



ARKANSAS MONARCH AND POLLINATOR CONSERVATION PLAN



MAY 2018

*Presented by the Arkansas Monarch
Conservation Partnership
Steering Committee*

EXECUTIVE SUMMARY

Following years of declines in populations of monarch butterflies and pollinators, the U.S. Fish and Wildlife Service has received petitions to list several pollinator species as threatened or endangered under the Endangered Species Act. The presidents of the United States and Mexico and the prime minister of Canada have called for cooperative action to address declining monarch populations. In June 2014, a Presidential Memorandum was issued from the White House directing federal actions to address the issue of pollinator conservation resulting in the creation of a Pollinator Health Task Force and the *National Strategy to Promote the Health of Honey Bees and Other Pollinators*.

Following a summit of state and federal agencies, nongovernmental organizations, businesses, landowners and others in 2015, a concerted effort was made to bring greater focus to the plight of the monarch butterfly and pollinators in Arkansas. Summit attendees agreed that a statewide strategy should be developed in the form of a state monarch and pollinator conservation plan. This document is the result of that commitment.

The plan is based on cooperation and collaboration and is a living document that will be periodically updated. It supports ongoing practices that benefit monarchs and pollinators and points out adjustments in other programs and practices that will improve monarch and pollinator habitat. It lays out a strategy to help agencies, organizations, businesses and individual Arkansans understand the need for action and the part they can play in recovering these important populations.

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Figure 2 (Pg. 4): The decline in total area occupied in surveys of overwintering sites in Mexico between the 1994-95 season and 2016-17 season. Source: *MonarchWatch.org*.

Figure 3 (Pg. 4): A group of researchers under the Monarch Conservation Science Partnership developed a priority map to help indicate where monarch conservation efforts should be targeted to maximize success. A large portion of Arkansas falls within the South Core priority on this map with the rest of the state in the "South Exterior." Source: U.S. Fish and Wildlife Service.

Arkansas Department of Transportation's Operation Wildflower Program

The Arkansas Department of Transportation's (ARDOT) Operation Wildflower Program establishes new wildflower populations along highway rights-of-way (ROW) with native wildflower seeds donated by a sponsor. ARDOT requires at least \$200 in seed donations, which is usually enough seed to plant an acre. When an Operation Wildflower project has a seed donation of over \$500, 'Wildflower Area Sponsored By'... signage is provided.

In the Fall of 2016, the Helena-West Helena Advertising and Promotion Commission donated almost 50 pounds of native wildflower and grass seed to plant 4.5 acres of Highway 49 ROW in Helena-West Helena, Arkansas. The native wildflower and grass seed mix consisted of:

Black-eyed Susan	Showy evening
Purple Blazing Star	primrose
Maximilian sunflower	Big bluestem
Lanceleaf coreopsis	Little bluestem
Tickseed coreopsis	Indiangrass

The Helena-West Helena Operation Wildflower project received two signs, at the beginning and end of the planted area. Also, in exchange for the seed donation, AHTD did all the site prep work—mowing, disking and sowing of seeds. Cooperation from the local District maintenance personnel is helpful, as they usually come out and help us prep the ground for sowing seeds, and it alerts the Districts where the wildflower plot(s) is, so that they don't mow the area at the wrong time of year.



Operation wildflower sign and U.S. Highway 49 in Helena-West Helena Operation Wildflower site preparation.

INTRODUCTION

Over the past two decades, monarch butterfly (*Danaus plexippus*) populations have declined significantly due to a variety of factors, including habitat loss and a lack of milkweed plants, the sole host plant used by the monarch during its egg and larval stages. Subsequently, the presidents of the United States and Mexico and the prime minister of Canada have called for cooperative action. This decline has also prompted several national groups to petition the U.S. Fish and Wildlife Service (USFWS) to protect monarch butterflies under the Endangered Species Act (ESA). In June 2014, a Presidential Memorandum was issued from the White House directing federal actions to address the issue of pollinator conservation, resulting in the creation of a Pollinator Health Task Force and the *National Strategy to Promote the Health of Honey Bees and Other Pollinators*.

ARKANSAS ACTION

Recognizing the importance of this issue and the need to be part of the solution, representatives from the National Wildlife Federation (NWF), Arkansas Wildlife Federation (AWF), U.S. Fish and Wildlife Service and Arkansas Game and Fish Commission (AGFC) began discussing Arkansas's role in monarch conservation. Staff from these agencies along with staff from the Arkansas Natural Heritage Commission and Arkansas Association of Conservation Districts formed the core team that planned a summit for discussing the options for future collaboration.

On Nov. 9-10, 2015, the planning team agencies and organizations and Pine Ridge Gardens hosted and sponsored the Arkansas Monarch Summit. The first part of the summit educated agency and organization staff and interested private citizens about monarch butterfly biology and life history, while the second part focused on forming a consortium of state and federal agencies, municipalities, non-governmental organizations, businesses and private individuals that would work together to develop a statewide comprehensive plan to conserve and protect monarch

butterflies, pollinators and their habitats in Arkansas. Over 100 agency and organization staff and private citizens attended the first part of the summit; over 40 invitees participated in the second.

Summit participants agreed that Arkansas's strategy for monarch butterfly conservation should focus on expanding and creating milkweed and nectar plant habitat necessary to support robust breeding and successful migration throughout the state. Moreover, participants agreed that while the monarch butterfly is the primary concern, the plight of all pollinator species needed to be included as part of the strategy and overall message.

Among the many ideas generated during the summit was the need to develop a steering committee that would guide the process of developing a Statewide Monarch and Pollinator Plan.

The Arkansas Monarch Conservation Partnership (AMCP) is the direct result of summit deliberations and the subsequently formed steering committee. The AMCP is a consortium of state and federal agencies, municipalities, nongovernmental organizations, businesses, academia and private individuals working together to conserve and protect monarch butterflies, pollinators and their habitats.

