium scoparium Appalachian Woodland	Cumberland Plateau shortleaf pine savanna	S1
Pinus rigida / Schizachyrium scoparium - Sorghastrum nutans - Baptisia tinctoria Woodland	Cumberland Mountains pitch pine barrens	S1
Quercus bicolor - Fraxinus pennsylvanica / Carex spp. Wet Forest	Bluegrass sinkhole swamp forest	S1
Quercus muehlenbergii - Juniperus virginiana / Schizachyrium scoparium - Manfreda virginica Wooded Grassland	Limestone Slope Glade	S1
Quercus stellata - Quercus marilandica / Schizachyrium scoparium Wooded Grassland	Sandstone barrens	S1
Quercus stellata / Cinna arundinacea Flatwoods Forest	Western Kentucky xerohydric flatwoods	S1
Sandstone prairie	Sandstone prairie	S1
Schizachyrium scoparium - (*Helianthus mollis, Helianthus occidentalis, Silphium trifoliatum*) Grassland	Limestone/dolomite prairie	S1
Sedum pulchellum - Phemeranthus calcaricus - Leavenworthia spp. / Nostoc commune Limestone Glade Vegetation	Limestone flatrock glade	S1
Spartina pectinata Western Kentucky Grassland	Western Kentucky Cordgrass prairie	S1
Sporobolus (*neglectus, vaginiflorus*) - *Leavenworthia exigua* var. *laciniata - Viola egglestonii* Grassland	Outer bluegrass dolomite glade	S1
Taxodium distichum - (*Nyssa aquatica*) / *Forestiera acuminata - Planera aquatica* Floodplain Forest	Bald-cypress - Water tupelo forest	S1
Thuja occidentalis / Carex eburnea - Pellaea atropurpurea Cliff Woodland	Appalachian Northern White-cedar Cliff Woodland	S1
Bottomland marsh	Bottomland marsh	S1S2
Carex comosa - Carex decomposita - Dulichium arundinaceum - Lycopus rubellus Marsh	Sinkhole/depression marsh	S1S2

Table B4. *Rare native plant community types. (cont.)*

Rare Native Plant Communities		
Community Scientific Name	**Community Common Name**	**S-Rank**
Quercus marilandica - Juniperus virginiana / Schizachyrium scoparium - Hypericum gentianoides Wooded Grassland	Shawnee Hills sandstone glade	S1S2
Quercus muehlenbergii - Cercis canadensis / Packera obovata - Lithospermum canescens Woodland	Cumberland Mountains dry limestone woodland	S1S2?
Fagus grandifolia - Quercus (*alba*, *rubra*) / *Acer floridanum / Asimina triloba* Forest	Coastal Plain Loess Bluff Forest	S2
Fraxinus quadrangulata - Juniperus virginiana / Schizachyrium scoparium - Lithospermum canescens Woodland	Eastern knobs rocky ledge	S2
Juniperus virginiana - Fraxinus quadrangulata / Symphyotrichum oblongifolium - Panicum flexile - Sedum pulchellum Woodland	Bluegrass rocky ledge	S2
Quercus montana / Juniperus virginiana / Vaccinium arboreum / Taenidia integerrima Kentucky Siltstone Woodland	Kentucky Knobs siltstone barrens	S2
Quercus palustris - Quercus bicolor - (*Liquidambar styraciflua*) Swamp Forest	Wet depression hardwood forest	S2
Quercus phellos - Quercus nigra - (*Nyssa biflora*) Wet Forest	Eastern Highland Rim xerohydric flatwoods	S2
Quercus stellata / Viburnum rufidulum / Schizachyrium scoparium - (*Sorghastrum nutans*, *Helianthus eggertii*) Woodland	Interior Low Plateau post oak savannah	S2
Aesculus flava - Acer saccharum - (*Tilia americana* var. *heterophylla*) / *Hydrophyllum canadense - Solidago flexicaulis* Forest	Pine Mountain calcareous mesophytic forest	S2?
Sparganium americanum - (*Sparganium erectum* ssp. *stoloniferum*) - *Epilobium leptophyllum* Seep	Cumberland Plateau upland depression marsh	S2?
Cephalanthus occidentalis / Hibiscus moscheutos Wet Shrubland	Buttonbush shrub swamp	S2S3
Quercus marilandica - (*Juniperus virginiana*) / *Schizachyrium scoparium - Danthonia spicata* Wooded Grassland	Shale glade	S2S3
Quercus montana / Danthonia spicata - Silene caroliniana Woodland	Kentucky Knobs shale barrens	S2S3
Bottomland hardwood forest	Bottomland hardwood forest	S3
Kalmia latifolia - Rhododendron catawbiense - (*Gaylussacia baccata*, *Pieris floribunda*, *Vaccinium corymbosum*) Shrubland	Cumberland Mountains xeric pine outcrop	S3
Pinus echinata - Quercus alba / Vaccinium pallidum / Hexastylis arifolia - Chimaphila maculata Forest	Cumberland Plateau shortleaf pine-oak forest	S3?
Quercus montana - Quercus rubra - Carya spp. - *Fraxinus americana / Solidago sphacelata* Forest	Cumberland Plateau circumneutral dry woodland	S3?

Appendix C. Configuration and Implementation of the RARR Tool

RARR Configuration and Field Protocols

To assess the quality of pollinator habitat at selected sites, OKNP utilized the Rapid Assessment of Roadside Right-of-Ways (RARR) scorecard developed by Monarch Joint Venture (MJV) (Cariveau et. al. 2019). OKNP utilized the Survey123 version of the RARR that enabled greater customization to tailor the RARR to the user's ecoregion and their anticipated site conditions. OKNP customized the standard RARR Survey123 forms to include additional location mapping functionality and fields for making notes. The CSS forms (developed by OKNP) were also appended directly onto the end of the RARR Survey 123 form to create a custom an all-in-one tool. These modifications did not affect information collected by the RARR or the calculations used by the RARR to create a pollinator habitat score. An example RARR form utilized by OKNP is provided at the end of this appendix.

OKNP followed the field protocols for sampling at random locations described by Cariveau et al. (2019). Additional notes pertaining to OKNP's configuration of the RARR and supplemental field instructions are provided below:

- The RARR includes three separate lists for recording plant species (nectar plant, milkweed, and noxious weed). The nectar plant and milkweed lists OKNP used in the RARR were derived from the Flora of Kentucky maintained in the Kentucky Natural Heritage Database following the taxonomy of Weakley et. al. 2022. The nectar plant list was broadly defined to include all angiosperms except for graminoids. The noxious weeds list included all species listed by the Kentucky Exotic Pest Plant Council (KYEPPC) as an exotic invasive plant in Kentucky (KYEPPC 2013).
- The management practices section of the RARR was set to default responses for all surveys. Site specific information was not immediately available to the field surveyors and would require site specific inquiries to KYTC. Default responses referring to mowing and herbicide applications were based on general information provided by KYTC prior to surveys.
- Survey length was set to a default of 150ft. Because selected habitats were of variable length, surveyors were instructed to complete the RARR scorecard within what they perceived of as the highest quality 150ft of the selected habitat.
- Surveyors would estimate the width of the ROW based on visual markers of the ROW boundaries (e.g. hedges or fence lines). Surveyors were instructed to enter 30ft if there was no clear visual marker of the ROW width.
    - The size of habitats (acres) reported for designated RCAs was not derived from the RARR scorecard. Many of the assessed habitats were greater than 150ft in length. All habitat acreage figures described in this project report were calculated separately based on digitization of habitat boundaries from aerial photography and detailed location points surveyors collected in the field.

- Each plant list (Nectar, Milkweed, Noxious) of the RARR has an upper threshold, after which, adding additional species will no longer affect the final score. The species richness of native nectar plants, also a component of the habitat score, has a similar upper limit. An attempt was made to maximize the final score for every evaluated site by entering species into the nectar plant list with the following prioritization:

    1. Dominant species
    2. Rare native species
    3. Milkweeds
    4. Other native species (non-dominant)
    5. Non-native, non-dominant species or noxious weeds

    Once the upper threshold was reached, all other nectar plant species could be entered in any order. Surveyors were also made aware that noxious weeds and milkweeds can also qualify as nectar plants and should also be entered into the nectar plant list to ensure a maximal score. This was especially relevant on lower diversity sites where the upper threshold of the nectar plant species list may not be reached.

Figure C1. *Example RARR Scorecard*

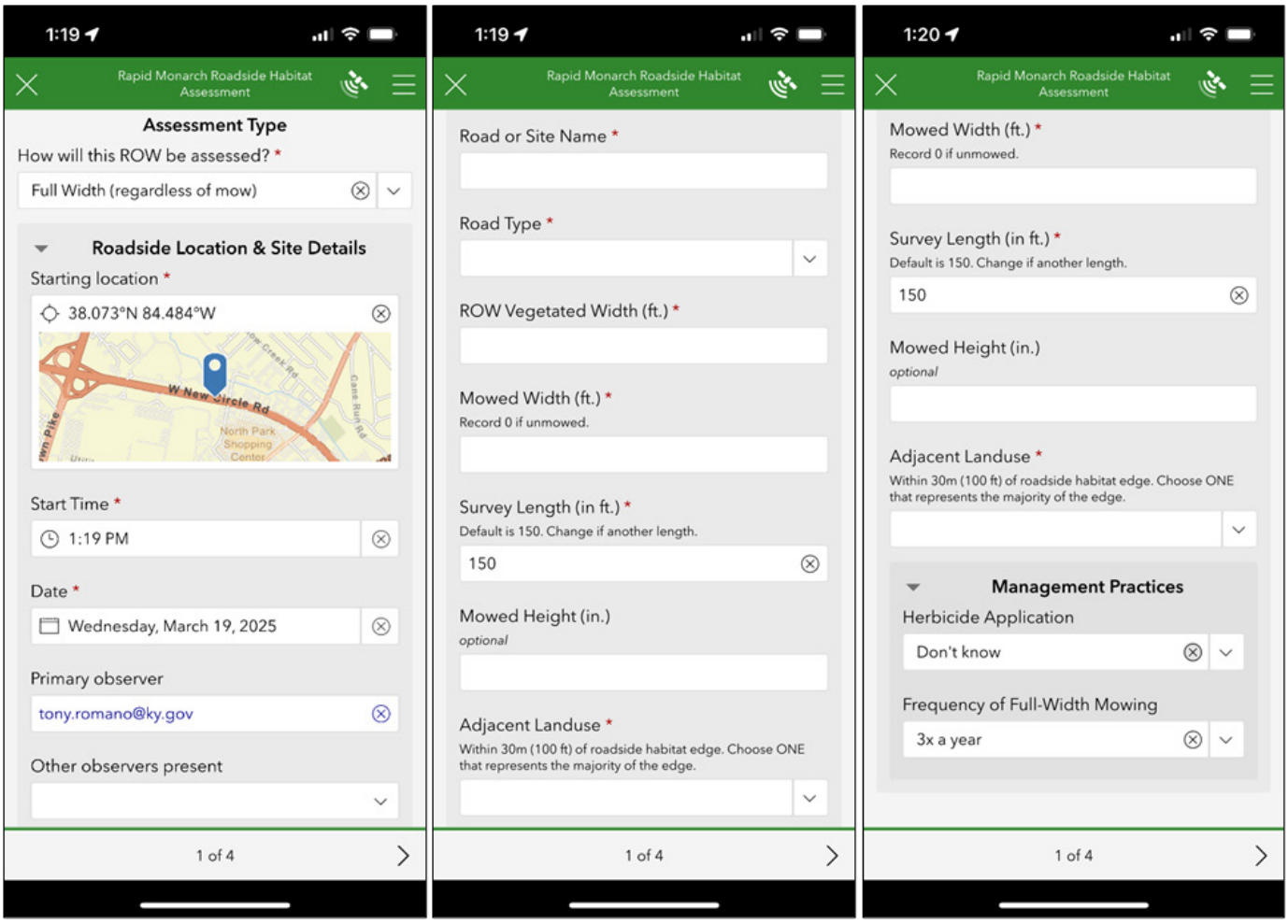
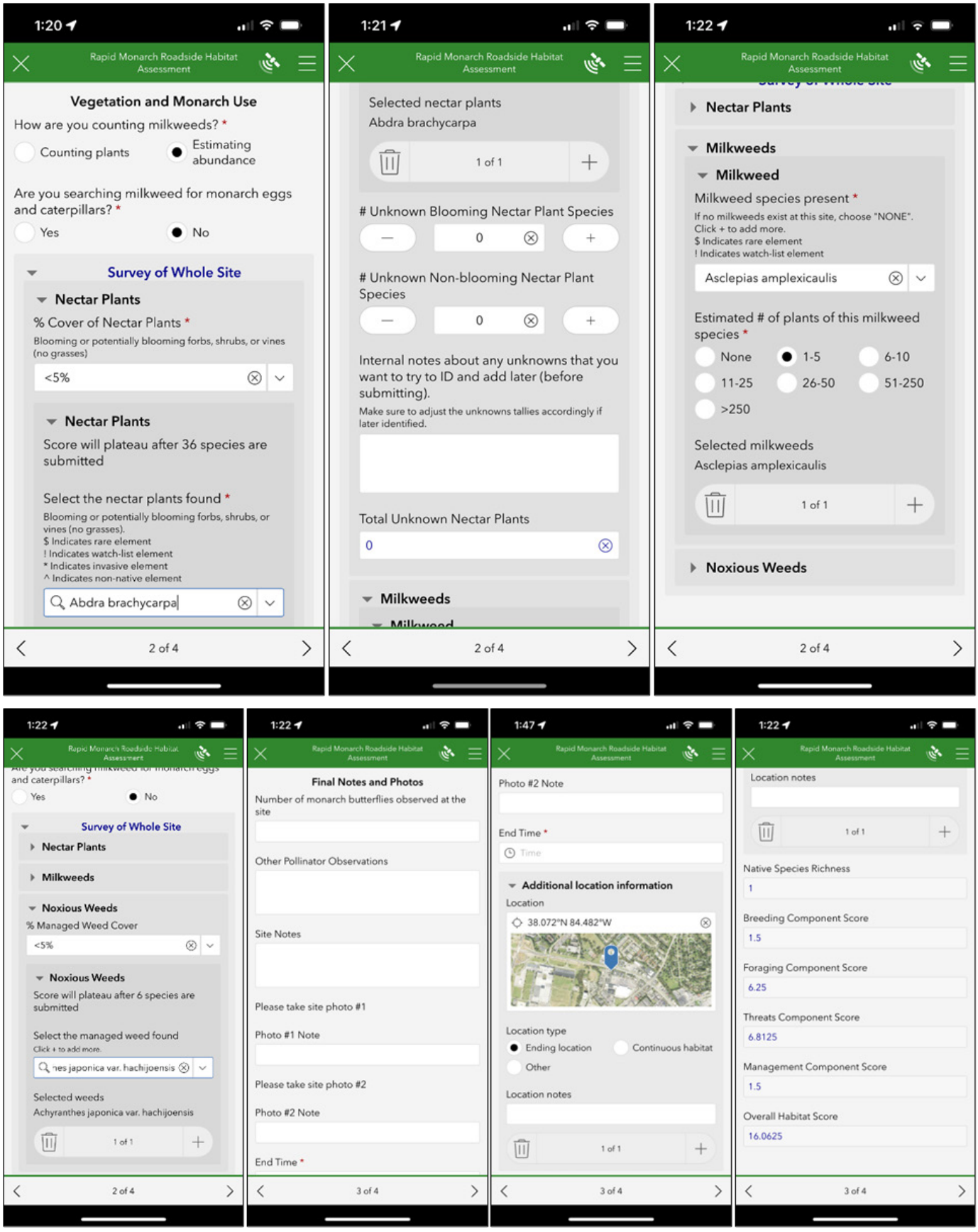


Figure C2. *Example RARR scorecard continued.*



Appendix D. Conservation Site Scorecard Development

The Conservation Site Scorecard (CSS) was developed by OKNP to address potential deficiencies in the information collected by the RARR scorecard. The CSS is a modified version of a previous habitat assessment tool developed by OKNP for a grassland assessment and mapping project in the Interior Low Plateau region of Kentucky (Yahn 2011). An example CSS form is provided at the end of this Appendix.

