

T. C. Davis, 2014



Tavia Clithcart Brown, 2019

Kentucky Pollinator Protection Plan


2019



Kentucky
Department of
Agriculture

Stakeholders

AgriBusiness Association of Kentucky
Bayer Corporation
Berea College
Berea Urban Farm
Bernheim Arboretum and Research Forest
Busy Bee Nursery
Central Kentucky Audubon Society
Columbia Gas of Kentucky
Cumberland Valley Cooperative
Dadant Bee Supply
Duke Energy
Floracliff Nature Preserve
East Kentucky Power Cooperative
Eastern Kentucky University
The Garden Club of Kentucky
Green Forests Work
Grow Appalachia
Governor's Office of Agricultural Policy
The Honey Depot
Kelley Beekeeping Company — Mann Lake
Kentucky Association of Conservation Districts
Kentucky Conservation Committee
Kentucky Corn Growers/Small Grain Growers Association
Kentucky Department of Agriculture
Kentucky Department of Fish and Wildlife Resources
Kentucky Division of Conservation
Kentucky Division of Forestry
Kentucky Environmental Foundation
Kentucky Farm Bureau
Kentucky Horticulture Society
Kentucky Master Gardeners



Kentucky Native Plant Society
Kentucky Organization of Field Stations
Kentucky Queen Bee Breeders Association
Kentucky Soybean Association
Kentucky State Beekeepers Association
Kentucky State Parks
Kentucky State University
Kentucky Vegetable Growers Association
Kentucky Transportation Cabinet
Kentucky Woodland Owners Association
Kentucky Women in Agriculture
Louisville Gas and Electric — Kentucky Utilities
Madison County Pollinator Working Group
Morehead State University
Murray State University
National Garden Club
The Nature Conservancy
Northern Kentucky University
Office of Kentucky Nature Preserves
Roundstone Native Seeds
Shaker Village
United States Department of Agriculture —
Farm Service Agency
United States Department of Agriculture —
Natural Resources Conservation Service
United States Fish & Wildlife Service
University of Kentucky Arboretum
University of Kentucky, Cooperative Extension
University of Louisville
Western Kentucky University
Wild Ones Native Landscaping, Inc.

Summary

Since 2015, stakeholders have met in an effort to enhance pollinator health in the Commonwealth by making available best management plans to beekeepers, chemical applicators, and landowners; increasing pollinator habitat; supporting education, extension and outreach; and facilitating communication among all entities that impact pollinators. These goals are intended to be inclusive of all pollinators.

Introduction

Managed bees and native pollinators are necessary to U. S. agriculture. Over 90 crops in the U. S., including many fruits and vegetables grown here in Kentucky such as apples, strawberries, peaches, pumpkins, melons, and canola, are dependent on insect pollinators such as bees for reproduction (USDA 2013).

Although bee-pollinated crops account for 15 to 30 percent of the food we eat (USDA 2013), beekeepers have suffered significant colony losses over the past decade. In addition to honey bee hive declines, the rusty-patched bumble bee has now been added to the federal endangered species list, and the monarch butterfly has been petitioned to be listed. Thus, the U. S. Department of Agriculture (USDA) has focused more resources to look at factors contributing to pollinator decline. These factors include pests, parasites, diseases, low genetic diversity, and poor nutrition. As a result, federal policies are beginning to address and enhance pollinator health, primarily in habitat programs. Currently, the consensus is there is no one reason for the declines. Additional research is needed.

With its diverse flora and centralized location, Kentucky once played a significant role in U. S. apiculture. Prior to the 20th century, Kentucky was a major honey production state, since clover planted for the cattle/dairy industries did very well. However, as tobacco and equine became dominant agricultural industries and the western states began to offer more alfalfas and specialized fruits/orchards, Kentucky apiculture gradually reverted to a cottage industry during the 20th century.

Not so in the 21st century. Kentucky is experiencing an agricultural shift with the need to protect pollinator-dependent “farmers’ market” producers while also balancing the challenges of large-scale cereal crops, equine farms, manufacturer facilities, and other urban concerns that currently define the state’s land uses. Kentucky’s forest-based beekeeping potential remains unknown.

Even with significant losses by some beekeepers and historic rainfalls in recent years, in the 2012 Census of Agriculture, Kentucky had approximately 1,869

farms with hives, with approximately 12,669 colonies. Of that, the value of honey sold was approximately \$898,000.

More recently, the National Agricultural Statistics Service estimated in its Honey Report 2017 that Kentucky operations with five or more colonies produced approximately 230,000 pounds of honey, valued at \$925,000. The demand for Kentucky honey remains strong, as does the demand for honey bees as livestock. Two major honey bee supply companies are located in this state, and they supply the Midwest region with bees, equipment, beeswax foundation, and other necessary supplies to the industry. Each spring, well over 10,000 packages are shipped or transferred out of the state to the region, and approximately 3,000 nucs (small hives of honey bees) are sold. With over 54 local bee associations, the honey bee industry is growing in Kentucky. Nationally, honey bees contribute over \$15 billion in pollinator services to the agriculture industry.

Unmanaged native bees are often solitary and nest in cavities in wood or tunnels that they excavate in the soil. While not as abundant in sheer numbers as managed honey bees, native bees provide invaluable pollination of flowering trees and some agricultural crops. Bumble bees provide the “buzz pollination” of tomatoes, blueberries and cranberries, to name a few crops. Native bees tend to be active earlier and later in the day. Native bees also tend to work more on cooler days than honey bees, sometimes increasing crop yields as they do. Winfree, *et. al.* (2007) found that in New Jersey and Pennsylvania, native bees could provide all pollination services for the watermelon farms in their study. This suggests that native bees may provide valuable and overlooked pollination services to agricultural crops. According to Shelby Fulton, a biologist at the Office of Kentucky Nature Preserves, there are over 552 species of native insects in Kentucky, although not every insect on that list is a pollinator. This number is only a fraction of the total insect diversity. Providing natural habitat by leaving existing areas or planting sites with native flower species that bloom throughout the season should be a standard practice for all Kentucky farmers.¹

With its diverse patchwork of family farms, gardens, orchards, and cereal crops, Kentucky agriculture will become more intensive in the future, and apiculture will play an increasingly important role. Unmanaged pollinators are equally sensitive to land use changes. For this reason, this plan's scope is broader beyond the managed pollinators, and the value of unmanaged pollinators to agriculture is only beginning to be recognized in agricultural statistics. Approximately \$6 billion was an estimate from a 2015 USDA report.

Many native trees, shrubs and wildflowers rely on insect pollinators. The fruits and seeds of these plants, as well as the insect pollinators themselves, are important sources of nutrition for songbirds, bats, frogs, and other wildlife. Pollinator conservation is, therefore, an important element in the overall conservation of Kentucky's ecosystem.