BACKGROUND

Arkansas lies within the migratory and spring breeding area of the monarch butterfly, a species that has declined significantly over the last 20 years. Each fall, hundreds of thousands of monarch butterflies pass through Arkansas as part of their spectacular journey to the high-elevation oyamel fir (*Abies religiosa*) forests in central Mexico where they overwinter. In the spring, usually early March, monarchs start

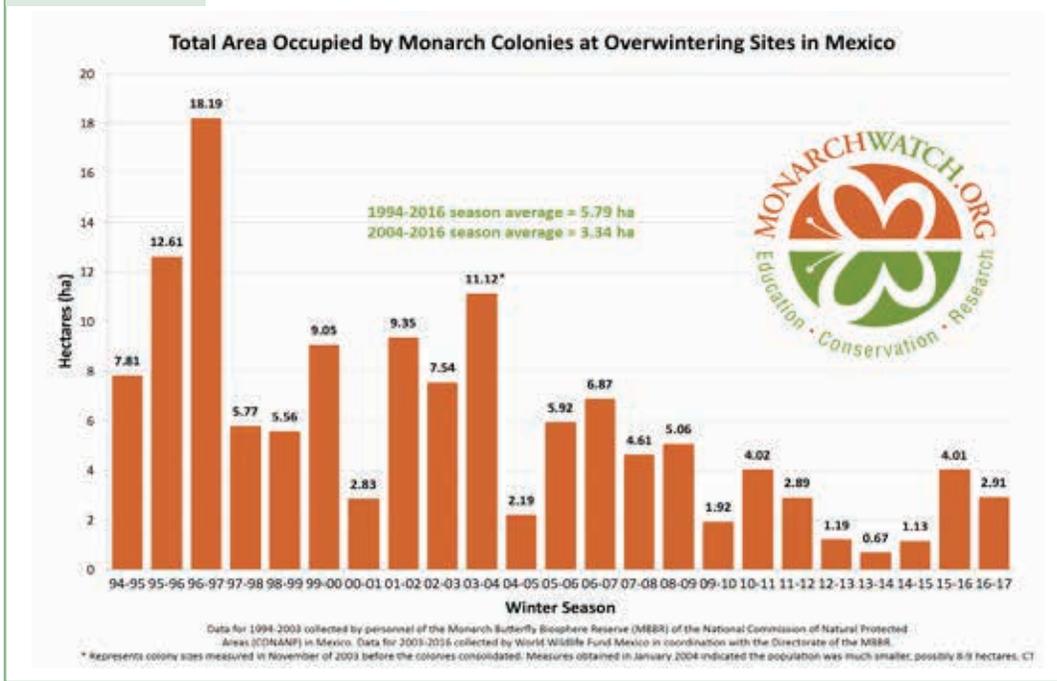
returning north to their breeding areas, a range that includes Arkansas, where female monarchs will lay their eggs on emerging milkweed plants. The subsequent offspring or first brood will then colonize the remainder of the breeding range in eastern North America. If this brood fails, a critical link in the migration chain is broken with detrimental effects on the eastern population of monarchs. Depending on the length of the season, as dictated by weather, monarchs might produce two to four broods in Arkansas. In the fall, the adults produced from the last hatch will then return to the oyamel fir forests, and in the spring the cycle will start again.

In recent decades, many factors have affected monarch populations, including habitat loss in the United States, Canada and Mexico; recent droughts; climate change; and a significant decline in milkweed and nectar resources in breeding areas and migration paths that include Arkansas. The decline in various species of native milkweed is particularly troublesome as they are essential for monarch survival. Milkweed species are the only plants on which monarch butterflies lay eggs and the only plants monarch caterpillars eat.

In North America, migratory monarchs have suffered because of habitat loss due to land use changes (commercial, residential, or agricultural



Figure 2

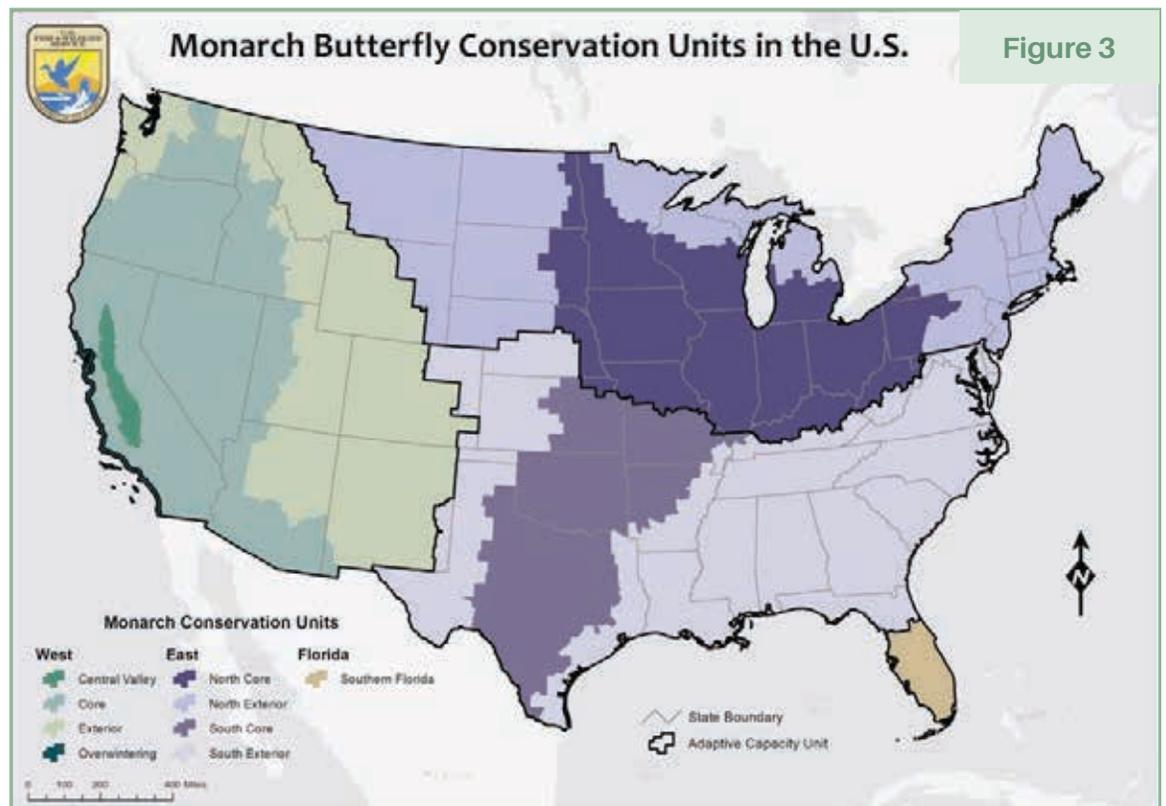


uncertainty to the future survival of monarchs, Arkansas’s primary strategy for effective monarch conservation will focus on expanding and creating milkweed and nectar plant habitat to support robust breeding and successful migration throughout the state. Therefore, finding ways to diversify habitat in agricultural and urban landscapes and rights-of-way, as well as improving habitat on existing lands in conservation ownership, will be crucial.

development or conversion) and mowing or pesticide applications that are not timed to monarch needs. Threats in Mexico include habitat degradation by logging, climate change and harsh winter storms. This combination of threats has led to a downward trend in the monarch population, which is assessed by measuring the total area occupied by monarch colonies at their overwintering sites in Mexico. The trend since 1994-95 has been downward; data for 2014-17 show a modest increase. However, this increase should be viewed in light of the increased surveillance effort during 2014-17 in response to the downward trend noted.

