MID-AMERICA MONARCH CONSERVATION STRATEGY
2018-2038
Version 1.0

Developed by: The Midwest Association of Fish and Wildlife Agencies

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ACRONYMS AND ABBREVIATIONS USED IN THIS DOCUMENT

AFWA – Association of Fish and Wildlife Agencies
BMP – Best Management Practice
CRP – Conservation Reserve Program
ESA – Endangered Species Act
FHWA – Federal Highway Administration
FSA – Farm Services Agency
IMMP – Integrated Monarch Monitoring Program
MAFWA – Midwest Association of Fish and Wildlife Agencies
MCD – Monarch Conservation Database
MCSP – Monarch Conservation Science Partnership
MJV – Monarch Joint Venture
NEAFWA – Northeast Association of Fish and Wildlife Agencies
NFWF – National Fish & Wildlife Foundation
NGO – Non-governmental organization
NRCS – Natural Resources Conservation Service
NWF – National Wildlife Federation
PF – Pheasants Forever / Quail Forever
SEAFWA – Southeast Association of Fish and Wildlife Agencies
SSA – Species Status Assessment
The Service – United State Fish & Wildlife Service
USDA – United States Department of Agriculture
USFS – United States Forest Service
USFWS – United States Fish & Wildlife Service
USGS – United States Geological Survey

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EXECUTIVE SUMMARY

The iconic monarch butterfly, known and appreciated by nearly every child and adult in the United States, is in serious decline. This striking orange and black butterfly, known for its spectacular long-distance migrations, has declined more than 80% in the past 20 years.

Rates of decline are similar for both the eastern monarch population, found east of the Rocky Mountains and overwintering in Mexico, and for the western monarch population that overwinters primarily along the California coast.

In 2014, the U.S. Fish and Wildlife Service (Service) was petitioned to list the monarch as a threatened species under the federal Endangered Species Act (ESA). The Service found that sufficient data was presented in the petition to demonstrate that listing may be warranted and has now begun a formal status review that will lead to a decision on whether listing is warranted by June of 2019.

This Mid-America Monarch Conservation Strategy (Strategy) builds off partner and state planning efforts and identifies conservation targets, programs, and coordinated strategies to provide a blueprint on how to successfully reverse the decline and achieve a viable monarch population through a coordinated, landscape-scale habitat conservation approach. The overall goal is to achieve habitat restoration and enhancement to support an average overwintering eastern monarch population in Mexico sufficient to sustain the eastern monarch population and to avoid a regulatory outcome (or minimize its impacts), such as monarchs becoming listed under the ESA.

Given the monarch's strong public recognition and support, the plight of this species may help rally broader public conservation support for grassland landscapes and the benefits they provide for wildlife as well as ecological values for people such as pollination services, water quality, and soil protection.

Though many factors have combined to affect monarch populations, the primary threats are related to habitat quantity and quality. For the eastern monarch population, these include loss or degradation of milkweed resources, particularly in the North Core monarch conservation unit; loss or degradation of nectar resources across the range; impacts of insecticides; overwintering habitat in Mexico (outside the scope of this Strategy); and potential impacts of changing climate.

The parallel of monarch population declines with similar declining population trends of grassland birds, pollinators, and other grassland-dependent species underscores the opportunity and importance for monarch conservation to be part of a larger and more broadly targeted landscape conservation approach. This approach includes nectar-producing habitats such as native rangelands, prairies, planted grasslands, savannas, and other open lands in both rural and urban areas.

Most states participating in this strategy have authority for insect conservation (including monarchs) in their state fish and wildlife or natural resource agency. Even though some states may lack specific insect management authority, all state natural resource agencies have authorities and resources to manage wildlife habitat or provide technical assistance for wildlife habitat, including monarchs.

This Strategy is limited to the mid-continental range of the eastern monarch population in the United States. It does not address conservation needs of the western monarch population, non-migratory Florida and coastal populations, monarchs in southern Canada, or monarch overwintering areas in Mexico.

The scope of the Strategy centers on the authorities and resources of the participating state agencies and federal and nongovernmental partners, as well as interested citizen conservationists.

It addresses the area where the largest potential exists to increase populations of breeding and migrating monarchs in North America.

This Strategy divides habitat restoration, enhancement, and management strategies into major land use categories or "sectors" – a combination of land use and land ownership factors – to highlight the unique challenges and opportunities in each. The primary sectors influencing monarch habitat include private agricultural lands, protected natural lands (public and private), rights-of-way (transportation, energy), urban and developed lands, and other energy infrastructure (mined lands, energy generation sites).

The Strategy gives a sector by sector account of habitat conservation programs and activities that have been developed and are already underway, as well as highlighting actions that could be enhanced with new or expanded approaches or supplemented with additional resources. Participation by all sectors will be needed to accomplish successful monarch conservation.

This Strategy establishes a habitat goal to support an eastern monarch population occupying 6 hectares (~15 acres) in the overwintering areas in Mexico, currently estimated to include the need for an additional 1.3 billion milkweed stems embedded in diverse, nectar-rich grasslands and open forest habitats in the North Core monarch conservation unit. No quantitative goal has been set at this time for the South Core monarch conservation unit due to lack of data, but qualitative goals include increased seasonal milkweed and reproduction habitat and improved grassland and nectaring habitat for breeding and migrating monarchs, with an emphasis on enhancing habitat in native rangelands, prairies, and planted grasslands There will also be important monarch habitat contributions from areas exterior to the identified core areas in both the north and the south portions of the eastern monarch range.

The monarch population goal for this Strategy is consistent with the goal established in the national pollinator strategy and trilateral goals between the U.S., Mexico, and Canada. The national pollinator strategy also established a preliminary goal of restoration and enhancement of 7 million acres of pollinator friendly habitat nationally by 2020 and considered the goal to be preliminary pending more comprehensive published scientific findings.

The habitat goal and timeline of this Strategy differ from the preliminary national pollinator habitat goal and timeline due to more recent published findings that better define the magnitude of habitat restoration likely needed and the geographic area of focus for habitat efforts to support achievement of the eastern monarch population goal. The habitat need is concentrated in some of the most highly intensive agricultural parts of the upper Midwest and eastern Great Plains in an area dominated by private land ownership.

Given the intensive land use in this area and the need in agricultural landscapes to apply precision conservation in small increments on less productive portions of fields and border areas, many monarch habitat conservation efforts will be small scale (e.g. an acre or less) and effective conservation will require hundreds of thousands of efforts across tens of thousands of land ownerships. Accomplishing the goals within the next 20 years will require a concerted and focused approach working with cooperating landowners and managers on voluntary and incentive-based efforts to restore and enhance private land habitats, as well as increased public land management.

The Strategy establishes a clear structure for implementing and monitoring conservation actions with existing resources and programs, but long-term success will require capacity and funding beyond current agency and partner resources. The Strategy identifies potential changes that could enhance future conservation efforts to help inform policy, program, and budget

managers on what would be required to achieve monarch conservation goals within the established timeframe, or to accelerate the effort.

Outreach and education are important components of the Strategy. Due to strong public recognition and support for monarchs, they have become a potent symbol for the plight of pollinator species, many of which are in serious decline in the United States and worldwide. Monarchs present an opportunity to engage a wide variety of individuals and groups in a wildlife conservation issue at a magnitude that is unprecedented.

Monitoring and research will be critical to evaluating the effectiveness of conservation efforts and guiding adaptive management of future efforts. The Strategy identifies key research priorities and biological monitoring approaches and describes an adaptive management approach to modify Strategy implementation as there is learning from implementation, monitoring, and improved scientific understanding.

The Strategy also addresses the importance of information management and database approaches for habitat conservation efforts and biological monitoring and the ability to effectively access and share data. The Service is developing a Monarch Conservation Database (MCD) that will track two categories: 1) Conservation plans, such as this one; and 2) Conservation efforts that deliver habitat improvements for the monarch butterfly. The MCD is being designed to allow each agency, organization, or landowner to enter plans as well as their habitat improvement or management efforts. The MCD will provide a unified system for tracking monarch habitat plans and efforts on a national scale and will provide data to help inform land managers and decision makers.

Because state fish and wildlife and natural resource agencies have the authorities and accountability for monarch conservation across much of the region, they and their partners will be the primary engines that drive implementation of monarch conservation. The Strategy includes descriptions of state agency and partner monarch conservation efforts for the 16 primary states covered by this plan, plus a supplement describing efforts for the northeastern states represented by NEAFWA. Some states have already completed state-level monarch/pollinator conservation plans, some state plans are in progress, and some states will build on landscape-based plans and their roles as outlined in this Strategy rather than creating stand-alone state monarch plans.

Overall, this Strategy represents a regional approach to addressing monarch conservation needs in the heartland of America. This area is also the heart of production and migration for the world's largest monarch population.

Scientific uncertainty remains about monarch conservation needs. The monarch Species Status Assessment (SSA) will not be completed by the Service until after this Strategy is completed. This Strategy is based on the best currently available information and will remain a "living document" with goals and strategies to be evaluated and revised through an adaptive process as needed to address changing understandings of monarch conservation needs.

The Strategy builds on state-led efforts, engages partners in conservation at all levels, and identifies habitat strategies to support widespread and resilient monarch populations capable of overcoming identified threats and reversing the long-term declining population trend.
The long-term vision is a diverse, resilient, and appropriately-connected habitat base to support a healthy and robust eastern population of monarch butterflies, sustained by long-term conservation efforts of governmental, non-governmental, and citizen conservationists.

PART ONE – INTRODUCTION

1.1 – PURPOSE AND STATEMENT OF PROBLEM

The monarch butterfly (*Danaus plexippus*) is an iconic butterfly species, known by children and adults alike for its striking orange and black wing patterns and magnificent long-distance annual migration phenomenon. The monarch occurs in a wide range of habitats and is nearly ubiquitous across the United States, except for Alaska. The eastern migratory population of monarch butterflies (those found east of the Rocky Mountains) that overwinters in Mexico decreased by 84% between the winters of 1996–1997 and 2014–2015 (Semmens et al. 2016). The highest count was 18.12 occupied hectares of overwintering habitat in 1996-1997 and the lowest was 0.67 hectares in 2013-2014. The most recent estimate in 2017-2018 was 2.48 hectares. The much smaller western monarch population (found west of the continental divide) that overwinters primarily in coastal California, has declined by a similar proportion. Through analyses that account for differences between sites and efforts over time, Pelton et al. (2016) estimated the western population has declined 74% since the late 1990s, with an even higher estimate of population decline since the 1980's hypothesized by Schultz et al. (2017). Western monarchs are monitored primarily by counts in overwintering groves in late fall. The most recent count in 2017 was 193,000 butterflies, even though a record number of 262 sites were monitored. The high count was 1.24 million butterflies in 1997 at 101 monitored sites.

In August 2014, the U.S. Fish and Wildlife Service (Service) was petitioned to list the monarch butterfly as a threatened species under the Endangered Species Act of 1973 (ESA). In December 2014, the Service issued a 90-day finding that the petition provided enough evidence to show that listing the monarch may be warranted. That prompted the Service to initiate a Species Status Assessment (SSA) for the global range of the monarch subspecies *Danaus plexippus plexippus* (79 FR 250, December 31, 2014). The Service is scheduled to make a proposed decision on whether listing of the subspecies is warranted by June 2019.

Much of the eastern monarch population's decline is hypothesized to be due to milkweed and nectar resource losses in the "corn belt" region of the central United States, as well as loss or degradation of nectar and milkweed resources in south-central states important to monarch migration and reproduction. Therefore, enhancement and restoration of milkweed and nectar-producing habitat are important components to helping to conserve the monarch butterfly (Pleasants & Oberhauser 2012; Flockhart et al. 2013; Flockhart et al. 2015).

Concerns about the dramatic population decline and about the impacts of regulations that would result from listing under the ESA have prompted action by state and federal agencies, non-governmental organizations (NGOs), and private individuals across North America. These actors are ramping up current conservation efforts that benefit monarchs and working to develop international, national, regional, state, and local plans for increasing monarch butterfly habitat conservation in the future.

Given the importance of the "corn belt" region of the upper Midwest (see Fig. 1.4) to monarchs and agriculture, and the potential impacts to both if the decline continues and monarchs are federally listed, the Midwest Association of Fish and Wildlife Agencies (MAFWA) has collaborated with state and federal conservation and agricultural agencies, as well as numerous NGOs (see Appendix A for a complete list) to develop this Mid-America Monarch Conservation Strategy (Strategy). By facilitating coordinated and effective actions across the region, monarch conservation will be enhanced and increased in the heart of the eastern population's breeding and migratory range. This will be accomplished by working with states and partners to coordinate and support effective restoration and enhancement of habitats

beneficial to monarchs on public lands and voluntary and incentive-driven monarch habitat conservation programs and efforts on private lands.

The 13 MAFWA member states, along with Texas, Oklahoma, and Arkansas, comprise a particularly important portion of the range of the eastern population of monarch butterflies, supplying much of the breeding and migrating habitat that produces the migratory generation of the eastern monarch population that overwinters in Mexico (Flockhart et al. 2013). The states and partner organizations that have come together to form this Strategy are uniquely positioned to engage in targeted conservation efforts that will contribute significantly to bolstering monarch butterfly populations and increasing monarch habitat with milkweeds and other nectar plants as part of diverse grassland habitats.

MAFWA has created a governance structure to coordinate and bring cohesion and consistency to state and partner monarch conservation efforts throughout the Midwest as well as important breeding and migration habitats in the south-central states of Texas, Oklahoma, and Arkansas. MAFWA has also coordinated with the northeastern states through the Northeastern Association of Fish and Wildlife Agencies (NEAFWA) on shared monarch conservation efforts.

This Strategy focuses on the eastern migratory population of monarch butterflies and excludes from most discussion both the western population and the largely non-migratory populations in Florida, along the Gulf Coast, and some other coastal areas. This scope reflects the authorities and resources of the participating state agencies, as well as where the largest potential for conservation impacts can be made on the overall eastern North American monarch population.

Conservation efforts underway and proposed by the states and partners can be considered by the Service during its listing decision process. To help guide the evaluation of such conservation efforts, the Service has developed a Policy for the Evaluation of Conservation Efforts (PECE) (68 FR 15100, March 28, 2003). This Strategy is structured to aid the Service in understanding the conservation plans and commitments offered by states and partner organizations to enhance monarch habitats and populations and avoid the need to list the monarch butterfly under the ESA.

The development and implementation of this Strategy is a truly collaborative process, involving dozens of partners from around the region. The initiating partners for this Strategy included MAFWA; Arkansas Game and Fish Commission; Illinois Department of Natural Resources; Indiana Department of Natural Resources; Iowa Department of Natural Resources; Kansas Department of Wildlife, Parks, and Tourism; Kentucky Department of Fish and Wildlife; Michigan Department of Natural Resources; Minnesota Department of Natural Resources; Missouri Department of Conservation; Nebraska Game and Parks Commission; North Dakota Game and Fish Department; Ohio Division of Wildlife; Oklahoma Department of Wildlife Conservation; South Dakota Game, Fish and Parks; Texas Parks and Wildlife Department; Wisconsin Department of Natural Resources; Association of Fish and Wildlife Agencies (AFWA); National Wildlife Federation (NWF); and Pheasants Forever/Quail Forever (PF/QF). MAFWA received a National Fish and Wildlife Foundation (NFWF) monarch butterfly conservation fund grant, and the partners listed above have committed matching resources of cash and in-kind contributions to this effort. The partners have also enlisted the cooperation and assistance of federal, state, and local agencies, nongovernmental organizations, academic institutions, and interested individuals. A full list of committee members and agency representatives who have contributed to the Strategy is included in Appendix A. In addition, many of the individual states have worked with local partners and constituencies on the

development of the state plans and collaborations that will ultimately constitute the primary delivery vehicle for state and partner monarch conservation efforts.

PURPOSE, VISION, AND GOAL

The Strategy provides a regional framework for coordinated monarch butterfly conservation to occur over a 20-year time horizon (2018-2038). Specific conservation objectives and efforts will be implemented by state and federal agencies, partner organizations, and individuals.

Purpose: To facilitate cohesive, coordinated, and effective conservation actions needed to sustain the eastern population of the monarch butterfly, including restoring, enhancing, and protecting habitat and providing information, education, and conservation engagement opportunities to interested citizens.

Vision: A diverse, resilient, and appropriately-connected habitat base to support a healthy and robust eastern population of monarch butterflies, sustained by long-term conservation efforts of governmental, non-governmental, and citizen conservationists.

Goal: To achieve habitat restoration and enhancement to support an average overwintering eastern monarch population in Mexico sufficient to sustain the eastern monarch population and to avoid a regulatory outcome or minimize its impacts (such as monarchs becoming listed under the ESA).

The monarch conservation goal for this Strategy is consistent with the eastern monarch population goal established in the national pollinator strategy (Pollinator Health Task Force 2015) that was subsequently adopted as a trilateral goal by Canada, Mexico, and the U.S. (Trudeau et al. 2016). That goal was to: "Increase the Eastern population of the monarch butterfly to 225 million butterflies occupying an area of approximately 15 acres (6 hectares) in the overwintering grounds in Mexico, through domestic/international actions and public-private partnerships by 2020." The goal as it relates to the Strategy will be subject to further review and analysis as the monarch species status assessment analysis and new science inform future monarch conservation needs and approaches.

The national strategy also established a habitat goal of restoring and enhancing 7 million acres of pollinator friendly habitat nationally by 2020 but considered the goal to be preliminary pending more comprehensive published scientific findings. The habitat goal and timeline of this strategy differ from the preliminary national pollinator habitat goal and timeline due to more recent published findings that better define the magnitude of habitat restoration likely needed and the geographic focus required to support achievement of the eastern monarch population goal. This will require a longer term and more targeted approach than envisioned in the national pollinator strategy and is discussed in more detail in Part 2.2.

DEFINITION OF MONARCH HABITAT AS USED IN THIS STRATEGY

While the habitat needs of monarch butterflies will vary across the species' range and throughout the year, this document uses a general definition that includes both larval and adult food sources necessary to support the monarch life cycle. The Strategy defines monarch habitat as diverse, forb-rich grasslands, mixed woodland-grasslands, or cultivated areas that provide

native, regionally-appropriate milkweed plants (*Asclepias spp.)* and blooming nectar resources throughout their breeding and migration range. In other words, an area is monarch habitat if it provides host plants for monarch larvae (milkweed) during the breeding season as well as nectar food sources for adult monarchs whenever the species may be present. This definition assumes that, when needed, best practices will be used to avoid or minimize pesticide or other potential mortality impacts within established or enhanced habitat areas.

1.2 – STRATEGY DEVELOPMENT PROCESS AND ADMINISTRATION

MAFWA voted to take a leadership role for monarch butterfly conservation shortly after the species was petitioned for listing under the ESA in 2014. MAFWA was formed in 1934 and is an organized non-profit professional association with the purpose of promoting the protection, preservation, restoration, and management of fish and wildlife resources in its region, including 13 Midwestern states and 3 Canadian Provinces. MAFWA, in collaboration with NWF, PF/QF and AFWA, initiated and led a Monarch Butterfly Conservation Workshop in October 2015 to identify monarch conservation and research needs and help launch state planning efforts. This workshop was attended by over 70 participants representing state fish and wildlife agencies, state agriculture departments, nongovernmental organizations, universities, various federal agencies, and the private sector. In May 2016, collaboration continued through a workshop convened in Chicago by the Service among MAFWA technical representatives from nine states to build regional milkweed allocation models for habitat restoration planning. During 2015-2017, many individual states took initiative to host statewide monarch summits and create state-level monarch conservation plans. Some of these efforts were facilitated under a NFWF Monarch Butterfly Conservation Fund grant that provided assistance for state summit design and execution and funding for a regional monarch conservation planning workshop.

Regional coordination of monarch conservation activities solidified in 2016, when MAFWA received a NFWF monarch grant to hire a technical coordinator to develop this Strategy and facilitate state and partner coordination and collaboration. In early 2017, a consortium of partners including NWF, PF/QF, AFWA, and MAFWA hosted a Mid-America Regional Monarch Butterfly Conservation Planning Workshop in Texas, funded through the first NFWF grant, to frame regional plan development and develop essential plan elements and proposed governance structure. The workshop was attended by experts and leadership from the 13 MAFWA states plus Arkansas, Oklahoma, Texas, California, and West Virginia. The workshop also included key partners from U.S. Geological Survey (USGS), the Service, U.S. Forest Service (USFS), USDA-NRCS, Monarch Joint Venture (MJV), Monarch Watch, and the American Soybean Association.

Following the January 2017 workshop, MAFWA created a governance structure for the Strategy that includes a 17-voting member board of directors with up to 7 non-voting ex-officio advisory members, a 6-member executive committee, and a 9-member technical steering committee. These groups guide formulation of the Strategy and the membership represents those with authority to commit resources to implementing monarch conservation in members' respective states, agencies, and organizations. The governance structure is designed to provide oversight over development and implementation of the Strategy, ensure progress towards goals, and to incorporate new science into the Strategy via an adaptive management framework. The Strategy governance structure is shown schematically in Figure 1.1 and described in general below. More detail, including a list of current members, can be found in Appendix A.

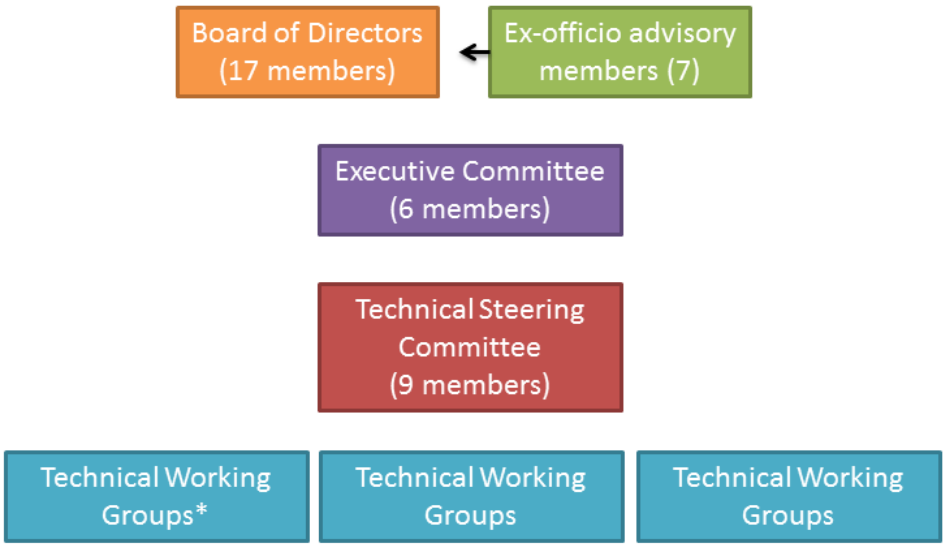

*Figure 1.1 - MAFWA Monarch Strategy governance structure; *Technical Working Groups are formed on an as-needed basis and are subject to change.*

Board of Directors

The MAFWA Monarch Board of Directors (Board) consists of executive level staff with public responsibility for species conservation, legal authority to undertake conservation actions, and with decision authority for their respective agency. It consists of state fish and wildlife directors or designees from the 16 primary eastern monarch core breeding and migratory pathway area states, plus a NEAFWA representative (i.e. the 13 MAFWA member states; Texas, Oklahoma, Arkansas; and NEAFWA as currently represented by West Virginia). It also includes up to seven ex-officio (non-voting) members representing key sector and/or agency partners. Advisory members currently include representatives from NWF, PF/QF, USFWS, NRCS, Monarch Joint Venture, and Keystone Monarch Collaborative. The Board oversees decision making, charges the Technical Steering Committee with tasks, and establishes standing committees as needed. The Board also plays an important role in obtaining and allocating funds and resources.

Executive Committee

The Executive Committee consists of a subset of six voting members of the Board, with consideration given for geographic distribution within the project area. It makes decisions related to plan development and implementation under authorities granted by the Board. It also approves any needed Technical Work Groups.

Technical Steering Committee

The Technical Steering Committee consists of technical staff from state agencies and initiating partners as identified in the NFWF grant that funded this project. These initiating partners include AFWA, NWF, and PF/QF. This group plays a primary role in drafting and coordination of the Strategy under the direction of the Board, as well as tracking

accomplishments, leading evaluation, and making recommendations for adaptive changes to implementation.

Technical Work Groups

Technical Work Groups operate under the direction of the Board and the Technical Steering Committee and are responsible for carrying out various tasks related to the technical aspects of the Strategy. Technical Work Groups are composed of knowledgeable individuals and experts in fields important to developing, implementing, and monitoring the Strategy. The Technical Steering Committee coordinates the Work Groups to ensure that they meet their individual charges in carrying out the overall Strategy.

Public Engagement

Public engagement in the development of this strategy has occurred primarily at the state level. Most states have conducted state monarch and/or pollinator "summits," "consortiums," or other forums of partners and stakeholders that have helped inform state efforts and this strategy. In addition, MAFWA has engaged a variety of agencies and groups at the regional or national level in the Technical Work Groups and other forums. A draft of this strategy will be provided for broad review and comment by any interested agencies, organizations, or individuals before this Strategy is finalized.