The first year of roadside surveys (2020) was approached as a pilot year in which the site assessment tools, including the CSS, would be tested, evaluated, and modified as needed based on the collected data and feedback from surveyors. Supplemental information regarding the development of the CSS interpretation index and testing of the CSS site selection criteria are provided below.

Development of the Conservation Site Scorecard Interpretation Index

The CSS calculates a simple habitat quality index that is used to assign sites into different habitat quality categories. An initial score interpretation index was developed in 2020 based on review of data from the previous grassland mapping project (Yahn 2011) and initial testing of the CSS at several roadside reference sites. The initial interpretation index utilized in 2020 consisted of three habitat quality categories (Table D1). See Methods section for definitions of the habitat and management categories.

Table D1. *CSS interpretation index and associated management category utilized in 2020.*

Conservation Site Score	Habitat Quality Category	Associated Management Category
6 or greater	Eliminate	Eliminated
4.1 - 5.9	Low to Medium Quality	Restoration Potential
4.0 or less	High Quality	High Quality

Sites that scored a 6 or higher were rejected as consisting of habitat that is too degraded to hold significant conservation value. Sites between 5.9 and 4.1 reflect a broad spectrum of habitat quality that ranged from sites with significant challenges to restoration (typically abundance of noxious weeds) to sites that are in good condition and would be expected to improve considerably with small investments of restoration management. Sites with a score of 4 or less were considered high quality habitat with conservation value significant to the county, region, or state.

Review of 2020 data indicated that the CSS and interpretation index were accurately identifying the reference test sites as High Quality habitats. Qualitative review of all the roadside sites evaluated in 2020 indicated that the CSS index was separating out the highest and lowest quality sites satisfactorily. The initial interpretation index provided above (Table D1) was used to designate RCAs identified in 2020.

In 2021, based on review of the combined CSS data from the 2020 and 2021 field seasons, and feedback from surveyors, it was determined that too broad a spectrum of sites qualified as Low to Medium Quality (Restoration Potential), and that further refinement of the interpretation index would be beneficial.

The interpretation index standards were increased to ensure that categories more accurately reflected site conditions and their potential for successful restoration. Low and Medium quality sites were split into separate categories. A third management category (Seed Source) was introduced for Low Quality sites with some conservation value, such as a rare plant population, but that were otherwise badly degraded (see *Methods* for habitat category definitions). This updated habitat interpretation index was used in 2021 and all subsequent years of the project (Table D2).

Table D2. *The CSS habitat interpretation index as revised in 2021.*

Conservation Site Score	Raw Habitat Quality Category	Associated Management Category
5 or greater	Eliminate	Eliminated
4.99 - 4.5	Low Quality	Seed Source
4.49 - 3.7	Medium Quality	Restoration Potential
Less than 3.7	High Quality	High Quality

It was determined that sites with a score of 5 or higher were typically very degraded and would be extremely difficult to restore and any conservation value was minimal. These sites were to be rejected from further consideration unless other mitigating factors were identified in the Habitat Quality Categorization process (see *Methods*). The broad spectrum of sites that scored between 4.99 and 3.7 were split into two categories Restoration Potential and Seed Source. The standard for High Quality sites was made stricter, requiring a score lower than 3.7. Sites that score at 3.7 or below are typically of statewide, or even regional, significance for conservation. The RCAs designated in 2020 under the original interpretation index were "grand fathered" in and not reassigned habitat quality categories based on this revision.

Svenson's Wildrye Sites

In 2020, OKNP documented several roadside sites where Svenson's wildrye (*Elymus svensonii*) occurs. This globally rare species grows on the sheer rock faces of natural outcrops and anthropogenic road cuts. In 2020, sites with Svenson's wildrye were treated as a separate RCA category, based primary on the presence of the species. This affected 7 sites with Svenson's wildrye populations. With additional data from multiple years and other cliff specialist species, it became clear that the CSS tool and the Habitat Quality Categorization process were robust enough to incorporate sites with Svenson's wildrye. For this final project report, the original 7 Svenson's wildrye RCAs have been reassigned habitat quality and management categories to conform to the standard scheme, and they were integrated into the standard RCAs.

Verifying the CSS Selection Criteria

The selection criteria for the CSS integrate pollinator habitat quality (as assessed by the RARR) and additional habitat variables pertinent to rare plant species and natural community quality. While there is a great deal of overlap in these considerations, OKNP desired to test that the site selection

criteria used for the CSS tool were accurately identifying high quality habitat for pollinators, and that sites that did not meet these criteria could be safely rejected in the field with a low risk of inadvertently rejecting important pollinator habitat.

In 2020, OKNP collected supplemental information to aid in this analysis. When evaluating a site that met the selection criteria for the CSS, surveyors were instructed to complete a second RARR form outside of the desirable habitat area. These additional RARR forms were intended to provide a direct comparison between selected sites and adjacent non-selected habitat. Thirty-eight additional RARR forms were collected in 2020 for this purpose.

A comparison was made of the average RARR scores from sites that met the CSS selection criteria (CSS completed), those sites were pollinator habitat was initially assessed but the CSS component was ultimately rejected in the field (CSS not completed), and those sites intentionally collected in non-selected habitat.

A random sample of 30 sites from each of these categories was drawn from the 2020 data. The mean was calculated for each category and plotted in a box-and-whiskers chart (Table D3., Figure D1).

Table D3. *2020 mean pollinator scores (RARR) from a random sample of each category. Sample size = 30.*

Site Type	Mean Pollinator Score
Potential Conservation Site	51
Potential Site - Field Rejected	36.49
Paired Point	32.4

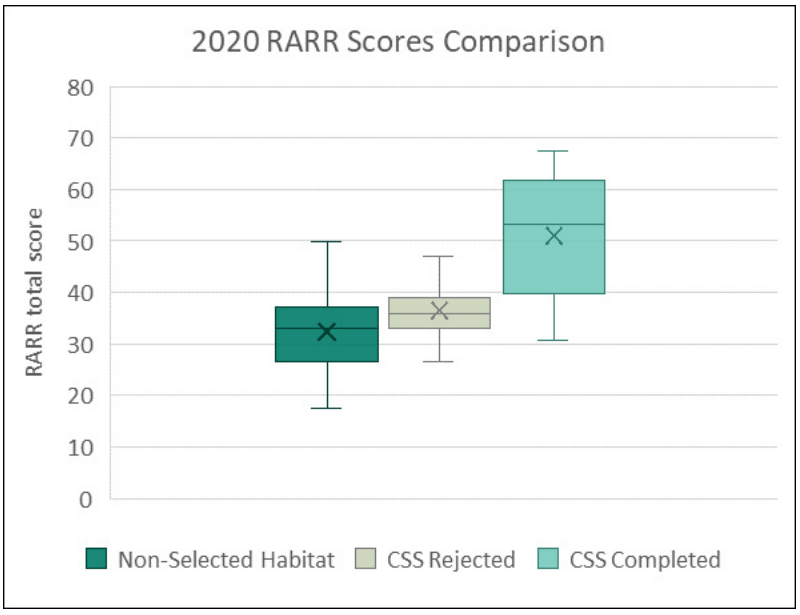


Figure D1. *2020 box-and-whiskers chart of random pollinator scores (RARR), n = 30.*

Sites that met the CSS selection criteria, on average, had higher RARR scores than the sites that were rejected in the field (CSS rejected) and sites where RARR forms were deliberately taken in non-selected habitat. While there is high variability in the RARR scores of sites where a CSS was completed, OKNP determined based on this comparison that the CSS site selection criteria were performing adequately and the danger of sites with high quality pollinator habitat being erroneously rejected from the project due to faulty site selection criteria was low.

Some of the high variability in the RARR scores is explained by the timing of data collection, with early season assessments introducing greater variability. A second comparison was made with a randomized sample of 18 sites from the CSS complete and CSS rejected categories. Surveys conducted in May were excluded from this analysis (Figure D2).

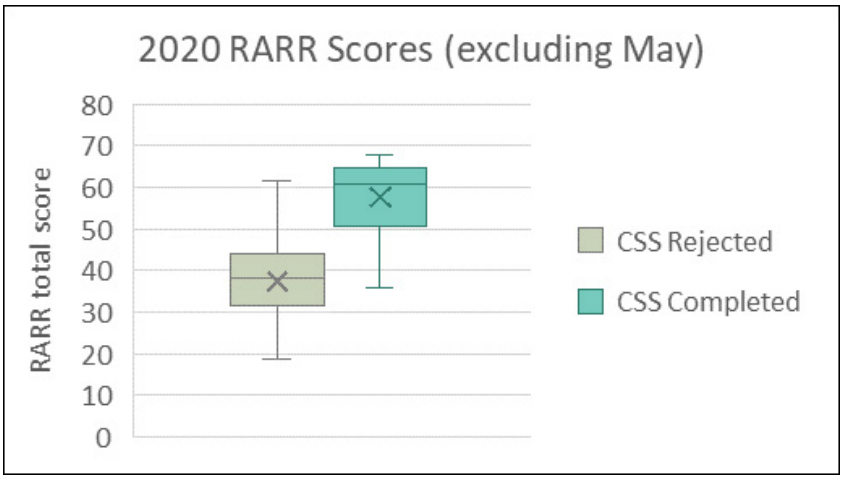
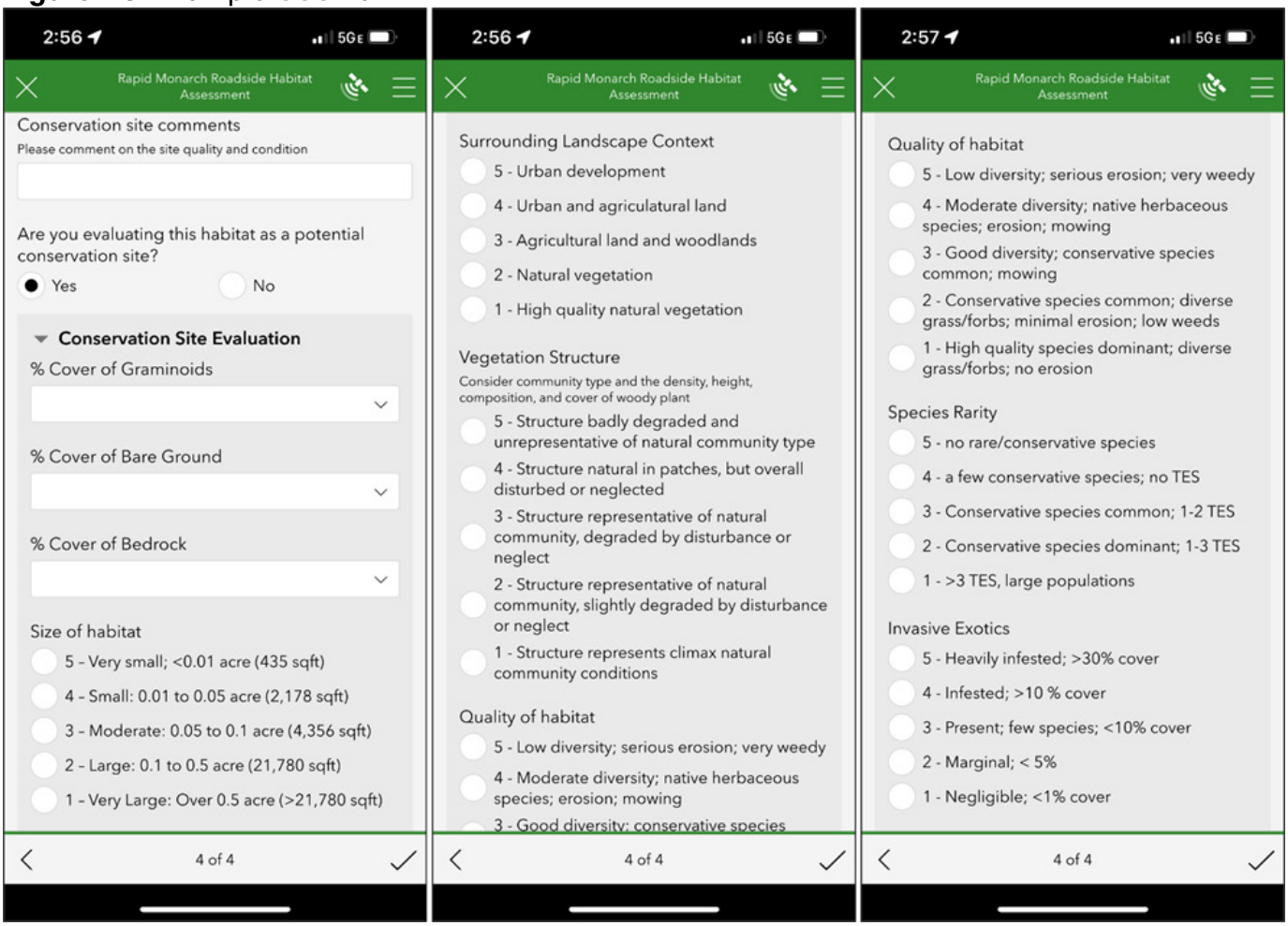


Figure D2. *Comparison of 2020 pollinator scores between potential conservation sites and those rejected in the field. Sample size =18. Surveys conducted in May were excluded from analysis.*

Removing the May observations reduced the variance of both categories and showed further differentiation of the means of both categories. The mean RARR score for sites that met the CSS criteria was 57.5 and the mean was 37.44 for sites that were rejected. OKNP concluded that the site selection and evaluation tools were working as intended, and that possibility of inadvertently rejecting good pollinator habitat was low.