The urgency for taking action cannot be overstated. Currently, states have considerable leeway in determining action for improving habitat, limited mostly by available resources (i.e., funding, seeds and/or plants) and the willingness of landowners and land managers. If the monarch butterfly is listed as threatened or endangered under the ESA, collaboration becomes

While the effects of climate change and related weather patterns may represent the greatest



more difficult, potentially polarizing and inherently political. Therefore, it is in everyone's best interest to work together in an effort to avert any potential federal action. These voluntary conservation efforts will contribute to ongoing actions to preclude the need to list the species under the ESA. Currently, the USFWS is conducting a species status assessment to determine monarch viability and to inform the decision as to whether the monarch should be listed.

A related but uniquely important problem is the plight of all pollinators, especially honeybees and Arkansas's hundreds of native bee species. Many native bees appear to be declining across their range with multiple species of bumble bees found in Arkansas listed as threatened on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. The USFWS has listed one pollinator species, the rusty patched bumble bee (*Bombus affinis*), as endangered under the ESA. While the rusty patched bumble bee is not present in Arkansas, this represents a milestone in the recognition of the importance of pollinators. In addition, over the last decade beekeepers have lost on average one-third of their managed honey bee colonies annually.



Photo by Steve Duzan

Bees are a critical pollinator vital to our food-production systems, and insect pollination in general contributes an estimated \$29.4 billion of added value to the agricultural economy in the United States. In Arkansas, thousands of acres are planted in crops dependent upon or improved by the pollination

Arkansas Audubon Society's Bird Friendly Yard (BFY) Program



Arkansas Audubon Society's bird friendly yard.

Launched in 2016, Arkansas Audubon Society's Bird Friendly Yard (BFY) program has a vision of turning Arkansas into America's largest bird sanctuary by creating a statewide network of yards and parks planted with native flowers, shrubs, and trees. The BFY program also supports monarch and pollinator conservation, as bird-friendly yards are havens for native insects, too.

Yards that meet the BFY criteria for the program can be certified at one of three levels (gold, green, or working to become bird friendly) depending on bird-friendly actions completed in specific categories, such as native plants, food and water, etc. See the Arkansas Audubon Society website (<http://arbirds.org/>) for criteria and downloading the application /certification form. The completed form plus \$20 may then be mailed to the address shown on the form. In return, BFY program participants will receive a yard flag identifying their level of certification, as well as resources about native and non-native invasive plants and yard recognition in the Arkansas Audubon Society's newsletter.

To date, there are 34 yards certified in 15 Arkansas counties through this program, but this number is growing rapidly! Ultimately, bird-friendly yards create habitat for birds, healthy environments for humans, and bridges between fragmented local ecosystems, supporting butterflies, pollinators, birds, and other wildlife.

TNC William Kirsch Preserve Habitat Improvement

The William Kirsch Preserve at Ranch North Woods was acquired by The Nature Conservancy in late 2014. With 247 acres along 1.2 miles of the Little Maumelle River, the property is home to both woodland and wetland species, including deer, waterfowl, osprey, and eagles.

Conservancy staff saw an opportunity to take a large, low diversity hayfield on the property and turn it into a haven for pollinators and monarchs. A series of controlled burns were conducted to begin restoring the old fields. In the spring of 2017, a grant from the U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program provided funding to plant 10 acres of wildflowers. Volunteers from Quail Forever and staff mowed, disked, and planted 200 pounds of wildflower seed consisting of various sunflowers, coneflowers, and milkweeds and over 200 native wildflowers from Pine Ridge Nursery including varieties of milkweed, mint, and coneflowers. Within days, staff noticed monarch caterpillars establishing homes on the newly added milkweed plants. There are still approximately 60 acres that need to be planted. Phase two plantings will take place in the spring of 2018.

The Preserve is open to the public, and signage, natural trails, and a canoe access have been added to the property to provide a positive visitor experience. Conservation, science, and school groups utilize the property as an outdoor classroom and numerous visitors hike, fish, bike, and explore.



Monarch caterpillar on planted butterfly weed.

services of honeybees and native bees. Honey production alone is valued in the millions. In addition, bees and other pollinators sustain native plant communities that further contribute to maintaining diverse and healthy ecosystems and all that they provide (e.g., wildlife, recreation, carbon cycling). As is the case with monarchs, multiple factors threaten bees and other pollinators, including loss of habitat and forage plants, pesticide exposure, pathogens and various pests.

Bees have special needs, including food habitat, nesting habitat and overwintering habitat. Bees take all of their nutrition from flowers. Nectar provides simple carbohydrates and energy, which fuel their activities. Pollen supplies the true nutrients: proteins, amino acids, vitamins, sterols and enzymes. Unlike butterflies, bees return to a nesting site where they provision food for their offspring. This behavior limits their foraging range to a fixed radius around their nest site. Depending on the bee species, this foraging radius may extend a few hundred yards or up to several miles. Some bee species are specialist pollinators and visit a highly limited, small taxonomic group of plants. These species thrive only when there are adequate flowers available within their limited foraging range.

Other bee species are generalist pollinators and will pollinate a wide variety of plant species. Many bees exhibit a floral fidelity when foraging, ensuring that pollen is only transferred among compatible plants. Generalist bees visit numerous plant species throughout the season, acquiring a balanced diet from multiple resources. Evidence suggests that bees can detect nutrient deficiencies in pollen sources and will actively seek other flowers to balance their nutrient intake. Therefore, these bees should have access to an abundant variety of flowers within their foraging range.

Bees nest in a variety of habitats, depending on their species and life cycles. Bees may be categorized as cavity-nesting, ground-nesting or tunnel-nesting. Cavity-nesting bees include honey bees and bumble bees. They form eusocial to semi-social colonies and occupy a cavity they find but do not excavate. Honey bees often nest in hollow trees or other cavities above

Fayetteville Mayors' Monarch Pledge and City-led Initiatives

The City of Fayetteville joined the Mayors' Monarch Pledge, a program of the National Wildlife Federation, in January of 2016 and committed to undertaking 13 specific city-led initiatives. The city's commitment coincided with the first meeting of what was to become the Fayetteville Monarch Project. Approximately 50 people gathered to develop a local plan to address monarch education and outreach initiatives and to increase monarch habitat. Several successful projects have been completed to advance the goals of the Mayors' Monarch Pledge and the Fayetteville Monarch Project.

Members of the Fayetteville Monarch Project and City of Fayetteville staff worked together to produce a monarch butterfly brochure and an educational presentation for engaging the public on the plight of the monarch butterfly. The Fayetteville Monarch Project brochure can be found here: <http://fayetteville-ar.gov/DocumentCenter/View/12006>.