1.3 – STATES' LEGAL STATUS AND AUTHORITY FOR MONARCHS

In most states participating in this Strategy, authority for insect management, including monarchs, resides with the state fish and wildlife or natural resources agency (Table 1.1). In some states, specific legal authority for management of insect species is lacking or ambiguous. To further explain the complexities of wild insect management at the state level, the following information is excerpted from an AFWA report entitled "State Fish and Wildlife Agency Activities to Benefit the Monarch Butterfly," pages 7-8 (AFWA 2015):

> "Under the U. S. federal system of government, the legal authority to manage most of the species of wildlife that live in the United States is vested in the individual U. S. states (Amendment 10, U. S. Constitution: "The powers not delegated to the United States by the *Constitution,* nor prohibited by it to the States, are reserved to the States."). As public trustees of wildlife, states manage wildlife for their citizens, working to sustaining wildlife populations for future generations (*See Baldwin v. Fish & Game Commission of Montana*, 436 U.S. 371, 386-387, 391 (1978)). Exceptions are those species such as endangered species or migratory waterfowl where federal law has created a special management authority for these species at the federal level and federal and state governments co-manage these species. In the case of species such as the monarch butterfly, which are not yet listed under the federal Endangered Species Act, management authority for the species resides with the states.
>
> States may choose to exercise their management authority over wildlife in a variety of ways. All states have established some form of fish and wildlife management agency, either as a stand-alone cabinet-level agency or as a department within a larger natural resource management agency. The management authorities granted to these departments by state statute and regulations differ, however, and not every state wildlife agency has the formal authority to manage insects such as the Monarch butterfly. In some states, insects are managed by the state Department of Agriculture rather than the state wildlife agency. Some states have their own versions of the federal Endangered Species Act that gives the state authority to create a state list of endangered and threatened species, while other states do not.

For state wildlife agencies that do have management authority over insects, it may be appropriate to consider adopting actions that directly benefit the Monarch butterfly, such as listing the butterfly as a Species of Greatest Conservation Need in the state's State Wildlife Action Plan, or contemplating a possible listing under state threatened and endangered species statutes…For those states that lack direct management authority over insects, there may still be activities that the state wildlife agency can undertake that will benefit the monarch butterfly."

The following table shows the legal authority and conservation status of monarch butterflies in each of the sixteen states covered in this regional strategy. This information is considered current as of the publication date of this document and may change.

*Table 1.1 - Summary of authority for management of insects within each participating state, including whether the state has the ability to list an insect species as state threatened or endangered, and the presence of monarchs in each state's State Wildlife Action Plan. *SGCN = Species of Greatest Conservation Need; SWAP = State Wildlife Action Plan*

	Department/ Agency with Management Authority	State Threatened/ Endangered Legislation	Insects Eligible for Threatened/ Endangered Status	Monarch included as SGCN* in SWAP*	Monarch Mentioned in SWAP
Arkansas	Wildlife	No	N/A	Yes	Yes
Illinois	DNR	Yes	Yes	Yes	Yes
Indiana	None	Yes	No	No	No
Iowa	DNR	Yes	Yes	Yes	Yes
Kansas	Wildlife	Yes	Yes	Yes	Yes
Kentucky	Wildlife	No	N/A	No	Yes
Michigan	DNR	Yes	Yes	Yes	Yes
Minnesota	DNR	Yes	Yes	Yes	Yes
Missouri	None	Yes	Yes	Yes	Yes
Nebraska	Wildlife	Yes	Yes	No	No
North Dakota	Wildlife	No	N/A	Yes	Yes
Ohio	None	Yes	Yes	Yes	Yes
Oklahoma	Wildlife	Yes	Yes	No	No
South Dakota	Wildlife	Yes	Yes	No	No
Texas	None	Yes	No	No	No
Wisconsin	DNR	Yes	Yes	Yes	Yes

MAFWA also has provincial members and Canada has taken steps to enhance monarch conservation both through tri-lateral efforts with the U.S. and Mexico and by developing a proposed management plan for Canada under its Species at Risk program (Environment Canada 2014).

1.4 – SPECIES INFORMATION

The following sections provide an overview of monarch species and habitat information most pertinent to this Strategy, with a focus on the eastern North American population of monarch butterflies.

DESCRIPTION

Adult monarch butterflies exhibit black to dark-brown veins and outlines against an orange background on their wings (Fig. 1.2). There are slight differences in the wing patterns of males and females. Most of the ventral side of the wings is paler than the dorsal side, making monarchs less conspicuous when their wings are fully folded.

The caterpillars (larvae) of monarch butterflies are similarly conspicuous and boldly-patterned, displaying a unique black, white, and yellow transverse banded pattern along the length of their bodies. Monarch larvae go through five size stages known as instars, growing to a larger size after each skin molt (Fig. 1.3)

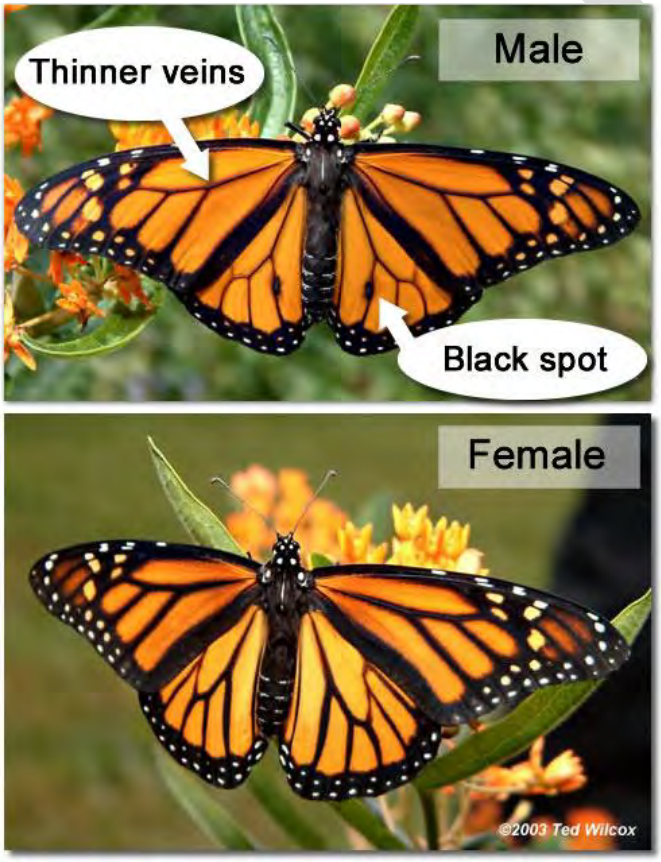

Figure 1.2 - Wing pattern differences between male and female adult monarchs. Image source: www.learner.org

Figure 1.3 - Photo showing the 5 larval instars of monarch caterpillars. Photo courtesy of Karen Oberhauser

TAXONOMY

Monarch butterflies are insects in the order Lepidoptera (moths and butterflies) and the family Nymphalidae—or the "brushfoot" family—characterized by small front legs with specialized hairs. Monarchs are further classified in the subfamily Danainae, otherwise known as the "milkweed butterflies," which only lay their eggs on plants in family Apocynaceae, subfamily Asclepiadoideae, genus *Asclepias* L. (1753) and related genera. These "milkweed butterflies" are specialized to sequester and accumulate toxins from milkweed plants into the larval and adult bodies to deter predators (Brower 1984).

The monarch is in the genus *Danaus* (Danaus Kluk, 1802), which contains 12 species, the majority of which are tropical. The monarch butterfly (*Danaus plexippus)* has six recognized subspecies. *Danaus plexippus plexippus* is the largely migratory subspecies that occurs in southern Canada, the continental United States, and Mexico and is the subject of the listing petition and this document.

BIOLOGY

The following information is largely summarized from the North American Monarch Conservation Plan (2008).

The North American monarch butterfly migration is one of nature's most spectacular natural phenomena. The North American geographic range of the monarch butterfly includes Mexico, southern Canada, and all of the U.S. except Alaska. Each fall, eastern monarchs breed east of the Rocky Mountains and migrate to overwinter in forests in the mountains of central Mexico. Western monarchs generally migrate to the coast of California, although some also go to Mexico (Figure 1.4).

Monarchs occur in a variety of habitats including rangelands, farms, riparian areas, deserts, prairies, meadows, open forests and woodlands, cities, gardens, and roadsides, where they search for their larval host plant milkweed (*Asclepias*. spp.) and nectar sources. Migratory North American monarchs undergo several generations per year. Adults are generalists that feed

on the nectar of a wide variety of flowers and water. The summer generation adults live between two and five weeks. The late generation adults go into reproductive diapause, migrate, and then overwinter. The overwintering generation lives seven to nine months. They do not breed and lay eggs until the following spring, as they re-migrate toward their spring and summer ranges.

Monarchs only lay their eggs on milkweed plants. Adult females lay eggs singly, secreting a glue-like substance that attaches the egg to a milkweed plant. The larvae emerge in three to five days, with shorter development times corresponding to warmer temperatures. Larvae (caterpillars) feed only on leaves of milkweed (*A.* spp). In this, they are strict specialists. Monarch larvae undergo five instars (intervals between molts) over a period of nine to 13 days. Once fifth instar larvae are fully grown, they leave their milkweed host plant to search for an elevated and usually well-hidden pupation site. The pupa stage, when monarchs form a chrysalis, lasts 9 to 15 days under normal summer conditions. Monarchs produce four to five generations in each annual cycle, starting with the first generation in the spring and ending with the migratory fourth or fifth generation adults in the fall.

OVERWINTERING

The following information is primarily summarized from the Monarch Butterfly Conference Report (NRCS and USFWS 2016).

From roughly late October through February, eastern population migratory monarchs live in the forested mountains of Mexico, where temperatures are cool enough for them to conserve energy reserves until spring, yet mild enough to avoid freezing. This specialized habitat is essential to the persistence of the eastern monarch population and its migration. The monarchs form large clusters in Mexico's high altitude *oyamel* fir forests, occasionally taking shelter in pines and other trees.

The Mexican overwintering sites for monarchs have been protected by a series of designations by Mexican government authorities beginning in the 1980's that protect a core of over 13,000 hectares (32,000 acres) and a buffer area of more than 42,000 hectares (104,000 acres – Jepsen et al. 2015). Most recently, the Monarch Butterfly Biosphere Reserve was named a World Heritage Site in 2008 and the area has become a popular tourist destination. The special status of the monarch overwintering areas in Mexico affords the population a certain degree of protection from development pressures, though illegal logging, the subsistence needs of local residents, and potential climate change effects still pose a threat to the sites' long-term viability. Significant international collaboration is continuing between the Countries of Canada, the United States, and Mexico to conserve the monarch butterfly.

In Mexico, most efforts have gone toward establishing (in several stages) the Monarch Butterfly Biosphere Reserve (MBBR) and its management. Land ownership in much of Mexico is communally based, making the designation of a protected area of little consequence without effective community engagement and local buy-in. This engagement is led by multiple federal agencies and NGOs. In 2000, a fund was created to compensate landowners for lost logging revenue in exchange for habitat protection. This fund stood at $7.3 million in 2012, and has received support from the David and Lucile Packard Foundation and the Mexican telecommunications company, Telcel (Shahani et al. 2015). In addition, it is partially matched by Mexican federal funds. The U.S. Fish and Wildlife Service and U.S. Forest Service have both contributed to conservation in and around the MBBR over the past decade. As a result of all of these efforts, logging rates have decreased markedly, though not all communities have

participated in conservation and logging still occurs (Navarrete et al. 2011; Vidal et al. 2013; Brower et al. 2016).

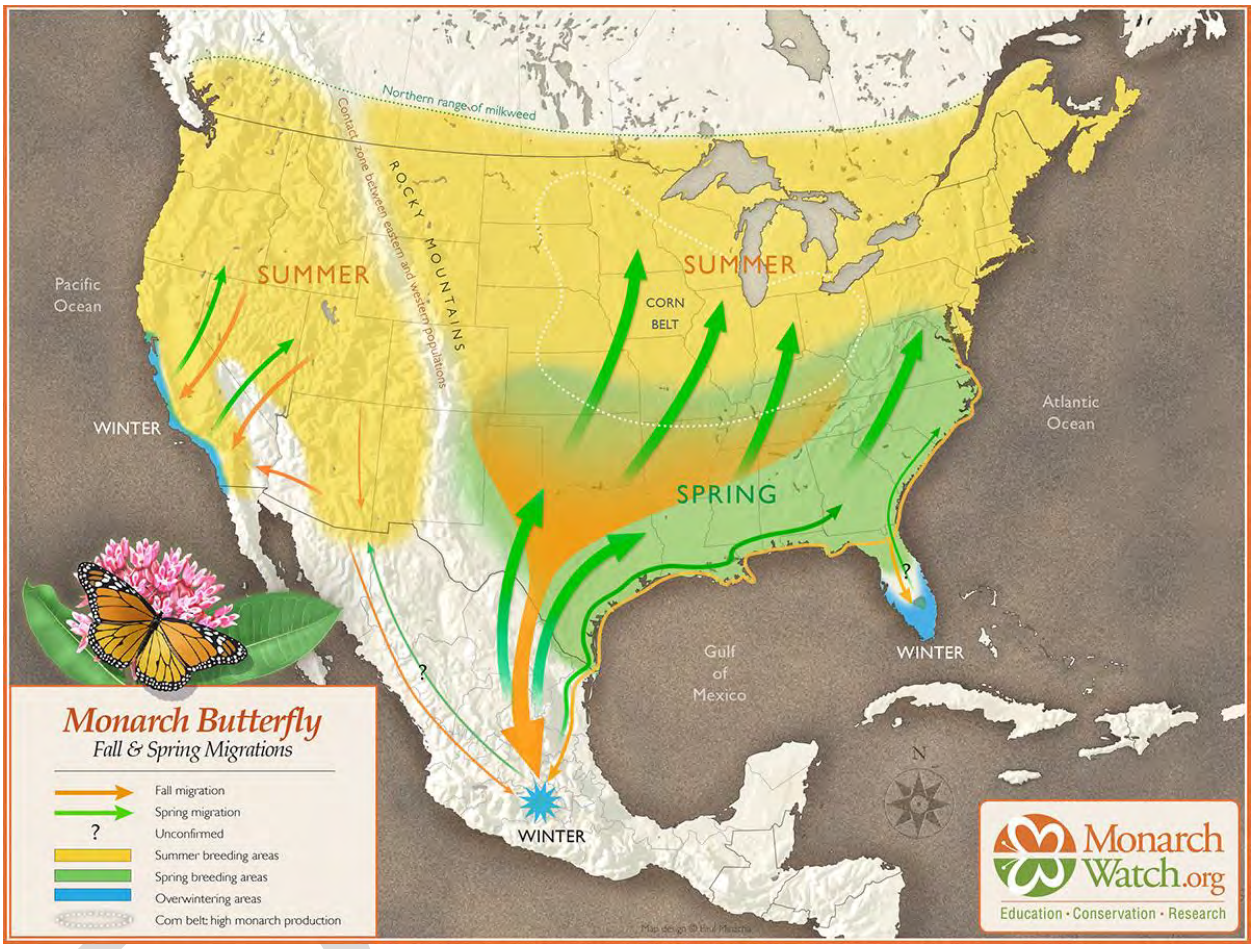

Figure 1.4 - Monarch Migration Map and approximate location of the "corn belt" historic monarch high production region. (Source: Monarch Watch https://monarchwatch.org/blog/2010/05/13/two-way-monarch-migration-map/)

HABITAT

Like all butterflies, monarchs require food resources as larvae (milkweed) and adults (various nectar resources) as well as sites for mating, roosting, thermoregulation and hibernating that provide protection from predators and extreme weather (Zalucki & Lammers 2010). The monarch butterfly is unique, however, in that its multi-generational migration life strategy necessitates widespread breeding and food resources at the right places at the right times. To accommodate all life stages of the monarch, milkweed species and diverse nectar resources are required throughout the growing season and when monarchs are present across the species' range. Given the seasonal movements of monarchs from south to north in the spring and reversing in the fall, the timing of availability of milkweed, nectar sources and other habitat

varies by geographic location and time of year. The ubiquitous presence of monarchs across the landscape, their high mobility, and presence in different regions at varying times of the year makes it difficult to define specific locations or characteristics of essential habitat for this species. Provision of seasonally-appropriate milkweed and nectar plants along the central migratory pathway of monarch butterflies and throughout the breeding range, as well as protection of existing overwintering sites in Mexico are crucial for the success of the eastern population of monarch butterflies.

Habitat conservation and restoration in the entire eastern United States and southern Canadian portion of the monarch range is desirable wherever migrating and breeding monarchs may be present, but scientific findings identify areas of the range where conservation efforts may have greater impacts to the overall population and/or be more efficiently applied. Stable isotope and citizen science analysis by Flockhart et al. (2013) indicate that monarch production in the "corn belt" region of the north central U.S. is especially important to the size of the overwintering population in Mexico. Furthermore, many "first generation" monarchs that allow for the northward progression of subsequent generations are produced in Texas and surrounding states, forming the foundation for the subsequent generations to follow. Combined, the south-central, central, and Midwestern states in the U.S. are an important region for monarch breeding and migration (Flockhart et al. 2013).

The Service has proposed certain areas as most important or efficient for conserving monarchs in the continental United States in regions described as "monarch butterfly conservation units" (Fig. 1.5). For eastern monarchs, a North Core conservation unit and a South Core conservation unit have been proposed. These conservation units were drawn using county boundaries to facilitate analysis of county level land use data for conservation planning purposes and they approximate what are considered the primary production and migration areas for the eastern population, recognizing that monarch breeding and migration also occur in all other units identified on this map.

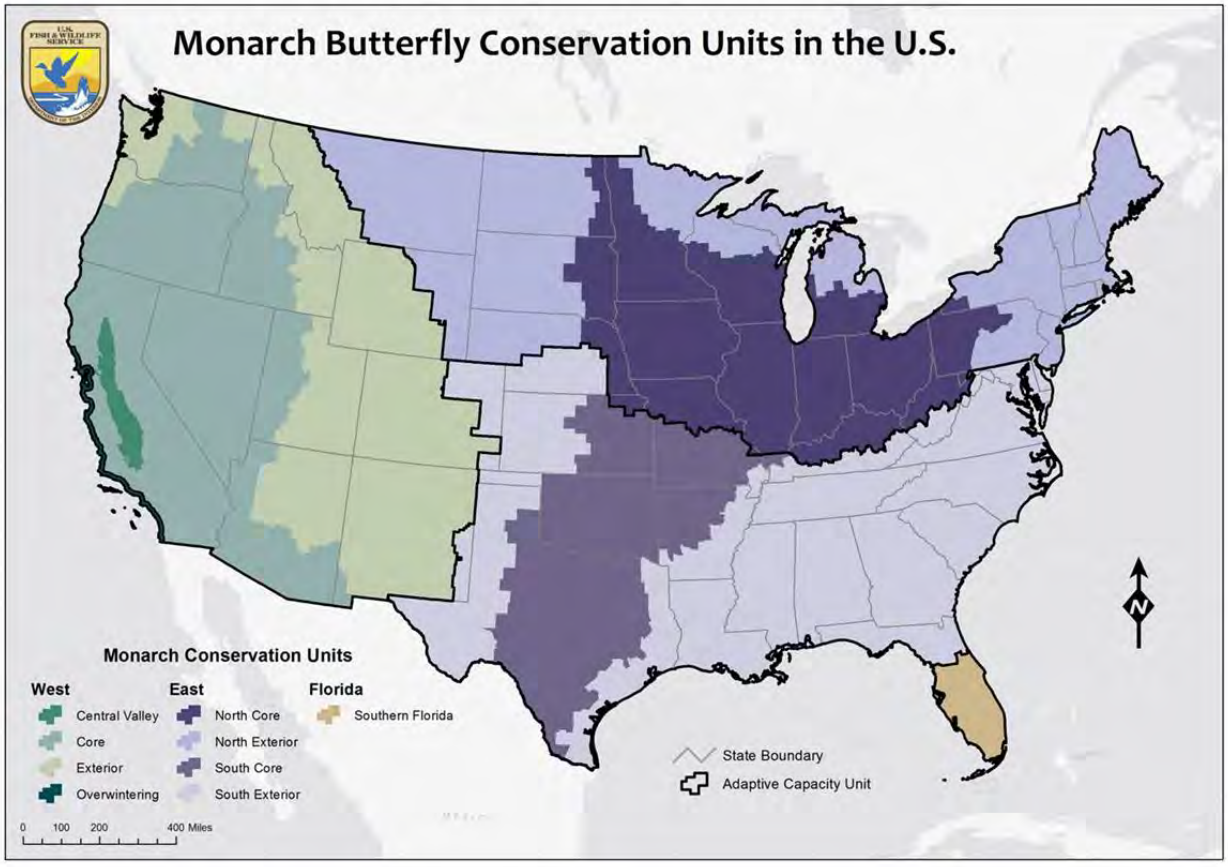

Figure 1.5 - Monarch Butterfly Conservation Units as described by the U.S. Fish & Wildlife Service (source: U.S. Fish & Wildlife Service)

1.5 – DISTRIBUTION AND POPULATION STATUS

DISTRIBUTION

Monarchs are native to North and South America but have spread to other areas of the world (Fig. 1.6). They were first seen in Hawaii in the 1840's, and spread throughout the South Pacific in the 1850's-60's. In the early 1870's, the first monarchs were reported in Australia and New Zealand. Monarchs also inhabit Portugal and southern Spain along the Iberian Peninsula (Monarch Lab, University of Minnesota: https://monarchlab.org/biology-and-research/biology-and-natural-history/global-distribution/).

Historical records were largely based on sightings from early European explorers that suggested Atlantic and Pacific dispersal events of the monarch butterfly occurred in the 1800s (Vane-Wright 1993, Zalucki & Clarke 2004). However, Zhan et al. (2014) suggest, based on genetic analysis, that dispersal events could have occurred 2,000 to 3,000 years earlier.

North American monarchs are the only population considered to be strongly migratory and are genetically distinct from non-migratory populations elsewhere in the world (Zhan et al. 2014). Some small non-migratory monarch populations have become established in southern Florida and along the Gulf Coast, and there is evidence that some southward-migrating eastern monarchs may join these non-migratory populations rather than continuing to the overwintering population in Mexico (Knight & Brower 2009).

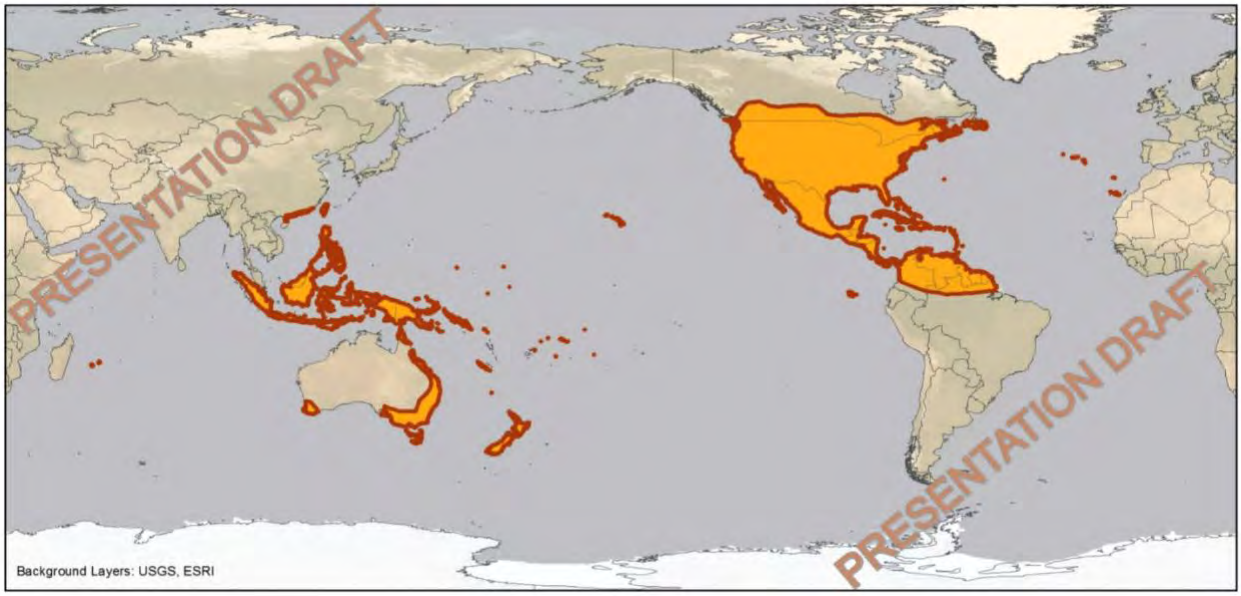

Figure 1.6 - Global monarch distribution (source: U.S. Fish & Wildlife Service)

This Strategy focuses on the eastern migratory population of monarch butterflies in the United States. It excludes from most discussion both the western population and the largely non-migratory populations in Florida, along the Gulf Coast, and some other coastal areas.

POPULATION STATUS AND TRENDS

The following information is largely summarized from the Monarch Butterfly Conference Report (NRCS & USFWS 2016) and has been updated with more recently published information.

Monitoring population trends of monarch butterflies takes a variety of forms, using differing methodology, and with many different organizations, agencies, and educational groups involved, often using "citizen science" programs. Monitoring programs can be generally broken down into the following categories:

(1) Breeding population;
(2) Population census, including at the overwintering sites;
(3) Migratory population; and
(4) Monitoring and assessment of individual butterfly health and condition

These efforts are summarized in Oberhauser et al. 2009.