Figure D3. Example CSS Form



Additional CSS form notes:

- Selecting “No” on the first question prompts the user to enter a rationale for rejecting the site from further consideration.
- The fields for percent cover of graminoids, percent cover of bare ground, and percent cover of bedrock are pick lists of pre-determined ranges.
- Selecting a percent cover of graminoids enables an additional field where plant species can be entered (this list is more expansive than graminoids, and includes all species of the Kentucky flora not previously captured by the RARR scorecard).

Appendix E. Lists of Plants Observed by the Project

Lists of Rare Plants, Noxious Weeds, and All Other Plants observed and documented by the project. Federal status refers to the Federal Endangered Species Act. State Status refers to the Kentucky Rare Plant List (E=endangered, T=threatened, S=Special Concern, W=Watchlist). Refer to Appendix A for explanation of G- and S-Ranks. EPPC status is designated by the Kentucky Exotic Pest Plant Council (1 = severe threat, 2 = significant threat, 3 = moderate threat, 4 = watchlist).

Table E1. *List of Rare plant species.*

Rare Plant Species					
Scientific Name	**Common Name**	**Federal Status**	**State Status**	**G-Rank**	**S-Rank**
Aesculus pavia var. pavia	Red Buckeye		T	G5T5	S2
Agalinis decemloba	Ten-lobed False Foxglove	At-risk	E	G3G4	S1
Agalinis gattingeri	Roundstem Foxglove		W	G4	S3S4
Asclepias hirtella	Prairie milkweed		T	G5	S2
Asclepias purpurascens	Purple Milkweed		S	G5?	S3
Baptisia aberrans	Eastern Prairie Blue Wild Indigo		E	G2	S1
Baptisia leucophaea var. leucophaea	Cream Wild Indigo		S	G4G5T4T5	S3
Baptisia tinctoria	Yellow Wild Indigo		T	G5	S1S2
Bartonia virginica	Yellow Screwstem		T	G5	S2
Bouteloua curtipendula var. curtipendula	Side-oats Grama		S	G5T5	S3?
Buchnera americana	Bluehearts		S	G5?	S2S3
Carex cherokeensis	Cherokee Sedge		W	G4G5	S1?
Carex crawei	Crawe's Sedge		S	G5	S3
Clematis catesbyana	Satin-curls		T	G5	S2
Clematis crispa	Blue Jasmine Leather-flower		T	G5	S2
Clematis glaucophylla	White-leaved Leather-flower		T	G4?	S2
Clematis versicolor	Pale Leatherflower		T	G5	S2S3
Cypripedium parviflorum var. parviflorum	Small Yellow Lady's-slipper		T	G5T5?	S2
Dalea candida	White Prairie-clover		T	G5	S2
Dalea purpurea	Purple Prairie-clover		T	G5	S2
Diarrhena obovata	Obovate Beakgrain		W	G4G5	S2?
Dichanthelium angustifolium	Narrow-leaved Witchgrass		S	G5T5	S3
Drosera intermedia	Spoon-leaved Sundew		E	G5	S1
Elymus svensonii	Svenson's Wildrye		T	G3	S2S3
Erythronium rostratum	Yellow Troutlily		S	G5	S3
Euphorbia mercurialina	Mercury Spurge		S	G4	S3
Eurybia hemispherica	Tennessee Aster		E	G4	S1
Eutrochium steelei	Steele's Joe-pye-weed		S	G4	S3
Gentianella occidentalis	Agueweed		W	G5T4T5	S3S4
Gillenia trifoliata	Bowman's-root		W	G4G5	S4
Gymnopogon ambiguus	Bearded Skeleton-grass		T	G4	S2
Gymnopogon brevifolius	Shortleaf Skeleton-grass		E	G5	S1

Table E1. *List of Rare plant species (cont.).*

Rare Plant Species					
Scientific Name	**Common Name**	**Federal Status**	**State Status**	**G-Rank**	**S-Rank**
Helianthus eggertii	Eggert's Sunflower	Delisted	S	G3	S3
Hibiscus lasiocarpos	Crimsoneyed Rosemallow		W	G5T4	S2?
Hieracium longipilum	Hairy Hawkweed		T	G4G5	S2
Hydrocotyle ranunculoides	Floating Pennywort		E	G5	S1S2
Iris brevicaulis	Zigzag Iris		T	G4	S1S2
Iris fulva	Copper Iris		E	G5	S1
Juncus articulatus	Jointed Rush		S	G5	S2S3
Juncus filipendulus	Ringseed Rush		S	G5	S3
Justicia lanceolata	Ovate Water-willow		W	G5T4T5	S3?
Lathyrus palustris	Vetchling Peavine		T	G5	S2
Lathyrus venosus	Smooth Veiny Peavine		S	G5	S2S3
Leavenworthia exigua var. laciniata	Kentucky Gladecress	LT	E	G4T1T2	S1S2
Leavenworthia torulosa	Necklace Gladecress		T	G4	S2
Lespedeza capitata	Round-head Bush-clover		S	G5	S3
Liatris cylindracea	Slender Blazingstar		E	G5	S2
Lilium philadelphicum var. philadelphicum	Wood Lily		T	G5T4T5	S2S3
Limnobium spongia	American Frog's-bit		T	G4	S2S3
Lithospermum bejariense	Western False Gromwell		E	G4G5T3	S1
Lithospermum parviflorum	Hairy False Gromwell		T	G4G5T4	S2
Ludwigia hirtella	Rafinesque's Seedbox		E	G5	S1
Malus angustifolia	Southern Crabapple		W	G5?	S3S4
Malvastrum hispidum	Hispid Falsemallow		T	G3G5	S2
Matelea carolinensis	Carolina Anglepod		T	G4	S2
Nabalus albus	White Rattlesnake-root		T	G5	S2
Nemophila aphylla	Small-flower Baby-blue-eyes		T	G5	S2
Oenothera linifolia	Thread-leaf Sundrops		E	G5	S1S2
Oenothera perennis	Small Sundrops		W	G5	S2?
Oenothera tetragona var. brevistipata	Northern Sundrops		W	GNRTNR	S3?
Orbexilum onobrychis	French-grass		S	G5	S3
Phacelia ranunculacea	Blue Scorpion-weed		S	G4	S3
Phlox subulata	Moss Phlox		S	G5	S3
Physaria globosa	Globe Bladderpod	LE	E	G2	S1
Polygala polygama	Racemed Milkwort		T	G5	S2
Pycnanthemum curvipes	Stone Mountainmint		E	G3	S1
Ranunculus longirostris	Longbeak Buttercup		S	G5	S2S3
Rhynchosia tomentosa	Hairy Snoutbean		E	G5	S1S2
Rorippa aquatica	Lakecress		T	G4?	S1S2
Sabatia quadrangula	Four Angled Rose Gentian		E	G4G5	S1
Sabulina fontinalis	Water Stitchwort		E	G3	S1S2
Salvia urticifolia	Nettle-leaf Sage		E	G5	S1

Table E1. *List of Rare plant species (cont.).*

Rare Plant Species					
Scientific Name	**Common Name**	**Federal Status**	**State Status**	**G-Rank**	**S-Rank**
Senecio suaveolens	Sweet-scented Indian-plantain		T	G4	S2S3
Silene regia	Royal Catchfly		E	G3	S1
Silphium integrifolium	Rosinweed		W	G5	S3S4
Silphium laciniatum	Compassplant		T	G5	S2
Silphium pinnatifidum	Tansy Rosinweed		S	G3Q	S3
Silphium terebinthinaceum var. luciae-brauniae	Lucy Braun's Prairie Dock		W	G4G5T3?Q	S3?
Silphium wasiotense	Appalachian Rosinweed		T	G3	S2
Sium suave	Hemlock Water-parsnip		W	G5	S3S4
Solidago buckleyi	Buckley's Goldenrod		S	G4	S3
Solidago harrisii	Harris' Goldenrod		W	G5T4	S3S4
Solidago shortii	Short's Goldenrod	LE	E	G1	S1
Spiranthes magnicamporum	Great Plains Ladies'-tresses		T	G3G4	S2
Symphyotrichum concolor var. concolor	Eastern Silvery Aster		T	G5T5	S2
Symphyotrichum kentuckiense	Price's Aster		T	G3G5	S2
Symphyotrichum pratense	Barrens Silky Aster		S	G4?	S3
Symphyotrichum puniceum var. puniceum	Swamp Aster		T	G5T5	S2S3
Thaspium pinnatifidum	Cutleaf Meadow-parsnip		T	G2G3	S2S3
Trepocarpus aethusae	Trepocarpus		W	G4G5	S3S4
Trifolium stoloniferum	Running Buffalo Clover	Delisted	T	G3	S2S3
Vitis labrusca	Northern Fox Grape		T	G5	S2S3
Xyris torta	Twisted Yellow-eyed-grass		S	G5	S2S3

Table E2. *Noxious Weeds as defined by KY-EPPC.*

Noxious weeds and other exotic pest plant species		
Scientific Name	**Common Name**	**EPPC**
Achyranthes japonica var. hachijoensis	Japanese Chaff-flower	1
Ailanthus altissima	Tree-of-heaven	1
Albizia julibrissin	Silk Tree	2
Alliaria petiolata	Garlic Mustard	1
Allium sativum	Garlic	4
Allium vineale	Field Garlic	3
Artemisia vulgaris	Common Wormwood	4
Arthraxon hispidus var. hispidus	Basket Grass	1
Arundo donax	Giant Reed	4
Barbarea vulgaris	Yellow Rocket	3
Bromus inermis	Awnless Brome	2
Bromus japonicus	Japanese Brome	2
Bromus racemosus	Spiked Brome-grass	3

Table E2. *Noxious Weeds as defined by KY-EPPC. (cont.)*

Noxious weeds and other exotic pest plant species		
Scientific Name	**Common Name**	**EPPC**
Bromus tectorum	Cheat Grass	2
Buglossoides arvensis ssp. arvensis	Corn-gromwell	3
Carduus acanthoides	Spiny Plumeless-thistle	3
Carduus nutans	Musk Thistle	1
Celastrus orbiculatus	Oriental Bitter-sweet	1
Centaurea stoebe ssp. micranthos	Spotted Starthistle	2
Cichorium intybus	Chicory	3
Cirsium arvense	Creeping Thistle	1
Cirsium vulgare	Bull Thistle	2
Clematis terniflora	Japanese Virgin's-bower	1
Commelina communis	Asiatic Dayflower	3
Conium maculatum	Poison-hemlock	1
Convolvulus arvensis	Field Bindweed	3
Coronilla varia	Common Crown-vetch	1
Daucus carota	Wild Carrot	2
Dioscorea polystachya	Chinese Yam	1
Dipsacus fullonum	Fuller's Teasel	2
Dipsacus laciniatus	Cut-leaf Teasel	2
Echinochloa crusgalli var. crusgalli	Barnyard Grass	2
Elaeagnus angustifolia	Russian Olive	3
Elaeagnus umbellata	Autumn Olive	1
Euonymus alatus	Winged Spindle-tree	1
Euonymus fortunei	Winter-creeper	1
Glechoma hederacea	Ground Ivy	1
Hedera helix	English Ivy	2
Hemerocallis fulva	Orange Daylily	2
Holcus lanatus	Common Velvet Grass	3
Hypericum perforatum	Europeon St. John's-wort	3
Kummerowia stipulacea	Korean-clover	1
Kummerowia striata	Common Korean-clover	2
Lactuca saligna	Willow-leaf Lettuce	4
Lamium purpureum	Purple Deadnettle	3
Lespedeza bicolor	Shrubby Bushclover	2
Lespedeza cuneata	Chinese Bushclover	1
Ligustrum sinense	Chinese Privet	1
Lolium arundinaceum	Kentucky Fescue	1
Lolium multiflorum	Italian Ryegrass	3
Lolium pratense	Meadow Fescue	2
Lonicera japonica	Japanese Honeysuckle	1
Lonicera maackii	Amur Honeysuckle	1
Lotus corniculatus	Birds-foot Trefoil	3
Lysimachia nummularia	Creeping Jennie	1
Lythrum salicaria	Purple Loosestrife	1
Medicago lupulina	Black Medic	2

Table E2. *Noxious Weeds as defined by KY-EPPC. (cont.)*

Noxious weeds and other exotic pest plant species		
Scientific Name	**Common Name**	**EPPC**
Melilotus albus	White Melilot	1
Melilotus officinalis	Yellow Sweetclover	1
Mentha spicata var. spicata	Spearmint	3
Microstegium vimineum	Japanese Stilt-grass	1
Miscanthus sinensis	Chinese Silver Grass	1
Morus alba	White Mulberry	2
Mosla dianthera	Mosla	2
Noccaea perfoliata	Perfoliate Penny-cress	3
Ornithogalum umbellatum	Common Star-of-Bethlehem	2
Pastinaca sativa	Wild Parsnip	2
Perilla frutescens	Beef-steak Plant	2
Persicaria longiseta	Creeping Smartweed	2
Persicaria maculosa	Lady's Thumb	2
Phragmites australis	Common Reed	1
Poa annua	Annual Bluegrass	3
Poa compressa	Canada Bluegrass	2
Poa pratensis ssp. pratensis	Kentucky Bluegrass	2
Potentilla indica	Indian Mock-strawberry	3
Potentilla recta	Sulphur Cinquefoil	3
Pyrus calleryana	Bradford Pear	1
Ranunculus bulbosus	Bulbous Butter-cup	3
Reynoutria japonica	Japanese Knotweed	1
Rosa multiflora	Rambler Rose	1
Rubus phoenicolasius	Wine Raspberry	2
Rumex acetosella	Sheep Sorrel	3
Setaria faberi	Giant Foxtail	2
Setaria viridis var. viridis	Green Bristle Grass	2
Sonchus asper	Spiny-leaf Sowthistle	4
Sorghum halepense	Johnson Grass	1
Spiraea japonica	Japanese Spiraea	2
Stellaria media	Common Starwort	1
Torilis arvensis	Field Hedge-parsley	3
Trifolium campestre	Low Hop Clover	4
Trifolium pratense	Red Clover	4
Trifolium repens	White Clover	4
Tussilago farfara	Colt's Foot	2
Verbascum thapsus ssp. thapsus	Woolly Mullein	2
Vicia sativa ssp. nigra	Narrow-leaved Vetch	4
Vicia sativa ssp. sativa	Common Vetch	4
Vicia villosa ssp. villosa	Hairy Vetch	4
Vinca minor	Periwinkle	2