In addition, the general public is becoming increasingly educated about the importance of pollinator health. Many people live in urban or suburban environments and have little interest in being beekeepers, but still want to know what they can do to help bees and other pollinators. One outgrowth of this interest is the steady increase in Monarch Way Stations and other pollinator gardens. Homeowners, corporations, schools, and a variety of civic partners are embracing important roles in pollinator conservation. Just as the plan is intended to be inclusive of a wide variety of pollinators, so too does it acknowledge a wide variety of efforts from the public and private sectors.

1 Of the 552 species on the list, Fulton explains that Office of Kentucky Nature Preserves currently tracks 56 insect species as rare (mostly butterflies, dragonflies and cave beetles). Over 49 insect species are endemic to Kentucky, largely due to speciation of cave beetles. Rare Kentucky Lepidoptera with nectarivorous adults include *Calephelis borealis* (Northern Metalmark), *Calephelis muticum* (Swamp Metalmark), *Callophrys irus* (Frosted Elfin), *Erora laeta* (Early Hairstreak), and *Euphyes dukesi* (Dukes' Skipper). Pollination ecology is uncertain for many plant taxa, but 17 of Kentucky's rare plants are thought to be pollinated by insects. Of these species, the Office of Kentucky Nature Preserves lists 11 as state endangered (at the federal level, two are endangered, one is threatened, and two are species of management concern) and 6 as state threatened (at the federal level, one is a species of management concern).

The KDA Pollinator Protection Plan

The overriding goal is to bring awareness to the issues faced by all parties and find ways for everyone to be included in solutions. The best management practices were developed with this goal in mind. This plan does not seek to eliminate chemical use, but rather urges responsible use. KDA has created a new and easily accessed electronic app to facilitate communication (<https://www.kyagr-apps.com/Pollinator/>). More formats are needed, however, to create additional lines of communication, and this Plan needs continual reassessment to update and define new efforts.

The more visible goal tends to be the increased pollinator habitat that aligns with federal goals of reducing chemical spray drift, providing more nutrition, and reducing the need to mow right of way margins. Encouraging the development of pollinator habitat in marginal areas can overlap with the other goals of education and communication. More pollinator awareness education in various outreach agencies and points-of-sale companies can reach general audiences as well as schools and civic partners.

A long-term commitment to the following goals can facilitate increased cooperation among beekeepers, landowners (including homeowners), pesticide applicators and governmental agencies, as well as continuing compliance with state chemical use requirements.

Goal One: Increase Pollinator Habitat

The most visible goal, *i.e.*, increasing pollinator habitat, benefits Kentucky because the state can reduce costs associated with spraying or mowing as well as increase nutrition or habitat for pollinators. Planting flowers, trees, and low-growing cover crops can take place at many scales and by many different entities. As already mentioned, many civic groups can take ownership of pollinator habitat, and by working together more acreage can provide sustained nutrition for all pollinators.

However, noxious weeds and invasive plant species need to be controlled, and so this plan recommends management of noxious weeds and invasive plant species. The Kentucky Exotic Pest Plant Council maintains a list of invasive plant species in Kentucky. The list can be found at https://www.se-cppc.org/ky/KYEPPC_2013list.pdf. Keeping pollinator habitat along roads mowed to allow adequate sight lines, especially near intersections and exit ramps, is paramount for public safety.

Although increasing pollinator habitat sounds easy, proper preparation and maintenance are important steps in creating quality habitat. The Farm Service Agency (FSA) and Natural Resources Conservation Service (NRCS) are good sources of information for how to best prepare and manage pollinator habitat, especially on larger acreages. Once the habitat is established, resource managers should consider the seasonal needs of pollinators when making management decisions. One management decision would be to delay mowing wildflower fields until after the first “killing” frost, typically in mid-October, to allow migrating monarchs and other late-season pollinators to access much-needed floral resources. See the Kentucky Pollinator Handbook for more information: <https://efotg.sc.egov.usda.gov/references/public/KY/KPH5a.pdf>.

In general, five steps are necessary to ensure successful conversion to pollinator habitat:

- 1) Spend time on initial site prep, including multiple herbicide treatments for invasive species scheduled in the spring, summer and fall, and then again in spring;
- 2) Choose primarily native plants and avoid invasive species;
- 3) Plant at high native seed rate, minimum 40 native forb-grass seed per square foot, and 50-60 per square foot if you can afford it;
- 4) Pollinator Habitat Zones require maintenance after establishment, through prescribed fire preferably, and/or late winter mowing and light strip disking (you have to do one or the other every year, or every other year);
- 5) If you don't want to plant forbs, plant nectar and pollen-producing trees, such as poplar, black locust, maples, sourwood, linden, and many more.

The following is a brief summary of some stakeholder efforts to provide pollinator habitat around the state.

A. Kentucky Transportation Cabinet has approximately 200,000 acres of right-of-way. Of that, it maintains about 100,000 acres with mowing, spraying, re-seeding, *etc.*

1. Overall, for its Pollinator Protection Zones, the Kentucky Transportation Cabinet has 35 sites in 10 of 12 districts across the state for a total of 71 acres.
2. The cabinet has converted former rest areas to monarch way-stations and provided pollinator plantings in Area 2 (Hardin County)



3. Kentucky passed a Highway Rights of Way law in 2010 allowing local Transportation officials to consider using pollinator habitat at interstate interchanges:
lrc.ky.gov/record/10RS/SJ177.htm
4. See **Appendix 2** for example of seed mixture for monarchs.

5. As a matter of policy, the Kentucky Transportation Cabinet does not spray fence rows.
6. The Kentucky Transportation Cabinet delays some mowing schedules to reduce impact to the late-summer generation of monarchs.



A Pollinator Habitat Zone outside Elizabethtown, I-65

B. Developing a Kentucky Monarch Conservation Plan and promoting Monarch Waystations

The Kentucky Department of Fish and Wildlife Resources has developed a **Kentucky Monarch Conservation Plan**. This plan includes education and outreach goals, private lands habitat management goals, public lands habitat management goals, right-of-way management goals, funding goals, and research and management goals. Achieving these goals will take the cooperation and collaboration of state agencies, local agencies, non-governmental agencies, corporations, and private landowners including homeowners. The Kentucky Monarch Conservation Plan is listed on the Fish and Wildlife website as well as the KDA Honey Bee website:

http://www.kyagr.com/statevet/documents/OSV_Bee_ky_monarch_plan.pdf

Existing Monarch Way Stations around the state provide resources necessary for monarchs to produce successive generations and sustain their migration. Without milkweeds throughout their spring and summer breeding areas in North America, Monarchs would not be able to produce the successive generations that culminate in the migration each fall. Similarly, without nectar from flowers, these fall migratory Monarch butterflies would be unable to make their long journey to overwintering grounds in Mexico. (Adapted from monarchwatch.org). Monarch Watch recommends that each monarch waystation have the following:

1. At least 10 milkweed plants (preferably two or more species).
2. At least four species of recommended nectar plants.

3. A good Monarch Way Station is also a pollinator garden and provides food, shelter and host plants for a variety of pollinator and wildlife species. (See **Appendix 3** for current public way stations throughout Kentucky and certification information.)