Due to the inherent complexity in assessing population trends and divergence in the data collection and approaches, the best available population estimate for the eastern population is the occupied area of the overwintering sites. The size of the eastern monarch overwintering population is measured by the number of hectares of trees covered by butterflies at the overwintering sites in Mexico. The number of overwintering hectares has declined significantly over the last decade and a half (Brower et al. 2011; Semmens et al. 2016). Statistical analyses show that overwintering monarch populations in Mexico are declining at a statistically significant rate, even when the extremely high and low numbers are removed from analysis (Brower et al. 2011) (see Fig. 1.7). Davis (2011) argued that the number of migrating monarchs in eastern North America has not changed in the past 15+ years, based on analysis of citizen science data from two long-term monitoring sites on peninsulas at Peninsula Point, MI and Cape

May, NJ. Brower et al. (2012) countered that estimates from northern Michigan or coastal New Jersey are not representative of conditions in the main monarch production areas of the Midwest.

The number of monarchs represented by these counts is a matter of some conjecture. The previously stated national goal of 225 million monarchs occupying 6 ha of habitat was based on an assumed density of 37.5 million monarchs per hectare (Pollinator Health Task Force 2015). Recent research has explored the wide variation in density estimates for overwintering monarchs and the implications for both the number of monarchs contained in 6 hectares of overwintering colonies and the amount of habitat estimated to be necessary to support that target population (Thogmartin et al. 2017b). That analysis indicates that the density of monarchs likely ranges from under 10 million per hectare up to 60 million per hectare. The authors suggested that a median of 21.1 million monarchs per hectare may be a more accurate representation of average overwintering density than earlier assumed densities of 37.5 to 50 million per hectare (Thogmartin et al. 2017b). That would equate to a population of 127 million instead of 225 million occupying 6 ha.

Semmens et al. (2016) developed a quasi-extinction risk and population target model for the monarch butterfly and found that the eastern population has a substantial probability of quasi-extinction, from 11% to 57% over 20 years, with acknowledgment that the uncertainty of these estimates is large. Their modelling exercise assumed overwintering habitat area as a proxy for population size and did not account for density dependence. Semmens et al (2016) concluded that a 5-fold increase in Monarch abundance was necessary to halve the quasi-extinction risk, relative to 2014-15 overwintering counts of 1.13 hectares. Since then, the overwintering estimate has been as high as 4.01 hectares in 2016.

These declines are believed to be due, in large part, to declines in habitat availability in the breeding range of the north-central United States, principally through loss of common milkweed (*Asclepias syriaca*) in agricultural crops (Pleasants & Oberhauser 2013; Pleasants 2017), grassland conversion (Lark et al. 2015), and forest degradation in the Mexican overwintering habitat (Brower et al. 2016). This is discussed in more detail under the habitat section below.

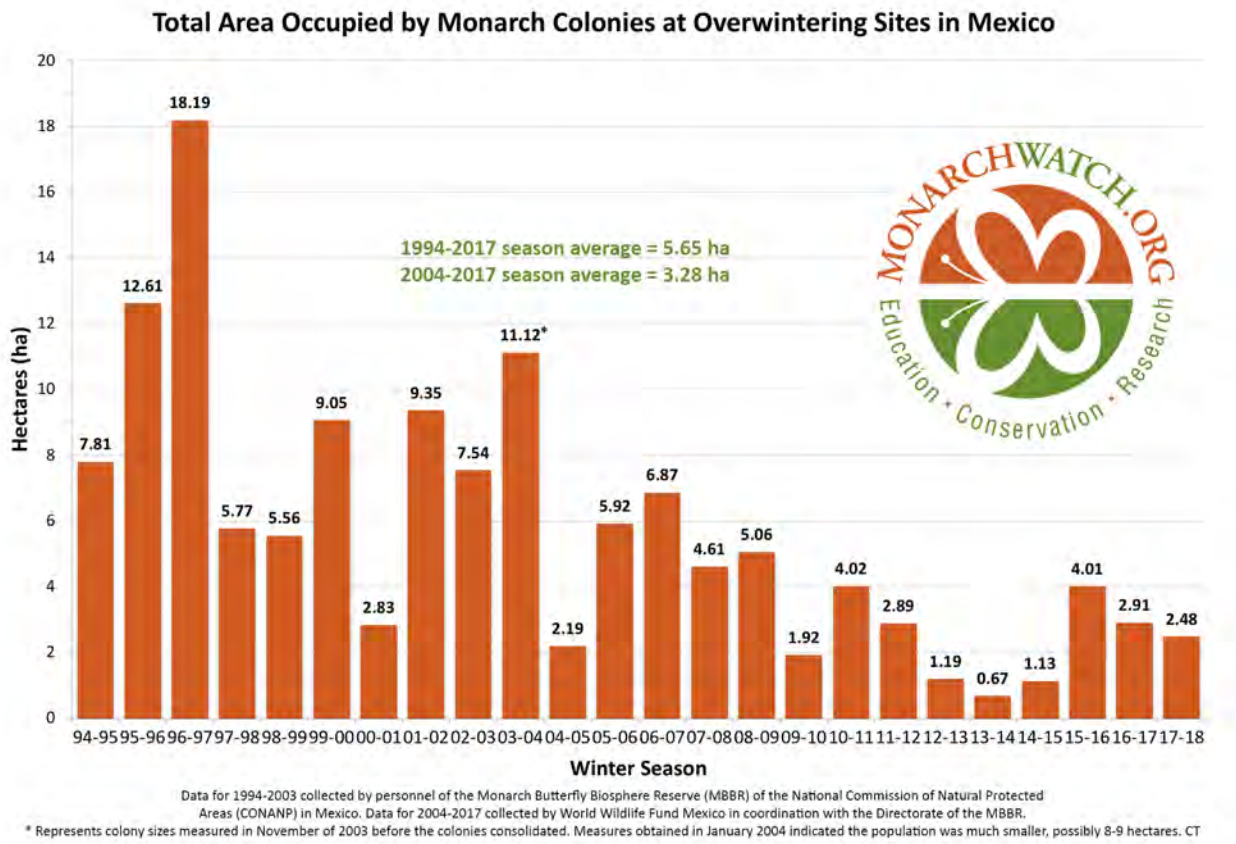

Figure 1.7 - Graph of Mexican overwintering monarch population counts 1994-2018 (source: Monarch Watch)

HABITAT TRENDS

Plants in the milkweed subfamily are the sole host plant for monarch butterfly reproduction. A body of researchers has concluded that the decline of milkweed host plants is the primary influence on monarch population status (e.g., Oberhauser et al. 2001, Brower et al. 2011, Pleasants & Oberhauser 2013). The loss of milkweeds in the Midwest, the major summer breeding area for monarchs (Wassenaar & Hobson 1998), has been implicated as the most important factor in the eastern population decline (Pleasants & Oberhauser 2013). Hartlzer (2010) conducted surveys of common milkweed in Iowa corn and soybean fields between 1999 and 2009. Initial surveys conducted in 1999 found that low densities of common milkweed occurred in approximately 50% of Iowa corn and soybean fields. In 2009, common milkweed was present in only 8% of surveyed fields, and the area within infested fields occupied by common milkweed was reduced by approximately 90% compared to 1999 (Hartzler 2010). Pleasants and Oberhauser (2013) reported that egg densities on milkweeds in agricultural fields were significantly higher than on milkweeds in non-agricultural habitats each year by an average factor of 3.89. The greatest loss of milkweeds has occurred in agricultural fields due to the use of glyphosate herbicide in conjunction with the adoption of glyphosate-tolerant corn and soybeans (Hartzler 2010; Pleasants & Oberhauser 2013). Pleasants (2017) estimated that 850 million milkweeds have been lost in corn and soybean fields since 1999 and an additional 11 million lost due to land conversion for agriculture or development.

In addition to the observed decline in milkweeds in the Midwest, cropland expansion into grassland and particularly into lands previously enrolled in the Conservation Reserve Program (CRP) that have expired, has been another identified factor linked to monarch habitat decline. Commodity price supports, U.S. agricultural policies, and the increased demand for biofuels have recently resulted in expansions of crop production (typically corn and soybeans) into areas previously considered grasslands and other areas not previously considered tillable and sustainable for these cropping systems (Lark et al. 2015). During the period of 2008-2012, the authors concluded that cropland expansion occurred most rapidly on lands that are less suitable for cultivation, with up to 42% of the recent expansion coming from lands exiting the CRP and the remaining coming from pasture/rangeland (Lark et al. 2015). Since 2012, this trend has continued, resulting in more lands going back into row crop/intensive agricultural production. According to the Farm Services Agency compiled data, all states within the NRCS Monarch Butterfly Action Area of the Midwest and south-central U.S. have seen continual decreases in total enrolled CRP acreage for the period of 2012-2015 (Conservation Reserve Program Reports and Statistics, Farm Services Agency). Likewise, the cap (maximum) imposed on acres available for CRP enrollment has fallen steadily since 2002.

Pleasants (2017) concluded that a total of 425 million milkweeds would need to be added to increase the monarch support capacity by just one more overwintering hectare, with 1.6 billion more needed to meet the 6-hectare (of wintering occupied habitat) goal established by the Pollinator Health Task Force in 2015. The current amount of milkweed in the northern U.S. is about 1.3 billion stems and sufficient in a year with average weather conditions to support an overwintering population occupying 3.2 hectares of habitat in Mexico (Pleasants 2017). Thogmartin et al. (2017a) assumed that a near doubling of the occupied area to 6 hectares would require a near doubling of the number of stems by at least 1.3 billion. Based on an estimated number of milkweeds to produce one monarch, Thogmartin et al. (2017b) calculated greater than 1.8 billion additional milkweed stems would be needed to sustain six hectares of overwintering monarchs given their analysis of monarch overwintering densities.

Another body of scientific inquiry has led others to different conclusions. Inamine et al. (2016) evaluated the status of monarch butterflies using multiple datasets covering 22 years of monarch monitoring programs across North America to retrospectively investigate associations between population dynamics in different regions, and to identify stages contributing to the recent population decline. Using count data reported to the North American Butterfly Association (NABA) and other citizen scientist data, including Cape May and Peninsula Point observations, the authors analyzed the relationships between butterfly population indices at successive stages of the annual migratory cycle to assess demographic connections and to address the roles of migrant population size versus temporal trends that reflect changes in habitat or resource quality. Contrary to the work cited above implicating milkweed loss, Inamine et al. (2016) did not find statistically significant temporal trends in stage-to-stage population relationships in the mid-western or northeastern U.S. Additionally, Davis and Dyer (2015) conducted a meta-analysis of some of the population status literature and concluded that there had been no decline over the past two decades in summer breeding numbers in the collection of citizen science studies that they reviewed focusing on spring, summer, and fall dynamics of monarchs. These findings have since been rebutted by Pleasants et al. (2017), who argued that they failed to account for the loss of milkweeds in agricultural fields and the shift in the proportion of the monarch population present in agricultural and non-agricultural areas compared to areas where counts are typically conducted.

1.6 – THREATS

The Service analyzes five general threat factors when determining whether or not a species merits listing as either threatened or endangered. Each of these threats is summarized below as they relate to the monarch butterfly, though more detailed information will be provided in the Species Status Assessment.

Factor One: Modification or Curtailment of Habitat or Range

As indicated in previous sections, there is ample scientific evidence of significant habitat loss across the breeding and migratory range of the eastern population of monarchs. Loss of milkweed and nectar resources in agricultural areas due to widespread use of herbicide-resistant crops (Zalucki & Lammers 2010, Pleasants & Oberhauser 2013, Pleasants 2015, Pleasants 2017) coupled with general habitat destruction related to human development (Pleasants 2017) has resulted in a landscape with host plant and food resources with reduced capacity to support a resilient population of monarch butterflies (Flockhart et al. 2014, Stenoien et al., In press). Additionally, the eastern monarchs' overwintering areas in Mexico are vulnerable to habitat destruction, degradation, and possible shifts due to the effects of climate change (Oberhauser & Peterson 2003, Brower et al. 2011, Vidal et al. 2013, Ramirez et al. 2015).

Factor Two: Overutilization for Commercial, Recreational, Scientific, or Education Purposes

While overutilization of monarch butterflies is likely not a significant risk to their overall population, there is some concern about the effects that captive rearing and release of monarchs may have on wild monarch populations given their already declining numbers. These concerns include the possibility of increased disease transmission from captive breeding, decreased genetic variation resulting from captive breeding, and the fact that large-scale breeding and release of farmed monarchs can interfere with scientific understanding of wild monarch population trends and dynamics (Altizer et al. 2014; Young-Isebrand et al. 2015). Monarch eggs, larvae, and adults are often collected and studied by both professional and citizen scientists throughout their range, but this collection is not thought to have a detrimental impact on monarch populations as long as moderate levels of activity are maintained.

Factor Three: Disease or Predation

Like many insect species, monarch populations are heavily affected by disease and predation, both of which are normal and natural phenomena throughout the life cycle of an insect. However, disease and predation can become problematic when exacerbated by other factors such as habitat loss and degradation (Bradley & Altizer 2005), which reduce the population's ability to rebound from losses. One of the main diseases of concern for monarchs is the protozoan parasite *O. elektroscirrha* (Altizer & Oberhauser 1999), and transmission of this parasite may be increased when multiple monarchs are forced to use the same milkweed patches due to limited habitat availability (Bartel et al. 2011). More research on the synergies between diseases and other factors affecting monarch populations is needed, and this issue is addressed later in the Strategy where research needs are discussed. Predation is another population pressure that can be exacerbated by other factors, and monarchs are susceptible to predation at all stages of their life cycle. As mentioned previously, as little as ten percent of monarch caterpillars

survive to adulthood (Nail et al. 2015), which underscores the importance of adequate monarch populations that can withstand losses from disease and predation.

Factor Four: Inadequacy of Existing Regulatory Mechanisms

Existing regulatory mechanisms for monarchs fall primarily under state authorities as discussed earlier, but not all state natural resource agencies have authority for insect management. However, all state natural resource agencies have authority to implement wildlife habitat programs that can benefit monarchs, as do a number of federal land management agencies. Because identified threats to monarchs relate primarily to habitat quantity and quality, not intentional or incidental take by humans, the programs and authorities related to habitat are the most critical to the future of monarch populations.

At the state level, most states have included the monarch in their State Wildlife Action Plans and about 40% have included monarchs as a species of greatest conservation need (Table 1.1). Many states have also developed monarch/pollinator protection or conservation plans that address issues of habitat loss and potential insecticide exposure (AFWA 2015). Some states have even taken legislative action to protect pollinators such as monarchs, including for example Minnesota that passed a law in 2014 authorizing the state agriculture commissioner to take enforcement action against legal violations of labeling use that result in harm to pollinators (Minn. Stat. Sec. 18B.03, Subd. 4).

Factor Five: Other Factors Affecting the Monarch's Continued Existence

Several factors are currently or could potentially affect the viability of monarch populations, including pesticides (Oberhauser et al. 2006; Pecenka & Lundgren 2015), global climate change (Lemoine 2015; Ramirez et al. 2015), severe weather and catastrophic events (Brower et al. 2004; Nail et al. 2015), invasive species (Casagrande & Dacey 2007), and traffic mortality (McKenna et al. 2001). Many of these factors need further research to better understand their scope and significance at a population scale. The direct and indirect effects of herbicides and insecticides on monarchs and their habitats is perhaps the most significant threat within this category and within the geographic focus of this Strategy. The interest in and need for further research on this topic is discussed in a later section of this Strategy.

Prioritization of Threats for this Strategy

Though many factors have combined to affect populations of monarch butterflies, by far the most detrimental influences on monarchs are all related to habitat (Thogmartin et al. 2017a). The Service has so far identified the major eastern monarch population influences in the U.S. as loss or degradation of milkweed resources, loss or degradation of nectar resources, impacts of insecticides, and potentially disease (Monarch Butterfly Status Assessment Update, August 2017). To focus resources where the most benefits are expected, the strategies in this document will focus on increasing and improving habitat for monarch butterflies. Additionally, this strategy focuses on the sixteen states in the breeding and migratory range of the monarch butterfly through the central portion of the continental United States. Threats to monarchs in their overwintering range in Mexico are significant but outside the scope of this Strategy. Non-migratory monarchs in areas of Florida and the Gulf Coast are also not addressed in this Strategy. In addition to a primary focus on habitat quality and quantity, approaches described in this document may often involve efforts to decrease insecticide exposure or better understand disease dynamics as they relate to habitat. Habitat management is the area of greatest authority

and influence for participating parties, such as state wildlife agencies, state and federal government partners, and environmental non-profit organizations. Providing diverse, resilient, and appropriately-connected habitats located throughout extensive areas of the eastern migratory monarch range will help to mitigate potential impacts of the identified threats to the eastern North American monarch population.

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PART TWO – SPECIES POPULATION AND HABITAT GOALS

2.1 – MONARCH POPULATION GOALS

This Strategy currently assumes the same eastern monarch population target set forth in both the National Strategy to Promote the Health of Honey Bees and Other Pollinators (Pollinator Health Task Force 2015) and as endorsed by the leaders of the United States, Mexico, and Canada (Trudeau et al. 2016) of an average occupied area of overwintering grounds in Mexico covering 6 hectares. This goal recognizes the high inter-annual variation in monarch population sizes and was based on the average overwintering colony areas occupied from 1994-2014 (Pollinator Health Task Force 2015). The Mid-America Strategy assumes a goal of providing monarch habitat conservation sufficient to sustain an average of six occupied hectares, until such time that new analyses or data become available to indicate that a different goal or different activities are needed to sustain the eastern migratory monarch population. This Strategy remains an adaptive document that will be adjusted based on future outcomes or new knowledge.

While the previously cited goal assumed a density of 37.5 million monarchs per hectare, recent research has explored the wide variation in density estimates for overwintering monarchs, which has important implications for both the number of monarchs contained in 6 hectares of overwintering colonies and the amount of habitat estimated to be necessary to support that target population (see discussion in Sec. 2.2).

2.2 - MONARCH HABITAT POTENTIAL AND GOALS

The national pollinator strategy established a preliminary goal of restoration and enhancement of 7 million acres of pollinator friendly habitat nationally for all pollinators, including monarchs (Pollinator Health Task Force 2015). That habitat target outcome was based on preliminary expert estimates regarding the need to offset annual losses of pollinator habitat, plus provide additional acres to reverse past losses. The National Strategy considered these estimates to be "…preliminary until comprehensive peer-reviewed literature becomes available to quantify the total magnitude of habitat losses, or needs for recovery" (Pollinator Health Task Force 2015).

Since the development of the 2015 National Pollinator Strategy, more comprehensive peer-reviewed literature has become available to better quantify the amount and geographic priority for habitat restoration and enhancement hypothesized to be needed to restore and maintain an average overwintering eastern monarch population occupying six hectares (see discussions below). This new information indicates that a larger and more geographically focused conservation effort will be needed for monarch butterflies than the original national pollinator habitat goal.

The geographic focus of the eastern monarch habitat conservation need is concentrated in some of the most highly-intensive agricultural parts of the upper Midwest and eastern Great Plains in an area dominated by private land ownership. Given the intensive land use in this area and the need in agricultural landscapes to apply precision conservation in small increments on less productive portions of fields and border areas, many monarch habitat conservation efforts will be small scale (e.g. an acre or less) and successful conservation will require hundreds of thousands of efforts across tens of thousands of land ownerships. This will require a concerted and focused long-term effort working with cooperating landowners and managers on voluntary and incentive-based approaches to restoring or enhancing private land habitats and increased support for public land management to accomplish conservation goals within the next 20 years.

Estimates of monarch habitat targets needed to reach the population goal have been developed with a specific focus on the milkweed component of habitats in the North Core of the

eastern monarch population (Fig. 1.5). Several publications have used similar rationale based on the following assumptions:

- Overwintering monarch populations are influenced by the amount and success of breeding activity in North America, which is limited by availability of milkweed plants;
- The current amount of milkweed in the northern U.S. (~1.3 billion stems) is sufficient, in a year with average weather conditions, to support an overwintering population occupying 3.2 ha of habitat in Mexico (Pleasants 2017). Thus, a near doubling of average abundance (i.e. 6 ha overwintering goal) would require roughly a doubling of the number of stems (Thogmartin et al. 2017a);
- There is a hypothesized numerical relationship between the number of milkweed stems (plants) in the Midwest and the number of monarchs overwintering in Mexico and that this relationship can be used to calculate the number of additional milkweeds necessary to reach the established overwintering population goal. The simplest is a calculated linear relationship of 28.5 milkweeds necessary to produce one adult monarch for migration to Mexico (Nail et al. 2015); see below for additional discussion.

Using combinations of the logic above, coupled with available data regarding milkweed and monarch numbers, the following estimates of monarch habitat targets, stated in number of milkweed stems (plants) added to the landscape, have been posited by various authors as noted below. The geographic scope of suggested habitat targets is noted, where provided:

- 1.6 billion additional stems east of 98 degrees W and north of 38 degrees N (the northern Midwest), based on rationale that 850 million stems have been lost from agricultural fields and non-agricultural field milkweeds are less productive of monarchs than those formerly located in agricultural fields (Pleasants 2017);
- At least 1.3 billion additional stems in the Midwest, based on the assumption that the approximately 1.3 billion currently existing milkweed stems are supporting an average of just over 3 occupied hectares in the overwintering area; if the goal is to double that to 6 hectares then there is a need to double the current number of milkweeds (Thogmartin et al. 2017a);
- More than 1.8 billion additional stems, based on the estimated number of milkweed stems needed to produce one fall migrant monarch and density estimates of total monarchs per hectare in the overwintering area (Thogmartin et al. 2017b);
- 1.6 billion additional stems suggested by the U.S. Fish & Wildlife Service at a Species Status Assessment update presented at the March 2017 North American Wildlife and Natural Resources Conference. That estimate was based on preliminary analyses of scientific data as part of the monarch SSA; that status assessment has not yet been completed.

Some of the above stated goals rely on the relationship between the number of monarchs per hectare of overwintering habitat and the number of milkweeds required to produce that number, a relationship that is very important for applied conservation programs. Thogmartin et al. 2017b concluded that, while highly variable, the best estimate for average monarch densities in Mexican overwintering areas is 21.1 million monarchs per ha. Thus 6 ha of occupied wintering habitat is predicted to hold 127 million monarchs (with a putative 95% confidence interval of 14-484 million), significantly less than the assumptions in the national goal that rely on an estimate of 37.5 million monarchs per hectare for a goal of 225 million monarchs in 6 ha of wintering area. Additional research is needed to reduce the confidence intervals surrounding the translation of overwintering occupancy rates to population estimates.

As land managers contemplate establishing management plans for monarchs, the uncertainty in these values is further complicated by the practical and economic realities of the magnitude of the changes in the landscape, particularly the agricultural landscape, that would be required to achieve what researchers hypothesize is necessary.

The habitat target estimates listed above focus on the Midwest or north-central region of the United States and use milkweed stems as a metric that represents habitat restoration in a diverse forb and grassland mix. However, factors other than milkweed (such as nectar resources) and geographies other than the Midwest are also important for the recovery and success of the eastern monarch population. Habitat limitations in the northern and southern portions of the monarch range are likely different.

While the general habitat and forage resource requirements for monarchs are similar between the South Core and North Core geographies, there is uncertainty as to what the monarch population limiting factors may be in the South Core. Milkweed is generally thought to be less of a limiting factor in most areas of the South Core, but supporting data is limited. Potential habitat limiting factors in the South Core include the same threats identified for the North Core, such as limited nectar resources, potentially including milkweeds, but may also include additional threats such as the intra- and inter-annual negative impacts of drought to grassland habitat, and woody plant and invasive herbaceous species encroachment into native grasslands.

NORTH CORE HABITAT POTENTIAL AND GOALS

HABITAT POTENTIAL

The following information is primarily summarized from the Monarch Butterfly Conference Report (NRCS and USFWS 2016); updated with more recent information. The NRCS has established habitat outcomes for monarchs under programs they administer through the central continental U.S., in consultation with the Service (NRCS & USFWS 2016). In the Midwest, their effort is focused on plantings of milkweed (*A.* spp.) and monarch nectaring forbs in wetlands and low productivity or highly erodible agricultural lands. In the southern Great Plains, the NRCS effort is focused on improving monarch habitat on existing grasslands.

Based on 1996 isotope data, roughly 50% of wintering monarchs in Mexico were produced in the Midwest "corn belt" (Wassenaar and Hobson, 1998). A more recent analysis (Flockhart et al. 2017) estimated about 40% of overwintering monarchs were produced in the "corn belt." More than 80% of total eastern monarch population production was estimated to come from the northern range of the eastern monarch population (Flockhart et al. 2017), an area approximating the North Core and north exterior monarch conservation units as described by the Service (Fig. 1.5). The Midwest region is home to many milkweed species, but monarch experts agree three have greater significance (NRCS and USFWS 2016):

- Common milkweed (*A. syriaca)*: This large species is very common to disturbed lands in the Midwest and eastern U.S. and will be the most important species for monarch restoration or habitat enhancement. Prior to the development of glyphosate herbicide, this species was very common in cropland fields. Common milkweed is rhizomatous, aggressive and can be difficult to control without herbicides. Tissue analysis of monarchs wintering in Mexico during 1995-1996 demonstrated that 85-92 percent of monarchs fed on common milkweed (*A. syriaca*) growing in the central, northern and eastern United States (Wassenaar and Hobson, 1998).

- Swamp milkweed (*A. incarnata)*: This tall rhizomatous species occurs in open lands in wetlands and along wetlands edges. Being rhizomatous, it tends to occur as colonies, rather than individuals.
- Butterfly milkweed (*A. tuberosa*): This non-rhizomatous species occurs sporadically in open lands on sandy, well-drained soils.

The aggressive growth habits and milky sap of common milkweed prohibit acceptance of milkweed in cropland. While livestock avoid feeding on milkweed in pastures, when cut and cured with hay, milkweed becomes more palatable and poses a greater risk of making cattle sick. Thus, hay producers have a low tolerance to milkweed (Shane 2008). For these reasons, NRCS anticipates that the largest gains and interest will be on lands not being used for agricultural production in this sub-region (NRCS and USFWS 2016).