Table E3. *All Other Observed Plant Species*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Abdra brachycarpa	Short-fruited Whitlow-grass	G4G5	S4?
Abelmoschus Medik	Okra	GNR	SNA
Acalypha gracilens	Shortstalk Copperleaf	G5	S5
Acalypha ostryifolia	Hornbeam Copper-leaf	G5	S5?
Acalypha virginica	Virginia Copperleaf	G5	S5
Acer negundo var. negundo	Box Elder	G5T5?	S5
Acer nigrum	Black Maple	G5	S4
Acer rubrum var. rubrum	Eastern Red Maple	G5T5	S5
Acer rubrum var. trilobum	Carolina Red Maple	G5T5	S4?
Acer saccharinum	Silver Maple	G5	S5
Acer saccharum	Sugar Maple	G5	S5
Achillea gracilis	American Yarrow	G5T5	SNR
Achillea millefolium	Common Yarrow	G5	SNA
Actaea pachypoda	White Baneberry	G5	S5
Actaea racemosa	Black Bugbane	G3G4	S5
Adiantum pedatum	Northern Maidenhair-fern	G5	S4
Aesculus flava	Yellow Buckeye	G5	S5
Aesculus glabra var. glabra	Ohio Buckeye	G5T5	S5
Agalinis fasciculata	Fascicled False Foxglove	G5	S4
Agalinis purpurea	Large-purple False-foxglove	G5	S4?
Agalinis tenuifolia	Slender False-foxglove	G5	S4
Agave virginica	False Aloe	G5	S4
Ageratina altissima	Common White Snakeroot	G5	S5
Ageratina aromatica var. aromatica	Lesser Snakeroot	G5T5	S4
Agrimonia parviflora	Swamp Agrimony	G5	S5
Agrimonia pubescens	Soft Groovebur	G5	S5
Agrostis gigantea	Black Bentgrass	G4G5	SNA
Agrostis hyemalis	Winter Bentgrass	G5	S4S5
Agrostis perennans	Perennial Bentgrass	G5	S4S5
Aletris farinosa	White-tubed Colicroot	G5	S3S4
Alisma subcordatum	Broad-leaved Water-platain	G5	S4S5
Allium canadense var. canadense	Meadow Onion	G5T5	S4
Allium cernuum	Nodding Onion	G5	S3S4
Alnus serrulata	Brook-side Alder	G5	S5
Ambrosia artemisiifolia	Annual Ragweed	G5	S5
Ambrosia bidentata	Lance-leaf Ragweed	G5	SNA
Ambrosia trifida	Great Ragweed	G5	S5
Amelanchier arborea	Downy Serviceberry	G5	S5
Ammoselinum butleri	Butler's Sand-parsley	G5	S5
Amorpha fruticosa	False Indigo-bush	G5	S4
Ampelopsis cordata	Heartleaf Peppervine	G5	S4?
Amphicarpaea bracteata var. bracteata	American Hog-peanut	G5T5	S5
Amsonia tabernaemontana	Wideleaf Blue-stars	G5	S4?
Andropogon gerardii	Big Bluestem	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Andropogon glomeratus	Bushy Bluestem	G5	S4?
Andropogon gyrans	Beardgrass	G5	S5
Andropogon ternarius	Silver Bluestem	G5	S4
Andropogon virginicus var. virginicus	Broomsedge	G5T5	S5
Anemone quinquefolia	Wood Anemone	G5T5	S3S4
Anemone virginiana var. virginiana	Virginia Anemone	G5T5	S5
Angelica venenosa	Hairy Angelica	G5	S4
Antennaria parlinii ssp. parlinii	Big-head Pussytoes	G5T5?	S4
Antennaria plantaginifolia	Plantain-leaf Pussytoes	G5	S5
Anthoxanthum odoratum	Sweet Vernal Grass	GNR	SNA
Apios americana	American Groundnut	G5	S5
Apocynum cannabinum	Clasping-leaf Dogbane	G5	S5
Aquilegia canadensis	Wild Columbine	G5	S5
Aralia racemosa	American Spikenard	G5	S4
Aralia spinosa	Hercules Club	G5	S5
Arisaema dracontium	Green Dragon	G5	S4S5
Arisaema triphyllum	Swamp Jack-in-the-pulpit	G5	S5
Aristida longespica	Slim-spike Three-awn Grass	G5	S4
Aristida oligantha	Prairie Three-awn Grass	G5	S4
Aristida purpurascens	Purple Needlegrass	G5	S4S5
Arnoglossum atriplicifolium	Pale Indian-plantain	G4G5	S5
Arnoglossum reniforme	Great Indian-plantain	G4	S4?
Artemisia ludoviciana	White Sagebrush	G5	SNA
Aruncus dioicus var. dioicus	Eastern Goat's-beard	G5T5?	S4
Arundinaria gigantea	Giant Cane	G5	S5
Asarum canadense	Canada Wild-ginger	G5	S5
Asarum reflexum	Wild Ginger	G5TNRQ	SNR
Asclepias amplexicaulis	Clasping Milkweed	G5	S4
Asclepias exaltata	Poke Milkweed	G5	S4
Asclepias incarnata var. incarnata	Western Swamp Milkweed	G5T5	S5
Asclepias perennis	Aquatic Milkweed	G5	S4
Asclepias quadrifolia	Whorled Milkweed	G5	S4
Asclepias syriaca	Common Milkweed	G5	S5
Asclepias tuberosa var. tuberosa	Butterflyweed	G5T5?	S5
Asclepias variegata	White Milkweed	G5	S4
Asclepias verticillata	Whorled Milkweed	G5	S4?
Asclepias viridiflora	Green Milkweed	G5	S4
Asclepias viridis	Spider Milkweed	G4G5	S4
Asparagus officinalis	Garden Asparagus-fern	G5?	SNA
Asplenium platyneuron	Ebony Spleenwort	G5	S5
Astilbe biternata	False Goat's-beard	G4G5	S5
Astranthium integrifolium	Entire-leaved Western-daisy	G5	S5?
Athyrium asplenioides	Lady-fern	G5T5	S5
Aureolaria flava	Yellow False-foxglove	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Aureolaria levigata	Downy Yellow Foxglove	G5	S5
Aureolaria virginica	Downy False-foxglove	G5	S5
Baptisia lactea	Largeleaf Wild Indigo	G4Q	S3S4
Betula nigra	River Birch	G5	S5
Bidens aristosa	Ozark Tickseed-sunflower	G5	S5
Bidens bipinnata	Spanish-needles	G5	S5
Bidens cernua	Nodding Beggar-ticks	G5	S5
Bidens comosa	Strawstem Beggar-ticks	G5T5	S5
Bidens connata	Purple-stem Swamp Beggar-ticks	G5	S5?
Bidens frondosa	Devil's Beggar-ticks	G5	S5?
Bidens polylepis	Midwestern Tickseed-sunflower	G5	S5?
Bidens vulgata	Tall Bur-marigold	G5	S5?
Bignonia capreolata	Crossvine	G5	S5
Blephilia ciliata	Downy Woodmint	G5	S4
Blephilia hirsuta	Hairy Woodmint	G5	S5?
Boehmeria cylindrica	False Nettle	G5	S5
Boltonia asteroides var. recognita	Aster-like Boltonia	G5T3T5	S5
Boltonia diffusa var. interior	Small-head Boltonia	G4G5T3T5	S3S4
Bothriochloa torreyana	Silver Bluestem	G5T5	SNR
Brachyelytrum erectum	Bearded Short-husk	G5	S5
Brassica napus	Turnip	GNR	SNA
Brassica nigra	Black Mustard	GNR	SNA
Brassica rapa var. rapa	Field Mustard	GNRTNR	SNA
Brickellia eupatorioides var. eupatorioides	A Thoroughwort Brickellbush	G5T5	S4
Bromus erectus	Meadow Brome	GNR	SNA
Bromus pubescens	Hairy Wood Brome Grass	G5	S5
Brunnichia ovata	Redvine	G4G5	S5
Calystegia sepium ssp. angulata	Northwestern Bindweed	G5T5	SNR
Camassia scilloides	Wild Hyacinth	G5	S4
Campanula divaricata	Southern Harebell	G4	S5
Campanulastrum americanum	Tall Bellflower	G5	S5
Campsis radicans	Trumpet-creeper	G5	S5
Cardamine bulbosa	Bulbous Bitter-cress	G5	S4
Cardamine concatenata	Cutleaf Toothwort	G5	S5
Cardamine diphylla	Two-leaf Toothwort	G5	S5
Cardamine hirsuta	Hairy Bitter-cress	GNR	SNA
Carex abscondita	Southern Leafy Wood Sedge	G4G5	S3S4
Carex albicans var. albicans	Bellow-beaked Sedge	G5T5	S5?
Carex albolutescens	Greenish-white Sedge	G5	S4?
Carex amphibola	Narrowleaf Sedge	G5	S5
Carex annectens	Yellow-fruited Sedge	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Carex austrina	Southern Sedge	G4?	SNA
Carex blanda	Woodland Sedge	G5	S5
Carex bushii	Bush's Sedge	G4	S4?
Carex caroliniana	Hirsute Sedge	G5	S4?
Carex complanata	Hirsute Sedge	G5	S3?
Carex crinita var. crinita	Long-fringed Sedge	G5T5	SNR
Carex cristatella	Crested Sedge	G5	S3?
Carex crus-corvi	Ravenfoot Sedge	G5	S5
Carex debilis	White-edge Sedge	G5	S5
Carex frankii	Frank's Sedge	G5	S5
Carex glaucodea	Flaccid Sedge	G5T5	SNR
Carex gracillima	Graceful Sedge	G5	S5
Carex granularis	Meadow Sedge	G5	S5
Carex grayi	Gray's Sedge	G4G5	S5
Carex hirsutella	Hirsute Sedge	G5	S5
Carex hyalinolepis	Shore-line Sedge	G4G5	S5
Carex intumescens var. intumescens	Bladder Sedge	G5T5	SNR
Carex jamesii	Nebraska Sedge	G5	S5
Carex laevivaginata	Smooth-sheath Sedge	G5	S5
Carex laxiflora	Loose-flowered Sedge	G5	S5
Carex lupuliformis	False Hop Sedge	G4	S4S5
Carex lupulina	Hop Sedge	G5	S5
Carex lurida	Shallow Sedge	G5	S5
Carex muehlenbergii var. muehlenbergii	Muehlenberg's Sedge	G5T5	S5
Carex muskingumensis	Muskingum Sedge	G4	S4S5
Carex pensylvanica	Pennsylvania Sedge	G5	S5
Carex planispicata	Flat-spiked Sedge	G4Q	SNR
Carex platyphylla	Broad-leaved Sedge	G5	S5
Carex rosea	Rosy Sedge	G5	S5
Carex shortiana	Short's Sedge	G5	S5
Carex squarrosa	Squarrose Sedge	G4G5	S5
Carex stipata var. stipata	Awl-fruit Sedge	G5T5	S5
Carex styloflexa	Bent Sedge	G4G5	S3S4
Carex swanii	Swan Sedge	G5	S5?
Carex torta	Twisted Sedge	G5	S5
Carex tribuloides	Blunt Broom Sedge	G5	SNR
Carex typhina	Cat-tail Sedge	G5	S5
Carex umbellata	Hidden Sedge	G5	S5
Carex vulpinoidea	Fox Sedge	G5	S5
Carex willdenowii	Willdenow's Sedge	G5	S4S5
Carpinus caroliniana ssp. caroliniana	American Hornbeam	G5T4T5	S5
Carya cordiformis	Bitter-nut Hickory	G5	S5
Carya glabra	Sweet Pignut Hickory	G5	S5
Carya tomentosa	Mockernut Hickory	G5	S4

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Caulophyllum thalictroides	Blue Cohosh	G5	S4S5
Ceanothus americanus var. americanus	Common New Jersey Tea	G5T5?	SNR
Celastrus scandens	Climbing Bittersweet	G5	S5
Celtis laevigata	Sugarberry	G5	S5
Celtis occidentalis	Common Hackberry	G5	S5
Celtis tenuifolia	Georgia Hackberry	G5	S5
Centaurea diffusa	Bushy Starthistle	GNR	SNA
Cephalanthus occidentalis	Common Buttonbush	G5	S5
Cercis canadensis var. canadensis	Eastern Redbud	G5T5	S5
Chaerophyllum tainturieri	Tainturier Chervil	G5	S5
Chamaecrista fasciculata var. fasciculata	Partridge Pea	G5T4T5	SNR
Chamaecrista nictitans var. nictitans	Common Sensitive Plant	G5T5	SNR
Chasmanthium latifolium	Indian Sea-oats	G5	S5
Chelone glabra	White Turtlehead	G5	S4S5
Chenopodium berlandieri var. bushianum	Pit-seed Goosefoot	G5T4T5	SNA
Chimaphila maculata	Spotted Wintergreen	G5	S5
Chrysopsis mariana	Maryland Golden Aster	G5	S4
Cicuta maculata var. maculata	Spotted Water-hemlock	G5T5	S5
Cinna arundinacea	Stout Wood Reed-grass	G5	S5
Circaea canadensis	Canada Enchanter's Nightshade	G5	SNR
Cirsium altissimum	Tall Thistle	G5	S5
Cirsium carolinianum	Carolina Thistle	G5	S3S4
Cirsium discolor	Field Thistle	G5	SNR
Claytonia caroliniana	Carolina Spring-beauty	G5	S5
Claytonia virginica var. virginica	Narrow-leaved Spring Beauty	G5T5	S5
Clematis viorna	Vasevine	G5	S4S5
Clematis virginiana	Virginia Virgin-bower	G5	S5
Clinopodium vulgare	Field Basil	G5	SNA
Clitoria mariana var. mariana	Butterfly Pea	G5TNR	SNR
Coleataenia anceps ssp. anceps	Beaked Panic Grass	G5TNR	SNR
Coleataenia rigidula ssp. rigidula	Redtop Panic Grass	G5?TNR	SNR
Comandra umbellata ssp. umbellata	Eastern Comandra	G5T5	S4
Commelina diffusa	Creeping Day-flower	G5	S5
Commelina erecta var. erecta	Slender Dayflower	G5T5	S5
Commelina virginica	Virginia Day-flower	G5	S5
Conoclinium coelestinum	Blue Boneset	G5	S5
Conyza canadensis var. canadensis	Canada Horseweed	G5T5	S5
Conyza canadensis var. pusilla	Fleabane	G5T5	S5
Coreopsis auriculata	Lobed Tickseed	G5	S5
Coreopsis lanceolata	Sand Coreopsis	G5	SNA
Coreopsis major	Wood Tickseed	G5	S5
Coreopsis tripteris	Tall Tickseed	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Cornus amomum	Silky Dogwood	G5	S5
Cornus drummondii	Rough-leaved Dogwood	G5	S5
Cornus florida	Flowering Dogwood	G5	S5
Cornus sericea	Red-osier Dogwood	G5	SNR
Corylus americana	American Hazelnut	G5	S5
Crataegus mollis var. mollis	Downy Hawthorne	G5T5	SNR
Croton capitatus	Woolly Croton	G5	S4?
Croton monanthogynus	Prairie-tea	G5	S5
Croton willdenowii	Elliptical Rushfoil	G5	S3S4
Cunila origanoides	Common Dittany	G5	S5
Cuphea viscosissima	Blue Waxweed	G5?	S4?
Cuscuta campestris	Field Dodder	G5	SNR
Cynanchum laeve	Honeyvine	G5	S5
Cyperus acuminatus	Short-point Flatsedge	G5	S5?
Cyperus refractus	Reflexed Flatsedge	G5	S5?
Cyperus strigosus	Straw-colored Flatsedge	G5	S5
Dactylis glomerata	Orchard Grass	GNR	SNA
Danthonia compressa	Flattened Oatgrass	G5	S3S4
Danthonia sericea	Silky Oat-grass	G5?	SNR
Danthonia spicata	Poverty Oat-grass	G5	S5
Dasistoma macrophyllum	Mullein Foxglove	G4	S4?
Delphinium tricorne	Dwarf Larkspur	G5	S5
Deparia acrostichoides	Silvery Spleenwort	G5	S5
Desmanthus illinoensis	Prairie Mimosa	G5	S5
Desmodium canescens	Hoary Tick-trefoil	G5	SNR
Desmodium ciliare	Hairy Small-leaved Tick-trefoil	G5	SNR
Desmodium cuspidatum var. cuspidatum	Long-bracted Tick-trefoil	G5T5?	SNR
Desmodium glabellum	Dillen Tick-trefoil	G5	SNR
Desmodium laevigatum	Smooth Tick-trefoil	G5	SNR
Desmodium marilandicum	Maryland Tick-trefoil	G5	S5
Desmodium nuttallii	Nuttall Tick-trefoil	G5	SNR
Desmodium obtusum	Stiff Tick-trefoil	G4G5	SNR
Desmodium paniculatum var. paniculatum	Narrow-leaf Tick-trefoil	G5T5	SNR
Desmodium perplexum	Perplexed Tick-trefoil	G5	SNR
Desmodium rotundifolium	Prostrate Tick-trefoil	G5	S5
Desmodium sessilifolium	Sessile-leaf Tick-trefoil	G5	SNR
Desmodium viridiflorum	Velvety Tick-trefoil	G5?	SNR
Dianthus armeria ssp. armeria	Deptford-pink	GNRTNR	SNA
Diarrhena americana	American Beakgrain	G4G5	S5
Dichanthelium acuminatum var. acuminatum	Woolly Witchgrass	G5T5	SNR
Dichanthelium acuminatum var. fasciculatum	Western Witchgrass	G5T5	SNR
Dichanthelium boscii	Bosc's Witchgrass	G5	SNR
Dichanthelium clandestinum	Deer-tongue Witchgrass	G5	SNR