C. Implementing Pollinator Awareness Programs at State Parks.

Many **Kentucky State Parks** have begun implementing pollinator awareness programs. These programs may include pollinator demonstration gardens as well as educational programs. Jenny Wiley State Park, Big Bone Lick State Park, and Barren River are just a few examples that provide honey bee demonstrations. Jenny Wiley maintains a monarch waystation, and Big Bone Lick State Park offers beekeeping programs for children and adults. Lake Barkley State Park offers hummingbird weekends in April and August, to celebrate the migratory patterns of that pollinator.

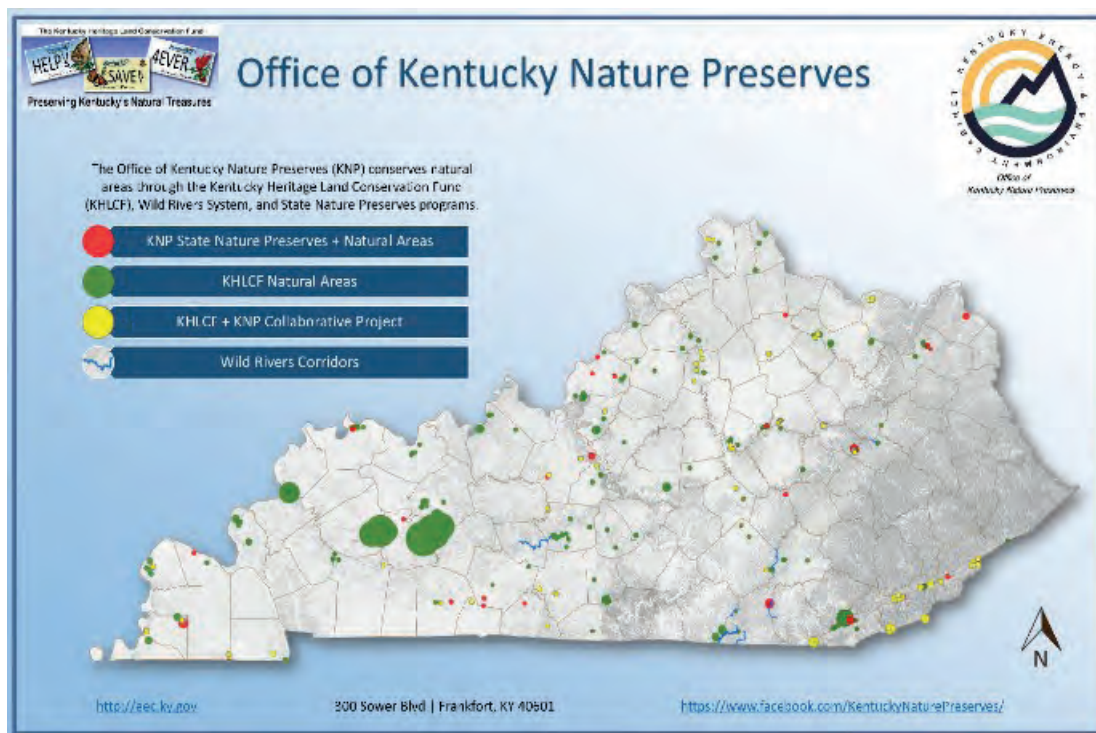
D. Supporting development of nectar corridors on farm conservation easements

The Conservation Stewardship Program (CSP) of the **Natural Resources Conservation Service** offers an opportunity to promote the on-farm use of nectar-producing plant

corridors in conservation practices such as field borders, windbreaks, and riparian buffers. Additional information can be found at this link: nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_017846.pdf

E. Conserving a diverse range of natural habitats for pollinators, wildlife, and natural plant communities

The natural areas programs of the Office of Kentucky Nature Preserves conserve over 125,000 acres in 72 counties, from State Nature Preserves containing native prairies, to forests along designated Wild Rivers, to community parks under Kentucky Heritage Land Conservation Fund easements. The State Nature Preserves provide a variety of nectar and pollen-producing plants, plus nesting sites essential to native pollinators from butterflies to beetles. They also provide excellent foraging habitat for honey bees, and research has demonstrated that diverse areas of native wildflowers can be used by both honey bees and native bees to detoxify themselves after exposure to harmful chemicals. Natural areas in proximity to agricultural fields and vegetable gardens provide habitat for native bees that are, in turn, performing essential pollination services. Protecting natural habitat is perhaps the best tool for ensuring healthy pollinator populations.



F. Providing Guidance on Mowing and Bush Mowing Conservation Reserve Program (CRP) and other large tracts of lands

“A general rule is that only 25 to 33 percent of pollinator habitat should be disturbed by mowing, grazing or haying at any one time in order to protect overwintering pollinators, foraging larvae and adults, and other wildlife. If that is not feasible, never disturb more than 50 percent of an entire area at once... . In order to maximize foraging and egg-laying opportunities, maintenance activities should be avoided while plants are in flower. Ideally, mowing in areas where pollinator habitat is important should be done only in the late fall or early winter.” (page 29)

Taken from Casey Shrader’s *Kentucky Pollinator Handbook*, which can be found at the following link:
<https://efotg.sc.egov.usda.gov/references/public/KY/KPH5a.pdf>

G. Providing Guidance on Rights of Way management for corporations, utility companies, university land managers, among other entities

In maintaining large rights of way tracts, land managers have to prioritize for the Public Service Commission the following: safety issues, treeline hazards, protecting their equipment and employees, and other resources. Below are some practices to help guide decision-making on right of way management to ease pressure on pollinators:

- Follow management window of not mowing until October 15 so as not to disrupt monarch migratory routes.
- The spring window management is prior to April 1, so any type of right of way management should be scheduled between Oct. 15 and April 1. Summer maintenance should be scheduled between July 15 and August 1.
- Visible signage to educate the public about the pollinator habitat.
- In general, mow roadside vegetation (beyond the clear zone) as little as possible.
- Establish communication lines with multiple partners to create action plans for maintenance, signage, possible funding opportunities and collaborations for future projects.
- See *Pollinators and Roadsides: Best Management Practices for Managers and Decision Makers*. U.S. Department of Transportation, Federal Highway Administration, January 2016.

Pollinator and Roadsides: Best Management Practices for Managers and Decision Makers:
http://rightofway.erc.uic.edu/wp-content/uploads/2018/05/1A8-BMPs_pollinators_roadsides.pdf

- See *Monarch Habitat Development on Utility Rights of Way*. (Kentucky is in the North Core for the monarch migration).
Pollinator Partnership, www.pollinator.org, 2013.

Monarch Habitat Development on Utility Rights of Way: <https://monarchjointventure.org/images/uploads/documents/Monarch.Habitat.Manual.ROW.NEast.ver16.pdf>

- For state DOT managers and staff, Pollinator Partnership created a “Technical Manual for Maintaining Roadsides for Pollinators.”
https://pollinator.org/assets/generalFiles/Maintaining_Roadsides_for_Pollinators.pdf (Michaela calls attention to the appealing graphics on pages 22-23.)