The City of Fayetteville has also planted several monarch butterfly habitats on public property in city parks, street medians and facility landscapes. These include: Wilson Park, Gulley Park, the College Avenue median and at the city's Sustainability Department located in the new Spring Street Parking Deck at the Walton Arts Center. These monarch gardens have a mixture of milkweed plants and flowering nectar-producing plants. Signs inform visitors of the purpose and functionality of the plants in these monarch gardens. Additional monarch gardens have been developed at public schools and local churches, and a demonstration garden is under construction at the Botanical Garden of the Ozarks.



Fayetteville monarch habitat garden.

The Fayetteville Monarch Project plans to continue monarch education efforts and increase monarch habitat in 2017 with tabling events, group presentations and how-to workshops.

Besides Fayetteville, three other Arkansas cities (De Queen, Little Rock and Springdale) have signed the Mayors' Monarch Pledge to take action to help the monarch butterfly. If you would like more information or to sign up your community, please go to www.nwf.org/Garden-For-Wildlife/About/National-Initiatives/Mayors-Monarch-Pledge.aspx.

Northwest Arkansas Master Naturalists Native Plants Project



Master Naturalists planting native plants.

In March of 2016, the Northwest Arkansas Master Naturalists undertook what has become the Native Plants Project. Under the leadership of Rose Gergerich and Warren Fields, a group of volunteers began the propagation of native seedlings. As these have matured, they have been made available for an extremely reasonable cost to private gardeners and to groups who have designed native plantings. The project works to include monarch host and nectar plants in its offerings. Since the inception of the project, nearly 3,000 plants have been sold or donated to private individuals, state parks and local non-profit organizations. Two more sales are planned to take advantage of the upcoming fall planting season.

ground. If natural cavities are unavailable, honey bees will nest in man-made structures, sometimes in the ground, or (more rarely) in exposed combs built in the open. Honey bees live in perennial colonies and must therefore store sufficient food (as honey) to support the entire colony through the winter, and they require a cavity with sufficient storage space in which

to construct wax combs. Bumble bees often nest in empty rodent holes in the ground or sometimes at ground level in grassy thatch.

Ground-nesting bees will dig their own burrows, and the selected home sites will vary among species. Some nest in grassy areas, while others prefer bare soil. Some prefer sandy loam soil, while others prefer hard-packed soil. The key component is that the ground is undisturbed and within range of floral resources.

Tunnel-nesting bees do not construct burrows but seek out appropriate holes and may modify them for their use. They look for holes in dead wood created by emerging insects or woodpeckers, or they may utilize hollow stems or crevices in masonry or natural cracks in stones. These bees may use plant material, such as fibers or leaf pieces, or mud to modify the diameter of the tunnel and to separate the tunnel into individual cells in which to provision food for their offspring.

The overwintering needs of bees are fairly simple. Honey bees require sufficient stored food. They convert the caloric energy of honey into heat to keep alive until spring brings more flowers, while the hive in which they live keeps them dry and insulated. Bumble bees live in annual colonies, which die out each year after producing new queens. Only mated queens overwinter, hibernating in the ground and emerging to found a new colony each spring. Suitable sites for queen bumble bees to overwinter include well-drained, sandy soil, often on a north-facing hillside that will not be exposed to premature warming by the sun. Most solitary bees provision nests for their offspring and abandon them, dying the same year. These bees will overwinter in the pupal stage and emerge in spring. After mating, the male bees die, and females establish new nest sites, which they provision with pollen and nectar collected from flowers. After depositing eggs, they will die out.

ARKANSAS MONARCH CONSERVATION PARTNERSHIP AND THE PLAN

The Arkansas Monarch Conservation Partnership is Arkansas's response to the challenges ahead. As detailed in this plan, we have:

- 1) *Set goals for monarch and pollinator habitat efforts in the state, including strengthening existing work, identifying gaps and prioritizing actions,*
- 2) *Created a holistic, coordinated statewide strategy for supporting monarchs and pollinators,*
- 3) *Developed a collaborative effort to attract resources needed to the state's monarch population while boosting populations of all pollinator species, and*
- 4) *Identified opportunities to integrate our efforts with other regional and national initiatives.*

This plan will be monitored and reviewed periodically and revised as needed to keep it relevant and up-to-date with the best available science and information.

MONARCH AND POLLINATOR HABITAT CONSERVATION, ENHANCEMENT AND RESTORATION

Provision of adequate feeding and breeding habitat to provide for the needs of monarchs and pollinators while they are in Arkansas is the primary concern and overarching goal of this plan. Monarch butterflies and pollinators must be able to complete their life cycles to sustain healthy populations, and can only do this if there is sufficient high-quality habitat available throughout the growing season. This is important not only for monarchs and other pollinators, but also for sustaining native vegetation as well as agriculture.

This plan establishes objectives for restoring, enhancing, creating and managing habitat to achieve this goal. This will be done by providing milkweed and nectar plants for monarchs and meeting the special needs of native bees and other native pollinators. Many of these treatments will also benefit honeybees.

GOAL 1: Provide high-quality habitat comprised of a diversity of nectar-producing plants, including milkweeds suitable for monarch reproduction that will be available to pollinators throughout the growing season.

Objective 1: Restore, create or enhance 3,500 acres of native habitats that support monarchs and pollinators on private lands by 2023.

STRATEGY 1: Use federal and state habitat programs to the maximum extent possible to increase milkweed and nectar plants on private lands. These include, but are not limited to:

- 1) *AGFC - Acres for Wildlife (AFW)*
- 2) *Natural Resources Conservation Service (NRCS)*
 - *Conservation Reserve Program (CRP)*
 - *Environmental Quality Incentives Program (EQIP)*
 - *Agricultural Conservation Easement Program, Wetland Reserve Easements (WRE)*
- 3) *USFWS - Partners for Fish and Wildlife (PFW)*
- 4) *Arkansas Forestry Commission - Forest Stewardship Program (FSP)*
- 5) *Federal Highway Administration - Transportation Alternatives Program (TAP)*

STRATEGY 2: Ensure that adequate numbers of milkweeds and all-season nectar-producing plants are included in the seed mixes in existing habitat restoration programs (CRP, PFW, EQIP, AFW, WRE).

Work with NRCS to ensure program guidelines include planting at least one species of milkweed and three late-blooming fall nectar plants.

Encourage the NRCS wildlife subcommittee to work toward allocating a set amount of the 5% wildlife funding toward conservation cover (practice 327) and field borders (practice 386).

STRATEGY 3: Work with AFW program administrators to add green antelope horn milkweed (*Asclepias viridis*) to the seed mix. This species is adapted to most upland soil types throughout the state and is prevalent in overgrazed or stressed pastures in southwest Arkansas. Pursue a partnership where the PFW program purchases the milkweed seed to add to the AFW mix.