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Dichanthelium commutatum ssp. ashei	Ashe's Witchgrass	G5TNRQ	SNR
Dichanthelium commutatum ssp. commutatum	Variable Witchgrass	G5TNRQ	SNR
Dichanthelium depauperatum	Starved Witchgrass	G5	SNR
Dichanthelium dichotomum var. dichotomum	Small-fruited Panicgrass	G5T5	S5
Dichanthelium latifolium	Broad-leaf Witchgrass	G5	SNR
Dichanthelium laxiflorum	Lax-flower Witchgrass	G5	SNR
Dichanthelium linearifolium	Slim-leaf Witchgrass	G5	SNR
Dichanthelium longiligulatum	Long-ligule Witchgrass	G4G5Q	S4?
Dichanthelium meridionale	Matting Witchgrass	G5	SU
Dichanthelium microcarpon	Small-fruited Witchgrass	GNR	S5
Dichanthelium oligosanthes var. scribnerianum	Scribneris Panic Grass	G5T5	SNR
Dichanthelium polyanthes	Small-fruited Witchgrass	G5	SNR
Dichanthelium ravenelii	Ravenel's Witchgrass	G5	SNR
Dichanthelium scoparium	Broom Panic Grass	G5	SNR
Dichanthelium sphaerocarpon	Roundfruit Panicgrass	G5T5	SNR
Digitaria ischaemum	Smooth Crabgrass	GNR	SNA
Digitaria sanguinalis	Hairy Crabgrass	G5	SNA
Dinebra panicea ssp. brachiata	Mucronate Sprangeltop	GNRT5	S4?
Diodia virginiana	Larger Button-weed	G5	S5
Dioscorea villosa	Yellow Yam	G4G5	S5
Diospyros virginiana	Persimmon	G5	S5
Doellingeria infirma	Cornel-leaf Aster	G5	S4S5
Doellingeria umbellata var. umbellata	Northern Flat-topped White Aster	G5T5	SNR
Echinacea purpurea	Eastern Purple Coneflower	G4	S4
Echinacea simulata	Wavy-leaf Purple-coneflower	G4	S3S4
Echinochloa muricata var. muricata	Rough Barnyard Grass	G5T5	S5
Echinodorus cordifolius	Upright Burhead	G5	SNR
Eclipta prostrata	False-daisy	G5	S4S5
Eleocharis compressa var. compressa	Flat-stemmed Spike-rush	G4	S5
Eleocharis obtusa	Blunt Spike-rush	G5	S5
Eleocharis ovata	Ovate Spikerush	G5	S4?
Eleocharis tenuis var. tenuis	Slender Spikerush	G5T5	SNR
Elephantopus carolinianus	Carolina Elephant-foot	G5	S5
Elephantopus tomentosus	Tobaccoweed	G5	S3
Elymus canadensis var. canadensis	Great Plains Wild Rye	G5T5	S3S4
Elymus glabriflorus var. glabriflorus	Southeastern Wild-rye	GNRTNR	S5
Elymus hystrix var. hystrix	Eastern Bottle-brush Grass	G5T5	S5
Elymus macgregorii	Early Wild-Rye	G5	SNR
Elymus riparius	River Wild-rye	G5	S5
Elymus villosus var. villosus	Downy Wild-Rye	G5TNR	SNR
Elymus virginicus	Virginia Wild-rye	G5	S5
Epigaea repens	Trailing Arbutus	G5	S5
Epilobium coloratum	Purple-leaf Willow-herb	G5	S4?

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Eragrostis hirsuta	Big-top Lovegrass	G5	S4?
Eragrostis spectabilis	Purple Love-grass	G5	S5?
Erechtites hieraciifolius	Fireweed	G5	S5
Erianthus alopecuroides	Silver Plume Grass	G5	SNR
Erianthus giganteus	Sugarcane Plume Grass	G5	S3S5
Erigeron annuus	White-top Fleabane	G5	S5
Erigeron philadelphicus var. philadelphicus	Philadelphia Fleabane	G5T5	S5
Erigeron strigosus var. strigosus	Daisy Fleabane	G5T5	S5
Eryngium prostratum	Prostrate Eryngo	G5	S4?
Eryngium yuccifolium var. yuccifolium	Rattlesnake-master	G5T5	S4?
Erythronium americanum ssp. americanum	American Trout Lily	G5T5	SNR
Euonymus americanus	American Strawberry-bush	G5	S5
Eupatorium album	White Thoroughwort	G5	S5
Eupatorium altissimum	Tall Boneset	G5	S5
Eupatorium godfreyanum	Godfrey's Boneset	G4	S5?
Eupatorium hyssopifolium	Hyssopleaf Thoroughwort	G5	S5
Eupatorium perfoliatum	Common Boneset	G5	S5
Eupatorium pilosum	Vervain Thoroughwort	G5	S5?
Eupatorium pubescens	Hairy Boneset	G5T5	S5
Eupatorium rotundifolium	Round-leaf Thorough-wort	G5	S5
Eupatorium serotinum	Late-flowering Thorough-wort	G5	S5
Eupatorium sessilifolium var. sessilifolium	Sessil-leaf Eupatorium	G5T5	S5
Eupatorium torreyanum	Torrey's Eupatorium	G5T4T5	S5
Euphorbia commutata	Wood Spurge	G5	S4
Euphorbia corollata	Flowering Spurge	G5	S5
Euphorbia dentata	Wild Poinsettia	G5	SNA
Euphorbia nutans	Eyebane Broomspurge	G5	S5
Euphorbia prostrata	Prostrate Broomspurge	G5	SNA
Eurybia divaricata	Serpentine Aster	G5	S5
Eurybia macrophylla	Large-leaf Aster	G5	S5
Eurybia surculosa	Creeping Aster	G4G5	S5
Euthamia graminifolia var. graminifolia	Northern Hairy Goldentop	G5T5	SNR
Euthamia graminifolia var. nuttallii	Grass-leaved Goldenrod	G5T5?Q	SNR
Eutrochium fistulosum	Hollow Joe-pye Weed	G5?	S5
Eutrochium purpureum var. purpureum	Purple Node Joe-pye-weed	G5T5?	S5
Fagus grandifolia var. caroliniana	American Beech	G5TNR	SNR
Festuca octoflora var. octoflora	Slender 8-flowered Fescue	G5T5	SNR
Festuca subverticillata	Nodding Fescue	G5	S5
Fragaria virginiana	Virginia Strawberry	G5	S5
Frangula caroliniana	Carolina Buckthorn	G5	SNR
Frasera caroliniensis	Carolina Gentian	G5	S5
Fraxinus americana	White Ash	G4	S5
Fraxinus biltmoreana	Biltmore Ash	G5	SNR