H. Support the creation of pollinator habitat on surface mine sites.

Surface mines account for the loss of thousands of pollen- and nectar-producing trees. Since 2008, major efforts have been made to address this aspect of reforestation, with an emphasis on economic development in forest-based beekeeping. In 1995, the **Appalachian Regional Reforestation Initiative** defined Five Steps of Forestry Reclamation Advisory, which are listed at the end of this document (**Appendix 4**).

Since forming the nonprofit **Green Forests Work**, regional university faculty, staff, volunteers and a variety of civic groups have planted over 2 million bare-root seedlings on former surface mine sites: www.greenforestswork.org.

1. Pollinator Habitat Law, 2010. lrc.ky.gov/record/10rs/hb175.htm
2. Example of flower seed mix used on surface mine sites (See **Appendix 4** for other surface mine site preparation).
3. Forestry Reclamation Advisory Memorandum on pollen-nectar production trees was published early in 2017.
4. **The Cerulean Warbler Appalachian Forestland Enhancement Project** enables partners to work with private landowners to enhance 12,500 acres of forest habitat on private lands for Cerulean Warblers and other wildlife: amjv.org/index.php/private_landowners/cerulean-warbler-appalachian-forestland-enhancement-project.

Goal Two: Best Management Practices

The best management practices (BMPs) listed below have been developed to enhance pollinator health and are intended to be voluntary as pollinator awareness is best addressed through education, management, and communication.

A. Beekeepers

- **The Honey Bee Health Coalition** has produced an 80-page **BMP Guide for Beekeepers** available for free at the following website (2019): <https://honeybeehealthcoalition.org/hivehealthbmps/>
- **Document honey bee hive health during all seasons**, with photographic evidence as well as business receipts from current and previous years.
- **Sign up for the KDA Pollinator Protection app:** The Home Page URL: <https://www.kyagr-apps.com/Pollinator/>. There is a handout to help someone navigate the process of signing up for the app: http://www.kyagr.com/statevet/documents/OSV_Bee_Pollinator-Handout.pdf.

- **Be aware, if possible, of municipality spraying schedules** and their potential impact for your hives.
- Beekeepers who treat their hives for varroa mites and other pests **are** pesticide applicators and are *required* to *read and follow* all label requirements
- Establish and maintain contact with local USDA Farm Service Agency offices regarding the **Emergency Livestock Assistance Program (ELAP)** (<https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/emergency-assist-for-livestock-honey-bees-fish/index>).
- **Report colony numbers and locations** to the Kentucky State Apiarist (kyagr.com/statevet/honeybees.html).
- **Use a Bee Flag to communicate approximate hive location with area farmers or urban neighbors to help create awareness between applicator/beekeeper.** (blogs.msucare.com/honeybees/files/2015/01/BeeWare-Flag-Pole-Flyer-2014.pdf)
- **Maintain strong healthy hives** using recommended management practices.
- **Plant diverse flowers for pollinator forage.** Every hive on average needs 252 million flowers to make it through a full calendar year. Those flowers need to be free of contaminants and not compromised by droughts, rainfall, etc.
- **Stay informed about honey bee issues** through beekeeping associations, cooperative extension, beekeeping journals, newsletters, and the USDA FSA. The Kentucky State Beekeeping Association website is a good place to look for local associations, meeting times, and other events: www.ksbabeekeeping.org. The Kentucky Department of Agriculture Honey Bee website is also a good resource: <http://www.kyagr.com/statevet/honeybees.html>.
- **Avoid placing honey bee hives in direct proximity to agricultural fields** in such a way that the hives are vulnerable to spray drift and/or residues in water. Many pesticide labels have language that addresses spraying of buffer areas. Placing hives within or behind buffer areas could help avoid slight drift issues. Beekeepers must always have permission from landowners before placing colonies on private property.
- **Have full-length screens or hive nets “at the ready”** to drape over hives and keep bees inside for a brief and limited time. These screens (sometimes called “moving nets”) can be bought at bee supply stores listed at the end of this document in “Other Resources”.
- **Send honey to be tested on a regular basis** to determine the plant species that are being represented in the honey varietals.
- **Understand how to recognize colony loss due to pesticides and properly report to KDA/ USDA FSA.** If there is a suspected pesticide kill, **do not** disturb the site, and contact **KDA Division of Environmental Services** inspectors immediately. Other than video or photos, do not take bee tissue or honey samples prior to an on-site inspection with KDA Division of Environmental Services inspectors.

Consult the following website for standard operating procedures: kyagr.com/statevet/honeybees.html.

- **Establish good relations and communication with neighboring farmers.** Notify them of the locations of hives.
- **Post “beekeeper contact” information** in a prominent location at each apiary.

B. Pesticide Applicators

Pesticide applicators include a broad range of people — homeowners, backyard gardeners, landscape professionals, beekeepers applying miticides, industrial or municipal applicators, and/or public health officials. Pesticides used in urban areas by a homeowner pose as much of a risk to pollinators as those applied in agricultural areas. Compounding the complexity of the spectrum of pesticide applicators, the recent Zika virus has altered the thought process of when and where pesticide applications can be made for public health.

Not all pesticide applications pose a risk to honey bees and other pollinators. The greatest risk occurs during the following conditions:

- 1). Broad-spectrum insecticides are applied to crops or weeds in bloom;
- 2). Pollinators forage in the area during daylight hours; and/or
- 3). Chemical spray drifts onto colonies.

Tank mixes of certain pesticides can also increase the risk to pollinators.

- **Be aware of honey bee hives or habitat for other pollinators near fields to be treated with pesticides.** Know how to contact owners of these colonies if required by product label.
- **Sign up for the KDA Pollinator Protection app:** The Home Page URL: <https://www.kyagr-apps.com/Pollinator/>. There is a handout to help someone navigate the process of signing up for the app: http://www.kyagr.com/statevet/documents/OSV_Bee_Pollinator-Handout.pdf.
- **Use Integrated Pest Management (IPM) and economic thresholds** to determine if insecticides are required to manage pests. When insecticides are required, consider using insecticides with low toxicity to bees, short residual toxicity, or repellent properties toward bees.
- **Avoid dusts and wettable powder insecticide formulations if possible.** Granular and liquid formulations are safer for pollinators since granules are not typically picked up by bees, and liquids dry onto plant surfaces.
- Crop consultants, agronomists, “points of sale” contacts, and others making pesticide recommendations should **consider impacts on pollinators**. This should include product choices and timing of application to minimize potential impact to pollinators.

THE NEW EPA BEE ADVISORY BOX

On EPA's new and strengthened pesticide label to protect pollinators

PROTECTION OF POLLINATORS

APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators. Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat.
- Minimize drift of this product onto beehives can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at: <http://pesticidestewardship.org/pollinatorprotection/Pages/default.aspx>

Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state/tribe, go to: www.aapco.org. Pesticide incidents can also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

Alerts users to separate restrictions on the label. These prohibit certain pesticide use when bees are present.