STRATEGY 4: Work with NRCS and FSA to enhance existing WRE and CRP sites by establishing milkweed and identify non-tree-planting CRP contracts, sending landowners a letter explaining the desire to enhance their lands for monarchs and pollinators, which will also benefit other wildlife, such as deer, quail and turkey.

STRATEGY 5: Use PFW to enhance previous projects for monarchs and pollinators by working with landowners to plant milkweeds or incorporate dormant-season disking to promote goldenrod and other nectar plants.

STRATEGY 6: Meet with the FSA to determine the feasibility of modifying Continuous Conservation Reserve Program (CCRP) practice CP42 to include pastureland, and what would be required to make this change. If modifying CP42 is not an option, then look at creating a new CCRP practice that takes pasture and hay production land into consideration without requiring a cropping history.

STRATEGY 7: Ensure that foresters, biologists and technical service providers working with landowners are providing information about opportunities to enhance monarch and pollinator habitat. Provide educational materials that cover the benefits of healthy pollinator populations.

STRATEGY 8: Provide guidelines or recommendations for managing riparian forests, native grasslands, glades and regenerating forests for monarchs and other pollinators.

STRATEGY 9: Provide best management practices (BMPs) for management of pastures, farmland, rights-of-way, highway corridors and food plots. Several practices that manage ground cover could be altered to improve milkweed and nectar-plant production and better meet the special needs of pollinators. These include management in pastures, farmlands, rights-of-ways and food plots and plantings in parks, businesses, schools and homes.

Objective 2: Restore, create, enhance and manage 500,000 acres of native habitats that support monarchs and pollinators on public lands by 2023.

STRATEGY 1: Provide input into long-range plans for agencies and make sure they understand opportunities to help monarchs and pollinators and any related responsibility they have. Some actions to support these practices are covered later in this plan. Other actions include working with agencies planning habitat work. Review proposed projects to make sure they address monarch and pollinator needs.

STRATEGY 2: Provide BMPs for management of habitats. Several practices that manage ground cover could be altered to improve milkweed and nectar-plant production and better meet the special needs of pollinators. These include highway corridors, food plots, parks and woodlands.

Objective 3: Create or restore 7,000 acres of monarch and pollinator habitat on public and private rights-of-way by 2023.

STRATEGY 1: Work with the state highway department to plant native milkweeds and other nectar-producing plants on appropriate areas of ROWs, such as after new construction and on ROWs adjacent to other state or federal lands. Identify new areas of protection on ROWs through various Arkansas Department of Transportation (ARDOT) programs—Operation Wildflower, Native Wildflower Area Signage Program and ARDOT's Wildflower Routes. All of these programs require specific maintenance regimes; e.g., an annual fall mowing and only spot spraying of nonnative invasive species is allowed, for the proliferation of wildflower populations. Encourage the use of regionally sourced wildflower seed and an increased diversity in seed mixes.

STRATEGY 2: Work with state, county and municipal highway maintenance crews to modify mowing ROWs such that they defer mowing areas outside safety zones until after the growing season.

STRATEGY 3: Engage pipeline managers, power companies, drainage districts and levee boards to assess the potential for and promote creation of monarch and pollinator habitat on their rights-of-way on private lands.

Pulaski Conservation District Uses NRCS Funding to Install School Pollinator Gardens

In September 2016, the Natural Resources Conservation Service awarded an \$11,000 cooperative agreement to the Pulaski Conservation District for the purpose of installing two pollinator gardens at local schools. The primary goals of the project were to develop urban pollinator habitat and provide pollinator educational opportunities to students. Lawson Elementary in west Pulaski County and Flightline Upper Academy Lighthouse Charter Middle School on the Little Rock Air Force Base were the two schools selected by the district. Both schools had existing outdoor classroom programs and staff dedicated to experiential learning opportunities.

Holly Anderson, the district's Urban Conservationist, designed the gardens using native perennials, shrubs and trees with pollen, nectar and/or host value to honey bees, native bees, wasps, moths and butterflies, and hummingbirds over three seasons of bloom. Two of the beds installed at each school were specifically designed to provide nectar and milkweed host plants for monarch butterflies. The plants were purchased from Pine Ridge Gardens in London, Arkansas

The bed installation and plantings were completed in spring 2017. Ten beds were installed in the Flightline Academy Middle School outdoor



Pulaski Conservation District, NRCS School Pollinator Gardens.

classroom, an interpretive nature trail behind the school on property that had once housed the air force base officers' club. These beds were made with one layer of lawn timbers that will eventually deteriorate, allowing the mature plants to self-sow and naturalize throughout the area.

Nine metal raised beds were installed in the Lawson Elementary School playground area, as an addition to the existing vegetable garden. The beds were installed on a Saturday with the help of Lawson's staff, parents and Boy Scouts from Troop 99. Then, on a sunny school day, small groups of students, pre-K through 5th grade, came into the garden area for about 30 minutes at a time to hear a short monarch butterfly conservation presentation and have the opportunity to plant in the beds.

Both gardens have progressed well since planting and are thriving. In total, over 500 plants were included in the gardens.



Pulaski Conservation District, NRCS School Pollinator Gardens.

“Go Native, Grow Native” Annual Event in Russellville

This event is hosted by Ozark National Forest personnel, but brings together many agencies, organizations and individuals to facilitate learning about growing native plants and their role in helping monarch butterflies and other pollinators. Free native seeds are given away as long as supplies last. Other related programs are also discussed. Informative booths are staffed by groups such as Pope County Master Gardeners, Pope County Conservation District, Arkansas Archeological Survey, Revitalizing Ozark-Ouachita Seed Traditions (ROOST), Arkansas Native Plant Society, Arkansas Game and Fish Commission, Arkansas Forestry Commission, Lake Dardanelle State Park and the U.S.D.A. Forest Service.

Presentations are provided on subjects such as beekeeping, the importance of pollinators, monarch and pollinator photography, control of invasive species and establishing native plants. The event continues to grow each year and is well attended.



Pope County Master Gardeners table at ‘Go Native, Grow Native’ Event.

GOAL 2: Increase the supply of regionally appropriate milkweed and forb seeds and plants needed for monarch conservation.

Objective 1: Develop the capability of providing at least 50% of the seed and plants needed for monarch and pollinator creation, restoration and enhancement projects by 2027.

STRATEGY 1: Work with the Arkansas native seed program to support collection of locally obtained native seed from public lands (e.g., Natural Areas, Wildlife Management Areas), and private conservation preserves (e.g., The Nature Conservancy).

STRATEGY 2: Foster and support private nurseries and private entities capable of producing locally sourced native seeds and plants.

STRATEGY 3: Provide technical and financial assistance to farmers to grow native plants in row-crop style agriculture for seed production.

GOAL 3: Provide bee-friendly habitats focusing on special needs of native bees because they are the most prolific pollinators.