NRCS identified the highest potential for gains in habitat in the Midwest region to be on lands in various USDA cropland retirement programs (NRCS and USFWS 2016), particularly lands currently enrolled in Wetland Reserve Program (WRP) and lands to be enrolled in a wetland easement through the Agricultural Conservation Easement Program (ACEP). The Conservation Reserve Program (CRP) administered by the Farm Services Agency, was identified as having significant potential to create or enhance monarch butterfly habitat. There are opportunities for the development of larger blocks of habitat on lands enrolled in CRP and wetland easements. Because the current land uses in this region are cropland and intensively managed pastures and hay fields, NRCS anticipates less potential of habitat gains compared to areas with less productive soils, lower precipitation, and that are more range-land dominated (NRCS and USFWS 2016). Nonetheless, establishment, enhancement and management of regionally appropriate milkweed and nectar plants through voluntary land retirement programs provides opportunities to establish blocks of quality habitat for monarchs (NRCS and USFWS 2016).

HABITAT GOALS

The Mid-America Monarch Conservation Strategy Board of Directors was presented with information in September 2017 as background for setting a regional milkweed stem goal for monarch conservation. After careful review, the Board selected a goal of an additional 1.3 billion stems of milkweed in the North Core monarch conservation unit by 2038. The full goal statement adopted by the Board of Directors says:

> "The goal of the Mid-America Monarch Conservation Strategy for the North Core is to work with partners to support an average of 6 hectares of overwintering eastern monarch population through an additional 1.3 billion stems of milkweed in the North Core monarch conservation unit by 2038, with a baseline year of 2014 for counting additional conservation efforts." (adopted September 12, 2017).

The Board recognized that the information informing the goals is complex and highly variable, as discussed previously, and that conservation needs may change with additional analyses or data. The background information provided with the above goal made it clear that the ultimate desired outcome is adequate habitat to sustain the eastern monarch population (currently considered to be an average overwintering population size of 6 ha of occupied habitat, with various interpretations of total monarch numbers).

The goal included a background statement that the Strategy will include a commitment to evaluate and adapt goals and approaches over time, based on monitoring and evaluation of implementation, monarch population response, and new science. The background information included recognition that additional milkweed stems will also be added in the north exterior conservation unit (see Fig. 1.5) through state and partner grassland and other conservation programs that will benefit monarchs in that area. The area described as the north exterior roughly corresponds to the area that Flockhart et al. (2017) estimated may exceed the "corn belt" area for total monarch contributions to the overwintering generation in Mexico, when considered as a whole.

The North Core Habitat Allocation Technical Work Group was formed in early 2017 to explore how individual states within or partially within the North Core Monarch Conservation Unit could consider setting statewide habitat goals based on the regional milkweed goal estimates available in the scientific literature. Previous work of partners in the Midwest region (including the Service, USGS, MAFWA, and state agency personnel) adapted various national land use data with scientific literature and expert opinion on milkweed stem densities in various habitats to develop a "habitat tool" that could calculate potential milkweed stem increases by county. This is a spreadsheet-based tool that uses estimates of existing and amended (improved) milkweed stem density by land use and land cover type.

The tool allows users to modify milkweed stem density as well as the "adoption rate" (the percent of each land cover type that might implement practices) that would result in improved milkweed stem density. The tool allows individual states to engage in scenario planning and to explore with their partners what milkweed stem targets they believe would be feasible in various "sectors" of habitat, such as managed natural lands, urban lands, rights-of-way, and agricultural lands.

The North Core Technical Work Group met in June 2017 to run scenarios at a regional level to better understand potential options for reaching a goal of 1.6 billion additional stems in the North Core conservation unit. A milkweed stem goal of 1.6 billion in the North Core was assumed for scenario planning purposes, based on preliminary information received from the Service at the North American Wildlife Conference in March 2017.

Using the tool, over twenty scenarios were run. This exercise demonstrated the difficulty in achieving 1.6 billion stems in the North Core area, given the amount of high productivity agricultural land use and relative scarcity of natural conservation land and grassland/rangeland acres in this region.

One scenario ("Scenario 20") met the regional goal, but it skewed additional milkweed stems more to the western margins of the "corn belt" where there was a greater amount of lower productivity agricultural land that could potentially be restored to habitat under voluntary programs. Apportionment of stems across states using this method is shown in Table 2.1 as "Allocation tool – Scenario 20." A second method of apportioning milkweed stems across the 17 states, based on the proportion of the North Core acreage present in each state, was also calculated. The stem apportionment resulting from this method is also shown in Table 2.1 as "Proportional land area method." The numbers presented in Table 2.1 are two of many potential planning scenarios and do not represent milkweed stem goals or commitments from the listed states.

Table 2.1 - Examples of two milkweed stem allocation scenarios between states in the North Core habitat conservation unit based on a regional total of 1.6 billion milkweed stems. The "Allocation Tool" method used a land cover-based spreadsheet tool to estimate potential milkweed stem increases whereas the "Proportional Land Area" method simply assigns a percentage of the 1.6 billion total to each state based on the percentage of the North Core geography that it represents. These numbers are for illustrative purposes and do not represent a goal of commitment by states.

State	Additional milkweed stems suggested by Allocation tool "Scenario 20"	Additional milkweed stems suggested by Proportional land area method	Lowest milkweed stem number of the two methods
Illinois	135,049,770	198,400,000	135,049,770
Indiana	121,555,412	132,800,000	121,555,412
Iowa	140,185,076	206,400,000	140,185,076
Kansas	17,319,569	12,800,000	12,800,000
Kentucky	54,424,150	78,400,000	54,424,150
Maryland	1,399,417	3,200,000	1,399,417
Michigan	51,899,198	78,400,000	51,899,198
Minnesota	232,766,863	187,200,000	187,200,000
Missouri	81,355,072	100,800,000	81,355,072
Nebraska	61,728,358	52,800,000	52,800,000
New York	4,511,012	9,600,000	4,511,012
North Dakota	123,209,232	35,200,000	35,200,000
Ohio	95,176,554	152,000,000	95,176,554
Pennsylvania	56,679,694	83,200,000	56,679,694
South Dakota	282,808,912	83,200,000	83,200,000
Wisconsin	119,166,104	137,600,000	119,166,104
West Virginia	23,037,866	48,000,000	23,037,866
TOTALS	**1,602,272,259**	**1,600,000,000**	**1,255,639,325**

The two milkweed stem goal scenarios presented in Table 2.1 are examples of potential options for state-level decision-makers. Even if each state in the North Core conservation unit chose the lower of the two alternatives for their state, the regional total would still come close to 1.3 billion additional milkweed stems (see third column of Table 2.1).

In Fall 2017, state coordinators and monarch leads were provided with the "habitat allocation tool" to facilitate scenario evaluation at a state level. A variety of methods were used by states to develop a milkweed stem goal and assess the feasibility of implementation, and some states have established milkweed-based habitat goals while others are still in the midst of this process with their partners. Milkweed/habitat goals by state are included in the State Summaries section of this document where provided. Some states have already completed state-level monarch/pollinator conservation plans including milkweed stem goals, some state plans are in progress, and some states will build on landscape-based grassland and prairie habitat

conservation plans and leverage their potential for milkweed and habitat enhancement consistent with the goals of this Strategy.

SOUTH CORE HABITAT POTENTIAL AND GOALS

HABITAT POTENTIAL

The following information is primarily summarized from the Monarch Butterfly Conference Report (NRCS and USFWS 2016); updated with more recent information. The South Core region includes portions of Arkansas, Kansas, Missouri, Oklahoma, and Texas. This area provides essential breeding habitat for monarchs arriving from Mexico in the spring. Additionally, it provides essential nectar plants for migrating monarchs in the spring and fall of each year. Recent data (Flockhart et al. 2013) suggest that fall monarch reproduction in the Southern Great Plains may contribute to the wintering population in Mexico at a higher proportion than estimated by Wassenaar and Hobson (1998). Although the contribution of the wintering population with a natal origin in the Southern Great Plains remains in question, data from Flockhart et al. (2013), coupled with data from the Monarch Larva Monitoring Project (Prysby & Oberhauser 2004) and Baum & Sharber (2012) suggests that opportunities to increase fall monarch breeding habitat in the Southern Great Plains may warrant further consideration.

During the fall migration, much of the eastern monarch population funnels through the South Core area (Fig. 1.6). Multi-year monitoring from citizen observational data (Journey North 2015) support that the location and timing of this fall migration funnel is dynamic and partially dependent on prevailing winds and other conditions during the migration. These data demonstrate the essential importance of fall nectar sources in this area to monarchs (NRCS & USFWS 2016).

Milkweed and monarch reproduction habitat.

Development of milkweed for improved reproduction should focus on three primary milkweed species that have been identified as important for the first generation (Best 2015) as well as late-summer breeding monarchs (Flockhart et al. 2017):

- Spider milkweed (*A. asperula*): This species is common to central Texas and is most adapted to shallow calcareous soils common to the Edwards Plateau of central Texas. It also occurs in Oklahoma and Kansas but to a lesser degree. It occurs on grazed lands but also on areas maintained by periodic mowing and shallow soils that are not grazed. It prefers shallow upland soils that are rocky or sandy.
- Zizotes milkweed (*A. oenotheroides*): This species is common in northern Mexico, southern, central and north-central Texas. It also occurs in a few counties in Oklahoma. Zizotes milkweed is well adapted to deep, neutral to moderately alkaline clays and clay loam soils, and occurs on grazed lands as well as on areas maintained by periodic mowing. Introduced grasses (and intensive management for these grasses) common to southern Texas may be contributing to the decline of this milkweed species.
- Green antelope horn (*A. viridis*): This species is common to central Texas, Oklahoma and Kansas, and also occurs in Missouri, Arkansas, and farther East. Many consider this species to be the key species for first generation monarchs, as well as season-long reproduction in the South Core. It commonly occurs on grazed lands and non-agricultural areas periodically mowed, such as roadsides, parks, and urban lands. It is tolerant of a

variety of soils including deep loams and fine sandy loam soils, deep finer texture soils, and shallow, rocky soils.

Each of these species is one to two feet tall and shade intolerant. Where herbicide application is avoided, these species can become abundant in rangelands, pastures, croplands, and native hay meadows. Like all native plant species in the Great Plains, these milkweed species evolved alongside fire-driven grazing by large native ungulates, creating a patchwork of habitat structure and plant species composition within and between landscapes (Fuhlendorf & Engle 2004; Fuhlendorf et al. 2009). Commercial seed propagation and the cultural practices for establishment of these three species are limited. NRCS is currently emphasizing protection and enhancement of existing stands of milkweed rather than planting new stands of milkweed, as well as promoting efforts to increase nectaring species (NRCS & USFWS 2016). However, increasing demand for native, eco-regionally appropriate milkweed and nectar resources has encouraged some commercial propagation and limited resources are available at some locations.

As monarchs move farther north into Kansas and Missouri, other milkweed species (e.g. *A. syriaca)* become important, although *A. viridis* is still the most important species because of its prolonged flowering season and resistance to grazing and herbicide. Additional milkweed species (e.g. *A. latifolia)*, and re-growth or new growth of milkweed species with earlier phenologies (e.g., *A. asperula*, *A. viridis*) may be important for fall monarch reproduction.

Grassland and Nectaring Habitat

The importance of native rangeland and grassland habitat for monarchs in the South Core cannot be overstated. The majority of grassland habitat for monarchs in the Southern Great Plains is found within the Mixed-grass Prairie Region, the Tallgrass Prairie Region, and the Cross Timbers Region (which is analogous to the Cross Timbers and Prairies Section plus portions of the Blackland Prairie Section and the Oak Woods and Prairies Section) (Bailey 1995; NatureServe 2009).

These Southern Great Plains grasslands (mixed-grass and tallgrass prairies and Cross Timbers Region) are important to monarchs, but they also include areas dominated by exotic pasture grasses and are subject to a wide range of grazing practices. Therefore, many grasslands in the region are of poor quality and lack suitable amounts of native foraging or reproductive habitat. Much of the historic rangeland (prairie-grasslands) in the region has been converted to other land uses, such as crop land or introduced pasture. In Oklahoma, nearly 4 million acres of mixed-grass prairie is thought to remain, but this is less than 40 percent of its historic acreage (Oklahoma Comprehensive Wildlife Conservation Strategy 2016), and the Flint Hills of Kansas and Oklahoma contain ~80% of all tallgrass prairie that remains in North America. These prairie-grasslands have been altered by several factors including fire suppression and heavy year-round grazing, which have facilitated invasion by introduced grasses and forbs and native eastern red cedar (*Juniperus virginiana*). For example,

> "Texas grasslands are now few and far between: highly fragmented, compromised in quality, or such tiny patches as to be barely functional habitat at all. Most of Texas's expanses of flat and gently rolling terrain was historically covered in Coastal and Blackland prairies, plateaus and plains, short- mid- and tall grasses, maintained by wildfire and unfenced wide-ranging herbivores. Fewer than five percent of the world's grasslands are well-managed or protected; in Texas, less than 5,000 acres (some estimates

say less than 3,000 acres) of Blackland Prairie remain out of 12 million historic acres - less than one tenth of one percent!" (Texas Conservation Action Plan 2012)

Historically, tallgrass prairies spanned portions of 14 states and nearly 150 million acres ranging from Texas to Canada. This ecosystem comprised a large portion of the eastern monarch's migration and breeding range. Presently, however, the last landscape-level tracts of unbroken tallgrass prairies are restricted primarily to the Flint Hills ecoregion of Oklahoma and Kansas. However, the typical rangeland management practices in the Flint Hills ecoregion select against most of the native forb species that are important monarch nectaring resources during breeding and both migrations. Additionally, these rangeland management practices have increasingly led to fragmented habitat. The primary cause of habitat fragmentation in the Flint Hills is encroachment by eastern red cedar, dogwood, and invasive herbaceous species.

The Cross Timbers Region is a complex mosaic of upland deciduous forest, savanna, and prairie communities that highlight the broad ecotone between the eastern forests and the grasslands of the Great Plains. The Cross Timbers woodlands are dominated by post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*), and the region extends from central Texas, across east-central Oklahoma, and into southeastern Kansas. The pre-settlement Cross Timbers may have covered nearly 20 million acres and consisted largely of low-stature oaks that were not suited for lumber production. It is possible that the Cross Timbers represents the largest single intact ecosystem type remaining in the Southern Great Plains of Texas, Oklahoma and Kansas, impacting the north and south migration of monarch butterflies.

HABITAT GOALS

Habitat for both reproduction and for migration are equally important within the Southern Great Plains. Essential actions to increase monarch reproduction and survival must address degraded or fragmented rangeland habitat. Improving habitat quality to increase nectaring plant species richness and abundance and connectivity, as well as milkweed-dependent monarch reproduction habitat, is critically important.

The South Core Habitat Allocation Technical Work Group (SCHTWG) is currently working to develop habitat goals for this region based on existing vegetation data and expert elicitation. The SCHTWG is collaborating with a small group of partners to develop a non-spatially explicit monarch habitat model for the South Core geography, similar to the "habitat allocation tool" employed in the North Core. This tool will incorporate acreage and milkweed and nectar resource density data for multiple land cover classes across the South Core geography.

As resources and capacity allow, the SCHTWG is also interested in developing a spatially-explicit model that will incorporate similar data. The model will be used initially to identify major gaps in food resources and as a tool to help identify priority areas for conservation efforts. Used in conjunction with spatially-explicit information about land-use change over time, the South Core model may give researchers the capability to estimate nectar and milkweed resource changes over time: an important first step towards defining habitat restoration targets. State agency representatives in the SCHTWG are currently identifying regional experts that will help assign milkweed and nectar resource values once final land-use categories are identified and mapped across the South Core geography. Inputs for the initial, non-spatially explicit model are anticipated by July 2018, with a goal of testing and evaluating an initial model by October 2018.

A final version of the non-spatially explicit model is anticipated in December 2018 with a goal of creating a spatially-explicit model and quantifying changes to monarch habitat quantity and quality in the South Core geography by December 2019.

MANAGEMENT CONSIDERATIONS

Monarchs limit lipid intake during migration and use a "fuel as you go" approach. As they near Mexico, monarchs begin to build lipid reserves needed to overwinter (Brower et al. 2006). NRCS is concentrating on increasing availability and distribution of fall nectaring habitat in the Southern Great Plains (NRCS & USFWS 2016). It is important to note that *Asclepias* species are an excellent source of nectar, both for monarchs and other pollinators. Prescribed burning during summer can increase the availability of milkweed for fall monarch reproduction and nectar during the fall migration (Baum & Sharber 2012), as well as allowing a large community of nectaring forb species to become established on the landscape. Similarly, summer mowing can increase availability of milkweed in the fall (Baum & Mueller 2015).

NRCS identified the highest potential for gains in habitat in the Southern Great Plains region to be on private grazing lands, particularly sites supporting native grass. Implementing rangeland management practices on native rangelands that maximize plant species richness and habitat structure will make the largest impact on improving monarch habitat in the ecosystems and landscapes they evolved with in the Great Plains (NRCS & USFWS 2016). Additionally, conversion from introduced monoculture grass systems to species-rich native grasslands will be a high priority. Most of the CRP contracts in the Southern Great Plains region are in the western portions and are not heavily used by monarchs in most years. For this reason, the potential for CRP in the South-Central area is considered lower than in the Upper Midwest area (NRCS & USFWS 2016).

Because the South Core currently lacks science-based information regarding direct relationships between land-use attributes (e.g. milkweed stem or nectar resource densities) and monarch demographic data (e.g. fecundity and fall migration survivorship), habitat restoration, enhancement, and conservation targets have not been identified. However, this research need has been conveyed to SCHTWG partners engaged in monarch research (e.g. Texas Comptroller of Public Accounts). South Core targets will be determined individually by South Core states, and the SCHTWG will continue to inform state-specific decisions with information from SCHTWG products (e.g. monarch habitat models and land-use change analysis) and partners.

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PART THREE – HABITAT CREATION AND MANAGEMENT

3.1 – INTRODUCTION

Landscape Approach to Habitat Management

Habitat is key to all wildlife populations, including monarchs and pollinators. Habitat conservation at a landscape scale is the primary focus of this Strategy. The only way to accomplish landscape scale conservation is to focus the efforts of broad conservation and land management interests on a common goal and to work in a coordinated and collaborative way towards achieving that goal. For monarch conservation, any conservation or land management efforts that enhance monarch habitat, no matter how small they may be individually, can collectively contribute to the overall goal across the landscape.

As discussed earlier, monarchs require open habitats with a supply of nectar plants, including milkweed, that are most often found in natural rangelands and prairies, planted grasslands, open forest and brushy areas, or other open areas. Monarch habitat occurs in both rural and urban areas, as well as along transportation (e.g. roads/railroads) and energy (transmission/pipeline) corridors, and therefore the potential for protection, enhancement, and addition of monarch habitat is wide-ranging.

The Broad Landscape Challenge

Natural and planted grasslands and rangelands are some of the most diminished and degraded habitats in the Midwest and Great Plains, as reflected by the decline of many grassland and open land dependent species. In addition to declining monarch and native pollinator populations, many species of grassland and open lands birds and some mammals are also in significant decline.

According to the North American Bird Conservation Initiative (NABCI), one-third of all grassland bird species are of special concern due to steeply declining populations and threats to habitat (NABCI 2018). Birds that breed in the Great Plains of Canada and the U.S. and winter in Mexico's Chihuahuan grasslands are experiencing exceptionally steep declines, a nearly 70% loss since 1970, while other temperate grassland birds have declined by 33% in that time (NABCI 2018). Eastern Meadowlark populations fell 89% between 1966 and 2015, according to the North American Breeding Bird Survey (Cornell Lab of Ornithology 2018). More than 95% of the Eastern Meadowlark's distribution is on private lands, meaning farmland conservation practices are essential to the survival of this species (NABCI 2018; Cornell Lab of Ornithology 2018). Similar patterns have been observed for other songbirds, as well as game species including bobwhite quail and ring-necked pheasant.

The parallels of these trends to that of monarchs are striking, which illustrates the need and opportunity for monarch conservation to be part of larger landscape conservation efforts focused on native rangelands and prairies, planted grasslands, and other open lands, with an emphasis on the Midwest and Great Plains states.

Monarchs are symbolic of the declines of many lesser known pollinator and wildlife species dependent on grasslands and open landscapes. Given the monarch's strong public recognition and support, the plight of this species is helping to rally broader public conservation support for grassland landscape conservation and the benefits that would accrue, including benefits to wildlife, pollination services, water quality, and soil protection.

Habitat Management, Restoration, and Enhancement

Habitat restoration, enhancement, and management are the primary conservation activities that state fish and wildlife agencies and other partners involved in this Strategy can engage in to

benefit monarch populations. Every individual and organization within the monarch range can contribute to monarch conservation by creating or enhancing monarch habitat at any scale. There is broad agreement among monarch experts, conservation organizations, and government agencies about the types of conservation actions monarch butterflies require (National Fish & Wildlife Foundation 2016). At its simplest, it means there needs to be a net gain in the quality, quantity, and connectivity of monarch breeding and flyway habitat. Any grassland conservation for monarchs will benefit a wide range of other pollinator and wildlife species that occupy those habitats. Likewise, habitat conservation efforts for other grassland species will benefit monarchs, as long as those efforts include a seasonal milkweed component that monarchs require for reproduction.

Best Management Practices

Many sources of information regarding best management practices (BMPs) for monarch habitat creation and management exist. The actions and strategies suggested in the following sections assume that BMPs relevant to the sector and site should be consulted and followed regarding factors such as site preparation, seed mixes/species composition, habitat management practices, and managing pesticide use and effects. Further, topics that Strategy partners identified as needing more research or outreach information are noted throughout this part where applicable as well as in sections 4 (Outreach and Education) and 5.1 (Research). A list of major BMP documents known at the time of publication is provided in Appendix B.

Sector-Based Approach

Part three of this Strategy divides habitat restoration, enhancement, and management strategies into major land use "sectors." Sectors represent a combination of land use and land ownership factors – as listed below – and are discussed individually to highlight the unique challenges and opportunities in each.

The sectors in this part include:

3.2 – Private lands: agriculture and conservation
3.3 – Protected natural lands (federal, state, tribal, and private organizations)
3.4 – Rights-of-Way (transportation and utility)
3.5 – Other energy infrastructure (mined lands and energy generation sites)
3.6 – Urban and developed lands

The subsections that follow give a sector by sector account of habitat conservation programs and activities that have been developed and are already underway and that could be enhanced with new approaches and supplemented with additional resources.

3.2 – PRIVATE LANDS: AGRICULTURE AND CONSERVATION

The vast majority of land in the Mid-America region is privately owned, and a significant portion of these private lands are in agricultural production. Agricultural lands are vital to the health and economy of the United States, providing food, fuel, and fiber for people across the country and much of the world. These landscapes include farms, orchards, range-lands and pastures, as well as lands currently enrolled in agricultural conservation programs. Lands in agricultural production make up approximately 57.5% of surface area in the lower 48 states and comprise about 46% of the area in the North Core region of the monarch range and 64% of the area in the South Core region of the monarch range (USGS, 2018). Because of the large amount of private agricultural lands in the core breeding and migratory range of eastern monarch butterflies, habitat conservation and enhancement within these landscapes will be essential to reversing the population decline of this species.

In addition to lands in agricultural production, other privately-owned lands addressed in this section include recreational properties and lands managed for conservation purposes that are not in permanent easements. In sum, this section includes privately-owned lands that are not urban (section 3.6), not in transportation or utility rights-of-way (section 3.4), and not permanently protected through easements or land trusts (section 3.3). Because the majority of private lands in the Mid-America region are agricultural, the main focus of this section is on agricultural programs and projects that can benefit monarchs, but many of the programs listed at the end of this section can also apply to private lands not in agricultural production.

Private agricultural landowners and managers understand their properties and where opportunities exist to enhance or create habitat for monarchs. The marginal portions of the agricultural landscape, such as buffer strips, drainage ditches, waterways, fence lines, and hedgerows have huge potential because these areas are woven throughout the landscape. Education and outreach about the need for additional monarch habitat and how to provide it is necessary to inform and encourage landowners and managers to use a portion of their property to help monarchs.

A critical need for some of these landowners is access to technical and financial resources that allow them to effectively and efficiently enhance, restore or create monarch habitat. Some private landowners and managers may require financial assistance to make modifications to their existing operations, while others may only require technical assistance to ensure a successful project. This Strategy supports both financial and technical assistance provided to private landowners via voluntary incentive-based programs.

Some examples of potential projects for private agricultural landowners include: voluntary conversion of less productive croplands to conservation lands; monarch and pollinator habitat enhancements on lands not in production, such as field borders, farm yards, irregularly shaped areas, waterways, and farm roadsides; improved monarch and pollinator habitat within rangelands and pastures through management practices; and enhancement of currently-enrolled agricultural conservation lands to improve monarch habitat.

Landowners and managers can pursue strategies for monarch habitat conservation and enhancement tailored to their specific management goals, needs, and available resources. Technical assistance to interested landowners and managers will ensure that habitat management and creation efforts on agricultural lands provide benefits to landowners and monarch butterflies, while providing added benefits to other wildlife and ecosystem services such as water quality and soil protection.

The following actions by Strategy partners would allow private landowners (primarily agricultural) the flexibility and resources necessary to increase and maintain monarch butterfly habitat on their lands using a variety of voluntary, incentive-based approaches. They apply to state, regional, and national efforts directed at private agricultural, conservation, and recreational landscapes.