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Fraxinus pennsylvanica	Green Ash	G4	S5
Fraxinus profunda	Pumpkin Ash	G4	S4S5
Fraxinus quadrangulata	Blue Ash	G4	S5
Galactia regularis	Eastern Milk-pea	G5	S1?
Galinsoga parviflora var. parviflora	Lesser Peruvian-daisy	G4G5TNR	SNA
Galinsoga quadriradiata	Fringed Quickweed	GNR	SNA
Galium aparine	Sticky-willy	G5	S5
Galium circaezans	Wild Licorice	G5	S5
Galium concinnum	Shining Bedstraw	G5	S5
Galium divaricatum	Lamarck's Bedstraw	GNR	SNA
Galium mollugo	Great Hedge Bedstraw	GNR	SNA
Galium obtusum var. obtusum	Large Marsh Bedstraw	G5T4	S4S5
Galium parisiense	Wall Bedstraw	GNR	SNA
Galium pilosum	Hairy Bedstraw	G5	S5
Galium tinctorium var. tinctorium	Southern 3-lobed Bedstraw	G5TNR	S5
Galium triflorum	Sweet-scent Bedstraw	G5	S5
Gamochaeta argyrinea	Silvery Cudweed	GNR	SNR
Gamochaeta purpurea	Purple Cudweed	G5	SNA
Gaultheria procumbens	Teaberry	G5	S5
Gaylussacia baccata	Black Huckleberry	G5	S5
Gentiana saponaria	Soapwort Gentian	G5	S4?
Gentiana villosa	Striped Gentian	G4	S4?
Geranium carolinianum var. carolinianum	Carolina Cranesbill	G5T5	S5
Geranium dissectum	Cut-leaf Crane's-bill	GNR	SNA
Geranium maculatum	Wild Crane's-bill	G5	S5
Geranium molle	Doves-foot Crane's-bill	GNR	SNA
Geum canadense	White Avens	G5	S5
Geum virginianum	Pale Avens	G5	S5
Gillenia stipulata	American Ipecac	G5	S5
Gleditsia triacanthos	Honey-locust	G5	S5
Glyceria striata var. striata	Fowl Manna-grass	G5T5	S5
Gonolobus suberosus var. suberosus	Eastern Anglepod	G5T5	SNR
Hamamelis virginiana var. virginiana	Northern Witch-hazel	G5TNR	SNR
Hedeoma pulegioides	American Pennyroyal	G5	SNA
Helenium autumnale	Common Sneezeweed	G5	S5
Helenium flexuosum	Purple-head Sneezeweed	G5	S5
Helianthus angustifolius	Swamp Sunflower	G5	S4
Helianthus atrorubens	Purple-disk Sunflower	G5	S4
Helianthus decapetalus	Thin-leaved Sunflower	G5	S5
Helianthus divaricatus	Woodland Sunflower	G5	S5
Helianthus hirsutus	Stiff-hair Sunflower	G5	S5
Helianthus maximilianii	Maximillian Sunflower	G5	SNA
Helianthus microcephalus	Small Wood Sunflower	G5	S5
Helianthus mollis	Ashy Sunflower	G4G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Helianthus strumosus	Pale-leaf Sunflower	G5	S4?
Helianthus tuberosus	Jerusalem Artichoke	G5	S5
Heliopsis helianthoides var. helianthoides	Ox-eye	G5T5	SNR
Hemerocallis lilioasphodelus	Yellow Daylily	GNR	SNA
Heuchera americana	American Alumroot	G5	S5
Heuchera macrorhiza	Giant Alumroot	G5T4Q	SNR
Heuchera parviflora var. parviflora	Cumberland Grotto Alumroot	G4T4	S5
Hexalectris spicata	Crested Coralroot	G5	S4
Hexasepalum teres	Rough Buttonweed	G5	S5
Hibiscus moscheutos	Swamp Rosemallow	G5	S5
Hieracium gronovii	Hairy Hawkweed	G5	S5
Hieracium scabrum	Rough Hawkweed	G5	S4
Hieracium venosum	Rattlesnake Hawkweed	G5	S4
Houstonia caerulea	Common Bluet	G5	S5
Houstonia canadensis	Longleaf Bluets	G4G5	S5
Houstonia lanceolata	Purple Bluet	G5T5	S4S5
Houstonia longifolia var. compacta	Eastern Longleaf Bluet	G5TNRQ	S4
Houstonia purpurea	Purple Bluet	G5	S5
Houstonia pusilla	Star Violet	G5	S4?
Hydrangea arborescens	Wild Hydrangea	G5	S5
Hydrophyllum canadense	Blunt-leaf Waterleaf	G5	S5
Hydrophyllum macrophyllum	Large-leaf Water-leaf	G5	S5
Hylodesmum glutinosum	Large Tick-trefoil	G5	S5
Hylodesmum nudiflorum	Bare-stemmed Tick-treefoil	G5	S5
Hypericum dolabriforme	Straggling St. John's-wort	G4	S4
Hypericum drummondii	Drummond St. John's-wort	G5	S5
Hypericum frondosum	Golden St. John's-wort	G4	S5
Hypericum gentianoides	Orange-grass St. John's-wort	G5	S5
Hypericum hypericoides	St. Andrew's-cross	G5	SU
Hypericum mutilum var. mutilum	Common Dwarf St. John's-wort	G5T5	SNR
Hypericum prolificum	Shrubby St. John's-wort	G5	S5
Hypericum punctatum	Common St. John's-wort	G5	S5
Hypericum sphaerocarpum	Roundfruit St. John's-wort	G5	S4
Hypericum stragulum	Straggling St. John's-wort	G5T4	S5
Hypericum virgatum	Strict St. John's-wort	G4?	S5
Hypoxis hirsuta	Eastern Yellow Stargrass	G5	S5
Ilex decidua	Deciduous Holly	G5	S5
Ilex opaca	American Holly	G5	S5
Impatiens capensis	Spotted Jewel-weed	G5	S5
Impatiens pallida	Pale Jewel-weed	G5	S5
Ionactis linariifolia	Flaxleaf Aster	G5	S5
Ipomoea lacunosa	Small-flower White Morning-glory	G5?	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Ipomoea pandurata	Big-root Morning-glory	G5	S5
Iris cristata	Crested Dwarf Iris	G5	S4
Iris shrevei	Southern Blueflag	G5T5	S3S4
Iris verna var. smalliana	Dwarf Iris	G5T4T5	SNR
Isotrema tomentosum	Woolly Dutchman's-pipe	G5	S4?
Iva annua	Annual Sumpweed	G5	S4S5
Juncus acuminatus	Sharp-fruit Rush	G5	S5
Juncus anthelatus	Large Path Rush	GNR	SNR
Juncus canadensis	Canada Rush	G5	S3S4
Juncus coriaceus	Leathery Rush	G5	S3S4
Juncus effusus ssp. solutus	Soft Rush	G5T5	S5
Juncus interior	Inland Rush	G4	S4?
Juncus marginatus	Grassleaf Rush	G5	S5
Juncus tenuis	Slender Rush	GNR	S5
Juniperus virginiana var. virginiana	Eastern Red Cedar	G5T5	S5
Kalmia latifolia	Mountain Laurel	G5	S5
Kickxia elatine	Sharp-point Toadflax	GNR	SNA
Krigia biflora	Two-flowered Dwarf Dandelion	G5	S5
Krigia dandelion	Potato Dandelion	G5	S5
Krigia virginica	Dwarf Dandelion	G5	S4?
Lackeya multiflora	Boykin Cluster-pea	G4	S4
Lactuca biennis	Tall Blue Lettuce	G5	S4S5
Lactuca canadensis	Canada Lettuce	G5	S4S5
Lactuca floridana	Woodland Lettuce	G5	S5
Lactuca hirsuta	Hairy Lettuce	G5?	S4?
Lactuca serriola	Prickly Lettuce	GNR	SNA
Laportea canadensis	Wood Nettle	G5	S5
Lathyrus hirsutus	Single-tary Pea	GNR	SNA
Lathyrus latifolius	Broad-leaf Peavine	GNR	SNA
Lathyrus sylvestris	Flat Peavine	GNR	SNA
Lechea minor	Thyme-leaf Pinweed	G5	S2?
Lechea mucronata	Hairy Pinweed	G5	S4
Lechea tenuifolia	Slender Pinweed	G5	S4?
Leersia lenticularis	Catchfly-grass	G5	S4S5
Leersia oryzoides	Rice Cutgrass	G5	S5
Leersia virginica	Virginia Cutgrass	G5	S5
Lepidium campestre	Field Pepper-grass	GNR	SNA
Lespedeza frutescens	Violet Bush-clover	G5	S4S5
Lespedeza hirta var. hirta	Hairy Lespedeza	G5T5?	SNR
Lespedeza procumbens	Trailing Bush-clover	G5	S4S5
Lespedeza repens	Creeping Bush-clover	G5	S4S5
Lespedeza violacea	Wand Bush-clover	G5	S4S5
Lespedeza virginica	Slender Bush-clover	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Leucanthemum vulgare	Oxeye Daisy	GNR	SNA
Leucospora multifida	Cliff Conobea	G5	S4S5
Liatris aspera	Tall Gay-feather	G4G5	S3S4
Liatris spicata var. spicata	Marsh Blazing Star	G5T5?	S4
Liatris squarrosa var. squarrosa	Scaly Blazing Star	G5T5	SNR
Liatris squarrulosa	Appalachian Gayfeather	G4G5	S4
Ligusticum canadense	Nondo Lovage	G4	S4
Lilium canadense	Canada Lily	G5	S4?
Lindera benzoin	Spicebush	G5	S5
Lindernia dubia	Yellow-seed False-pimpernel	G5	S5
Linum curtissii	Wild Flax	G5T5	S4?
Linum striatum	Ridged Yellow Flax	G5	S4
Linum sulcatum	Grooved Yellow Flax	G5	S3S4
Linum virginianum	Virginia Flax	G4G5	S4S5
Liquidambar styraciflua	Sweet Gum	G5	S5
Liriodendron tulipifera var. tulipifera	Tulip-tree	G5TNR	SNR
Lithospermum canescens	Hoary Puccoon	G5	S4
Lithospermum tuberosum	Tuberous Gromwell	G4	S3S4
Lobelia cardinalis	Cardinal Flower	G5	S5
Lobelia inflata	Indian-tobacco	G5	S5
Lobelia puberula	Downy Lobelia	G5	S4
Lobelia siphilitica	Great Blue Lobelia	G5	S5
Lobelia spicata	Pale-spiked Lobelia	G5	S4S5
Lotus tenuis	Slender Birdsfoot trefoil	GNR	SNA
Ludwigia alternifolia	Bushy Seedbox	G5	S5
Ludwigia decurrens	Primrose Willow	G5	S5
Ludwigia glandulosa	Cylindric-fruited Seedbox	G5	S4?
Ludwigia palustris	Marsh Seedbox	G5	S5
Ludwigia peploides var. glabrescens	Floating Seedbox	G5T5	S4
Luzula echinata	Wood Rush	G5	S4?
Lycopus americanus	American Bugleweed	G5	S5
Lycopus virginicus	Virginia Bugleweed	G5	S5
Lysimachia ciliata	Fringed Loosestrife	G5	S5
Lysimachia lanceolata	Lance-leaf Loosestrife	G5	S5
Lysimachia quadriflora	Four-flowered Loosestrife	G5?	S3S4
Lysimachia quadrifolia	Whorled Loosestrife	G5	S5
Maianthemum racemosum	Eastern Solomon's Plume	G5	S5
Matelea obliqua	Climbing Milkweed	G4?	S4?
Mazus pumilus	Japanese Mazus	GNR	SNA
Mecardonia acuminata var. acuminata	Purple Mecardonia	G5T5	S4
Menispermum canadense	Canada Moonseed	G5	S5
Mentha x gracilis	Spearmint	GNA	SNA
Mikania scandens	Climbing Hempweed	G5	S4?
Mimosa microphylla	Little-leaf Sensitive-briars	G5T5	S4S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Mimulus alatus	Sharp-wing Monkeyflower	G5	S5
Mimulus ringens var. ringens	Monkey Flower	G5T5	S5
Mirabilis nyctaginea	Wild Four-o'clock	G5	SNA
Mitchella repens	Partridge-berry	G5	S5
Monarda bradburiana	Eastern Bee-balm	G5	S4?
Monarda clinopodia	Basil Bee-balm	G5	S5
Monarda fistulosa var. fistulosa	Appalachian Bergamot	G5T5	SNR
Monarda fistulosa var. mollis	Pale Wild Bergamot	G5T5?	SNR
Mononeuria patula	Pitcher's Stitchwort	G4	S4
Morus rubra	Red Mulberry	G5	S5
Muhlenbergia capillaris	Long-awn Hairgrass	G5	S3S4
Muhlenbergia schreberi	Schreber Muhly	G5	S5
Muscadinia rotundifolia var. rotundifolia	Muscadine Grape	G5T5	S5
Myosotis macrosperma	Large-seeded Forget-me-not	G5	S4S5
Nabalus altissimus	Tall Rattlesnake-root	G5	S5
Nabalus serpentaria	Lion's-foot	G5	S5
Nabalus trifoliolatus	Three-leaved Rattlesnake-root	G5	SNA
Nothoscordum bivalve	Crow-poison	G4	S5
Nuphar advena	Broadleaf Pondlily	G5T5	S4
Nyssa sylvatica	Black Tupelo	G5	S5
Oenothera biennis	Common Evening-primrose	G5	S5
Oenothera filipes	Slender-stalked Gaura	G5	S5
Oenothera fruticosa var. fruticosa	Narrow-leaved Sundrops	G5TNR	SNR
Oenothera gaura	Biennial Gaura	G5	S5
Oenothera tetragona var. fraseri	Appalachian Sundrops	GNRTNR	S4
Oligoneuron rigidum	Stiff Goldenrod	G5T5	S3S4
Onoclea sensibilis	Sensitive Fern	G5	S5
Opuntia cespitosa	Common Eastern Prickly-pear	GNR	SNR
Orbexilum pedunculatum	False Scurf-pea	G5	S4?
Osmorhiza claytonii	Hairy Sweet-cicely	G5	S5
Osmorhiza longistylis	Smoother Sweet-cicely	G5	S5
Ostrya virginiana	Eastern Hop-hornbeam	G5	S5
Oxalis corniculata	Creeping Woodsorrel	GNR	SNA
Oxalis dillenii	Dillen's Woodsorrel	G5	S5
Oxalis grandis	Great Yellow Wood-sorrel	G4G5	S5
Oxalis stricta	Upright Yellow Wood-sorrel	G5	S5
Oxalis violacea	Violet Wood-sorrel	G5	S5
Oxydendrum arboreum	Sourwood	G5	S5
Oxypolis rigidior	Stiff Cowbane	G5	S4
Packera anonyma	Small's Ragwort	G5	S4S5
Packera aurea	Golden Ragwort	G5	S4S5
Packera glabella	Grassleaf Ragwort	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Packera obovata	Round-leaf Groundsel	G5	S5
Panicum capillare	Old Witch Panic-grass	G5	S5
Panicum dichotomiflorum var. dichotomiflorum	Spreading Panicgrass	G5T5	SNR
Panicum flexile	Wiry Witch Grass	G5	S5
Panicum virgatum	Old Switch Panic Grass	G5	S4S5
Parthenium integrifolium var. integrifolium	Common Wild Quinne	G5T5	SNR
Parthenocissus quinquefolia	Virginia Creeper	G5	S5
Paspalum floridanum	Florida Paspalum	G5	S3S5
Paspalum laeve var. circulare	Field Paspalum	G4G5T4T5	SNR
Paspalum laeve var. laeve	Field Paspalum	G4G5T4T5	SNR
Paspalum pubiflorum var. glabrum	Hairy-seed Paspalum	G5T5	SNR
Paspalum setaceum var. muhlenbergii	Thin Paspalum	G5TNR	S4
Passiflora incarnata	Purple Passion-flower	G5	S4S5
Passiflora lutea var. glabriflora	Yellow Passionflower	G5TNR	SNR
Pedicularis canadensis	Early Wood Lousewort	G5	S5
Peltandra virginica	Green Arrow-arum	G5	S4?
Penstemon brevisepalus	Short-sepaled Beardtongue	GNR	SNR
Penstemon calycosus	Long-sepal Beardtongue	G5	S4S5
Penstemon canescens	Gray Beardtongue	G4	S5
Penstemon digitalis	Foxglove Beardtongue	G5	S5
Penstemon hirsutus	Hairy Beardtongue	G4	S5
Penstemon laevigatus	Smooth Beardtongue	G5	S4?
Penstemon pallidus	Pale Beardtongue	G5	S5
Penstemon tenuiflorus	White-flower Beardtongue	G4?	S4?
Penthorum sedoides	Ditch-stonecrop	G5	S5
Persicaria amphibia	Water Smartweed	G5	S5
Persicaria careyi	Carey's Smartweed	G4	SNR
Persicaria hydropiperoides	Mild Water-pepper	G5	S5
Persicaria lapathifolia	Dock-leaf Smartweed	G5	S5
Persicaria pensylvanica	Pennsylvania Smartweed	G5	S5
Persicaria punctata	Dotted Smartweed	G5	S5
Persicaria sagittata	Arrow-leaved Tearthumb	G5	S5
Persicaria setacea	Swamp Smartweed	G5	S3S4
Persicaria virginiana	Virginia Knotweed	G5	S5
Phacelia bipinnatifida	Fernleaf Phacelia	G5	S5
Phalaris arundinacea	Reed Canary Grass	G5	S5?
Phalaris canariensis	Common Canary Grass	GNR	SNA
Phaseolus polystachios	Wild Kidney Bean	G5	S4S5
Phegopteris hexagonoptera	Broad Beech Fern	G5	S5
Phleum pratense ssp. pratense	Meadow Timothy	GNRTNR	SNA
Phlox glaberrima	Smooth Phlox	G5	S5
Phlox maculata ssp. maculata	Northern Meadow Phlox	G5T4T5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Phlox paniculata	Fall Phlox	G5	S5
Phlox pilosa ssp. pilosa	Downy Phlox	G5T5	S5
Phryma leptostachya	Lopseed	G5	S5
Phyla lanceolata	Fog-fruit	G5	S5
Phyllanthus caroliniensis	Carolina Leaf-flower	G5	S5
Physalis heterophylla	Clammy Ground-cherry	G5	S5
Physalis longifolia var. subglabrata	Ground Cherry	G5T4T5	S5
Physalis virginiana	Virginia Ground-cherry	G5	S5
Physocarpus opulifolius var. opulifolius	Eastern Ninebark	G5T5	S5
Physostegia virginiana ssp. praemorsa	False Dragon-head	G5T4T5Q	SNR
Physostegia virginiana ssp. virginiana	Northern Obedient-plant	G5T5	SNR
Phytolacca americana	Common Pokeweed	G5	S5
Pilea pumila	Canada Clearweed	G5	S5
Pinus echinata	Shortleaf Pine	G5	S4
Pinus rigida	Pitch Pine	G5	S4
Pinus virginiana	Virginia Pine	G5	S5
Piptochaetium avenaceum	Blackseed Needlegrass	G5	S4
Pityopsis graminifolia var. latifolia	Narrowleaf Silkgrass	GNR	SNR
Planera aquatica	Planertree	G5	S3S4
Plantago aristata	Large-bract Plantain	G5	S5
Plantago heterophylla	Slender Plantain	G5	SNR
Plantago lanceolata	English Plantain	G5	SNA
Plantago major	Nipple-seed Plantain	G5	SNA
Plantago patagonica	Woolly Plantain	G5	SNA
Plantago rugelii	Black-seed Plantain	G5	S5
Plantago virginica	Pale-seeded Plantain	G5	S5
Platanthera flava	Southern Rein-orchid	G4?	S4?
Platanthera lacera	Green-fringe Orchid	G5	S4?
Platanthera peramoena	Purple Fringeless Orchid	G5	S3S4
Platanus occidentalis	Sycamore	G5	S5
Pluchea camphorata	Marsh Fleabane	G5	S5
Poa autumnalis	Autumn Bluegrass	G5	S5
Poa chapmaniana	Chapman Bluegrass	G5	S5
Podophyllum peltatum	May Apple	G5	S5
Polygala ambigua	Whorled Milkwort	G5T5?	SNR
Polygala curtissii	Curtis's Milkwort	G5	S5
Polygala incarnata	Pink Milkwort	G5	S4?
Polygala sanguinea	Field Milkwort	G5	S5
Polygala senega	Seneca Snakeroot	G4G5	S4?
Polygala verticillata	Whorled Milkwort	G5	S5
Polygonatum biflorum var. biflorum	Common Solomon's-seal	G5T5	S5
Polygonatum pubescens	Downy Solomon's-seal	G5	S5
Polymnia canadensis	White-flower Leafcup	G5	S5
Polystichum acrostichoides	Christmas Fern	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Populus heterophylla	Swamp Cottonwood	G5	S3S4
Potentilla canadensis	Canada Cinquefoil	G5	S5
Potentilla simplex	Old-field Cinquefoil	G5	S5
Primula meadia	Shootingstar	G5	S5
Prosartes lanuginosa	Yellow Mandrin	G5	S5
Prunella vulgaris ssp. vulgaris	Eurasian Self-heal	G5TU	SNA
Prunella vulgaris var. lanceolata	Self-heal	G5T5	S5
Prunus mexicana	Big Tree Plum	G4G5	S5?
Prunus serotina var. serotina	Eastern Wild Black Cherry	G5T5	SNR
Pseudognaphalium obtusifolium	Fragrant Cudweed	G5	S5
Ptelea trifoliata	Wafer-ash	G5	S5
Pteridium aquilinum var. latiusculum	Bracken Fern	G5T5	S5
Pycnanthemum incanum var. incanum	Hoary Mountainmint	G5T5	S5
Pycnanthemum loomisii	Loomis' Mountain-mint	G4?	S5?
Pycnanthemum pilosum	Whorled Mountain-mint	G5T5	SNR
Pycnanthemum pycnanthemoides var. pycnanthemoides	Southern Mountainmint	G5TNR	SNR
Pycnanthemum tenuifolium	Slender Mountain-mint	G5	S5
Pycnanthemum virginianum	Virginia Mountain-mint	G5	S4?
Pyrrhopappus carolinianus	Carolina False-dandelion	G5	S5
Quercus alba	White Oak	G5	S5
Quercus falcata	Spanish Oak	G5	S5
Quercus imbricaria	Shingle Oak	G5	S5
Quercus marilandica var. marilandica	Blackjack Oak	G5T4T5	SNR
Quercus montana	Chestnut Oak	G5	S5
Quercus muehlenbergii	Yellow Oak	G5	S5
Quercus rubra var. rubra	Northern Red Oak	G5T5	S5
Quercus stellata	Post Oak	G5	S5
Quercus velutina	Black Oak	G5	S5
Ranunculus abortivus	Kidney-leaved Buttercup	G5	S5
Ranunculus hispidus	Hispid Buttercup	G5	S5
Ranunculus micranthus	Rock Crowfoot	G5	S4S5
Ranunculus recurvatus var. recurvatus	Hooked Buttercup	G5T5	SNR
Ratibida pinnata	Gray-head Prairie Coneflower	G5	S4
Rhamnus davurica	Dahurian Buckthorn	GNR	SNA
Rhexia mariana var. mariana	Maryland Meadow-beauty	G5T5	S5
Rhexia virginica	Virginia Meadow-beauty	G5	S4
Rhododendron maximum	Great Laurel	G5	S5
Rhus aromatica var. aromatica	Fragrant Sumac	G5T5	S5
Rhus copallinum var. copallinum	Winged Sumac	G5T5	SNR
Rhus glabra	Smooth Sumac	G5	S5
Rhus typhina	Staghorn Sumac	G5	S4?
Rhynchospora capitellata	Brownish Beakrush	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Rhynchospora corniculata	Short-bristle Hornedrush	G5	S4S5
Rhynchospora glomerata var. glomerata	Clustered Beakrush	G5T5?	S5
Ribes cynosbati	Prickly Gooseberry	G5	S4S5
Robinia pseudoacacia	Black Locust	G5	S5
Rorippa palustris ssp. palustris	Bog Yellow-cress	G5TNR	SNR
Rosa carolina ssp. carolina	Carolina Rose	G5TNR	SNR
Rosa carolina ssp. subserrulata	Carolina Rose	G5TNR	SNR
Rosa palustris	Swamp Rose	G5	S5
Rosa setigera	Prairie Rose	G5	S5
Rotala ramosior	Toothcup	G5	S4
Rubus allegheniensis	Allegheny Blackberry	G5	SNR
Rubus flagellaris	Northern Dewberry	G5	S5
Rubus hispidus	Bristley Dewberry	G5	S5
Rubus occidentalis	Black Raspberry	G5	S5
Rubus pensilvanicus	Pennsylvania Blackberry	G5	SNR
Rudbeckia fulgida var. fulgida	Orange Coneflower	G5T4?	S4
Rudbeckia hirta	Black-eyed Susan	G5	S5
Rudbeckia laciniata var. laciniata	Common Cutleaf Coneflower	G5T5	SNR
Rudbeckia triloba var. triloba	Three-lobed Coneflower	G5T4T5	S4
Ruellia caroliniensis	Carolina Petunia	G5	S5
Ruellia humilis	Hairy Wild-petunia	G5	S5
Ruellia strepens	Limestone Petunia	G4G5	S5
Rumex altissimus	Tall Dock	G5	S4S5
Rumex crispus ssp. crispus	Curly Dock	GNRTNR	SNA
Rumex verticillatus	Swamp Dock	G5	S5
Sabatia angularis	Square-stemmed Rose Pink	G5	S5
Sagittaria latifolia var. latifolia	Broadleaf Arrowhead	G5T5	S5
Salix humilis	Tall Prairie Willow	G5	S4
Salix nigra	Black Willow	G5	S5
Salvia azurea var. grandiflora	Blue Sage	G4G5T4?	S4S5
Salvia lyrata	Lyre-leaf Sage	G5	S5
Salvia nemorosa	Wood Sage	GNR	SNA
Sambucus canadensis	Common Elderberry	G5T5	S5
Samolus parviflorus	Water Pimpernel	G5T5	S4?
Sanguinaria canadensis	Bloodroot	G5	S5
Sanicula canadensis var. canadensis	Short-styled Sanicle	G5T5	S5
Sanicula odorata	Clustered Snakeroot	G5	S4?
Sanicula smallii	Small's Sanicle	G5	S5
Sassafras albidum	Sassafras	G5	S5
Saururus cernuus	Lizard's Tail	G5	S5
Schizachyrium scoparium var. scoparium	Pinehill Bluestem	G5T5	S5
Schoenoplectus acutus	Hard-stemmed Bulrush	G5	SNR
Schoenoplectus pungens var. pungens	Three-square Bulrush	G5T5	SNR