Objective 1: Establish foraging and nesting habitats to sustain population of native bees and other pollinators.

STRATEGY 1: Develop guidelines for sustaining healthy bee populations, addressing special needs for reproduction and wintering habitat.

STRATEGY 2: Develop diversified wildflower habitats, providing season-long food resources to native bees. These wildflower plantings may also provide nesting habitats to ground-nesting bee species.

STRATEGY 3: Provide incentives to farmers and landowners to establish native wildflower pollinator plantings on their property.

RESEARCH AND MONITORING

A great deal of information is available on monarch biology and behavior. However, there are many unanswered questions regarding monarchs and milkweed in Arkansas. Additional research will provide a greater understanding and allow us to adapt habitat management to have an increased benefit on monarchs. Completing research will provide a greater understanding and allow us to adapt habitat management to have an increased benefit. Monitoring will be a critical component in understanding monarch distribution, migration timing and habitat use in the state.

GOAL 1: Increase and expand knowledge of the biology, distribution, population status, threats and habitat needs, requirements and creation for monarchs and pollinators to better manage populations.

Objective 1: Determine distribution, population status and habitat requirements of monarchs and pollinators.

Research Needs:

- 1) *Develop baseline information on the biodiversity of native bees in each ecoregion of the state. Priority: High*
- 2) *Determine abundance and distribution of native bee species, including identifying the most dominant native bees in the state. Priority: High*
- 3) *Assess milkweed and nectar availability and determine if resources are adequate for monarch populations. Priority: High*
- 4) *Identify breeding concentrations (hot-spots) of monarchs in Arkansas. Priority: High*
- 5) *Delineate travel corridors used by migrating monarchs. Priority: High*
- 6) *Determine the utility and efficacy of current native wildflower plantings in supporting native bee communities. Priority: High*
- 7) *Determine the best nesting materials and substrates for tunnel-nesting bees. Priority: Medium*
- 8) *Determine the relationship between habitat structure and quality and the number of monarch larvae produced per acre at existing sites. Priority: Low*

Pollinator Garden at the Sylamore Ranger District Office

Through a grant from the Joint-Chief's Landscape Restoration Partnership between the USDA NRCS and the USDA Forest Service, the Sylamore Ranger District of the Ozark-St. Francis National Forests designated an eight-acre area adjacent to the Ranger Station as an interpretive site in 2015. This area includes a half-mile nature trail and a native pollinator garden that is open to the public. The objective of the interpretive area is to show the public an example of ecological restoration. The site has undergone invasive species treatments, mechanical treatment of woody species, prescribed burns, and native species planting. Several signs like the one below will be placed along the trail with information on invasive species, ecological restoration, native wildflowers, native pollinators, and land management.



Nature's Path Interpretive Walk sign at Sylamore Ranger District Office Pollinator Garden.

- 9) *Manipulate plant species assemblages and density and measure the effects on number of monarch larvae produced. Priority: Low*

Objective 2: Conduct research to determine the best methods for habitat creation and enhancement for monarchs and pollinators.

Ouachita National Forest Shortleaf Pine–Bluestem Ecosystem Restoration Project

The shortleaf pine–bluestem ecosystem restoration project began in 1991 on the Ouachita National Forest. The purpose is to restore ecosystem function to this community in the Ouachita Mountains of Arkansas and Oklahoma. Management actions include prescribed burning, timber harvest, both thinning and regeneration, midstory reduction and milkweed plantings to enhance restoration of monarch populations. Management actions were coordinated with a massive research effort involving the Forest Service Southern Research Station and numerous colleges and universities. This allows the Ouachita National Forest to adapt its management based on sound science. Total project area is almost 320,000 acres, with about 116,000 acres already in a restored condition and many more acres in different stages of restoration.



Pine bluestem restoration on the Mena Ranger District.

Research Needs:

- 1) *Determine the best methods for effectively establishing the more common milkweed species by testing various techniques with native seeds. Priority: High*
- 2) *Identify how vegetation management techniques and timing may impact or improve nesting, reproduction and overwintering sites for native bees. Priority: High*
- 3) *Examine the effects of herbicide use on milkweed production. Priority: Medium*

Objective 3: Identify biotic and abiotic factors that may impact or benefit pollinator health in Arkansas (e.g., land use, habitat destruction, parasites, pathogens, invasive species, etc.).

Research Needs:

- 1) *Evaluate impact of land management practices (agricultural, residential, recreational, etc.) on native bee populations and health. Priority: High*
- 2) *Evaluate impact of non-target pesticide activity and residue on native bee health and abundance. Priority: High*
- 3) *Identify common diseases, pathogens and parasites of native bees in Arkansas and classify as native or exotic. Priority: Medium*
- 4) *Determine if any nonnative solitary or Bombus species are present and evaluate the ecologic impact on native bee species. Priority: Low*

GOAL 2: Expand monitoring efforts to inform conservation actions.

Objective 1: Increase public participation in citizen science efforts to monitor migrating and breeding monarchs.

STRATEGY 1: Promote Journey North and other projects in outreach materials.

STRATEGY 2: Continue to promote the Arkansas Monarch Mapping Project in social and print media and through oral presentations where feasible.

Objective 2: Increase conservation agency participation in monitoring.

STRATEGY 1: Adopt national or regional monitoring protocols into agency efforts.

Objective 3: Develop a protocol for periodic monitoring to determine if native bee populations

are increasing or decreasing in abundance or diversity, especially near areas managed for pollinator conservation.

Objective 4: Monitor populations of rare, threatened or endangered bee and butterfly species for changes in population abundance.

OUTREACH AND EDUCATION

Outreach and education efforts are needed to ensure that Arkansas residents across all sectors are informed about the threats to monarchs and other pollinators and encouraged to contribute in a variety of ways toward conservation efforts. Research conducted by the U.S. Geological Survey indicates that planting of multiple, smaller pockets of milkweed and other native plants are as important as are efforts aimed at large-acre agricultural operations. Individuals, local groups, schools and industrial, commercial and agricultural associations educated and supported in citizen science efforts can also be important in gathering data on monarch and pollinator activities in the state, including migration pathways, foraging and breeding. An informed citizenry is important to obtain and maintain public-opinion support for conservation measures.

GOAL 1: Increase public awareness of the value of monarchs and pollinators and the threats they face.

Objective 1: Disseminate monarch and pollinator information to the public.

STRATEGY 1: Promote monarch and pollinator curriculum as it becomes available and fits state standards and frameworks.

STRATEGY 2: Outreach and Education subcommittee will write one article per year for a targeted publication.

1) *Target potential authors of monarch and pollinator articles and help facilitate getting articles published.*

STRATEGY 3: Prepare and curate promotional items for the public.