1. **COLLABORATION:** Collaborate with agricultural stakeholders and partners to identify and promote monarch conservation on private agricultural lands. All governmental, non-governmental, and private organizations participating in this Strategy will seek to:
   - Identify and network with a diverse array of agricultural partners;
   - Encourage federal, state, and private voluntary incentive-based programs to promote monarch conservation;
   - Increase awareness and adoption of "Precision Agriculture" techniques and technology that can optimize landowner efficiency, wildlife habitat potential, and profitability;
   - Promote and disseminate information that will increase awareness and implementation of BMPs to improve monarch and pollinator conservation on croplands, rangelands and pasturelands;
   - Promote and disseminate information that will increase awareness and implementation of Integrated Pest Management (IPM), crop rotations, cover crops, and other land management practices that can also benefit monarchs and pollinators.

2. **CAPACITY**: Develop additional capacity to help ensure that private agricultural landowners and managers can access necessary information, equipment, funding, and technical assistance for creating and managing monarch and pollinator habitat. All governmental, non-governmental, and private organizations participating in this regional strategy will seek to:
   - Continue to build strong relationships with trusted advisors to the farm and ranching communities and provide information to them to reach a larger audience (e.g. University Agricultural Extension programs, technical service providers);
   - Continue to engage with state farmers organizations, grazing land and livestock organizations, prescribed fire managers, and others to identify opportunities to improve rangeland and pastureland for monarchs and pollinators;
   - Increase availability of technical assistance to landowners;
     - Develop and implement training for a land managers and professionals about existing programs that create, enhance or restore monarch habitat relevant to agricultural lands;
     - Help provide access to and interpretation of the latest biological and agricultural research as it applies to monarch habitat on private lands;
   - Work with the native seed industry to help assure that regionally appropriate seed/plant supply is sufficient for monarch and pollinator habitat restoration projects;
   - Pursue opportunities to increase efficiencies developing monarch habitat on croplands, rangelands and pasturelands through encouragement of natural establishment or enhancement of milkweed and nectar plants through adjustments to existing management practices such as mowing, grazing, or soil disturbance;

- Recruit and train volunteers for monitoring and citizen science opportunities so that principles of adaptive management can be applied in agricultural landscapes (see section 5.2).

3. **FUNDING:** Seek to develop, provide, and promote financial and technical support that will increase the rate and effectiveness of establishing and maintaining monarch and pollinator habitat on private agricultural lands (e.g., cropland, rangeland and pastureland) over the course of this 20-year Strategy. All governmental, non-governmental, and private organizations participating in this regional strategy will seek to:
   - Increase technical support (staff or consultants) for creating, managing, and monitoring monarch habitat on private agricultural lands;
   - Support additional financial or other incentives to increase the number of private agricultural landowners or land managers participating in voluntary and incentive based-programs;
   - Incentivize care and enhancement of diverse native rangelands that still have significant native broadleaf flowering plants and/or dis-incentivize conversion of native grasslands to crops.

4. **OUTREACH:** Improve and expand outreach efforts to agricultural stakeholders and partners to increase awareness of monarch and pollinator population declines and increase participation in voluntary incentive-based conservation programs to establish monarch habitat. All governmental, non-governmental, and private organizations participating in this regional strategy will seek to:
   - Develop and provide information to increase awareness of BMPs related to creating, enhancing or restoring monarch habitat;
   - Develop and provide educational materials about existing voluntary and incentive-based programs that promote monarch habitat for private landowners and partners;
   - Engage youth agricultural organizations (e.g., 4H, Future Farmers of America) to increase their awareness and knowledge about monarch butterflies;
   - Increase outreach to agricultural stakeholders and partners by providing information online and through social media campaigns about the monarch butterfly and available resources;
   - Engage with nongovernmental conservation organizations (e.g. Pheasants Forever/Quail Forever, Ducks Unlimited, National Wild Turkey Federation, National Wildlife Federation) at all levels to promote private land monarch conservation.

5. **SUSTAINABILITY:** Design and implement strategies to sustain monarch habitat outcomes achieved through voluntary and incentive-based conservation programs. All governmental, non-governmental, and private organizations participating in this regional strategy will work on efforts to:
   - Identify and implement opportunities to combine ongoing rental or incentive payments with implementation payments through public – private partnerships and other approaches;

- Work with local and regional organizations to build and maintain positive working relationships with agricultural stakeholders and partners so as to foster a stewardship ethic for long-term maintenance of monarch habitat.

Voluntary and incentive-based programs present good opportunities for creating or enhancing habitat for monarchs and other pollinators on private lands through financial and technical assistance. Below is a brief description of several regional and national private lands conservation programs and how they can contribute to monarch conservation. Also included for many programs is a list of potential policy and programmatic changes that could increase monarch and pollinator conservation. These potential changes are not exhaustive but are offered to stimulate additional thought and consideration by policy and program managers interested in enhancing monarch and pollinator conservation.

Farm Bill Programs (USDA Farm Service Agency)

Conservation Reserve Program (CRP):

The Conservation Reserve Program (CRP) provides technical and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The program provides assistance to farmers and ranchers in complying with Federal, State, and tribal environmental laws, and encourages environmental enhancement. The program is funded through the Commodity Credit Corporation (CCC). The Farm Service Agency (FSA) administers CRP, with NRCS providing technical eligibility determinations, conservation planning, and practice implementation.

The Conservation Reserve Program reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as introduced or native grasses, wildlife plantings, trees, filter strips, or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.
Source:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/?cid=stelprdb1041269

CRP has significant potential to create or enhance monarch butterfly habitat through development of relatively large habitat blocks enrolled in CRP contracts. Establishment, enhancement, and management of regionally appropriate milkweed and nectar plants through these land retirement programs provides opportunities to establish quality habitat for monarchs.

Monarch-friendly opportunities available within CRP:

- There are various programs under the larger umbrella of CRP, and each have unique opportunities for monarch conservation;
- Continuous CRP stresses enrollment in certain practices, such as CP42 Pollinator Habitat or CP38 State Acres For Wildlife Enhancement (SAFE);
    - Pollinator Habitat Initiative (CP42) has been designed to provide habitat for honey bees and native pollinator species. CP42 practices shall typically be

comprised of native plant species and should include a variety of plants that flower at different times throughout the growing seasons;
    - State Acres for Wildlife (SAFE) projects (CP38) commonly target individual wildlife species, including pollinators, as identified by the cooperating state;
    - Although many look to CP42 Pollinator Habitat as the primary CRP practice to increase monarch habitat, many other practices provide habitat for monarchs, including those CRP acres that do not specifically target wildlife;
  - Conservation Reserve Enhancement Program (CREP) targets high-priority conservation concerns identified by a state, and federal funds are supplemented with non-federal funds. Approved CREP programs commonly stress enrollment that enhances wildlife habitat as well as protecting water and soil;
- In 2015, FSA indicated that it would review its CRP practices to identify those practices that already are beneficial to wild pollinators and managed bees, and where additional pollinator plantings can be included;
- Mid-contract management and contract renewal practices that enhance enrolled lands for monarchs and pollinators:
    - This could include adding or enhancing practices leading to expansion of existing milkweed and other nectar producing species. Due to its ability to establish by wind-blown seeds and to spread through underground rhizomes, milkweed commonly occurs on CRP lands, whether planted or not, but can be enhanced through active management such as seeding, inter-seeding, or ground disturbance to facilitate rhizome growth and provide seed germination sites.

Policy options that could improve monarch conservation:

- Increase the national CRP cap to allow additional voluntary enrollment by interested landowners. The current cap is 24 million acres. Peak CRP enrollment was 36.8 million acres in September 2007. As of September 2017, a total of 23.4 million acres were enrolled. Source: USDA-FSA https://www.fsa.usda.gov/programs-and-services/conservation-programs/reports-and-statistics/conservation-reserve-program-statistics/index
- Increase or eliminate the cap on CP-42 Pollinator Habitat. As of October 2017, USDA stopped processing CP-42 applications because the national goal had been met;
- Support an ESA Section 7 consultation and Conference Report between FSA and USFWS, as has been requested by agriculture and conservation interests. A conference report has already been done between NRCS and USFWS (NRCS & USFWS 2016). This would provide regulatory assurances to participants implementing monarch conservation practices under USDA programs;
- Provide cost-share for planting monarch habitat as part of CRP mid-contract management in the same way as the honey bee habitat initiative was established in 2014. Source: https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/FactSheets/2017/crp_honey_bee_habitat_initiative_july2017.pdf

Program options that could improve monarch conservation:

- Provide programmatic options for inter-seeding or inter-planting plugs of beneficial forbs (including milkweeds) during Mid-Contract Management activities;

- States can submit State Acres for Wildlife Enhancement (SAFE) projects that prioritize and benefit monarch and pollinators. For example, Ohio and Wisconsin offer a pollinators and monarch SAFE and North Dakota offers a honey bee and monarch SAFE. As of fiscal year 2017, the national cap on SAFE awards was 2.45 million acres and enrollment was approximately 1.45 million acres;
- Increase rates for forb/milkweed inter-seeding during mid-contract management; require 2 intervals of mid contract management on 15-year contracts (already required in some states);
- Consider an alternative approach to converting introduced grass to native grasses and forbs. Allow landowners to waive site preparation cost share in exchange for a year of cropping to prepare the site. This would be an alternative way to eliminate unwanted cool season grasses and invasive species before planting a new seed mix.

Crop Insurance Options

Crop insurance has long been an important part of the farm safety net, providing a reliable and cost-effective risk management tool. To benefit monarchs and other pollinators, a modification to the crop insurance program could include providing insurance rate discounts to farmers who agree to implement precision farming assessment tools by removing lands from production that are identified to have a high risk of crop loss or are not profitable.

Farm Bill Programs (USDA Natural Resources Conservation Service)

A collaborative landscape level partnership between NRCS and others – including the USFWS – has been established to benefit the monarch butterfly. The primary focus of the partnership is the design and application of selected NRCS conservation practice standards and enhancements to benefit the monarch. These conservation practice standards and enhancements are applied by NRCS when providing technical and financial assistance to eligible landowners using its farm bill authorities. At present, this action area is focused on ten states in two sub-regions: Midwest (IL, IN, IA, MN, MO, OH, WI) and South Central (KS, OK, TX). While limited to the action area at this point, both NRCS and USFWS expect that the use of this approach to facilitate monarch conservation will grow geographically and have designed the proposed action to be scalable and more expansive. For more information, see the Monarch Butterfly Conference Report (NRCS & USFWS 2016).
https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid...ext=pdf

In addition to the core monarch focus mentioned above, several NRCS programs provide habitat benefits for monarchs and other wildlife nationally. These are discussed below.

Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers to plan and implement conservation practices that improve soil, water, plant, animal, air and related natural resources on agricultural land and non-industrial private forestland. EQIP may also help producers meet Federal, State, Tribal, and local environmental regulations.

In addition to the more technical use of EQIP, financial assistance payments can also be used to help producers develop Conservation Activity Plans (CAP) to address specific land use issues. Payments are made on completed practices or activities identified in an EQIP contract

that meet NRCS standards. Payment rates are set each fiscal year and are attached to the EQIP contract when it is approved. Payment rates for each conservation practice can be found at each NRCS State Program's website.
Source: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

Monarch-friendly opportunities available within EQIP:

- NRCS provides support specific to monarch habitat via the Working Lands for Wildlife (WLFW) Monarch Butterfly project. This 10-state effort has provided over $2.7 million to restore and enhance over 24,000 acres for monarchs in 2016 and 2017;
- In addition, projects benefitting monarchs can be implemented outside of the Monarch Butterfly Project area and WLFW with EQIP funds from the "General EQIP Fund Pool."

Policy options that could improve monarch conservation:

- Expand the current monarch WLFW effort to cover the USFWS Northern and Southern Core Monarch Habitat Units;
- Increase EQIP statutory funding mandate for wildlife conservation practices (e.g. from 5% to 10%);
- Require pollinator CAP plans to include consideration of monarch butterflies;
- Modify program policy to allow forgone income payments for more than one year, when cropland is being converted to monarch habitat;
- Modify program policy to provide financial assistance for contracting for implementation of precision farming assessment tools;
- Consider a set-aside program that offers small payments to allow land to go idle.

Program options that could improve monarch conservation:

- Offer extra screening points for monarch projects at the state and local level in targeted geographies;
- Promote opportunities for producers with expired CRP to get assistance on alternative watering systems and fences, which could help keep some acres in grassland rather than being converted to cropland;
- Identify and implement ways of increasing participation in, and sustaining outcomes from EQIP programs benefitting monarchs by leveraging private funding to provide ongoing incentive payments.

Conservation Stewardship Program (CSP)

The Conservation Stewardship Program (CSP) presents a significant shift in how the Natural Resources Conservation Service (NRCS) provides conservation program payments. CSP participants will receive an annual land use payment for operation-level environmental benefits they produce. Under CSP, participants are paid for conservation performance: the higher the operational performance, the higher their payment. CSP is a voluntary conservation program that encourages producers to address resource concerns in a comprehensive manner by:

- Undertaking additional conservation activities; and
- Improving, maintaining, and managing existing conservation activities.

In addition to the per acre conservation payment, financial assistance is provided for implementation of CSP enhancements.

Source:
https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/csp/?cid=nrcs143_008316

Monarch-friendly opportunities available within CSP:

- NRCS provides a CSP enhancement for planting monarch habitat, and another monarch habitat enhancement for implementing prescribed grazing in a manner that will increase milkweeds or wildflowers.

Policy options that could improve monarch conservation:

- Consider a set-aside program that offers payments to allow land to go idle.

Program options that could improve monarch conservation:

- Improve and streamline application process to increase program participation;
- Increase awareness of this program, as it is one of the best options for up-front payment for installing monarch habitat;
- Prioritize implementation of monarch-friendly practices by offering higher ranking points in the core monarch geographies;
- Offer a CSP enhancement for implementation of insecticide drift mitigation actions for cropland fields located immediately adjacent to monarch habitat;
- Allow CSP applicants who just want to establish pollinator habitat to be accepted into the program, without doing additional enhancements.

Regional Conservation Partnership Program (RCPP)

The Regional Conservation Partnership Program (RCPP) encourages partners to join in efforts with producers to increase the restoration and sustainable use of soil, water, wildlife and related natural resources on regional or watershed scales. Through the program, NRCS and its partners help producers install and maintain conservation activities in selected project areas. Partners leverage RCPP funding in project areas and report on the benefits achieved.
Source:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbill/rcpp/?cid=nrcseprd1308280

Monarch-friendly opportunities available within RCPP:

- A monarch RCPP exists to promote monarch habitat development in the Midwest and southern Great Plains. This RCPP targets EQIP as the primary funding source.

Program options that could improve monarch conservation:

- Increase awareness of RCPP with private companies/enterprises to facilitate submission of regional monarch habitat implementation projects.
- Ensure project proposals addressing the habitat needs of monarchs and other pollinators are given priority in project ranking.

Voluntary Public Access and Habitat Incentive Program

The Voluntary Public Access and Habitat Incentive Program (VPA-HIP) is a competitive grants program that helps state and tribal governments increase public access to private lands for

wildlife-dependent recreation, such as hunting, fishing, nature watching or hiking. State and tribal governments may submit proposals for VPA-HIP block grants from NRCS. These governments provide the funds to participating private landowners to initiate new or expand existing public access programs that enhance public access to areas previously unavailable for wildlife-dependent recreation.
Source:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbill/?cid=stelprdb1242739

Monarch-friendly opportunities available within VPA-HIP:

- States and Tribes can submit monarch specific grant proposals to target monarch habitat projects and public access to those projects.

Program options that could improve monarch conservation:

- Update the ranking criteria to include improving habitat for monarchs and pollinators.

Agricultural Conservation Easement Program (ACEP)

The Agricultural Conservation Easement Program (ACEP) provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the Agricultural Land Easements component, NRCS helps American Indian tribes, state and local governments and non-governmental organizations to protect working agricultural lands and limit non-agricultural uses of the land.
Source: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/

Monarch-friendly opportunities available within ACEP:

- NRCS is implementing monarch consideration for all plantings on ACEP projects.

Options that could improve monarch conservation:

- Improve conservation plans associated with easements by including habitat for monarch and pollinators;
- Increase priority for lands that provide habitat for monarchs and pollinators;
- Recommend a general increase in ACEP acres and easements that promote monarch and pollinator habitat.

Agricultural Land Easements

NRCS provides financial assistance to eligible partners for purchasing Agricultural Land Easements that protect the agricultural use and conservation values of eligible land. In the case of working farms, the program helps farmers and ranchers keep their land in agriculture. The program also protects grazing uses and related conservation values by conserving grassland, including rangeland, pastureland and shrubland. Eligible partners include American Indian tribes, state and local governments and non-governmental organizations that have farmland, rangeland or grassland protection programs.

Under the Agricultural Land component, NRCS may contribute up to 50 percent of the fair market value of the agricultural land easement. Where NRCS determines that grasslands of special environmental significance will be protected, NRCS may contribute up to 75 percent of the fair market value of the agricultural land easement.

Monarch-friendly opportunities available within ALE:

- The primary purpose of this program is to reduce the rate of conversion of agricultural lands to urban land. There are opportunities to consider monarch habitat in the planning process.

Options that could improve monarch conservation:

- Ensure successful candidates willing to install or maintain monarch and pollinator habitat rank higher than those not interested.

Wetland Reserve Easements

In the 2014 Farm Bill, the Wetlands Reserve Program was replaced with the Wetlands Reserve Easements (WRE) program. The WRE program enrolls land under an easement to restore, protect and enhance enrolled wetlands. NRCS also provides technical and financial assistance directly to private landowners and Indian tribes to restore, protect, and enhance wetlands. For wetland reserve easements, NRCS pays all costs associated with recording the easement in the local land records office, including recording fees, charges for abstracts, survey and appraisal fees, and title insurance.

Source: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/

Monarch-friendly opportunities available within WRE:

- Helps fund 10-state Monarch Habitat Development Project.

Options that could improve monarch conservation:

- NRCS holds easements under the WRP program. In the past, WRP funds were used to conduct habitat maintenance and enhance existing habitat on these easements. Those opportunities are now lost, as WRE funds can only be used on WRE easements, and not WRP easements. Allow the use of WRE funds on existing Wetland Reserve Program (WRP easements), to enhance grasslands habitats for monarch butterflies;
- Ensure successful candidates willing to install monarch and pollinator habitat rank higher than those not interested;
- Allow harvest of milkweed seed for resale.

U.S. Fish and Wildlife Service Programs

The United States Fish and Wildlife Service has dedicated significant resources to monarch conservation (https://www.fws.gov/savethemonarch/). In addition to ESA species work related to monarchs, the Service participates in many programs to benefit conservation efforts.

Partners for Fish and Wildlife Program

The Partners for Fish and Wildlife (PFW) Program is a voluntary, citizen, and community-based stewardship program for fish and wildlife conservation on private land. The PFW Program provides technical and financial assistance to private landowners who work in partnership with Service biologists to implement local conservation strategies in targeted geographic areas. In addition to improving fish and wildlife habitat, these restored areas provide

other valuable benefits, including clean air and water, supporting tourism and recreation, protecting communities from flood damage, and supporting America's agricultural production by conserving soil, controlling pests, and benefitting other pollinators and declining migratory bird populations.

The PFW Program staff has evolved into a highly strategic group with a focus on helping private landowners achieve their conservation goals while simultaneously helping to sustain healthy wildlife populations and rural communities with one-on-one customer service. Its voluntary and partnership-based approach has built trust and credibility across the United States and allowed it to be the premier habitat restoration and enhancement program in the Service. Over the past 30 years, the PFW Program has worked with more than 48,000 landowners and 5,000 partners on more than 50,000 projects restoring and enhancing 4 million acres of uplands, 1.5 million acres of wetlands, and 12,000 miles of stream habitat. Since 2015, the PFW Program has restored and enhanced more than 70,000 acres annually for monarchs and other pollinators.

Wildlife management projects can fit well with most farming and ranching operations and are custom designed specifically for the project site. Technical assistance and financial incentives are available from the FWS to landowners interested in improving the status of wildlife and important habitat on their property.
Source: https://www.fws.gov/partners/

Monarch-friendly opportunities available within the Partners Program:

- As part of the Service's monarch conservation efforts, the Partners Program is in the third year of a 5-year effort to focus financial and technical resources specifically on implementation of monarch restoration and enhancement projects;
- Habitat restoration plans are designed and adapted specifically for each site and site conditions, capitalizing on establishing a highly diverse mix of native forbs and grasses, including milkweeds in upland, wetland, and riparian sites and unproductive sites on farms and ranches;
- Participation in the Partners Program to benefit monarchs and pollinators simply requires contacting a biologist from a PFW Program Office
- The PFW Program provides specific habitat management guidance for each site pertaining to mowing regimes, grazing, herbicide application and habitat management techniques to optimize monarch habitat and also in consideration of other pollinators and grassland dependent wildlife. The only requirement is a landowner agreement to maintain the habitat for no less than 10 years during which time the PFW Program biologist will be available to provide advice and guidance.

Options that could improve monarch conservation:

- Continue to identify monarch habitat restoration and enhancement as a priority of the program.

Coastal Program

The Coastal Program is one of the U.S. Fish and Wildlife Service's most effective resources for restoring and protecting fish and wildlife habitat on public and privately-owned

lands. The Program plays an important role in promoting the Service's mission and priorities by implementing strategic habitat conservation. The Coastal Program operates in 24 priority coastal areas, along the Atlantic and Pacific Oceans, Gulf of Mexico, Great Lakes, and in the Caribbean. Working with partners, locally-based staff provides technical assistance for habitat conservation design and planning, and financial assistance for habitat restoration and protection projects. Source: https://www.fws.gov/coastal/

Monarch-friendly opportunities available within the Coastal Program:

- As part of the Service's monarch conservation efforts, the Coastal Program continues to seek opportunities to benefit monarchs and other pollinators in project implementation.

State and Local Programs

Many state fish and wildlife agencies, soil and water conservation districts, and other local agencies have technical assistance and/or cost-share programs for enhancing wildlife habitat, including pollinator habitat, on private lands. See specific state monarch and pollinator plans or agency websites for more information.

National Fish and Wildlife Foundation

Through its monarch butterfly conservation fund and more recently monarch butterfly and pollinators conservation fund, the National Fish and Wildlife Foundation (NFWF) provides grants for monarch conservation on private and public lands.

NFWF was established as a nonprofit by Congress in 1984 to support the U.S. Fish and Wildlife Service (FWS) mission to conserve fish, wildlife, and plant species. Since then, NFWF and FWS have worked together to foster innovative partnerships with corporations, foundations, other federal agencies and non-profit organizations to generate new resources for conservation.

Monarch Butterfly Conservation Fund

In 2015, NFWF established the Monarch Butterfly Conservation Fund to protect, conserve and increase habitat for the monarch butterfly and other pollinators. The program is a public-private partnership administered by NFWF with funding and other support from the Monsanto Company, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Bureau of Land Management and USDA's Natural Resources Conservation Service. The Monarch Butterfly Conservation Fund invests in projects that: 1) improve the availability of high-quality habitat and 2) increase the capacity needed to expand conservation efforts into the future.

Monarch Butterfly and Pollinators Conservation Fund

In 2018, NFWF expanded the fund to the Monarch Butterfly and Pollinators Conservation Fund and is soliciting proposals in 2018 that will advance conservation of the monarch butterfly and other at-risk native insect pollinators. Most funding will support projects that benefit monarch butterfly, but projects that address demonstrated needs for other federally listed or candidate insect pollinator species are also eligible. Grants will be awarded in two primary categories: 1) habitat improvement; and 2) outreach and organization coordination. Priority will be given to projects within the monarch butterfly eastern population migratory flyway, which includes the 16 states of Arkansas, Illinois, Indiana, Iowa, Kansas, Michigan,

Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, Ohio, Pennsylvania, South Dakota, Texas, and Wisconsin.

Habitat projects will support on-the-ground work to increase the quality, quantity, and connectivity of habitat for monarch butterfly and other native insect pollinators. Funding will primarily support the following two strategies relevant to the eastern monarch population: 1) Restore and enhance habitat, with an emphasis on regionally appropriate milkweed and a diversity of nectar plants; and 2) Increase native seed and seedling supply, with an emphasis on improving the sustainability and affordability of regionally appropriate, local ecotypes. Restoration work for eastern monarchs will be focused on the following lands:

- Federal, state, and tribal lands;
- Right-of-way: rail, transmission/pipeline, and roadside; and
- Agricultural lands: buffers, rangeland and pastureland, roadsides, field edges, including land enrolled in Farm Bill programs.

To date, NFWF monarch butterfly conservation fund grants have resulted in 70 projects funded; 127,000 acres restored or enhanced on public and private lands; 13,200 pounds of native milkweed and other forb seed collected; 730 workshops or meetings hosted; and 730,000 native milkweed and other forb species propagated.
Source: http://www.nfwf.org/monarch/Pages/home.aspx

NGO and Non-Profit Programs for Private Lands

Monarch Joint Venture

Since 2009, the Monarch Joint Venture (MJV) has brought together over 70 partners from across the United States in a unified effort to conserve the monarch migration. This diverse partnership ranges from government agencies to NGOs, businesses, and academic institutions that work together to implement science-based conservation actions in the form of education, habitat, and research. These actions are organized in an annually updated Monarch Conservation Implementation Plan, which serves as a framework to guide conservation planning for individuals, partners, or other interested stakeholders nationally.