The new bee icon helps signal the pesticide's potential hazard to bees.

Makes clear that pesticide products can kill bees and pollinators.

Bees are often present and foraging when plants and trees flower. EPA's new label makes it clear that pesticides cannot be applied until all petals have fallen.

Warns users that direct contact and ingestion could harm pollinators. EPA is working with beekeepers, growers, pesticide companies, and others to advance pesticide management practices.

Highlights the importance of avoiding drift. Sometimes, wind can cause pesticides to drift to new areas and can cause bee kills.

The science says that there are many causes for a decline in pollinator health, including pesticide exposure. EPA's new label will help protect pollinators.

EPA

Read EPA's new and strengthened label requirements: <http://go.usa.gov/jHH4>

- **Always use registered pesticides (including miticides used in bee hives) according to the label.** Failure to comply with the label not only puts humans and the environment at risk, it is also illegal. Many pesticides, especially insecticides, have use restrictions prohibiting applications when pollinators are foraging in the treatment area. Some labels prohibit applications to blooming plants (crops or weeds) and require the applicator notify beekeepers in the area prior to application. Applicators are bound to follow all directions, precautions, and restrictions on pesticide labels, even when following other BMPs. Contact the KDA Division of Environmental Services at (502) 782-0282 or your local cooperative extension office with any questions on pesticide label language.
- **Pesticides toxic to pollinators should be applied when bees are less active.** Pollinators are most active during daylight hours between 9 a.m. and 3 p.m. and when the temperature is over 55 degrees Fahrenheit.
- Be aware of temperature inversions when choosing the best time for applications, as temperature inversions increase the risk of off-site movement.
- Avoid applying when low temperatures will allow dew formation. Dew may re-wet pesticides and increase pollinator exposure.



FOR CROPS UNDER CONTRACTED POLLINATION SERVICES

Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless the following condition has been met.

If an application must be made when managed bees are at the treatment site, the beekeeper providing the pollination services must be notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.

Bees must be removed, covered or otherwise protected for 5 days following application.



FOR FOOD CROPS AND COMMERCIALY GROWN ORNAMENTALS NOT UNDER CONTRACT FOR POLLINATION SERVICES BUT ARE ATTRACTIVE TO POLLINATORS

This product is toxic to bees exposed to treatment for more than 5 days following treatment.

Do not apply this product to blooming, pollen-shedding or nectar-producing parts of plants if bees may forage on the plants during this time period.

- **Minimize pesticide drift.** Pesticide drift involves the off-site movement of pesticides through the air from the treatment site to other areas, either in the form of mist, particles, or vapor. Drift reduces the effectiveness of the chemical applied since only part of the applied amount remains on site and unnecessarily increases cost to the applicator. Drifting chemicals also pose a risk to pollinators that come in contact with off-target residues. Contact the Cooperative Extension Service for more information on how to prevent pesticide drift.
- Insecticide applications should be made only in calm weather when winds are blowing--**away** from hive locations adjacent to or near fields to be treated.

- Consider alternatives to talc/graphite in seed planters. The talc and graphite can erode the insecticide treatment off of the seeds, creating insecticide-containing dust that can drift onto flowering plants and into hives.
- Identify and notify beekeepers in the area prior to applying pesticides if required by label directives. To facilitate this, applicators are encouraged to use an interactive map. The Kentucky Department of Agriculture has created an electronic app: <https://www.kyagr-apps.com/Pollinator/>. This tool assures anonymity while quickly alerting beekeepers about products requiring notification that will be sprayed and the date. Notification should be done at least 48 hours prior to application, or as soon as possible but no less than 24 hours. Timely notification provides ample time for the beekeeper and applicator to develop a mutually acceptable strategy to manage pests while mitigating risk to pollinators. These strategies may include covering hives, moving hives, or choosing an appropriate time of day to apply.
- Notifying beekeepers does not exempt applicators from complying with pesticide label restrictions. Some insecticide labels prohibit use while pollinators (bees) are foraging in the treatment area.
- Document your efforts (via emails or phone calls) to contact beekeepers when applying pesticides that require beekeeper notification.
- Minimize spraying non-crop areas and buffer zones with insecticides or other pesticides highly toxic to pollinators. Buffer areas, hedge rows and other natural areas provide both feeding and nesting habitat for native pollinators. If these areas must be treated, time applications or use other tactics to minimize impact on pollinators.
- Establish good relations and communication with your local beekeepers. Sign up for the Kentucky Pollinator Protection Plan app or reach out through email, phone, text, *etc.* — and keep all copies of communication about spray notice.

A. Landowners/Growers/Homeowners

Landowners, property owners, homeowners, and land managers may apply and/or hire pesticide applicators to control pests. They should be aware of implications to pollinators in land use decisions. Many landowners in Kentucky rent out a portion of their property for agricultural purposes. While they do not necessarily apply pesticides, the landowners can help to reduce exposure of pollinators on their property by facilitating communication between beekeepers and applicators. (**for large scale corporations, utility companies, university property managers, please also see “Goal One, Rights of Way Management,” page 8.)

- **Work with beekeepers to choose hive locations.** Ideal locations for hives will have minimal impact on farming operations but still will allow bees to access forage and water. Communicate with beekeepers about which roads/trails can be problematic when muddy and any preferred traffic routes. Landowners will also want to provide emergency contact information to beekeepers for pesticide applicators, renters, and neighbors (if needed).

- **Communicate with renters about bee issues.** Renting land for agricultural production is a common practice in Kentucky. Landowners and renters should discuss bee issues, such as who has authority to allow hives on site, how long the hives will be allowed, and hive placement. These issues should be addressed and included when rental agreements are negotiated. If possible, include a map in the paperwork.
- **When contracting with commercial chemical applicators, make sure there is a clear understanding of who has the responsibility to identify hive locations and communicate with beekeepers.** Applicators may do this as part of their standard procedures, but some landowners may also prefer to make contacts with the beekeeper. Landowners can also remind applicators to comply with all label directions and restrictions, including communications with beekeepers.
- **Encourage or consider planting bee forage.** Plant diverse, native flowering plants, trees or shrubs to improve pollinator forage, especially in non-farmable or non-crop areas. Doing so provides pollinator forage and may also lure bees (and other pollinators) away from areas being treated with chemicals, thereby minimizing impacts to pollinators.

See also: plants.usda.gov/pollinators/Improving_Forage_for_Native_Bee_Crop_Pollinators.pdf

- **Rural landowners** should consider interseeding pastures, selecting cover crops, and establishing pollinator forage plants in buffer zones to provide high-quality pollinator forage
(nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1143636.pdf).
- **If planting cover crops, consider adding flowering plants** into the mix, including milkweed. Even a small percentage of flowering plants can provide a considerable amount of forage for pollinators. Milkweed species are the only hosts for monarch butterfly caterpillars.
- **Alter mowing plans to provide cover for migratory birds and pollinators.** This practice can be done by delayed mowing or reduced mowing or no-mowed swaths. This will enhance native flowering perennials, trees, and shrubs as forage and native pollinator habitat.
- **Leaving small patches of disturbed bare ground** provides attractive habitat for some types of native bees.