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Scirpus atrovirens	Woolgrass Bulrush	G5	S5
Scirpus cyperinus	Cottongrass Bulrush	G5	S5
Scirpus georgianus	Georgia Bulrush	G5	S4S5
Scirpus pendulus	Pendulous Bulrush	G5	S5
Scirpus polyphyllus	Leafy Bulrush	G5	S4S5
Scleria ciliata var. ciliata	Fringed Nutrush	G5TNR	SNA
Scleria oligantha	Little-headed Nutrush	G5	S4S5
Scleria pauciflora var. caroliniana	Few-flowered Nutrush	G5T4T5	S4
Scleria triglomerata	Whip Nutrush	G5	S4S5
Scrophularia marilandica	Carpenter's Square Figwort	G5	S5?
Scutellaria australis	Southern Skullcap	G4T4?	SNR
Scutellaria elliptica var. elliptica	Hairy skullcap	G5T5	S5
Scutellaria elliptica var. hirsuta	Hairy skullcap	G5T5	S5
Scutellaria incana var. incana	Hoary Skullcap	G5T5	S5?
Scutellaria integrifolia	Hyssop Skullcap	G5	S4?
Scutellaria lateriflora	Mad Dog Skullcap	G5	S5
Scutellaria leonardii	Shale-barren Skullcap	G4T4	S3S4
Scutellaria nervosa	Veined Skullcap	G5	S3S4
Scutellaria parvula	Small Skullcap	G4	S4?
Sedum pulchellum	Rock Stonecrop	G5	S5
Sedum ternatum	Wood Stonecrop	G5	S5
Senna hebecarpa	Northern Wild Senna	G5	S4?
Senna marilandica	Maryland Senna	G5	S5
Sericocarpus asteroides	Toothed White-top Aster	G5	S5
Sericocarpus linifolius	Narrowleaf Aster	G5	S5
Setaria parviflora	Bristly Foxtail	G5	SNR
Setaria pumila ssp. pumila	Yellow Foxtail	GNR	SNA
Sherardia arvensis	Silver Buffalo-berry	GNR	SNA
Sicyos angulatus	One-seed Bur-cucumber	G5	S5
Silene caroliniana var. wherryi	Wherry's Catchfly	G5T3T4Q	S3S4
Silphium asteriscus	Starry Rosin-weed	G5	SNR
Silphium glabrum	Smooth Rosinweed	GNR	SNR
Silphium integrifolium var. gattingeri	Gattinger's Rosinweed	G5TNRQ	SNA
Silphium perfoliatum	Cup-plant	G5	S4S5
Silphium terebinthinaceum var. terebinthinaceum	Prairie Dock	G4G5T4T5	S4
Silphium trifoliatum	Three-leaved Rosinweed	G4?	S5
Sisymbrium altissimum	Tall Hedgemustard	GNR	SNA
Sisyrinchium albidum	White Blue-eyed-grass	G5?	S5
Sisyrinchium angustifolium	Pointed Blue-eyed-grass	G5	S5
Sisyrinchium atlanticum	Eastern Blue-eyed-grass	G5	S5
Sisyrinchium mucronatum	Needle-tip Blue-eyed-grass	G5	SNA
Smallanthus uvedalia	Yellow-flowered Leafcup	G4G5	S5
Smilax bona-nox var. bona-nox	Fringed Greenbriar	G5TNR	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Smilax ecirrata	Upright Carrionflower	G5	S5
Smilax glauca	Whiteleaf Greenbriar	G5	S5
Smilax herbacea	Common Carrionflower	G5	S5
Smilax hispida	Bristley Greenbriar	G5	S5
Smilax rotundifolia	Common Greenbriar	G5	S5
Solanum carolinense var. carolinense	Carolina Horse-nettle	G5T5	S5?
Solanum rostratum	Buffalo Bur	G5?	SNA
Solidago altissima var. altissima	Tall Goldenrod	G5	SNR
Solidago arguta var. arguta	Cut-leaved Golden-rod	G5T4T5	S4
Solidago caesia	Bluestem Goldenrod	G5	S5
Solidago canadensis var. canadensis	Northern Common Goldenrod	G5T5	S5
Solidago erecta	Showy Goldenrod	G5	S5?
Solidago flexicaulis	Broad-leaved Goldenrod	G5	S5
Solidago gigantea	Smooth Goldenrod	G5	S5
Solidago hispida var. hispida	Hairy Goldenrod	G5T5	S4S5
Solidago juncea	Early Goldenrod	G5	S4S5
Solidago nemoralis ssp. nemoralis	Eastern Gray Goldenrod	G5T5	SNR
Solidago odora	Sweet Goldenrod	G5	S5
Solidago rigidiuscula	Showy Goldenrod	G5T4	SU
Solidago rugosa var. aspera	Rough-leaf Goldenrod	G5T5	S4S5
Solidago rugosa var. rugosa	Rough-leaf Goldenrod	G5T5	S4S5
Solidago speciosa	Harper Goldenrod	G5	SNR
Solidago sphacelata	Autumn Goldenrod	G4G5	S4
Solidago ulmifolia var. ulmifolia	Elmleaf Goldenrod	G5T5	S5
Sonchus arvensis var. arvensis	Perennial Sow-thistle	GNRTNR	SNA
Sorghastrum nutans	Yellow Indian-grass	G5	S5
Spermacoce glabra	Smooth Buttonweed	G4G5	SNR
Sphenopholis nitida	Shiny Wedge Grass	G5	S4S5
Sphenopholis obtusata	Prairie Wedgegrass	G5	S5?
Spigelia marilandica	Woodland Pinkroot	G4	S5
Spiraea tomentosa	Hardhack Spiraea	G5	S4S5
Spiranthes cernua	Nodding Ladies'-tresses	G5	S5
Spiranthes lacera var. gracilis	Southern Slender Ladies'-tresses	G5T4T5	S4?
Spiranthes lacera var. lacera	Northern Slender Ladies'-tresses	G5T5	S4?
Spiranthes tuberosa	Little Ladies'-tresses	G5	S4S5
Spiranthes vernalis	Twisted Ladies'-tresses	G5	S5
Sporobolus compositus var. compositus	Tall Dropseed	G5T5	SNR
Sporobolus neglectus	Small Dropseed	G5	S5
Sporobolus vaginiflorus	Sheathed Dropseed	G5	S5
Stachys tenuifolia	Smooth Hedge-nettle	GNR	S5
Staphylea trifolia	American Bladdernut	G5	S5
Strophostyles helvola	Trailing Wild-bean	G5	S5

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Strophostyles leiosperma	Slick-seed Wild-bean	G5	SNR
Strophostyles umbellata	Pink Wild-bean	G5	S5
Stylosanthes biflora	Pencilflower	G5	S5
Styrax americanus var. americanus	American Snowbell	G5TNR	S3S4
Symphoricarpos orbiculatus	Coral-berry	G5	S5
Symphyotrichum concinnum	Harmonious Aster	G5T4	SNR
Symphyotrichum cordifolium	Heart-leaf Aster	G5	S5
Symphyotrichum dumosum var. dumosum	Long -stalked Aster	G5T3T5	SNR
Symphyotrichum laeve	Smooth Blue Aster	G5	S2S3
Symphyotrichum lanceolatum var. lanceolatum	Common Panicled Aster	G5T5	S5
Symphyotrichum lateriflorum var. angustifolium	Calico Aster	G5T4T5	S2?
Symphyotrichum lateriflorum var. horizontale	Calico Aster	G5T4T5	SNR
Symphyotrichum novae-angliae	New England Aster	G5	S5
Symphyotrichum oblongifolium	Aromatic Aster	G5	S5
Symphyotrichum ontarionis var. ontarionis	Bottomland Aster	G5T4	SNR
Symphyotrichum patens var. patens	Skydrop Aster	G5T5	SNR
Symphyotrichum pilosum var. pilosum	Hairy White Oldfield Aster	G5T5	SNR
Symphyotrichum pilosum var. pringlei	Pringle's Aster	G5T5	SNR
Symphyotrichum prenanthoides	Crooked-stem Aster	G4G5	S5
Symphyotrichum racemosum	Small White Aster	G4G5	S5
Symphyotrichum shortii	Short's Aster	G5	S5
Symphyotrichum undulatum	Waxy-leaved Aster	G5	SNR
Symphyotrichum urophyllum	White Arrowleaf Aster	G4G5	SNR
Taenidia integerrima	Yellow Pimpernell	G5	S5
Taraxacum officinale	Common Dandelion	G5	SNA
Tephrosia virginiana	Goat's-rue	G5	S5
Teucrium canadense var. canadense	American Germander	G5T5	SNR
Thalictrum dasycarpum	Purple Meadowrue	G5	S5
Thalictrum dioicum	Early Meadowrue	G5	S5
Thalictrum mirabile	Little Mountain Meadow-rue	G4?Q	S4?
Thalictrum pubescens	Tall Meadow-rue	G5	S5
Thalictrum thalictroides	Windflower	G5	S5
Thaspium barbinode	Hairy-jointed Meadow-parsnip	G5	S5
Thaspium chapmanii	Chapman's Meadow-parsnip	GNR	SNR
Thaspium trifoliatum var. trifoliatum	Purple Meadow-parsnip	G5T5	SNR
Thelypteris palustris var. pubescens	Marsh Fern	G5T5	S5
Thlaspi arvense	Field Penny-cress	GNR	SNA
Thyrsanthella difformis	Climbing Dogbane	G4G5	SNR
Tiarella cordifolia	Northern Foam-flower	G5	S5
Tipularia discolor	Cranefly Orchid	G4G5	S5
Toxicodendron radicans var. radicans	Eastern Poison Ivy	G5T5	SNR
Tradescantia ohiensis	Ohio Spiderwort	G5	S5
Tradescantia subaspera	Zigzag Spider-wort	G5	S5?