As a leader in monarch conservation, the MJV supports monarch conservation planning and implementation efforts on a broad scale by facilitating information sharing, partnership building, and carrying out identified conservation priorities. MJV facilitates multiple working groups that focus on things like communications, agriculture, and monitoring. Additionally, The MJV funds partners to carry out priority actions identified in the Implementation Plan. Beyond this, MJV provides key and accessible information on monarchs and their conservation to various sectors and the public.

To reach our nation's ambitious monarch and habitat targets, commitment from a diverse set of stakeholders is required. The MJV works to recruit, educate, engage, and inspire to action a broad spectrum of individuals and entities, both partner and non-partner.

Source: https://monarchjointventure.org/about-us/what-we-do/

Pheasants/Quail Forever

Pheasants Forever is dedicated to the conservation of pheasants, quail and other wildlife through habitat improvements, public awareness, education, and land management policies and programs.

Monarch-friendly practices available within Pheasants/Quail Forever:

- Pollinator Seed Program - In the last five years, PF/QF has developed seed mixes that have included milkweed for 11,294 projects across the Midwest. Of those projects, PF/QF has impacted 134,550 acres and has planted 597.7 million milkweed seeds.
- Youth Pollinator Habitat Program – Since 2014, PF/QF has established 275 projects on 546 acres. In addition, the program has educated 24,851 individuals who have participated in the program. The program offers small grants to the organization's 700 volunteer chapters to work with community groups to plant small pollinator habitat projects.
- State Pollinator Habitat Programs – Pheasants Forever & Quail Forever has worked with state partners to develop the following pollinator specific habitat programs: Corners For Wildlife (NE), Habitat Share (NE, OH), Roadside Pollinator Habitat Programs (IL, OH), Ameren Energy Pollinator Partnership (IL), Saline Soils Initiative (SD), Prairie Partners (IA).

Source: *https://www.pheasantsforever.org/*

Bee and Butterfly Habitat Fund

The Bee & Butterfly Habitat Fund is establishing high quality pollinator habitat to ensure honey bee and monarch butterfly populations thrive. The Bee and Butterfly Habitat Fund is working with landowners, conservationists, scientists and beekeepers to build healthy and sustainable pollinator habitat with maximum benefits. Their solution precisely targets pollinators' needs by engineering projects that provide appropriate bloom diversity, density and duration to optimize forage potential.

Monarch-friendly benefits available from the Bee and Butterfly Habitat Fund:

- The '*Seed A Legacy*' program will be available in 11 states (IA, IL, IN, KS, MN, MO, NE, ND, NE, OH, SD) beginning in February 2018. The program will allow for the enrollment of private, public and corporately owned lands into the program. The program will provide high quality pollinator seeding mixtures free of charge. Projects will enroll 50% of the acres to a monarch butterfly seeding mixture and 50% of the acres to a honey bee seeding mixture which increases the success of both mixtures. Applications are ranked for acceptance and agree to maintain the habitat for a 5-year period. Applications can be reviewed and completed at www.BeeAndButterflyFund.org.
- The fund provides access to high quality pollinator seed mixes at discounted pricing. BBHF endorsed seed mixtures are all designed using updated technology to ensure higher pollinator benefits that are cost-effective and designed to establish quickly with reduced weed competition.

Source: http://beeandbutterflyfund.org/

Monarch Habitat Exchange (Environmental Defense Fund)

The Monarch Butterfly Habitat Exchange (Exchange) is a relatively new type of habitat market through which farmers and ranchers can sell quantified conservation outcomes in the form of functional acres of monarch habitat to buyers such as private industry, philanthropic foundations and citizens wishing to increase the effectiveness and accountability of their investments in monarch recovery. These same buyers can also provide start-up funding to assist farmers and ranchers in generating functional acres of monarch habitat. Functional acres are determined through application of a Monarch Habitat Quantification Tool (HQT) and represent the quality (or functionality), as well as the quantity of monarch habitat, which allows payments to farmers and ranchers participating in the Exchange to be focused as much or more on outcomes as on practices. This approach fosters creativity and innovation, and also provides a strong incentive to farmers and ranchers to achieve and sustain high quality habitat.

The Monarch HQT was developed in collaboration with the Monarch Lab at the University of Minnesota, Monarch Joint Venture and Environmental Incentives, LLC, and will be available at www.monarchhabitatexchange.org in early February 2018. It is closely aligned with the habitat protocol developed by the Monarch Conservation Science Partnership so as to facilitate rigorous and consistent accounting of monarch habitat benefits at all scales – from individual sites to regions to the nation as a whole. Having the ability to measure and report improvements in habitat quality (not just quantity of acres) is vital to increasing private funding, and provides a more rigorous accounting of benefits achieved for each investment.

In addition to greater accountability of outcomes, the Exchange is actively incorporating lessons from human-centered design. Incorporating agricultural landowner needs and preferences and reducing barriers to participation are vital to achieving conservation outcomes; building and maintaining relationships that foster farmer and rancher stewardship values are critical to sustaining those outcomes.

Pilot projects are currently underway on ranches and farms in Missouri, Texas and California and these projects are expected to result in over 3,000 functional acres of habitat for the monarch. Details on how the Exchange operates and how farmers, ranchers and investors can participate will be available online at www.monarchhabitatexchange.org beginning in February 2018.

Source: https://www.edf.org/ecosystems/habitat-exchanges-how-do-they-work

Ducks Unlimited Conservation Easements

DU's conservation easements can meet the needs of interested owners of working farms, ranches, timberlands, sporting properties and recreational lands, who wish to protect valuable natural resources while retaining ownership of the property. A perpetual conservation easement allows a landowner to protect key natural habitats of a property while continuing to use the area for economic gain or recreation.

A conservation easement is a legal agreement that a land owner makes to restrict the type and amount of development that may take place on his or her property. The easement document is tailored to meet the needs and interests of the landowner. DU believes that most lands can benefit wildlife and still produce an economic return to its owner.

DU's program accepts easements in perpetuity through its affiliate Wetlands America Trust, as well as accompanying donations to cover associated costs such as the annual

monitoring effort. DU agrees to monitor the property on a yearly basis to ensure the protection of its natural resources for years to come. Such protection will ensure that large acreages of wetlands, riparian habitats and important uplands will be preserved for the benefit of waterfowl, other wildlife and the enjoyment of future generations. This partnership between the landowner and DU also may result in the reduction of current income and estate taxes.

Source: http://www.ducks.org/conservation/land-protection/ducks-unlimiteds-conservation-easement-program

National Wild Turkey Federation

The National Wild Turkey Federation (NWTF) is a 501C3 organization that is dedicated to the conservation of the wild turkey and the preservation of our hunting heritage. NWTF has 225,000 members nationally and has nearly 700 local chapters and 13 states that participate with their super fund program. The Midwest contains the most chapters, the most members, and raises the most money to help protect the habitat of wild turkey and other forest/grassland dependent species.

Funding for the super fund is secured when each local chapter hosts an annual fundraiser in their respective communities and the proceeds from these local events go into a state specific account at NWTF national headquarters in Edgefield SC. Most states have an official super fund request for proposals (RFP) process that is annually or biannually announced to partners and posted on state websites. Each state has a 15 to 18 member elected volunteer state board that serves as the super fund committee and rank the project proposals received. NWTF staff and State Agency Technical Committee Representative(s) also rank the projects but only serve in an advisory capacity and do not vote on which projects receive funding.

There is an average of around $590,000 available annually for habitat projects from the super fund accounts in the 13 member states. NWTF strives for a minimum 3:1 match rate to magnify the NWTF's influence on habitat improvement projects within the Midwest which create a minimum of 1.7 million dollars annually. Many habitat projects are forestry related; including glade and savannah work, but NWTF does assist in many grassland projects, equipment purchases and any projects will be considered that can improve habitat in local communities and engage new hunters.

Since each state functions differently regarding how and when superfund dollars are allocated from their respective accounts, the best avenue to access individual state specific super fund granting programs is to contact the State District Biologist at the following link:
Source: http://www.nwtf.org/about/nation

Corporate/Industry Programs

Monsanto

Monsanto's biodiversity program protects species and promotes sustainable landscapes. Monsanto has established 72 habitats for monarch butterflies and other pollinators at company sites across America. The number of those sites certified by the Wildlife Habitat Council doubled from 15 to 31 in the past year.

In addition to the work Monsanto is doing on its own sites, they're providing funding to support several initiatives that help to boost monarch habitat, honeybee health, reforestation, seed collection, and preservation. Monsanto is the primary corporate funder of the National Fish

and Wildlife Foundation's Monarch Butterfly Conservation Fund. One result of the Fish and Wildlife Foundation's projects includes creating 16,000 acres of new pollinator habitat in 2016. Pheasants Forever also worked with Monsanto to help develop new pollinator sites across the Midwest.

Source: http://www.beeculture.com/catch-buzz-monsanto-surpasses-pollinator-habitat-goal/

Bayer

The Feed a Bee 50-state forage initiative, sponsored by the Bayer Bee Care Program, launched in 2017 as a way to join with the increasing number of individuals and organizations also looking to do their part to support pollinator health and add to the 3 billion wildflower seeds already distributed across the country by Feed a Bee. Organizations working to plant forage can apply for grants through Bayer's Feed a Bee program to help offset costs of the project. Organizations that can apply for funding include nonprofits, fish and wildlife services, community groups, master gardeners, beekeepers and more!

Source: https://beehealth.bayer.us/home

BASF Living Acres Program

BASF Corporation introduced their Living Acres program in 2015. The program is a research initiative focused on improving monarch butterfly habitats in high-production agriculture. The research initiative, which started at the BASF Research Farm in Holly Springs, North Carolina works to help farmers and other land owners increase biodiversity and develop best practices for establishing and maintaining milkweed plants in non-cropland areas.

Source: https://www.basf.com/us/en/company/news-and-media/news-releases/2015/11/P-US-15-112.html

Honey Bee Health Coalition

The Honey Bee Health Coalition (HBHC) was formed to bring together beekeepers, growers, researchers, government agencies, agribusinesses, conservation groups, manufacturers, and consumer brands to improve the health of honey bees in general and specifically around production agriculture. HBHC is taking collaborative action to improve honey bee health by addressing multiple factors influencing bee health, including hive pests and disease, forage and nutrition, and exposure to crop pesticides.

Source: https://honeybeehealthcoalition.org/about-the-coalition/

Keystone Monarch Collaborative

The Monarch Collaborative is working to identify how partnerships in the farming and ranching community can support and enhance habitat for a sustainable monarch population. The Monarch Collaborative consists of national organizations representing farmers, ranchers, and land owners; businesses working along the agricultural supply chain; researchers and academic institutions; federal and state entities; and conservation organizations. Because farmers and ranchers are stewards of the land across much of monarch habitat, they are in a unique position to support sustainable monarch populations.

The Monarch Collaborative supports productive agriculture and livestock operations in concert with monarch conservation. An increase in milkweed and nectar plants appropriately placed in rural areas can benefit monarchs without inhibiting production. The Monarch Collaborative is committed to make progress through voluntary efforts to restore, enhance, and protect monarch habitat while maintaining producers' flexibility in their operations.

The Collaborative is utilizing the expertise and experience of its members to:

• Identify agricultural and conservation practices to support healthy monarch populations.

• Increase awareness of those strategies with the agricultural community and other interested parties.

• Promote the implementation of practices that will support monarch butterfly populations in agricultural landscapes.

Source: https://www.keystone.org/our-work/agriculture/monarch-collaborative/

Other Options – Not Specific to One Program or Group

- Increase opportunities to manage and conserve monarchs and pollinators on working rangelands and pasturelands;
- Consider identifying and managing odd areas of the farm for monarch and pollinator habitat within agricultural lands (e.g., precision agriculture);
- Increase milkweed and wildflowers in perennial gardens and consider cover crops in annual gardens;
- Implement monarch and pollinator friendly practices in areas not in production (e.g., roadsides, farm yards, ditch banks, edges of ponds and odd areas)
    - Seed areas to native habitat beneficial to monarchs where practical;
    - Reduce mowing or modify time of mowing to benefit milkweed and other native wildflowers;
    - Plant nectar-rich species (including flowering trees and shrubs) along riparian corridors and hedge rows;
- Manage moist soil wetland units to encourage swamp milkweed and other wildflowers to benefit monarchs and many species of migrating waterfowl;
- Manage overgrown brushlands, hedgerows, and woodlots to set back succession and encourage a diversity of wildflowers;
- Increase communication between policy-makers and seed producers to ensure availability of wildflower and milkweed seeds and plugs;
- Promote the use of appropriate BMPs to protect and buffer established or enhanced monarch habitat from influences of pesticides;
- BMPs relevant to the sector and site should be consulted and followed regarding factors such as site preparation, seed mixes/species composition, habitat management practices, and managing pesticide use and effects.

Next Steps for Private Lands Partners

- Convene partners to discuss current efforts and what are realistic conservation targets on private agricultural lands; what is working and not working; what are barriers to

achieving conservation targets; what are strategies to address them over the short and long term;

- Remain engaged in Farm Bill discussions and other opportunities to enhance landowner access to technical assistance, cost-share, seed supply, or other factors that may be limiting participation in voluntary monarch conservation efforts on private agricultural lands;
- Facilitate communication and consistent information sharing about programs, technical assistance, BMPS, etc. among agricultural partners and states engaged in monarch conservation, such as NRCS, FSA, Keystone Monarch Collaborative, Farmers for Monarchs, Monsanto, and others identified in this section;
- Build networks or partnerships that will aid in tracking monarch habitat accomplishments and progress towards habitat goals on private and agricultural lands, including better data on milkweed baseline conditions and response. Include communication between U.S. Fish & Wildlife Service, NRCS, FSA, state agencies, and the Integrated Monarch Monitoring Program (IMMP; see section 5.2).

3.3 – PROTECTED NATURAL LANDS

Millions of acres of natural lands are owned and administered by public entities throughout the eastern portion of the monarch butterfly range. For example, in the 16-state region covered by this Strategy, the state fish and wildlife or natural resource agencies and federal agencies own 4,707,643 and 2,863,491 acres in the North Core region and 3,336,642 acres and 6,577,856 acres in the South Core region, respectively (Table 3.1). In addition, the state fish and wildlife agencies and federal agencies in the 16-state area also own 12,661,583 acres and 16,479,964 acres outside the monarch's north and south core, respectively. Not all of this land is suitable for monarchs, but these acres present an opportunity for effective implementation and adoption of monarch and pollinator management actions.

To reach the goal of additional milkweed stems to be added to the landscape for restoring the eastern monarch population, it will require more conservation lands to be restored, enhanced and maintained for the benefit of monarchs and pollinators. Specifically, conservation lands should make strategic and concerted efforts to promote presence of milkweed species as well as diverse nectar resource availability while monarchs are present. Strategies for achieving high-quality monarch habitat on conservation lands will vary by geographic region and existing habitat characteristics of the site, but in general these strategies will include: planting a high-diversity forb and grass mixture that includes native milkweed species; inter-seeding milkweeds into existing grassland or open habitats; and engaging in management practices that encourage milkweed and nectar plant presence and maintain those plants on the landscape at appropriate times.

The remainder of this section is divided in four main sections: federal, state, private, and tribal lands. The major players for each of these groups of conservation lands are identified, as well as the strategies these organizations can pursue and what their contribution would be to monarch habitat conservation goals.

Table 2.1 - Acreage of land owned by State fish and wildlife agencies and Federal agencies in the sixteen-state area covered by the Strategy.

State	State Land (acres)			Federal Land (acres)		
	Inside North Core	Inside South Core	Outside North and South Core	Inside North Core	Inside South Core	Outside North and South Core
Arkansas	0	149,180	209,640	0	3,741,870	401,519
Illinois	393,444	53,821	0	274,112	250,973	0
Indiana	455,097	0	0	511,137	0	0
Iowa	418,841	0	0	284,519	0	0
Kansas	4,287	297,693	0	0	120,694	152,293
Kentucky	165,303	0	168,266	491,455	0	613,528
Michigan	602,985	0	4,319,828	132,441	0	2,946,316
Minnesota	1,120,000	0	4,690,000	470,000	0	3,380,000
Missouri	333,725	796,867	41,325	69,371	1,505,898	12,003
Nebraska	67,718	0	201,540	23,540	0	579,141
North Dakota	31,727	0	921,039	124,313	0	2,031,993
Ohio	135,000	0	0	365,000	0	0
Oklahoma	0	1,419,557	27,019	0	321,000	38,772
South Dakota	124,932	0	281,221	117,603	0	2,776,860
Texas	0	553,732	857,845	0	637,421	2,115,994
Wisconsin	854,584	0	970,879	427, 232	0	1,431,545
Total	**4,707,643**	**3,336,642**	**12,661,583**	**2,863,491**	**6,577,856**	**16,479,964**

3.3.1 – Federal Conservation Lands

Federal agency monarch conservation efforts (e.g. conservation plans, programs with metrics) will be captured in a standardized database being developed by the Service to inform the ESA listing decision for the monarch butterfly. Broader information about current monarch/pollinator habitat efforts and how they relate to the Mid-America Monarch Conservation Strategy are captured below:

U.S. Fish & Wildlife Service

The USFWS is engaged in a breadth of monarch conservation activities to strategically increase the amount of native milkweeds, nectar plants, and suitable overwintering habitat on the landscape to support the monarch butterfly life cycle. The National Wildlife Refuge System (NWRS) continues to identify and implement opportunities to create, restore, and enhance monarch habitat on USFWS-owned and managed lands (National Wildlife Refuges, Waterfowl Production Areas, conservation easements). Habitat will be restored, enhanced, and maintained for monarchs and other pollinators using existing programs and incorporating best management practices. On USFWS-owned and managed lands, best management practices (BMPs) and guidance for incorporating pollinator conservation will be developed and implemented for grassland and rangeland systems, and riparian areas in the West. New acquisitions will include restoration using seed mixes with a high diversity of nectar plants and milkweed species. The Service will create or expand partnerships for monarch and pollinator conservation with federal land management agencies such as U.S. Forest Service, Bureau of Land Management, National Park Service, Army Corps of Engineers, and Department of Defense, as well as non-federal public land management agencies, such as cities, counties and State parks.

The Service works with private landowners through the Partners for Fish and Wildlife (PFW) program. PFW provides financial and technical assistance for habitat restoration and enhancement on private lands focusing on priority areas for monarch conservation. See section 3.2 for more information regarding this program.

U.S. Forest Service

The Forest Service in both the Eastern and Southern Regions has been actively contributing to creating and improving monarch and pollinator habitat within the northern and southern core conservation units through restoring ecosystem function, composition and structure to promote native plant diversity. Specific agency actions include but are not limited to: overstory thinning (increasing understory irradiance, and subsequent diversity and nectar sources for 3-5 years); prescribed burning and mechanical treatments to reduce woody components in mid-stories and understories thereby increasing ground flora diversity; native seed production; seeding/planting areas with native forbs and grasses; employing roadside maintenance/management best management practices to maintain/increase nectar sources for pollinators; early successional habitat management (mowing, grazing); invasive species treatments; installation and maintenance of pollinator gardens; and public education and outreach.

The Forest Service is committed to implementing the Federal Strategy to Promote the Health of Honey Bees and Other Pollinators (Pollinator Health Task Force 2015). The Forest Service has committed to improving or maintaining 300,000 acres of pollinator habitat annually across all National Forest lands, and has done so in fiscal years 2015-17.

The Forest Service has received direction by Chief Tony Tooke to increase the pace and scale of ecosystem restoration on National Forests and Grasslands, which will continue to provide additional habitat for monarchs and pollinators in general. Forest Plans are currently being revised that will reflect this direction.

The agency is also looking for opportunities to increase native seed production regionally for greater use on Forest Service lands and also to build capacity for our partners. USFS has partnered with NRCS, The Nature Conservancy, and Chicago Botanical Garden (Seeds for Success program) to develop a variety of opportunities to create genetically appropriate seed sources for milkweed and other nectar plants. In addition, Forest Service National Seed Lab, seed orchards, and nurseries are all involved in this effort (e.g., Ouachita National Forest Seed Orchard and Warren Fields in Arkansas, Oconto River Seed Orchard in Wisconsin, Toumey Nursery in Michigan). Contracts with seed producers allow USFS to more efficiently collect and produce seed at an increased scale.

Furthermore, data for pollinator enhancement work has been collected for over 10 years. Given more time, the Forest Service can further extrapolate from the past data and develop more specific acreage numbers for NFS pollinator habitat improvement work on the ground.

Department of Defense (DoD)

Pollinators Are Important to DoD's Mission

The U.S. Department of Defense (DoD) owns and manages 25 million acres of land that provide habitat for many native plant communities and pollinator species, including monarch butterflies. Through the Integrated Natural Resources Management Plan (INRMP) process, DoD creates, enhances, and maintains diverse natural plant communities as integral parts of the training landscape. Native plants not only make up the realistic testing and training landscape on which warfighters depend, positively contributing to troop readiness, but they are resilient to impacts from DoD activities and other stresses such as drought and invasive species.

DoD-funded Pollinator Projects

At the installation level, DoD is funding several projects to proactively conserve and protect monarchs and other key pollinators and their habitats. For example, Fort Hood, TX has implemented a monarch management plan that tagged more than 1,000 monarch butterflies in 2017 and documented their overall fitness and health. This is part of their effort to minimize future military operational impacts in the event the monarch becomes an ESA-listed species. Through the National Military Fish and Wildlife Association, DoD maintains a chartered pollinator protection working group with 150 members on an active listserv.

DoD Legacy Resource Management Program (Legacy)

Through Legacy, which funds high priority natural and cultural resource management projects, DoD has competitively awarded a number of monarch and general pollinator projects. Recently, Legacy funded a wide-ranging project to monitor monarch populations across six DoD installations west of the Rocky Mountains. The resulting information will be used to implement installation INMRPs.

Since FY2000, Legacy has also funded pollinator projects through its participation in National Public Lands Day (NPLD), which is the nation's largest single-day volunteer effort for public lands. On military installations, volunteers have helped complete 35 monarch and

pollinator related projects, including public and interpretive gardens featuring milkweed and other monarch-preferred plants that promote pollinator protection and awareness. A list of projects and other DoD pollinator resources can be found at http://www.dodpollinators.org.

Strategic Environmental Research and Development Program (SERDP)

Through SERDP, which funds basic and applied research, DoD awarded Tufts University funding to examine three butterfly species: the monarch, Baltimore checkerspot, and Puget blue. The project will develop a source-sink model on military lands. Results will be incorporated into installation INRMPs to improve population viability and lower management costs.

DoD's Future Plans for Monarch Habitat

DoD will continue conserving natural resources to sustain the landscape and the species that reside on it, including for monarch butterflies and the plants on which they depend. Outcomes from Legacy and SERDP funded projects will be made available so all partners may benefit from those results.

Army Corps of Engineers

The US Army Corps of Engineers is actively incorporating conservation practices for pollinator habitat improvement on the 12 million acres of lands and waters at resource development projects across the country. Specifically, the Corps is working with others to promote education, awareness, and implement management practices that provide for improved butterfly, bee, and pollinator populations and habitat.

The Corps has and will continue to seek opportunities for habitat improvements specific to monarch butterflies. In coordination with partners, the Corps has begun and continues to implement habitat improvement projects in recognized zones of importance for the monarch butterfly such as the I-35 corridor. The Corps of Engineers has over 1 million acres at 45 water resource development projects that are within 50 miles of the I-35 corridor and has prioritized programs that seek to implement improvements and conservation practices for the species. During 2017, nearly 1,200 acres were managed specifically for monarch butterflies.

In addition to butterfly specific conservation, the Corps supports the utilization of best management practices to include thinning and understory shrub control, removing invasive species to improve pollinator habitat, promote native plant communities along forest roads for pollinators, seeding native forb species in restoration, rehabilitation, and revegetation efforts. During 2017, nearly 25,000 acres were managed or maintained for pollinator specific habitat while over 3,000 acres were restored as pollinator habitat.

3.3.2 – State Conservation Lands

The state fish and wildlife agencies contributing to this plan own and manage lands for the protection of natural and cultural resources, the sustainable use or harvest of resources, and/or for the recreational use by the public they serve. The states can make significant contributions to monarch conservation since they own and manage 4,707,643 acres in the north core and 3,336,642 acres in the south core (Table 2.1). However, the governance structure within each state varies, so the agencies responsible for managing natural resource and recreation lands will be different for each state. For example, in some states, state recreation areas and habitat areas for fish and wildlife are owned and managed by different agencies.

The types of habitat in each contributing state agencies' ownership varies and includes a mix of forest, grassland, wetland, open water, and agriculture. The portions of these lands that include existing grasslands and open forest provide the most desirable habitat for the monarch butterfly. Efforts are underway at the state level to more accurately identify and define the types of habitat in state ownership, and therefore the potential for enhancing monarch habitat. Additionally, states have or will develop strategies for improving or increasing monarch and pollinator habitat. Many of these strategies are briefly identified in the state summary sections of this Strategy document and more fully described in state-specific plans.

County Conservation Lands:

County Forest Preserve and Conservation Districts play significant roles in some states with acquiring, restoring, and managing land for the purposes of protecting open space, preserving plant and animal diversity, and providing environmental education opportunities. For example, the Forest Preserve District of Cook County, Illinois, owns more than 69,000 acres. County conservation agencies often have active stewardship programs to manage natural communities and utilize citizen scientists to monitor native plants and animals. In addition to providing habitat for monarch butterflies and other pollinators, county conservation lands offer extensive opportunities to engage the public in monarch conservation.