B. Governmental Agencies and Corporations

- **Post spray schedules** for routine applications for public access on respective agencies' websites. List the products used with hyperlinks for additional information.
- **Use Integrated Pest Management (IPM) and economic thresholds** to determine if insecticides are required to manage pests. When insecticides are required, choose insecticides with low toxicity to bees, short residual toxicity, or repellent properties toward bees and other pollinators. Avoid spraying insecticides on habitats for native pollinators including, shrubs, and butterfly host plants such as milkweed.

- When designing public landscapes and rights of way, consider using **suitably adapted, native flowering plants** that can provide supplemental quality forage for pollinators.
https://plants.usda.gov/pollinators/Improving_Forage_for_Native_Bee_Crop_Pollinators.pdf
- **Consider planting Monarch Way Stations.**
pollinator.org/PDFs/Guides/EBFContinentalrx13FINAL.pdf AND
monarchjointventure.org/images/uploads/documents/WFM_Brochure_final.pdf
- **Alter mowing plans** to provide cover for migratory birds and late-season pollinators. This can be done by delayed mowing or reduced mowing on no-mowed swaths. This will enhance native flowering perennials, trees, and shrubs as forage and native pollinator habitat.
- **Consider funding/participating in grants** that would be science-based and focused on pollinator issues. USDA-APHIS Honey Bee Health Survey administered via Kentucky Department of Agriculture State Apiarist program.

See the following website for details: aphis.usda.gov/plant_health/plant_pest_info/honey_bees/downloads/SurveyProjectPlan.pdf
- **Consider flex-time schedules for crews** so spraying is done during evening and early-morning hours.

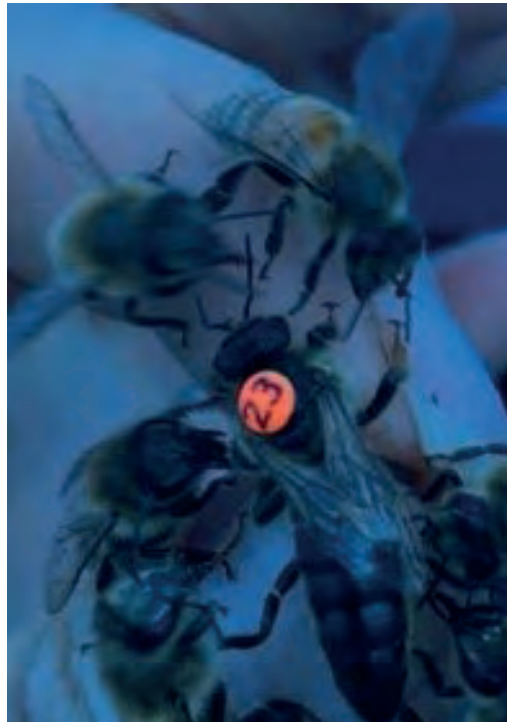
Goal 3. Increase Communication about Pollinators

Communication is the most important tool, often the least expensive option, and arguably has the most important impact when attempting to reduce hive deaths due to chemical application or lack of nutrition. Communication takes many forms, has many audiences, and is ongoing. Below is a list of some of the methods currently being used to communicate pollinator awareness in Kentucky.

1. **The KDA Pollinator Protection app** should be used when growers are faced with making a risky application, and/or growers are required to notify surrounding beekeepers according to the label. If growers use this free tool, they will be compliant with EPA requirements and their anonymity is guaranteed. It typically takes 2-5 minutes to register. Home Page URL: <https://www.kyagr-apps.com/Pollinator/>.
2. **Bee Aware Flags** are available for individual purchase and can be used to alert pesticide applicators and others to the location of hives.
mississippi-crops.com/wp-content/uploads/2014/03/Bee-Aware-Order-Information.pdf
3. Each year, the **Kentucky Department of Agriculture** and the **Kentucky State Beekeepers Association** work a **Honey Booth** at the Kentucky State Fair. The Honey Booth features information on honey bees, beekeeping, and the importance of pollinators to agriculture.
4. The Kentucky Department of Agriculture offers many resources related to honey bees and pollinators in agriculture. These resources include a monthly newsletter, bee association talks, and pollinator updates.
kyagr.com/statevet/honeybees.html.

5. The **Kentucky State Beekeepers Association (KSBA)** is a volunteer-led, non-profit organization dedicated to beekeeping in Kentucky. This association represents Kentucky's backyard, hobby, and commercial beekeepers as well as local associations. The website, www.ksbabeekeeping.org, updates on honey bee issues relevant to Kentucky beekeepers.
6. Pollinator research is being conducted at many Kentucky universities and presented at scientific conferences, civic events, and a wide variety of outreach.
7. The **Kentucky Farm Bureau** has created pollinator-friendly policies, and provides pollinator-related communication and outreach.
8. The **University of Kentucky** and **Kentucky State University** provide pollinator-related extension and outreach programs through the cooperative extension services.
9. The **Kentucky Department of Fish and Wildlife Resources** has developed the **Kentucky Monarch Protection Plan**:

http://www.kyagr.com/statevet/documents/OSV_Bee_ky_monarch_plan.pdf



10. The **Kentucky Queen Bee Breeders Association** is working on more diverse genetic stock of honey bees, including genetic lines that show resistance to mites and also overwinter well. Working with Purdue University, the Kentucky Queen Bee Breeders offer a variety of workshops.

Website: www.kyqueenbreeders.com.

Goal 4: Education and Outreach

Education and outreach are second only to communication in importance.

As with communication, education and outreach take many forms, have many audiences, and are ongoing. Below is a list of some of the methods currently being used for pollinator education and outreach in Kentucky.

1. **Kentucky State Fair.** Bees and Honey Exhibit, 4-H Cloverville, Kentucky Agriculture and Environment in the Classroom; National Honey Queen program.
2. **Universities and schools.** Ongoing pollinator studies to better understand and enhance pollinator health.
3. **Kentucky Department of Agriculture — State Apiarist and Division of Environmental Services.** The Apiarist implements the USDA Honey Bee Health Survey grants to the Kentucky Department of Agriculture.
4. **Kentucky Pollinator Protection app** alerts beekeepers to spraying when chemical product labels require communication.
5. **4-H Bee Ambassador Program**, which provides lessons and resources for counties to promote pollinator programs.

<https://entomology.ca.uky.edu/files/beemanualfinaldec2018.pdf>

6. **Pesticide Safety Education Program** has incorporated pollinator protection.
7. **Pollinator Protection Plan Stakeholder Meetings** are typically scheduled twice a year and provide updates to a vast variety of stakeholders.
8. Funded by the **Foundation for the Preservation of Honey Bees**, the *Kids and Bees Handbook* by Sarah Red-Laird, published in 2019, is available for download.