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Tradescantia virginiana	Virginia Spiderwort	G5	S5
Tragia cordata	Heart-leaved Noseburn	G4	S3S4
Tragopogon dubius	Meadow Goat's-beard	GNR	SNA
Triadenum tubulosum	Large Marsh St. John's Wort	G4?	S5
Triadenum walteri	Walter St. John's Wort	G5	S5
Trichostema brachiatum	False Pennyroyal	G5	SNR
Trichostema dichotomum	Forked Bluecurls	G5	SNR
Tridens flavus	Tall Purple-top Fluffgrass	G5	S5
Trifolium arvense	Rabbit-foot Clover	GNR	SNA
Trifolium dubium	Suckling Clover	GNR	SNA
Trifolium hybridum	Alsike Clover	GNR	SNA
Trillium cuneatum	Little Sweet Trillium	G4G5	S4
Trillium erectum var. erectum	Red Trillium	G5T5	S5
Trillium sessile	Sessile Trillium	G5	S5
Triodanis biflora	Clasp-leaf Venus'-looking-glass	G5T5	SNR
Triodanis perfoliata	Clasp-leaf Venus'-looking-glass	G5	S5
Triosteum angustifolium var. angustifolium	Yellowleaf Tinker's-weed	G5T5	S5
Tripsacum dactyloides var. dactyloides	Gama grass	G5TNR	SNR
Typha angustifolia	Narrow-leaved Cattail	G5	SNR
Typha latifolia	Broad-leaf Cattail	G5	S5
Ulmus alata	Winged Elm	G5	S5
Ulmus rubra	Slippery Elm	G5	S5
Utricularia gibba	Humped Bladderwort	G5	S4
Uvularia perfoliata	Perfoliate Bellwort	G5	S5
Uvularia sessilifolia	Sessile-leaf Bellwort	G5	S5
Vaccinium arboreum	Farkleberry	G5	S5
Vaccinium pallidum	Early Lowbush Blueberry	G5	S5
Vaccinium stamineum var. stamineum	Common Deerberry	G5T5	SNR
Valerianella chenopodiifolia	Goose-foot Corn-salad	G4	S4?
Valerianella radiata	Beaked Corn-salad	G5	S5
Verbascum blattaria	White Moth Mullein	GNR	SNA
Verbena bracteata	Large-bract Vervain	G5	S4S5
Verbena hastata	Blue Vervain	G5	S4S5
Verbena simplex	Narrow-leaved Vervain	G5	S5
Verbena stricta	Hoary Vervain	G5	S4S5
Verbena urticifolia	White Vervain	G5	S5
Verbesina alternifolia	Wingstem	G5	S5
Verbesina helianthoides	Hairy Wingstem	G5	S5
Verbesina occidentalis	Yellow Crownbeard	G5	S5
Verbesina virginica var. virginica	Common Frostbeard	G5?T5?	SNR
Vernonia gigantea	Giant Ironweed	G5	S5
Vernonia missurica	Missouri Ironweed	G4G5	S4?

Table E3. *All Other Observed Plant Species (cont.)*

All Other Observed Plant Species			
Scientific Name	**Common Name**	**G-rank**	**S-Rank**
Vernonia noveboracensis	New York Ironweed	G5	S3S4
Veronica arvensis	Corn Speedwell	GNR	SNA
Veronica hederifolia	Ivy-leaf Speedwell	GNR	SNA
Veronica officinalis	Common Speedwell	G5	S5
Veronicastrum virginicum	Culver's-root	G4	S3S4
Viburnum acerifolium	Maple-leaf Viburnum	G5	S5
Viburnum prunifolium	Smooth Black-haw	G5	S5?
Viburnum rufidulum	Rusty Blackhaw	G5	S5
Vicia caroliniana	Carolina Wood Vetch	G5	S5
Viola canadensis var. canadensis	Canada Violet	G5	S5
Viola communis	Hooded Blue Violet	GNR	S5
Viola cucullata	Marsh Blue Violet	G5	S5
Viola hastata	Halberd-leaved Yellow Violet	G5	S5
Viola hirsutula	Southern Wood Violet	G4	S5
Viola lanceolata	Lance-leaf Violet	G5	SNR
Viola palmata var. palmata	Palmate-leaved Violet	G5TNR	S5?
Viola pedata var. pedata	Bird's-foot Violet	G5TNR	S5?
Viola rostrata	Long-spur Violet	G5	S5
Viola sagittata	Arrow-leaved Violet	G5	S3?
Viola sororia var. sororia	Woolly Blue Violet	G5TNR	S5
Viola striata	Striped Violet	G5	SNR
Vitis aestivalis var. aestivalis	Small's Grape	G5T5	S5
Vitis riparia	Riverbank Grape	G5	S5
Vitis vulpina	Winter Grape	G5	S5
Wisteria frutescens	American Wisteria	G5	S5
Xanthium strumarium	Rough Cockle-bur	G5	S5?
Youngia japonica	Oriental Hawksbeard	GNR	SNA
Zizia aptera	Golden Alexanders	G5	S5
Zizia aurea	Common Alexanders	G5	S5

Appendix F. Roadside Conservation Area - Management Tables

Table F1. Management Tables for Standard RCAs. ***Example table provided to protect locations of sensitive sites***

District	County	Site Name	Mile Start	Mile End	Side	Management Category	ROW Full Width Mow	Safety Zone Mow	Herbicide Application
1	Ballard	KY-136 B			South Bound	Seed Source			
1	Calloway	KY-1918 A			East Bound	High Quality	Once per year after Oct. 15	3 times per year, single deck width	No broadcast, spot spray only
1	Calloway	KY-1918 B			South Bound	High Quality	Once per year after Oct. 15	3 times per year, single deck width	No broadcast, spot spray only
1	Calloway	KY-444			Both Sides	High Quality	Once per year after Oct. 15	3 times per year, single deck width	No broadcast, spot spray only
1	Calloway	KY-280 A			West Bound	High Quality	Once per year after Oct. 15	3 times per year, single deck width	No broadcast, spot spray only
1	Calloway	KY-732 B			Both Sides	Restoration Potential	Once per year after Oct. 15	3 times per year, single deck width	No broadcast, spot spray only
1	Calloway	KY-1836 A			South Bound	Seed Source			
1	Calloway	KY-1836 B			Both Sides	Seed Source			
1	Calloway	KY-94 A			North Bound	Seed Source			
1	Calloway	KY-121 A			West Bound	Seed Source			
1	Calloway	KY-1536			West Bound	Seed Source			
1	Calloway	KY-280 C			Both Sides	Seed Source			
1	Calloway	KY-280 B			North Bound	Seed Source			
1	Calloway	KY-732 A			West Bound	Seed Source			
1	Calloway	KY-464			East Bound	Seed Source			
1	Calloway	KY-121 B			East Bound	Seed Source			
1	Carlisle	KY-1820			Both Sides	Restoration Potential			No broadcast, spot spray only
1	Carlisle	US-51			Both Sides	Seed Source			
1	Crittenden	KY-120			West Bound	Restoration Potential	Once per year after Oct. 15	3 times per year, single deck width	No broadcast, spot spray only
1	Fulton	KY-1282			Both Sides	High Quality			No broadcast, spot spray only

Appendix G. Site Reports of all Standard RCAs

Standard RCA Site Reports

Site report sheets for all standard RCAs (See Appendix H for KG-RCAs) including maps, management category, management recommendations, and lists of rare plants, milkweed, and noxious weed species that occur at each standard RCA are provided below. Site reports are organized by district, county, and management category. Site reports are provided in the same order as in the Management Table provided in Appendix F.

***Appendix G includes locations of rare species and sensitive sites. To protect sensitive information, Appendix G has been replaced with 3 example site reports. If you a researcher, or potential project partner, interested in the RCAs designated by this project please contact OKNP for more information. ***

Roadside Conservation Area

Road or Site Name: KY-106
KYTC District: 3; **County:** Logan
Survey Date: May 19, 2020

Location

Roadside Conservation Areas

- High Quality
- Restoration Potential
- Seed Source
- Kentucky Gladecress RCA

District: 3
County: Logan
Route: KY-106
Site Name: KY-106
Date: 3/20/2025

N W E S

0 0 0.01 0.01 0.02 0.03 Miles

Latitude XX.XXXXXXX; **Longitude** XX.XXXXXXX

RCA Details	
Management Category	High Quality
Mile Start – Mile End	11.9 – 11.91, East Bound
Acreage	0.21
Percent Managed Weed Cover	5-9%

Management Recommendations	
ROW Full Width Mow	Once per year after Oct. 15
Safety Zone Mow	3 times per year, single deck width
Herbicide Application	No broadcast spraying, spot-spray only

Additional Management Comments

Very high-quality tallgrass prairie remnant. The intersection may require some additional mowing to ensure proper sight lines.

Milkweed Species			
Scientific Name	**Common Name**	**G-RANK**	**S-RANK**
Asclepias syriaca	Common milkweed	G5	S5
Asclepias viridiflora	Glade milkweed	G5	S4

Noxious Weeds, Pasture Grasses, and Other Exotic Pest Species		
Scientific Name	**Common Name**	**EPPC**
* *Lolium arundinaceum*	Tall fescue	1
* *Leucanthemum vulgare*	Oxeye daisy	n/a
* *Lespedeza cuneata*	Sericea lespedeza	1
* *Medicago lupulina*	Black medic	2
* *Daucus carota*	Wild carrot	2
* *Coronilla varia*	Crownvetch	1

Site Photo

High quality tallgrass prairie remnant. Facing east bound.

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Roadside Conservation Area

Road or Site Name: KY-1820
KYTC District: 1; **County:** Carlisle
Survey Date: June 1, 2022

Location

Roadside Conservation Areas
- High Quality
- Restoration Potential
- Seed Source
- Kentucky Gladecress RCA

District: 1
County: Carlisle
Route: KY-1820
Site Name: KY-1820
Date: 3/20/2025

N W E S

0 0.01 0.02 0.04 0.06 0.08 Miles

Latitude XX.XXXXXXX; **Longitude** XX.XXXXXXXX

RCA Details	
Management Category	Restoration Potential
Mile Start – Mile End	2.1 – 2.4, Both Sides
Acreage	1.43
Percent Managed Weed Cover	5-9%

Management Recommendations	
ROW Full Width Mow	No recommendation
Safety Zone Mow	No recommendation
Herbicide Application	No broadcast spraying, spot-spray only

Additional Management Comments

ROW consists of a narrow strip and steep embankment that ends in good quality, inundated wetlands with rare species. Current mowing not likely to negatively affect the resources. Recommend designation as no spray zone to protect wetland resource.

Noxious Weeds, Pasture Grasses, and Other Exotic Pest Species		
Scientific Name	**Common Name**	**EPPC**
* *Ranunculus bulbosus*	Bulbous buttercup	3

Site Photo

Facing east bound.

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Roadside Conservation Area

Road or Site Name: KY-1693
KYTC District: 10; **County:** Menifee
Survey Date: June 9, 2023

Location

Roadside Conservation Areas
- High Quality
- Restoration Potential
- Seed Source
- Kentucky Gladecress RCA

District: 10
County: Menifee
Route: KY-1693
Site Name: KY-1693
Date: 3/20/2025

N W E S

0 0.010.01 0.02 0.03 0.04 Miles

Latitude XX.XXXXXXXX; **Longitude** XX.XXXXXXXX

RCA Details	
Management Category	Seed Source
Mile Start – Mile End	0.9 – 1.0, West Bound
Acreage	0.09
Percent Managed Weed Cover	26-50%

Management Recommendations	
ROW Full Width Mow	No recommendation
Safety Zone Mow	No recommendation
Herbicide Application	No recommendation

Milkweed Species			
Scientific Name	**Common Name**	**G-RANK**	**S-RANK**
Asclepias variegata	Redring milkweed	G5	S4
Asclepias tuberosa var. tuberosa	Butterfly milkweed	G5T5?	S5

Noxious Weeds, Pasture Grasses, and Other Exotic Pest Species		
Scientific Name	**Common Name**	**EPPC**
* *Lonicera japonica*	Japanese honeysuckle	1.0
* *Medicago lupulina*	Black medic	2.0
* *Coronilla varia*	Crownvetch	1.0
* *Lolium arundinaceum*	Tall fescue	1.0
* *Conium maculatum*	Poison hemlock	1.0
* *Melilotus albus*	White sweetclover	1.0

Site Photo

Facing west bound.

Appendix H. Kentucky Gladecress RCAs - Management Table and Maps

Table H1. Management table for KG-RCA no-spray zones. ***Example table provided to protect locations of sensitive sites***

County	Route Name	Start Mile Point	Start Description	End Mile Point	End Description	Side	Site Name	Source
Bullitt	KY-1116					Both	KY-1116	2016 Schedule
Bullitt	US-31E					Both	US-31E B	2016 Schedule
Bullitt	US-31E					Both	US-31E C	2016 Schedule
Bullitt	US-31EX					Both	US-31EX	2016 Schedule
Bullitt	KY-660					Both	KY-660 B	2016 Schedule
Bullitt	KY-480					Both	KY-480	2016 Schedule
Bullitt	KY-1442					Both	KY-1442	2016 Schedule
Bullitt	KY-1604					East Side Only	KY-1604	2016 Schedule
Bullitt	KY-44					Both	KY-44 A	Added 2020
Bullitt	KY-44					North Side Only	KY-44 B	Added 2020
Bullitt	XX-61					Both	XX-61	Added 2020
Jefferson	KY-2053					Both	KY-2053 A	2016 Schedule
Jefferson	KY-2053					South Side Only	KY-2053 B	2016 Schedule
Jefferson	US-31E					Both	US-31E A	2016 Schedule
Jefferson	KY-660					Both	KY-660 A	2016 Schedule

Roadside Conservation Areas

- High Quality
- Restoration Potential
- Seed Source
- Kentucky Gladecress RCA

KG-RCA Overview
District: 5
County: Bullitt/Jefferson
Date: 3/20/2025

N W E S

0 0.5 1 2 3 4 Miles