3.3.3 – Private Lands

Permanent Easements and Land Trusts

Opportunities to establish monarch habitat are not limited to public lands and agencies. As discussed elsewhere, private land makes up the vast majority of land area in the eastern monarch's primary breeding and migratory range. Many landowners have already been working to restore and re-establish native grassland, prairie and savanna habitat on their land in large and small tracts for many years. In an effort to protect their hard work in perpetuity, landowners frequently reach out to non-profit organizations called land trusts for help. Land trusts can provide options for landowners to permanently protect their land through a variety of methods. There are land trusts located all across the country, and some work at the local level while others work statewide, nationally and internationally. The two primary ways for private landowners to protect their land for natural resources and wildlife benefits are described below.

Land Trusts

Private land trusts have the ability and authority to own land for the sake of protection and management of lands of particular interest from the standpoint of conservation of species or habitats. With ownership in fee title to a property, the land trust has purchased or received by donation or bequest, all rights to a specific piece of land, be it large or small. The land trust is charged with the responsibility of protecting the conservation values of the property for the long term (in perpetuity). It is not allowed to sell or convey the property or any of its rights that relate to the defined conservation values of the property to anyone, with the exception of another conservation or land trust entity. The approval or agreement of the original donor if the property was donated or bequeathed is also required in those instances. The land trust must maintain the property in a manner that protects, restores, promotes or enhances the conservation values of the land.

Conservation Easements

An accredited private land trust may secure a conservation easement on a piece of property by purchase, donation or bequest from a willing landowner. A conservation easement transfers certain rights associated with a piece of property to a land trust. The property remains in the ownership of the property owner, and that person continues to pay taxes on that property, but one, some or many of the property rights are sold or given to the land trust. These property rights can include the rights to subdivide, develop, mine, log, plow, graze, alter topography or hydrology, allow recreation, plant non-native plants, and remove cultural resources, among others. Restrictions jointly agreed upon by the land owner and land trust are placed on the use of the property by the conservation easement document to enforce the relinquishment of the property rights transferred to the land trust. The restrictions placed on the property remain with the property in perpetuity, regardless of future ownership. The restrictions are enforceable in a court of law. The land trust must inspect the property at least once per year to determine that the restrictions have been complied with. The rights/uses of the property that the landowner wanted to retain are still his or hers to pursue. If the right to graze is not transferred to the land trust, then the landowner can ranch the property. This definition does not include short-term easements often associated with various Farm Bill conservation programs. Easements with durations of a few years or decades expire after that time and any property use prohibitions terminate then as well.

For the purposes of monarch habitat conservation and enhancement, there are multiple land protection options available to landowners. Land trusts and other organizations are well-positioned to help these lands become protected habitat for monarchs and other pollinators while achieving the many conservation goals that a landowner or organization may have.

3.3.4 – Tribal Lands

Native American tribes have important lands and authority for managing natural resources and wildlife habitat in many areas across continental North America. Within the 16 states included in this Strategy, there are many tribal governments, including some with significant land holdings. Most of these tribal lands are located outside the north core and south core monarch conservation units as identified by the U.S. Fish and Wildlife Service, with the primary exception of a concentration of tribal lands in Oklahoma. See map (Fig. 3.1) for distribution of tribal reservations across the central portion of the continental United States.

Figure 3.1 - Indian lands in the mid-continental United States. Source: Bureau of Indian Affairs: https://www.bia.gov/sites/bia.gov/files/assets/bia/ots/webteam/pdf/idc1-028635.pdf

According to the U.S. Bureau of Indian Affairs, there are currently 338 sovereign tribal nations outside of Alaska, mostly located in the western continental United States. These tribal nations (variously called *tribes*, *nations*, *bands, etc.)* all have a formal nation-to-nation relationship with the U.S. government. These tribal governments are legally defined as "federally recognized tribes."

Tribes ceded millions of acres of land to the United States through a series of treaties with the federal government. In return, they received the guarantee of ongoing self-government on their own lands. The treaties and laws create what is known as the federal "trust responsibility." Direct nation-to-nation relations is a fundamental principle of the federal government's trust relationship with tribes. While the federal government retains the government-to-government responsibility for tribal relations, individual states work with tribal governments on shared natural resource goals within their borders.

Within the 13 states of MAFWA and the 3 south-central states of Arkansas, Oklahoma, and Texas included in this monarch conservation strategy, most tribal lands occur in the upper Great Lakes states of Michigan, Minnesota, and Wisconsin, the western Dakotas, and Oklahoma,

with some smaller scattered tribal lands in eastern Nebraska, northeastern Kansas, and Iowa, and elsewhere (Fig. 3.1). In the north core monarch conservation unit, there are few tribal reservations and relatively little tribal land ownership. In the south core monarch conservation unit, there is a concentration of tribal lands in Oklahoma, as discussed below.

There are at least 38 federally recognized tribes in Oklahoma. See map (Fig. 3.2) for a view of tribal jurisdictions across the state. According to the Oklahoma Monarch and Pollinator Collaborative's draft Statewide Monarch Conservation Plan, most of the tribal lands in Oklahoma have not been developed and are "unimproved." The lands are managed by tribes and the Bureau of Indian Affairs, the Bureau of Land Management, the U.S. Fish and Wildlife Service and other federal agencies. The Intertribal Land Trust is also working to utilize state and federal land trust laws to improve the landscape and character of tribal lands in Oklahoma.

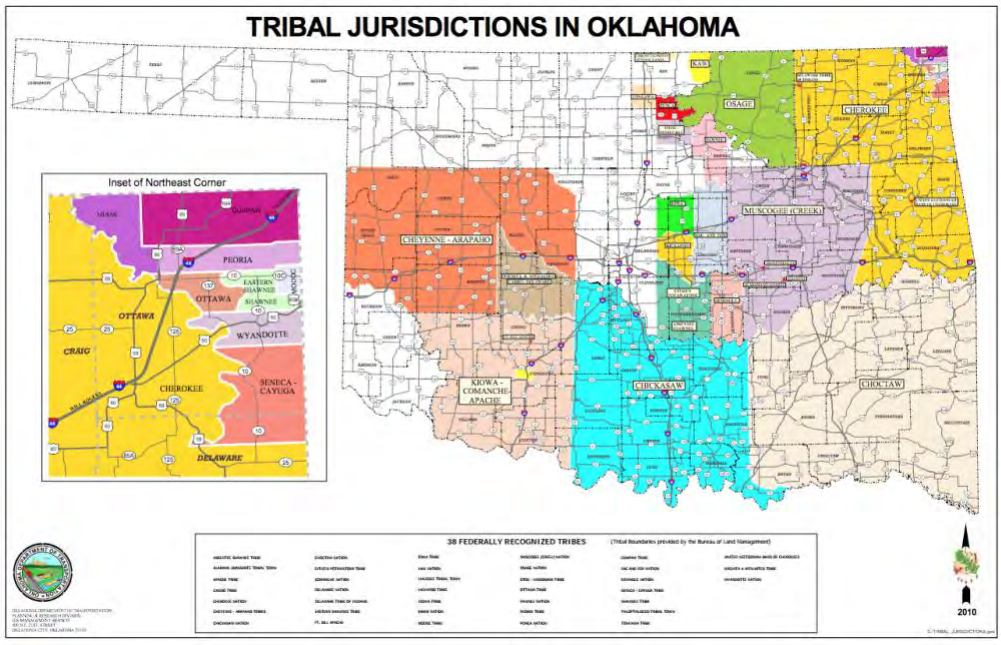

Figure 3.2 - Tribal jurisdictions in the state of Oklahoma

In Oklahoma, monarch migration passes through tribal lands annually, and much of this land is important monarch breeding and feeding grounds. These lands may offer growth areas for monarch habitat through collaboration with tribal, federal, and nonprofit partnerships. For example, Kansas University's Monarch Watch and the U.S. Fish and Wildlife Service have begun pilot programs with Oklahoma tribes to restore and enhance monarch habitat. Monarch tribal conservation actions started from a National Fish and Wildlife Foundation Monarch Butterfly Conservation Fund project with Monarch Watch and seven Native American tribes in eastern Oklahoma in 2015. The project provided the training needed to plant milkweed and to collect, process, store and propagate seeds of native milkweeds and wildflowers. It also established seed production plots, creation of demonstration plots and the development of conservation plans, including site selection and preparation, as well as long term maintenance of restored properties.

Other tribal lands in the region that contain grassland cover, particularly in the great plains, may also provide important monarch habitat, even if located outside the core monarch conservation units. These lands offer potential areas for collaborative monarch conservation with tribal, federal, state, and nonprofit partnerships.

Next Steps for Protected Lands Partners

- Maintain communication between state and federal agencies to share successes, failures, and lessons-learned regarding monarch habitat;
- Promote monarch and pollinator habitat establishment and management on appropriate land trust and conservation easement lands, tribal lands, as well as federal, state, and local public lands;
- Partner with researchers, citizen scientists, and others to promote biological and habitat monitoring on public lands that will help inform monarch population models and answer habitat management questions;
- Build networks or partnerships that will aid in tracking monarch habitat accomplishments and progress towards habitat goals on protected natural lands, including better data on milkweed baseline conditions and response. Include communication between U.S. Fish & Wildlife Service, other federal agencies, state agencies, tribal authorities, land trusts, and the Integrated Monarch Monitoring Program (IMMP; see section 5.2).

3.4 – RIGHTS-OF-WAY

Transportation and utility rights-of-way are ubiquitous across the North American landscape, crisscrossing our mountains, grasslands, farms, parks, and cities. Though often ignored by the general public, utility rights-of-way comprise about 12 million acres of land in North America (Peterson et al. 2015), while transportation rights-of-way, including roads and railroads represent even more potential acres of wildlife habitat. State DOT-managed roadsides alone consist of over 17 million acres in the United States (Hopwood et al. 2015). Vegetation on the majority of right-of-way lands is generally managed to prevent the growth of trees and other large woody vegetation, resulting in land that is in a perpetual state of arrested succession, thus held in grassland, meadow, prairie, or shrub-scrub type habitats (Lanham & Whitehead 2011). While early successional habitats are in decline across North America due to urban development and changes in agriculture and silviculture practices, transportation and utility rights-of-way present an incredible opportunity to provide valuable wildlife habitat to species that depend on early successional plant communities and structures, such as monarch butterflies and other pollinators.

Strategies for increasing or improving monarch and pollinator habitat along rights-of-way will vary depending on the ownership, safety concerns and regulations, and competing vegetation management objectives in any particular location. Furthermore, specific strategies should be tailored to newly-established right-of-way vegetation as opposed to management of existing areas. The remainder of this section addresses three major types of ROW separately: transportation, electric, and oil/gas. A suite of habitat creation and enhancement strategies are identified for major right-of-way categories within each of these sections, as well as the potential scale of their contributions to established monarch habitat targets.

3.4.1 – TRANSPORTATION RIGHTS-OF-WAY

Transportation rights-of-way have been identified as an important potential source of monarch and pollinator habitat across the country, yet many worry if such habitat areas might prove to be an ecological trap – a location appearing to provide valuable habitat for wildlife yet ultimately resulting in their death. As for many animals, vehicles are a source of mortality for monarch butterflies. Limited research suggests that monarch mortality levels due to collisions are low but that mortality increases significantly during fall migration (McKenna et al. 2001). However, research also suggests that roadside monarch habitat is a net benefit, despite losses due to collisions. Research in the U.S. and Europe has found that the number of butterflies killed by vehicle collisions is a small proportion of overall populations (0.6-10%), though mortality rates depend on species and their natural history and flight capabilities (Munguira and Thomas 1992; McKenna et al. 2001; Ries et al. 2001; Rao and Girish 2007; Zielin et al. 2010; Skórka et al. 2013; Munoz et al. 2015).

Reducing roadside mowing at particular times of the year can reduce butterfly mortality, as can enhancing the diversity and abundance of wildflowers on roadsides (Munguira and Thomas 1992; Ries et al. 2001; Skórka et al. 2013). While providing pollinator habitat on roadsides may attract more insect species and thus increase overall vehicle-related insect mortality, there is no evidence yet that this mortality outweighs the benefit of the increased habitat quantity and quality provided by roadside pollinator habitat projects (Keilsohn et al. 2018).

There are multiple benefits of establishing and managing roadside vegetation for monarch and pollinator habitat. Monarch butterflies will inevitably cross many miles of roadsides and ROWs throughout their migratory journeys, and managing roadsides for propagation of wildflowers and milkweeds will provide beneficial food and habitat for many species of wildlife that will be crossing the roadsides regardless of the presence of food and habitat. Managing roadsides for monarchs and pollinators also provides ample beautification of roadways, and opportunities for establishing pollinator waystations at other DOT-managed properties allows civic minded communities to build useful habitats and increase community engagement and awareness around monarch and pollinator conservation more generally.

Types of ROW and Habitat Opportunity Areas

Access-controlled Roadways (e.g., interstates, tollways, etc.)

Routinely mowed areas range from 15-feet to 30-feet adjacent to pavement and are routinely maintained by mowing to provide for the safety of the motoring public. These areas are not generally considered to be suitable habitat for monarchs. Areas outside of routine mowing offer high potential habitat that extends from the routinely mowed area to the access control fence, including median areas and interchange infields. The area inside the access control limits is generally protected from mowing, farming and disturbance. Due to their protected nature, these areas are considered to be the highest value habitat areas within the highway transportation system when properly managed.

Highways (e.g., U.S. or state marked routes)

Routinely mowed areas range from 15-feet to 30-feet adjacent to pavement and are routinely maintained by mowing to provide for the safety of the motoring public. These areas are not generally considered to be suitable habitat for monarchs. Areas outside of routine mowing offer potential habitat that extend from the routinely mowed area to the right-of-way line. These areas along rural highways are typically not controlled by fencing and are subject to volunteer mowing by others. If properly signed and maintained, the potential for viable habitat does exist.

Managed areas (signed and protected remnant, Threatened and Endangered species (T&E) areas, waysides, excess ROW) along rural, non-access controlled highways are typically signed to identify the asset and to prohibit mowing or spraying. These areas are typically mapped and protected by policy within all sectors of transportation agencies. Due to their protected nature, these areas are considered to be the second highest value habitat areas within the highway transportation system when properly managed.

County and Township Roadways

These roads include county, township, or other roads not designated as an interstate, U.S., or state marked route, nor a municipal road (within the urban boundary or city limits). The right-of-way is typically between 40-feet to 60-feet in width. These ROWs can be managed by a county entity or adjacent landowner. Routinely mowed areas adjacent to pavement provide for the safety of the motoring public. Adjusting mowing standards, i.e. strategic and rotational mowing, or delayed roadside mowing could provide habitat opportunities for monarchs. Areas outside of routine mowing or excess ROW land provide a significant opportunity for additional habitat.

Urban Roadways

Urban ROWs can be up to 120-feet wide and are typically owned and/or maintained by state or local agencies. Generally, these ROWs can be considered always or frequently mowed and therefore do not present a high-value habitat opportunity area for monarchs.

Railroad ROW

Much like highway ROWs, railroad ROWs generally consist of an area immediately adjacent to the track where vegetation is routinely managed to control for safety. This area does not present much opportunity for monarch habitat due to its frequent management interval. However, the remainder of the rail ROW beyond this rail-adjacent area is managed less-frequently and therefore could serve as potential monarch habitat.

Other Managed Lands

Road authorities own and/or manage many different types of land beyond the ROW as well. Most visible are rest areas, which are great locations for possible monarch butterfly waystation plantings, particularly considering the potential for public involvement and outreach. These areas usually have large tracts of land where habitat can be created and areas where the public can park without the safety concerns of the roadway. There are many initiatives ongoing to turn some of these large areas into prairie-type habitat to provide nectar plants to all pollinator species throughout the growing season with controlled mowing. Other non-ROW lands managed by road authorities include land purchased for building that has never been developed, land purchased by government mandates, picnic areas, excess lands purchased for future ROW development, and some mitigation sites. Many of these sites are not seen or even known of except by the local representatives in any given area. Most of these lands have great potential for creation of monarch and pollinator habitat without significant input of resources.

Railroad companies often own non-operating properties, which consist of unused portions of railyards, abandoned railroad tracks, or other properties that are not currently in operation. These areas would be prime locations for habitat restoration projects where resources are available. These properties are not in view of the public but could provide monarch habitat that is undisturbed by the operations of the rail company.

Current Initiatives

Collaborative partnerships

The Interstate 35 Monarch Highway is a multi-state partnership launched in 2015 to bring together state transportation agencies and other partners along Interstate 35 (I-35) and promote habitat conservation and enhancement along the transportation corridor and within neighboring communities. In May 2016, a Memorandum of Understanding was signed by the Federal Highway Administration and six states (Minnesota, Iowa, Missouri, Kansas, Oklahoma, and Texas) to create "a cooperative and coordinated effort to establish best practices and promote public awareness of the monarch butterfly and other pollinator conservation" (Iowa Department of Transportation et al. 2016).

State and local DOTs frequently partner with local conservation groups (e.g., 4-H or Boy Scouts) or national groups (e.g., Pheasants/Quail Forever or Ducks Unlimited) to develop or convert portions of ROW to habitat. Work is generally allowed by permit from the agency to the partner organization for any work to be conducted on ROW. These partnerships offer DOTs access to experienced technical restoration staff and equipment that may not exist within the

DOT agency. Partnerships are also excellent educational and public outreach and support opportunities for both the DOT agency and the partner.

Legislation Promoting Habitat

In December of 2015, Fixing America's Surface Transportation (FAST) Act was signed into law. The FAST Act aims to support and increase pollinator species by encouraging integrated vegetation management and development of habitat and forage for native pollinators. Specifically, section 1415 of the FAST Act declares that efforts towards establishing or improving pollinator habitat may be eligible for federal funding as long as it is related to transportation projects funded under title 23, United States Code.

Several states have adopted laws that prohibit or restrict certain vegetation management practices on roadside ROW and, in doing so, protect habitat for monarch butterflies and other wildlife. Examples of such laws are summarized below:

- In Iowa, mowing roadside vegetation on the ROW or medians on any primary highway, interstate highway, or secondary road prior to July 15 is prohibited. Exceptions include within rest areas, fifty feet of a drainage or on ROW within one mile of the corporate limits of a city, or where mowing is essential for visibility or weed control (Iowa Code 314.17).
- In Minnesota, the entire ROW may be mowed after July 31. From August 31 to the following July 31, the entire ROW may only be mowed if necessary for safety reasons, but may not be mowed to a height of less than 12 inches (Minnesota Statute 160.232).
- In Nebraska, mowing and hay harvesting is only permitted on or after July 15 of each year (Nebraska Revised Statute 39-1359.01).
- In South Dakota, the start date for mowing state ROW in east river counties is July 10. The start date for mowing state ROW in the west river counties is June 15. However, the June 15 start date restriction was eliminated for all west river counties except Gregory, Tripp and Lyman (South Dakota Administrative Rule 70:04:06).

Another example of proactive legislation is the Living Roadway Trust Fund (LRTF) established in 1988 by Iowa Code 314.21. The Iowa DOT administers the fund, which includes a competitive grant program to fund integrated roadside vegetation management activities across the state. Since 1990, the LRTF has provided more than $17 million for research and demonstration projects, vegetation inventories, education and training programs, gateway landscaping, snow and erosion control, and roadside enhancement and maintenance. The LRTF promotes the creation of "safe and effective habitats for wildlife which can coexist with highways" and directly supports integrated approaches to manage roadside vegetation for this purpose.

Policies Promoting Habitat

Several states have adopted policies that protect or promote habitat for monarch butterflies and other wildlife on roadside ROW. Such policies are summarized below:

- Illinois DOT revised mowing policy: Beginning spring of 2017, the mowing policy for all department maintained right-of-way was amended to restrict mowing to one single pass (15-feet) mowing along all roadways during each mowing cycle (2 to 3 times per year) and established dates when additional

mowing outside the 15-foot safety strip for maintenance needs or to prevent snow drifting could be conducted in the fall (September 15 north, October 1 south). In 2017 interstate medians were mowed completely during each cycle. Beginning in 2018 interstate medians will also only be mowed one pass (15 ft.) and mowed completely after fall mowing restriction dates. It is estimated that over 80,000 acres is now being left as habitat that was previously maintained by regular mowing. Research along two access controlled interstate corridors of similar geographic area—one regularly mowed/maintained and one maintained utilizing one single pass (15-feet) and leaving the remaining vegetation standing—has demonstrated a 3000% increase in the density of milkweed stems.

- Kansas DOT's mowers are generally set for a 6-inch cut for mowing the shoulder strip. Highway ROW in undeveloped areas is mown approximately 15 feet from the pavement edge. Areas outside the shoulder edge mowing are not mowed between April 15th and October 1st. These areas are mowed out on a four year cycle with an 8-inch cut, but both sides of the road are usually not mowed in the same year.
- Ohio DOT implemented new mowing dates at the end of summer 2017 utilizing the mowing guidance from Monarch Joint Venture (MJV). Since Ohio has a decentralized transportation department all counties in the state are encouraged to stop mowing after May 1 with mid-season mowing for maintenance or visibility from July 1-15, and then no mowing between July 15 and October 15. The State of Ohio is committed to the safety of the traveling public and will always maintain a 30-foot safety zone typically from edge of pavement to ditch on all maintained roadways. This means that regardless of date the DOT will mow this zone for safety reasons.

Agency Programs and Commitments (state DOTs, tollways, county/township agencies)

In addition to policies and regulations, road authorities have made significant commitments of resources to promote habitat along roadsides. As an example:

- Illinois DOT has created a dedicated state budget line item for Pollinator Habitat Preservation and Restoration. This funding ($500,000 annually) is utilized for restoration of native habitat or preservation of existing habitat (using no mow/no spray signs). Priority is given to highly visible, easily protected sites, typically on the interstate system. Projects must utilize a specific monarch and pollinator seed mix.

Management Strategies to Provide Maximum Viable Habitat for Each ROW Type

Management strategies for roadside habitat are broadly identified below. More detailed guidelines and recommended practices are available in the Federal Highway Administration's *Roadside Best Management Practices that Benefit Pollinators* (Hopwood et al. 2015).

Routine Maintenance

Mowing:

Mowing is a critical component of maintaining ROW and ensuring the safety of the motoring public. Sight visibility, access to fixed assets and maintenance of drainage structures and features

must be managed with mowing. Utilizing mowing strategies that improve or lengthen bloom time of nectaring plant species, control the spread of invasive species, and maintain the safety and integrity of the ROW should be considered when preparing a management strategy. Mowing strategies that have a positive impact include:

- Adjusting mowing standards by strategic or strip mowing, rotational section mowing or delayed roadside mowing, to avoid mowing during vulnerable times for pollinators (see mowing guidance from Monarch Joint Venture);
- Utilizing different mowing equipment and/or adjusting mower deck heights to decrease the amount of chopping and mulching, if in season maintenance needs to occur;
- When using mowing as a management tool, minimization and avoidance measures should be considered;
- Timing mowing in coordination with spot herbicide spraying.

Prescribed Burning (where appropriate):
Prescribed burning can help to rejuvenate vegetation diversity. Strategies for prescribed burning that could have a positive impact on monarchs include:

- Encourage prescribed burning as a management method where appropriate and allow for species recovery time in burning interval (for example, FHWA BMPs recommend 3-5 years or more). Consideration should be given to percentage of suitable habitat nearby, adequate refugia within the site, tolerance for burning, and benefit to the overall community;
- When using prescribed fire as a management tool, minimization and avoidance measures should be considered.

Herbicide Application (where appropriate):
Herbicides can serve as an important tool for controlling noxious and invasive weeds or encroaching woody vegetation. Herbicides can suppress undesired plants that compete with native vegetation, but can also reduce the quality of roadside habitat if they inadvertently affect valuable feeding resources or host plants. Herbicide application strategies that could have a positive impact on monarchs include:

- Herbicide use should be limited to areas where other practices are not an option and/or severe methods of control need to be implemented;
- Labels and restrictions should be followed for specific, legal application of chemicals;
- When using herbicide application as a management tool, minimization and avoidance measures should be considered.

Minimizing Operational Impacts
Minimization and avoidance practices as determined by the U.S. Fish and Wildlife Service (USFWS) for the monarch butterfly—including date, daily and seasonal temperatures, and minimum percent of suitable cover—should be followed in conjunction with any other restrictions implemented by road authorities. Consideration should be given to:

- Date/temperature restrictions for prescribed burning, mowing, and herbicide application;
- Standards of suitable habitat;
- Minimum acreage of suitable habitat;
- Refugia habitat / Non-mow areas.

Habitat Replacement: Proper selection of and prioritization of habitat replacement areas can have a positive impact on overall available acres. Factors to be considered are:

- Permanent refugia - areas mitigated to offset permanent impacts to another site where the proposed species is known to occur:
    - Accessible for proper establishment of native species;
    - Maintained as habitat for an indefinite period of time or for a significant time to justify the cost of permanent refugia;
    - Protected from routine mowing and herbicide application;
    - Frequently monitored and maintained to provide the maximum possible food and nectar species in a manner that is beneficial to monarchs and all species.
- Temporary refugia- existing, nearby suitable habitat to offset temporary impacts to an existing site where the species is known to be present for the intention of management or improved habitat:
    - Sites are typically short-term or installed between major construction or maintenance activities to provide food and nectar sources for one to two years;
    - Focused on the maximum benefit possible for minimum investment.

Construction Projects: Habitat restoration during construction projects is a viable method of habitat preservation and restoration that utilizes opportunities made available by ground disturbance and other activities. Strategies can be incorporated throughout the construction phases and include:

- Identify habitat opportunities early on in the construction design phase to maximize benefits and align conservation strategies with project goals;
- Identify site-specific best management practices during planning phase;
- Utilize native vegetation for erosion control during construction;
- Utilize native vegetation post-construction. An applicable revegetation manual written by FHWA and U.S. Forest Service is available here: http://nativerevegetation.org/.