<https://www.beegirl.org/kidsandbees>

9. General education resource about bees: *Turn This Book into a Beehive: And 19 Other Experiments and Activities that Explore the Amazing World of Bees*, Lynn Brunnell, Workman Publishing, 2018.

Conclusion

As Kentucky's economy continues to evolve, the state is reviving a once-dominant apiculture industry.

This document reflects policies to enhance communication among beekeepers, chemical applicators, and land managers and other groups; and to consider increasing habitat with a goal toward responsible economic development as well as providing nutrition and shelter.

The plan cannot remain static. Future iterations will appear at regular intervals to evaluate how pollinators are doing in the state, and revise the Pollinator Protection Plan so that the Commonwealth may not only benefit from the services provided by pollinators but also provide nutrition and sanctuary to pollinators.

Our state relies on a diverse agriculture sector. Our agriculture, in turn, relies on the services of a sustainable beekeeping industry and a healthy diverse ecosystem of native pollinators.

APPENDIX 1

Kentucky Soybean Promotion Board and Kentucky Soybean Association Commitments to Protecting Pollinators

Partnering for Improved Communication and Coordination

Kentucky soybean farmers know that pollinators are essential to agriculture, whether they are commercially-managed honeybees, wild bees, butterflies or other beneficial insects.

We are committed to being a positive partner in the Kentucky Department of Agriculture's Managed Pollinator Protection Plan process, and it is essential that we continue to re-evaluate how we can do things better on the farm. As active partners, we are working to make sure this new plan can be practically implemented by farmers and chemical applicators to achieve our shared goal of protecting pollinators.

Limiting insect damage is essential for growing crops, but we understand our obligation to use crop protection products responsibly for the good of pollinators, and the people who make their living from honey production and pollination services.

Investing in Pollinator Research

The Kentucky Soybean Promotion Board continues to fund research to help growers improve their Integrated Pest Management practices and use of non-foliar applications like insecticide seed treatments. While conventional wisdom from crop specialists has long held that soybeans do not benefit from insect pollination, the United Soybean Board has begun research partnerships in Iowa and Illinois to test new findings that bees can increase soybean production.

2013 research published in Environmental Chemistry Letters by Brazil's Federal University of Ceará found that wild pollinators increased soybean yield by 6 percent, and the introduction of honeybee colonies increased yields further by 18 percent. A 1975 study in Arkansas and Missouri found significant increases in seed yield up to 100 meters from apiaries.

How can soybean farmers better protect pollinators?

The United Soybean Board says that maintaining bee-friendly waterways, riparian corridors, field borders and planting cover crops are key steps. Cover crops increase the diversity of insects, most of which are beneficial for production, such as pollinators and predatory insects that feed on insect pests.

Scheduling of pesticide application after pollination and communication with beekeepers is key. For the long term, soybean research will prioritize genetics to increase nectar production and make soybeans a better forage crop for bees.

For more information, visit KySoy.org.

APPENDIX 2

Examples of Pollinator-Friendly Diverse Seed Mix.

Roundstone Native Seed 9764 Raider Hollow Road Upton, KY 42784

Kentucky Department of Transportation

Pollinator/Monarch mix

Acres: 1

Kind	Botanical name	PLS oz/ac	PLS lbs/ac	PLS lbs
Butterfly Milkweed	<i>Asclepias tuberosa</i>	18.91	1.182	1.182
Common Milkweed	<i>Asclepias syriaca</i>	17.92	1.120	1.120
Swamp Milkweed	<i>Asclepias incarnata</i>	10.00	0.625	0.625
Whorled Milkweed	<i>Asclepias verticillata</i>	1.15	0.072	0.072
Smooth Beardtongue	<i>Penstemon digitalis</i>	1.95	0.122	0.122
Lance Leaved Coreopsis	<i>Coreopsis lanceolata</i>	4.05	0.253	0.253
Blackeyed Susan	<i>Rudbeckia hirta</i>	3.35	0.209	0.209
Hoary Mountain Mint	<i>Pycnanthemum incanum</i>	1.25	0.078	0.078
Slender Mountain Mint	<i>Pycnanthemum tenuifolium</i>	1.25	0.078	0.078
Early Goldenrod	<i>Solidago juncea</i>	2.65	0.166	0.166
Bergamot	<i>Monarda fistulosa</i>	2.65	0.166	0.166
Spiked Blazing Star	<i>Liatris spicata</i>	3.35	0.209	0.209
Greyheaded Coneflower	<i>Ratibida pinnata</i>	3.00	0.188	0.188
Purple Coneflower	<i>Echinacea purpurea</i>	4.05	0.253	0.253
False Sunflower	<i>Heliopsis helianthoides</i>	3.00	0.188	0.188
Browneyed Susan	<i>Rudbeckia triloba</i>	3.00	0.188	0.188
Joe-Pye Weed	<i>Eupatorium fistulosum</i>	1.60	0.100	0.100
Iron Weed	<i>Vernonia altissima</i>	1.95	0.122	0.122
Sneezeweed	<i>Helenium autumnale</i>	1.95	0.122	0.122
Narrow-Leaved Sunflower	<i>Helianthus angustifolius</i>	1.95	0.122	0.122
New England Aster	<i>Aster novaeangliae</i>	2.30	0.144	0.144
White Wingstem	<i>Verbesina virginica</i>	2.65	0.166	0.166
Indian grass	<i>Sorghastrum nutans</i>	3.35	0.209	0.209
Little bluestem	<i>Schizachyrium scoparium</i>	6.85	0.428	0.428
Partridge Pea	<i>Cassia fasciculata</i>	1.25	0.078	0.078
Compass Plant	<i>Silphium laciniatum</i>	3.00	0.188	0.188
Cardinal Flower	<i>Lobelia cardinalis</i>	0.90	0.056	0.056
Lance-Leaved Goldenrod	<i>Euthamia graminifolia</i>	1.35	0.084	0.084
Boneset	<i>Eupatorium perfoliatum</i>	1.35	0.084	0.084
Spring Oats	<i>Avena sativa</i>	20.00		

Freight calculated at time of shipping 7.00 Lbs/acre of Forbs 27.0 Total Lbs/acre

APPENDIX 3

Current Monarch Way Station Locations in Kentucky.

(Certification information available at monarchwatch.org).