1) *Secure brochures for use in workshops or at public events.*

2) *Create a master PowerPoint presentation that can be altered for different audiences.*

3) *Maintain and support Arkansas Monarch Conservation Partnership website.*

4) *Create a reading list of monarch and pollinator publications.*

5) *Create a speakers bureau for Arkansans to access.*

6) *Create materials to educate commercial nurseries and landscape companies about propagating, growing and using native plants for monarch butterflies and pollinators in home gardens and home and commercial landscaping.*

STRATEGY 4: Organize a sponsored wildlife art or photography contest with monarchs as the main focus in year one and pollinators as the focus in year two.

1) *Suggest "Monarchs and Pollinators" to the Arkansas Wildlife Federation as a theme for its art contest.*

STRATEGY 5: Promote the National Wildlife Federation Mayors' Monarch Pledge and recognize those who have enrolled.

STRATEGY 6: Request governor's proclamation for pollinator week.

Objective 2: Disseminate information and engage various civic groups through at least 12 presentations and exhibits per year.

STRATEGY 1: Engage garden clubs and public entities such as Crystal Bridges, Master Gardener groups, Master Naturalist groups and civic organizations, among others.

STRATEGY 2: Engage agricultural and natural resources organizations at meetings and other events of the Arkansas Association of Conservation Districts, AR Grazing Lands Coalition, The Wildlife Society, etc.

STRATEGY 3: Engage corporations, land managers of roadways and parks, and private landowners through private land biologists, and landscape designers and contractors.

Objective 3: Work with local media to highlight monarch and pollinator conservation initiatives to get at least four monarch or pollinator segments on air per year.

STRATEGY 1: Develop list of media sources and contacts.

Fourche Pollinator Garden on Ouachita National Forest



Kiosk at Ouachita National Forest Pollinator Garden.

The Fourche Pollinator Garden was developed as part of the Monarch Joint Venture project to provide host plants and nectar sources to various butterflies, pollinators and other wildlife species. This garden is designed around an old log landing that is the center of the garden opening. A woodland vernal pond was created to provide breeding habitat for dragonflies and amphibians, and to provide educational opportunities. As the pond dries in the summer, it creates mudding areas for the butterflies and water for other pollinators. A concrete accessible trail was created that winds approximately 780 feet and has various animal footprints stamped across it for education. This garden is small but has a variety of local plants that were planted in the garden, and the paved trail in the surrounding woods offers other opportunities to view additional plant species in their natural setting.

Several other pollinator gardens at Forest Service District offices focus on local native nectar sources and milkweeds for monarchs.

Objective 4: Work with universities and libraries to host authors and other experts on pollinators and native plants on at least one campus per year.

STRATEGY 1: Outreach subcommittee member(s) will contact universities to develop contacts and facilitate scheduling presentations.

GOAL 2: Encourage development of habitat projects of all sizes.

Objective 1: Communicate with at least 150 schools about schoolyard habitat projects per year.

STRATEGY 1: Send flyers to K-12 schools with information about schoolyard habitat projects.

STRATEGY 2: Create a list of funding sources for schoolyard gardens.

Objective 2: Encourage at least 200 certified gardener habitats in Arkansas.

STRATEGY 1: Create brochure and host informational tables at events statewide.

STRATEGY 2: Contact Master Gardener, Master Naturalists, garden clubs and similar groups with brochure and speaker information

STRATEGY 3: Encourage gardeners to certify their gardens with Monarch Watch, National Wildlife Federation, North American Butterfly Association, Arkansas Audubon Society bird-friendly yards, etc.

STRATEGY 4: Disseminate Arkansas Monarch Host and Nectar Plant Lists upon request.

STRATEGY 5: Work with rural and agricultural publications to feature monarch habitat programs.

STRATEGY 6: Share locations of demonstration gardens or plantings.

Objective 3: Educate and encourage 20 businesses to create pollinator-friendly habitat.

STRATEGY 1: Create flyers/brochures tailored to local business owners.

STRATEGY 2: Identify trade or business associations to contact local businesses and work directly with them to create gardens.

GOAL 3: Encourage participation in citizen science initiatives.

Objective 1: Encourage more people to collect monarch observations.

STRATEGY 1: On every group or agency Facebook page, publish posts regarding the Journey North phone app and encourage everyone to collect data.
STRATEGY 2: Include information about citizen science in presentations.
STRATEGY 3: Provide educators with information about other citizen science projects.

GOAL 4: Engage Arkansas’s agricultural community in discussions about ways Arkansas farmers and ranchers can participate in meeting monarch habitat objectives using methods that are compatible with agricultural production systems.

Objective 1: Find or create opportunities for discussions with agricultural leaders to explore, develop and promote practical conservation solutions designed for farmers and ranchers.

STRATEGY 1: Identify critical agricultural stakeholder groups.

STRATEGY 2: Create an agriculture-focused work group.

STRATEGY 3: Work with agricultural leaders in convening an agriculture-specific monarch and pollinator summit for the purpose of information sharing and strategy development.

STRATEGY 4: Initiate collaboration in the development of best management practices for monarchs and pollinators in agricultural settings.

CAPACITY, GOVERNANCE AND FUNDING

Comprised of an expanding and diverse array of partners, the Arkansas Monarch Conservation Partnership requires structure in order to achieve its goals and remain sustainable from both a financial and organizational standpoint. The flexibility that members enjoy in developing and implementing their initiatives will facilitate creative thinking and problem-solving, while their common purpose of conserving monarchs and other pollinators in Arkansas will strengthen the Partnership and individual responsibilities in the effort. To maximize the Partnership’s ability to conduct meaningful, far-reaching work, funding and staffing will need to be secured and thereafter maintained.

GOAL 1: Formalize the Arkansas Monarch Conservation Partnership as a multi-organizational public-private partnership.

Objective 1: Develop a formal partnership document that lists steps the partners will take to implement the AMCP plan.

GOAL 2: Create an Arkansas Monarch Conservation Partnership Coordinator Position to implement the AMCP plan and further develop conservation goals, strategies and action items.

Objective 1: Develop a funding plan to establish adequate financial support including:

- 1) *Commitments from partners; and,*
- 2) *Grants or donations from supporters of the plan.*

Objective 2: Hire a full-time Arkansas Monarch Conservation Partnership coordinator.

STRATEGY 1: Develop a plan for hiring a program coordinator who will help formalize the Partnership, coordinate all AMCP members, seek new and nontraditional partners, and strategize for sustainable funding to reach long-term goals.

STRATEGY 2: Determine qualifications and develop job description to be approved by the steering committee.

STRATEGY 3: Determine salary and initial funding sources (short-term and long-term).