Listing of public monarch waystations as of 11/2015*

- | | | |
|--|---|--|
| 1. Berea Municipal Utilities, Berea | 28. Victorian Estates, Georgetown | 52. St. Michael's Episcopal Church, Lexington |
| 2. Happy Meadow Natural Foods, Berea | 29. Newtown Christian Church, Georgetown | 53. Klausing Group Commercial Landscaping, Lexington |
| 3. Berea Urban Farm, Berea | 30. Kentucky Dam Village State Park, Gilbertsville | 54. Lexington Public Libraries |
| 4. Daniel Boone National Forest Redbird District, Big Creek | 31. Woodlands Nature Stations, Golden Pond | 55. Peace Meal Gardens, Lexington |
| 5. New Beginnings Riding Stables, Bowling Green | 32. Creasey Mahan Nature Preserve, Goshen | 56. McConnell Springs, Lexington |
| 6. Baker Arboretum, Bowling Green | 33. Shaker Village of Pleasant Hill, Harrodsburg | 57. Ashland Terrace Retirement Home, Lexington |
| 7. Bowling Green Community Park | 34. Beaumont Inn, Harrodsburg | 58. Raven Run, Lexington |
| 8. Buckhorn Lake Park, Buckhorn | 35. John James Audubon State Park, Henderson | 59. Firebrook Estates, Lexington |
| 9. Blue Star Memorial Garden, Cadiz | 36. Campbell County Cooperative Extension, Highland Heights | 60. Audubon Park (4), Louisville |
| 10. Sanders Park, Corbin | 37. Jeffers' Bend Environmental Center, Hopkinsville | 61. Copper and Kings Brandy Co., Louisville |
| 11. Cumberland Falls State Park, Corbin | 38. Marcum and Wallace Memorial Hospital, Irvine | 62. Landis Lake Subdivision, Louisville |
| 12. Goebel Park, Covington | 39. Garrard County Cooperative Extension, Lancaster | 63. Downtown Maysville |
| 13. Boone County Garden Club, Crittenden | 40. Anderson County Library, Lawrenceburg | 64. Morehead Community Park |
| 14. Boyle County Public Library, Danville | 41. Floracliff Nature Sanctuary, Lexington | 65. Blue Licks State Park, Mount Olivet |
| 15. Boyle County Co-Op Extension, Danville | 42. State of Kentucky Arboretum (2), Lexington | 66. Springhouse Gardens, Nicholasville |
| 16. Centre College, Danville | 43. Cardinal Hill Rehabilitation Hospital, Lexington | 67. Paducah Airport Viewing Area, Paducah |
| 17. Kentucky School for the Deaf, Danville | 44. St. Ann Street median, Lexington | 68. Buddenbaum House, Paducah |
| 18. Mary Akin Garden at Constitution Square, Danville | 45. Fayette County Cooperative Extension, Lexington | 69. Nannie Clay Wallis Arboretum, Paris |
| 19. Toyota Motor Engineering & Manufacturing North America, Erlanger | 46. Waveland Museum, Lexington | 70. Central Kentucky Wildlife Refuge, Parksville |
| 20. City Walking Trail, Flemingsburg | 47. Dogwood Park, Lexington | 71. Madison County Cooperative Extension, Richmond |
| 21. Commonwealth Gardens, Frankfort | 48. Wellington Park, Lexington | 72. E. C. Million Community Park, Richmond |
| 22. Reserve by the Governor's Mansion, Frankfort | 49. Morning Point, Lexington | 73. Dumont Hill Park, Scottsville |
| 23. Frankfort Senior Center, Frankfort | 50. Christian Towers, Lexington | 74. Red Orchard Park, Shelbyville |
| 24. Franklin County Cooperative Extension, Frankfort | 51. St. Margaret St. median, Lexington | 75. Pulaski County Cooperative Extension, Somerset |
| 25. Salato Wildlife Education Center, Frankfort | | 76. Pulaski County Public County, Somerset |
| 26. Liberty Hall Historic Site, Frankfort | | 77. Lincoln County Library, Stanford |
| 27. Fort Wright Community Park, Fort Wright | | 78. Boone County Arboretum, Union |

* **NOTE:** The list of 78 above is not complete. Monarchwatch.org estimates a total **636** Monarch Way Stations in Kentucky as of early 2019. Some are not certified under the names of their physical locations. Does not include public or private schools.

APPENDIX 4

Five Steps for Forestry Reclamation Advisory on Surface Mine Sites (FRA).

1. Create a suitable rooting medium for good tree growth that is no less than four feet deep, and consists of topsoil, weathered sandstone, and/or the best available material.
2. Loosely grade the topsoil or topsoil substitutes established in step one to create a noncompacted growth medium.
3. Use ground covers that are compatible with growing trees.
4. Plant two types of trees – 1) early succession species for wildlife and soil stability, and 2) commercially valuable crop trees.
5. Use proper tree planting techniques.

APPENDIX 5

Challenges with Creating More Pollinator Habitat.

1. Although prescribed burns are often the best way to prepare a site, many people do not feel comfortable burning their acreage. Consult with Kentucky Prescribed Fire Council: www.kyfire.org. The Kentucky Prescribed Fire Council wishes to pass legislation that would indemnify agencies/private conservation practitioners, but it also would cause more regulation on burning in Kentucky.
2. Seasonality of seed can be an issue.
3. Availability of seed can be an issue.
4. If one patch of land is changed, it will impact other species that may or may not find the changes attractive.

Other Resources:

- Bee Forage: Recent research from Penn State suggests that bees can detoxify themselves if they have access to diverse flowers. says Dr. Christina Grozinger, “Natural Diet Helps Honey Bees Fend Off Pesticide Effects,” ezezine.com/ezine/archives/1636/1636-2014.11.03.14.21.archive.html
- Bee Hive Nets: Where to purchase bee nets. Dadant Supply, model #V02000, approximate cost \$28.95. Kelley’s Bee Supply does not have bee nets for purchase, but its parent company Mann Lake does. #HD714, \$26.95.
- Green Forests Work, LLC. For work on planting pollinator trees, understory, ground covers, greenforestswork.org.
- Honey testing: An example of one lab is the Palynology Laboratory, Department of Anthropology, Texas A&M, College Station, Texas, 77843-4352. Beekeepers should check for the most recent prices: txbeeinspection.tamu.edu/files/2014/10/TAIS-Submission-Form.pdf Samples need to be sealed in zip-locking bags, should be at least four ounces, and if you want samples back, include extra fees for the shipping and handling.
- Mason bee nest tubes and houses can be bought at garden.com for approximately \$20. Item #37-481.
- Monarch butterflies: monarchwatch.org.
- Moissett, Beatriz and Stephen Buchmann. *Bee Basics: An Introduction to Our Native Bees*. Can be downloaded free at fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5306468.pdf.
- Prairie Moon Nursery in Minnesota has an excellent eight-step guide to helping landowners consider their goals and appropriate strategies to converting various land uses to pollinator habitat. See their website for a downloadable document: prairiemoon.com/how-to-grow-a-prairie-from-seed.html.
- Prescribed Burn Info: 1. kyfire.org; 2. Wayne Pauley’s *How to Manage Small Prairie Fires*, 1982 (book available at WildOnes.org and/or amazon.com).
- Pollinator education materials, legislative updates, planting guides: pollinator.org.
- Pumpkin/squash bees: see *Pumpkin Production Guide*, NRAES-123. Cornell: Cornell University Press, 2003. Excellent guide for *Peponapis pruinosa* bees.

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— *Tammy Horn Potter, Ph.D.*

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