STRATEGY 4: Determine coordinator’s workplace.
STRATEGY 5: Develop a 6- to 12-month work plan for the coordinator. Duties of the coordinator will include, but are not limited to:

- 1) *Implement the conservation plan.*
- 2) *Manage the website.*
- 3) *Write grants that help implement the plan.*

STRATEGY 6: Hire the coordinator.

GOAL 3: Develop, support and manage a network of volunteers willing to donate time and expertise to the purpose of Arkansas Monarch Conservation Partnership.

Objective 1: Create process, structure and tools necessary to facilitate group and individual volunteer recruitment and action.



Fayetteville butterfly camp.

Botanical Garden of the Ozarks Butterfly Camp

The Botanical Garden of the Ozarks in Fayetteville was the site of a butterfly camp for children July 31-Aug. 3. Twelve children ages 8-10 participated in the four-day camp during which they were engaged in activities that introduced them to the importance of butterflies and other pollinators. The campers were introduced to their own monarch caterpillars early on and learned to care for them and to measure their growth as well as how much they ate.

Each child took his caterpillar home along with a butterfly keeper cage.

Life cycles of various butterflies were examined, but the focus was on the monarch

as students learned about various instars, factors that prevent monarchs from reaching the adult stage, and the importance of host and nectar plants. As part of learning about what butterflies need, campers wandered the various gardens and participated in a habitat scavenger hunt. Several hours were spent in the Butterfly House making observations about the different kinds of butterflies and their behaviors. The children enjoyed trying to identify different butterflies, caterpillars and chrysalids during a scavenger hunt.

Campers made notes of flowers used by pollinators, learned what attracts different kinds of pollinators, and were introduced to the idea of nectar guides before they labeled and illustrated their own flowers. Each child described for others the color choices made, why those colors were chosen and how a nectar guide was included. Part of this exercise involved learning to use a dichotomous key. A favorite activity was making a home for solitary bees.



Fayetteville butterfly camp.

STRATEGY 1: Identify opportunities for volunteer recruitment and engagement. Establish a communications link between the Arkansas Monarch Conservation Partnership and existing and potential volunteers. Promote volunteerism within existing organizations.

- 1) *Identify local and regional organizations that might form independent volunteer teams or crews (e.g., business clubs, church groups, school districts and universities or colleges).*
- 2) *Identify groups and organizations whose members may be receptive to individual volunteer action.*
- 3) *Provide a volunteer portal as part of the Arkansas Monarch Conservation Partnership.*
- 4) *Create and/or provide information and tools necessary for self-guided action.*
- 5) *Coordinate with target groups to develop an understanding of their resources and needs in order to assist them with delivering monarch and pollinator conservation.*

COLLABORATION AND PARTNERSHIPS

Monarch and pollinator conservation is a greater and more complex task than any one agency or organization can accomplish alone. It is essential to develop and maintain effective relationships and promote collaboration among all groups sharing the common interest of conserving and enhancing monarch and pollinator habitat and populations in Arkansas. A fundamental component of this effort is a reliance on voluntary actions. Matching those voluntary actions to the varying levels of ability, willingness and desire of all partners involved will be a necessary component for success.

Fulfilling our mission requires a concerted effort to identify and implement methods and approaches that are science-based, effective and practical. It is our intention to act in partnership with all interested parties as a true coalition, providing information about all aspects of monarchs and pollinators in Arkansas and creating opportunities for public engagement in decisions about the future management of Arkansas's pollinator resources.

GOAL 1: Promote and cultivate collaboration and partnership across agencies, organizations and stakeholder groups in support of our mission to increase and sustain habitat for monarch butterflies and pollinators.

Objective 1: Communicate monarch and pollinator management needs and strategies to all stakeholders and take the lead in maintaining dialogue, ensuring all sectors are included and engaged.

STRATEGY 1: Arrange periodic meetings, visits to demonstration sites, workshops and industry or partner events to share information, encourage participation, plan future projects, solve problems and recognize accomplishments. Use partner events and venues to promote collaboration, express needs and celebrate accomplishments.

- 1) *Identify and target major partner events for presence and/or delivery of the Arkansas Monarch Conservation Partnership message.*
- 2) *Identify existing efforts, resources and potential partners in order to connect interests with opportunities.*

ACRONYMS AND PLANNING TERMS:

AFW Acres for Wildlife
ARDOT Arkansas Department of Transportation
AGFC Arkansas Game and Fish Commission
AWF Arkansas Wildlife Federation
CRP Conservation Reserve Program
CCRP Continuous Conservation Reserve Program
ESA Endangered Species Act
EQIP Environmental Quality Incentives Program
NRCS Natural Resources Conservation Service
NWF National Wildlife Federation
PFW Partners for Fish and Wildlife
TNC The Nature Conservancy
USFS U.S. Forest Service
USFWS U.S. Fish and Wildlife Service
WMA Wildlife Management Area
WRE Wetland Reserve Easement

This plan identifies goals and objectives that will guide the Arkansas Monarch Conservation Partnership over the next five years. Objectives are supported by an initial set of strategies and actions/tasks that will be evaluated and modified over time as needed. Terms and their definitions as used in this plan are as follows:

GOALS (*in what direction will we proceed*)

Generalized directional statements for an intended purpose (e.g., to improve, increase, maintain, decrease, provide, etc.); qualitative and usually not quantified.

OBJECTIVES (*what will we accomplish*) Concise statements of what will be accomplished.

STRATEGIES (*how will we accomplish it*)

Statement(s) of an approach to achieve an objective(s).

ACTIONS/TASKS (*how to implement the strategy*)

Specific things that must be done.

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Fred Berry Conservation Education Center Native Grassland Restoration Project

Beginning in spring 2013, staff of the Arkansas Game and Fish Foundation's Fred Berry Conservation Education Center in Marion County, Arkansas, began work on converting 114 acres of former fescue pasture to native grassland/savanna habitat with funding attained through the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program. The primary goal of the project was to provide habitat for declining grassland birds, including northern bobwhite, painted bunting, prairie warbler, dickcissel and field sparrow, as well as resident wildlife. However, in 2015 the agreement was modified to add funds for planting milkweeds and nectar-producing forbs for monarch butterflies and pollinators.

Through a series of herbicide applications and prescribed burns, and drilling seeds of a standard native grass and forb mix, the property was gradually transformed into a diverse native habitat rich in species diversity. Over 100 plugs



Native grassland/savanna habitat.

of assorted species of milkweeds were planted on 10 acres dedicated specifically to enhancing monarch and pollinator habitat, with 50 more milkweed plants added later. These milkweed plantings had a significant success rate and monarchs, eggs and caterpillars, as well as a variety of other pollinator species, have been observed on them. Other forbs in the dedicated 10-acre pollinator plot include coreopsis, black-eyed Susan, bee balm, yarrow, coneflower and more.



Aerial view of Fred Berry Conservation Education Center.

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