Partnering or Contracting for Specialty Maintenance Activities

- Consider specific "adoption" programs for problematic or hard-to-manage areas, i.e. T&E sections where maintenance must happen at non-traditional intervals or times.

Employee and Contractor Training

- Identify training needs (i.e., who/what/where/when/why) and gaps in existing training;
- Implement comprehensive training throughout the organization (e.g., top down, side-to-side, included in required environmental management systems training);
- Find and utilize available training resources from state or federal agencies, conservation organizations, or other partners.

Seed Sourcing/Design

- Review/modify existing seed specifications for all sites considering environmental aspects, i.e. slope, soil type, drainage, aspect, etc. (consider noxious weed lists);
- Identify and promote the use of native species appropriate for site and location. An online native plant selection tool for roadside managers is available here: http://www.nativerevegetation.org/era/;

- Identify native seed sources and approved vendors to streamline the process. Resources for seed mix design and vendors are available at state agencies, federal partners within each state, and other sources specific to each state.

Monitoring

- Consult resources for monitoring milkweed, nectar sources, and various stages of the monarch life cycle (see Monitoring Section 5.2);
- Monitoring milkweed and monarch response to roadside management techniques is important for informing future habitat models and adaptive management strategies.

Funding

- Utilize end-of-year budgets to purchase native seed;
- Build partnerships with conservation organizations to leverage available funding and other resources.

Mapping, Signage, and Protection

- Strategies for mapping existing and potential habitat areas should be discussed and implemented per each state monarch consortium;
- Strategies for signage ("no mow," "protected habitat area," etc.) should be discussed and implemented per each state monarch consortium.

Outreach/Public Engagement

Many states already have various projects underway and varying levels of engagement with the public. Events and programs, including but not limited to those listed below, should be considered and shared throughout the region.

- Work within the urban/rural interface, i.e. in town/urban projects, Mayor's Monarch Pledge, and designated pollinator-friendly cities;
- Adopt-a-Highway for pollinators, roadside ROW projects;
- Create monarch waystations with information signage;
- Include monarch information on DOT websites, ROW companies and agencies, and social media outlets;
- Educational materials at rest areas including seed packets for native gardens;
- Monarch, additional pollinator species, and/or wildflower license plates;
- Public outreach and education events for promotion monarchs and their habitats.

Potential Scale/Impact of Monarch Habitat on Road ROWs

According to the source data compiled for the Thogmartin et al. (2017a) "All Hands on Deck" paper, there are over 25 million non-urban acres of roadside ROW within the 16 primary states participating in this Regional Strategy. Assuming that half of those acres are not suitable monarch habitat due to the routine mowing practices described above, this leaves about 12.5 million acres of potentially suitable monarch habitat along road ROWs. A realistic potential is that 10% of this land area would "adopt" monarch-friendly practices, (Thogmartin et al. 2017a) suggesting that 1.25 million acres of roadsides in these 16 states could be managed for monarch habitat, contributing millions of additional milkweed stems to the primary monarch breeding and migratory range.

3.4.2 – UTILITY RIGHTS-OF-WAY

Electric ROW Overview

Electric utility rights-of-way (ROW) can take many forms, as infrastructure specifics range from high voltage transmission power lines, switch stations and substations, to lower voltage distribution power lines. Depending on the voltage of the power line, the width of the ROW can vary, but widths are not arbitrary. These widths must meet engineering and construction standards.

Transmission Power Line ROW (69 kV and greater)

Transmission power lines provide the bulk movement of electricity from a generation site, such as a power plant, wind farm, or solar array to an electrical substation. These are very high voltage and typically described as anything over 69 kiloVolts (kV). As mentioned above the widths of the ROWs for transmission lines can vary by voltage. Technical reference FAC-003-2 from the North American Electric Reliability Corporation (NERC) lists the minimum distance from centerline of the circuit to the edge of the active transmission ROW, ranging between 75 and 200 feet in minimum total ROW width.

Transmission line ROWs are commonly on a vegetation management rotation that can range between three to seven years and may include mowing, herbicide treatment or selective vegetation control. Rotation time is developed to ensure that Minimum Vegetation Clearance Distances (MVCD) are maintained. With appropriate vegetation management schemes, these locations can provide significant habitat opportunities for monarchs and other pollinators.

Typically, electric ROWs only acquire rights from the property owner through an easement to locate the transmission line on their property. This provides the utility the right to construct, operate, maintain, and access the utility lines on the land. As long as current land practices promote appropriate vegetation management according to ROW best management practices, the landowner may continue to operate the property at their discretion as long as it is not prohibited in the easement document. This can generate challenges in restoration and maintenance of ROW vegetation if maintenance and care of pollinator habitat is not in line with the landowner's interest. However, this arrangement could also provide a great educational opportunity for landowners, potentially allowing them to manage a ROW, once planted by the utility, that provides long-lasting pollinator habitat.

Substation ROW

Substations can include switching stations, collector stations, and distribution stations. All serve the purpose of either providing reliability backup, changing electricity flow, or changing voltages from either a high voltage to a lower voltage or vice versa. Substation ROWs are typically on annual mowing and spraying schedules. Often these stations are made up of a crushed rock pad, which requires application of a sterilant herbicide to prevent vegetation growth throughout the station. Substations can be various sizes depending on the voltage and location. Switching stations are often on larger pieces of property, containing larger buffer zones around the station, which are not covered in crushed rock that can be planted. However, height considerations are important to maintain security. Switching stations also offer more distance in between phases than distribution substations. It has been suggested that this makes them more ideal for pollinator habitat because encroaching wildlife, such as snakes, are less likely to span

the phases and cause an outage. Distribution substations can also be planted with pollinator-friendly vegetation when location and land availability allow.

Distribution Power Line ROW

Distribution power lines are lower in voltage than transmission power lines, providing the last leg of the electricity's journey to the end users, including homes and businesses. These linear ROW are much smaller than the transmission line ROW (approximately 20 feet total), and often encounter congested residential areas. Distribution ROWs are commonly on a mowing and spraying rotation that can range between one to five years. Much like transmission lines a rotation is developed to maintain MVCD to avoid unscheduled outages. Also similar to transmission line ROW, distribution ROW is acquired through an easement, presenting the same challenges for ROW restoration and maintenance for pollinator habitat.

Oil and Gas ROW Overview

An oil and gas line right-of-way (ROW) commonly has a defined width according to diameter and pressure of the pipeline and runs for the entire length of a given line. A ROW easement allows for the utility company to keep the area clear of any trees or other obstructions that may interfere with the ability to operate and maintain the integrity of the pipeline, perform essential maintenance, or place additional lines on the ROW. Access to the ROW must always remain available to the utility company. Pipelines and their ROW exist almost everywhere. Natural gas is delivered directly to homes in relatively small diameter distribution lines buried under the street and even your own yard. These ROWS are typically smaller and not always obvious. Larger cross-country transmission pipelines delivering gasoline, home heating oil, or moving crude oil or natural gas are usually easier to find and notice.

Pipeline ROW Width

The width of a pipeline ROW depends on the diameter and pressure of the line and the number of lines in a given ROW. ROW widths can vary, but are not arbitrary. The widths must meet engineering or construction standards. ROW for distribution lines can range from 5-25 feet. A typical transmission ROW consists of a 50-foot permanent ROW and a 25-foot temporary construction easement used during the initial construction of the pipeline.

Pipeline ROW Ownership

Most of the ROW associated with pipelines remains private property and is not owned by the utility. Typically, the utility only acquires rights from the property owner through an easement to locate the transmission line on their property. This provides the utility the right to construct, operate, maintain, and access the utility lines on the land. As long as current land practices promote appropriate vegetation management according to ROW best management practices, the landowner may continue to operate the property at their discretion as long as it is not prohibited in the easement document.

Regulation of Pipeline ROWs

PHMSA – Transmission Class Pipelines

While there are no specific regulations that require pipeline operators to manage vegetation on ROW, the Pipeline and Hazardous Materials Safety Administration (PHMSA), through the Pipelines and Informed Planning Alliance (PIPA), has recommended practices that

were developed by task teams of industry representative stakeholders who agree on the practices. All stakeholders are encouraged to become aware of and implement the PIPA recommended practices where appropriate. One such recommended practice is BL12 "Notify Stakeholders of Right-of-Way Maintenance Activities" (Pipeline and Hazardous Materials Safety Administration). Within this recommended practice is a discussion regarding the basis for maintaining the ROW, specifically addressing vegetation management requirements. The PIPA states "The transmission pipeline operator must maintain the ROW vegetation so that it will not hinder pipeline inspection and maintenance activities."

PHMSA – Distribution Integrity Management Plans

Many natural gas distribution companies have assets that meet the definition of a transmission class pipeline and therefore fall under the above guidance. Similar to transmission class pipelines there are no specific regulations for vegetation management on natural gas distribution ROW. Further there are no recommended practices for distribution pipelines. The driver for vegetation management on gas distribution ROW can be interpreted by understanding the requirements of the distribution integrity management plans. Many of these activities are administered most effectively on a clear ROW, i.e. free of obstructions and woody vegetation encroachment.

Current Initiatives

American Electric Power Prairie Research Project at the Dawes Arboretum

Incorporating native plants into electric utility ROWs can meet the objectives of vegetation management, while also improving the habitat value for wildlife species in need of conservation, including grassland birds and pollinators such as the monarch butterfly. A combination of native warm season and cool season grasses, mixed with forbs and legumes, can help achieve a desired vegetation cover and provide greater species diversity in the long term as compared to that of non-native cool season grasses alone. The goal of this AEP-sponsored project at the Dawes Arboreum in eastern Ohio is to assess the feasibility of economically incorporating native plants and pollinator habitat into utility ROW sites through prairie establishment. Study plots were chosen within forested and agricultural corridors. Seed beds were prepared using herbicide applications or by a dozer removing surface vegetation, leaving the top soil intact. Plots were seeded with a native prairie mix using a no-till drill or by hand broad casting. The vegetation successfully established within four weeks or less and was monitored using common evaluation standards, as were bird, butterfly and bee populations. Thirty-four species of vegetation were recorded, including eight grasses and five woody plants. First year monitoring results demonstrated that the ROWs were being utilized by a variety of wildlife, including nine bee species, 21 bird species and nine butterfly species, including the monarch butterfly.

American Transmission Company

Utility corridors, such as those maintained by American Transmission Company (ATC), provide excellent opportunities for the development of suitable habitat for pollinators and other insects, such as the monarch butterfly. To help reach the goals of its Pollinator Program, ATC developed a Pollinator Opportunities Within Rights-of-Way (POWR) GIS mapping tool to help

identify priority areas for pollinator conservation. The focus of this effort was to identify and prioritize which areas of the company's rights-of-way can be enhanced to create a contiguous flight path for insects and butterflies, including the monarch butterfly. This landscape conservation analysis identified approximately 10% of ATC's transmission line system that can be enhanced in Wisconsin as landscape connections for pollinators. ATC has committed to using pollinator-enhanced seed mixes as appropriate during project restoration activities. Project teams, construction contractors and ATC environmental project managers work together to use the results of the POWR model to help determine where the enhanced mixes may benefit pollinator species in specific rights-of-way following construction. The mixes are designed to provide flowering forbs throughout the growing season.

Electric Power Research Institute

The Electric Power Research Institute (EPRI) has initiated a study to learn how transmission ROW vegetation management affects pollinators (*Pollinator Diversity on Powerline Corridors in New York and Ohio: Study Initiation*. EPRI, Palo Alto, CA: 2016. 3002008535). This research has included the development of a preliminary field study protocol and testing program on New York and Ohio study sites. Observations of plant communities and pollinator assemblages on select powerline corridors in New York and Ohio were initiated between June and August 2016. Multiple research plots of approximately one acre in size that had been managed using standard mechanical and chemical vegetation treatment practices were sampled for plants and insects. The plant communities were as expected for managed systems, with little to no tree cover and complex combinations of shrubs, herbs, grasses and ferns. Over 4,000 pollinator insect specimens were collected with a total of 141 genera being identified to date, indicative of the potential pollinator diversity on managed ROWs. A second field season of sampling was conducted in 2017.

Typical Current Utility ROW Management Strategies

Many utility ROW sites already provide suitable monarch and pollinator habitat, yet initial re-vetation and ongoing vegetation management practices can be improved upon to maximize monarch habitat potential within these land uses. When re-vegetating a disturbed construction area, utilities consider what will grow in the area, the type of fast-growing plants that will help accelerate soil stabilization, and identify the right native grasses to plant. On new ROW projects, these factors are considered during routing analysis at the start of the project. Companies are to restore the ground cover in the ROW to be sustainable over the long-term and to maintain it according to environmental and reliability standards. Typically, a cool-season turf grass is installed after the completion of a construction project. Species in such mixes include tall fescue, Kentucky Blue Grass, Kentucky 31 Fescue, domestic rye grass, white dutch clover, and for fall applications, winter rye is added.

Most utility vegetation management plans include aerial and/or ground patrols twice per year. Teams of experienced foresters work with landowners along the ROWs when maintenance is planned to inform them of what to expect and to address their concerns. To maintain ROWs, the utility chooses the best option that is cost-effective, minimally invasive, and responsive to landowners' concerns. Typically, a combination of manual, mechanical, chemical and biological methods are used to maintain the ROW. Under certain circumstances, such as unique topographic or environmentally-sensitive conditions, low-growing, compatible vegetation is

allowed to remain in the ROW. This can serve to create habitats and protect native plant species that are beneficial to a wide range of wildlife. Without exception, maintenance of the ROW must comply with NERC standards while meeting all environmental requirements.

Suggested Management Strategies and Best Management Practices

New Projects

- Provide guidance on how to restore and plant vegetation within a new easement using agreed upon seed mixes that would benefit the monarch butterfly and pollinators for different zones within the primary breeding and migratory monarch regions;
- Seed mixes need to be regionally appropriate for the geography and site conditions, cost-effective, and viable during all seasons of the year (winter, spring, summer, etc);
- Any vegetation restoration activities need to achieve the performance criteria of 70% vegetative coverage as soon as possible to achieve erosion control and allow the utility to file a notice of termination.

Existing ROWs

- Provide companies with a description of agreed-upon mowing practices that would meet MVCD standards and provide a benefit to monarchs (see Monarch Joint Venture Mowing Guidelines for an example);
- Provide companies with a description of agreed-upon herbicide application practices that would meet MVCD standards and provide a benefit to monarchs;
- Provide companies with guidance on how to monitor the site for vegetative coverage, presence of desired forbs, etc., and incidence of invasive or woody vegetation.

Contracting (new construction)

- Change terms and conditions in contracts to adjusted engineering and construction specifications that benefit monarchs;
- Revise scoping documents to clearly indicate BMPs for monarchs and pollinators that will be implemented.

Contracting (existing ROWs)

- Change terms and conditions in contracts to adjusted vegetation management specifications that would benefit monarchs;
- Develop and adopt regionally- and seasonally- appropriate seed mix specifications; long term contracts can avoid spikes in seed costs;
- Revise scoping documents to clearly indicate BMPs for monarchs and pollinators that will be implemented.

Education/Outreach

- Provide annual education to ROW contractors, internal forestry personnel, including ROW land agents, and project managers/engineers;
- Recommend a requirement for monarch and pollinator habitat education for contractors to be on bid list;

- Allow ROW agents to provide information and options to landowners regarding potential to restore the ROW with monarch and pollinator-friendly vegetation;
- Educate project managers/engineers to gain their support for these changes on projects. Work with these individuals and company leadership to change engineering and construction specifications as well as scoping documents to benefit pollinators;
- Create and disseminate a brochure that a utility company could use to show a landowner about various opportunities for using approved seed mixes for monarchs and pollinators on their ROW;
- Coordinate with agricultural service providers (such as NRCS and PF/QF) working with conservation programs to educate ROW owners with agricultural land about monarch and pollinator habitat cost share opportunities.

Next Steps for Rights-of-Way Partners

- Continue to foster information-sharing and supportive partnerships through the Rights-of-Way as Habitat Working Group;
- Support research that will help make the business case for investing in monarch and pollinator habitat establishment and management in ROW environments;
- Work to begin engaging contracting companies (i.e. not just DOTs and utilities) in monarch and pollinator habitat discussions since these are often the "boots on the ground" for vegetation work in ROWs;
- Build networks or partnerships that will aid in tracking monarch habitat accomplishments and progress towards habitat goals on rights-of-way, including better data on milkweed baseline conditions and response. Include communication between U.S. Fish & Wildlife Service, current participants of the Rights-of-Way as Habitat Working Group, state agencies, and the Integrated Monarch Monitoring Program (IMMP; see section 5.2).

3.5 – ENERGY INFRASTRUCTURE

While utility rights-of-way are one of the primary land use "sectors" identified in the Thogmartin et al. (2017) "All Hands on Deck" paper, the participants in this Strategy development process agreed that other energy-related infrastructure also provides important opportunities for increasing and improving monarch habitat. Unlike rights-of-ways, utility companies usually own and control the lands on which various types of energy are generated and stored, and thus these areas present a clearer opportunity for the engagement of these companies at a large scale. The remainder of this section addresses major energy-related sites such as abandoned and reclaimed mine lands and electric power generation sites.

3.5.1 – MINED LANDS

Mined Lands Regulations Overview

The Surface Mining Control and Reclamation Act (SMCRA) of 1977 established the federal policy and nationwide program regulating coal mining operations and reclamation. The intent of SMCRA is to balance the nation's energy needs with the protection of society and the environment from any adverse effects of coal mining operations. The public law established the Office of Surface Mining Reclamation and Enforcement (OSMRE) within the Department of the Interior and provides for cooperation between the States and the Secretary of the Interior by granting primacy to states with current and legacy coal mining operations (except for Tennessee, Washington and some Tribal lands). Primacy allows states to establish their own acts, promulgate and enforce their own regulations, and control reclamation on mined lands. State acts must be no less effective than SMCRA, with OSMRE acting in an oversight and guidance capacity.

The Title IV abandoned mine reclamation program and the Title V regulatory control program were established via SMCRA to provide funding for the reclamation of problem sites for mined areas abandoned before a specific date and policy and laws specific to lands affected by surface coal mining operations after enactment. Surface coal mining operations also include the surface areas that are affected to facilitate underground mines. Abandoned mine sites are termed "pre-law" with the date of enactment of individual state permanent program regulations/primacy determination by OSMRE determining the cutoff date for state pre-law status. For example, Illinois mines are considered pre-law if they ceased operation prior to February 1, 1983 and Indiana mines are considered pre-law if they ceased operation prior to July 29, 1982. Reclamation standards and practices, governing regulations, and ownership of affected lands vary between pre-law mines and permanent program mines. These variations present some benefits and some limitations for reclaiming land surface affected by mining operations for the monarch butterfly and native pollinator habitat initiatives.

Abandoned Mined Lands

Generally, Abandoned Mined Lands (AML) programs under Title IV in each state are responsible for addressing public safety, environmental hazards, and health concerns at legacy sites that were mined during the two centuries prior to the passage of SMCRA and state permanent program regulations. Funds are generated for AML programs through a federal tax assessed on each ton of coal produced in the nation. These monies are appropriated to states with primacy, each state determines the sites most in need of reclamation. Priority is given to abandoned mine sites where public health and safety are in danger. Many AML sites are under

private ownership with the landowner providing input regarding the species that are chosen for re-vegetation. AML reclamation projects are not tied to any regulated (i.e. permitted) post-mining land use and therefore represent many available acres that could be reclaimed to prairie communities composed of native grasses and forbs.

Reclamation of abandoned mined lands can be limited by state and federal budget impasses. Adequate funding may not be appropriated to state programs in a consistent or timely manner. In addition, erosion control and water quality protection are the highest priority parameters when considering how to best reclaim these legacy sites. This may affect the species chosen for re-vegetation at some project sites or some portions of project sites. Seedbed quality may be significantly degraded due to available materials which plays a role in the types of vegetation that will successfully grow on a site. Despite these limitations, monarch butterfly and pollinator friendly habitat restoration on AML project sites is becoming increasingly more common and represents a potentially positive impact for monarch conservation efforts.

Regulated Mined Lands

States with primacy function as the regulatory authority (RA) under Title V and ensure that, in accordance with SMCRA and state regulations, coal is mined in an environmentally responsible manner and land surface affected by coal mining is adequately reclaimed. State RAs are bound by regulations and can require the use of native species for Fish and Wildlife post-mining land uses but cannot require specific re-vegetation species unless those species are part of site specific management practices for listed threatened or endangered species. A far more effective and proactive approach for monarch butterfly conservation efforts, and species conservation efforts in general, would be a mechanism by which RAs could encourage, promote, and provide incentives for the voluntary adoption of specific species in accordance with state or federally recognized pre-listing conservation programs. Educating coal mine operators and consultants regarding the difference between reactive and proactive approaches to conservation and relaying potential permitting and operational impacts of listing the monarch butterfly is needed for larger scale buy-in.

Enhancement of wildlife habitat for native pollinators is encouraged where practicable, however there are requirements under Title V that prohibit such activities. For example, all pre-mining prime farmland is required by law to be restored to a functional post-mining land use of cropland. Therefore, the significant amount of prime farmland in the Midwest will constrain some initiatives focused on herbaceous vegetation. In addition, instances routinely arise where erosion control takes priority over the use of native species to stabilize steep slopes and reduce sediment loading and water quality violations in surface waters.

The funds for reclamation of permanent program sites are collected from the permittee in the form of a reclamation bond that is required prior to approval of a mining permit. The permittee is responsible for the total cost of reclamation, which limits voluntary adoption of higher priced seed mixes such as those comprised of native grass species and pollinator friendly native forbs. Permittees must meet bond release criteria outlined in the regulations prior to bond monies returning to the company, which also may limit the voluntary adoption of more management intensive seed mixes. In addition, after reclamation bond is released the land is no longer regulated by the state and a company may wish to pursue alternative uses for the land such as cattle grazing or recreation. A company, in this instance, would likely choose seed mixes that meet regulations but also facilitate the long-term land use plan.

Enhancement of Fish and Wildlife Habitat on regulated mined lands for monarch butterflies and native pollinators occurs when possible. Additional opportunities to contribute to the proactive conservation of the monarch butterfly do exist. Effective educational outreach to operators and consultants, consideration of monarch butterfly and pollinator seed mixes that are effective for erosion control, and fostering partnerships that defray pollinator habitat enhancement reclamation costs are necessary to move the initiative forward.

Current Initiatives

OSMRE has embraced a science-based technology called the Forestry Reclamation Approach (FRA) on both active and abandoned mine site reclamation projects. This method focuses on planting native herbaceous and woody species on non-compacted soils which can greatly increase pollinator foraging opportunities and volunteer native species. In addition, the FRA Pollinator Advisory provides guidance on re-establishing pollinator habitat on mined lands with some nuances of mined lands considered. The West Virginia Department of Environmental Protection/Division of Mining and Reclamation is an example of a state RA that has adopted this approach. OSMRE supports the state RAs and AML programs by providing information about the FRA and Pollinator Advisory, encouraging the use and suggestion of native species for re-vegetation, and providing educational and field observation opportunities to interested parties.

Abandoned Mined Lands

Title IV AML reclamation projects do not typically face the same limitations that permanent programs sites encounter. For this reason, most of the current mined lands monarch butterfly habitat restoration occurs on these sites. Multiple state AML programs such as the Railroad Commission of Texas/Division of Mining and Exploration/Abandoned Mines Program and the Ohio Department of Natural Resources/Division of Mineral Resources Management/Abandoned Mined Lands Reclamation Program currently utilize native species seed mixes on reclamation projects. The seed mix developed in Ohio is specifically geared toward pollinator habitat. Two state AML programs have received grant funding from the National Fish and Wildlife Foundation (NFWF) to move forward with pollinator habitat and monarch butterfly conservation initiatives on their respective abandoned mined lands projects.

1. The Iowa Department of Agriculture and Land Stewardship/Division of Soil Conservation and Water Quality/Mines and Minerals Bureau/Abandoned Mined Lands Reclamation Program in partnership with Pathfinders RC&D and the Iowa Division of Soil and Water Conservation received portions of a NFWF grant in 2015 (other programs a party to grant funding were the Conservation Reserve Enhancement Program (CREP wetlands), urban, and Buffer Initiative with over 5,000 total acres of pollinator habitat established). The AML program in Iowa has committed to several educational field days and has seeded upwards of 150 acres with pollinator friendly plant species. If successful, future plans are to incorporate pollinator habitat seed mixes on reclamation projects as it fits with landowner use of the site. The AML program in Iowa has also been actively involved with the Iowa Monarch Consortium along with Iowa State University.

2. The Missouri Department of Natural Resources/Land Reclamation Program/Abandoned Mined Lands has formulated a new initiative focused on

increasing the ecological fitness of pollinator species by improving the quality, quantity, and connectivity of habitat on landscapes affected by historic mining activities. The state AML program is pursuing a multi-objective approach to re-vegetating mined lands, which includes the integration of native milkweed and other nectar producing forbs into warm season grass mixes. The Missouri program received grant funding from the NFWF Monarch Butterfly Conservation Fund, and will be planting native warm season grasses and forbs in the spring of 2018 on approximately 100 acres.

Regulated Mined Lands

Although not all state RAs are aware of the extent of the monarch butterfly conservation initiative, most programs currently encourage and support the voluntary addition of native milkweed species and other pollinator friendly forbs in the re-vegetation seed mixes for Fish and Wildlife Habitat and Pasture/Hay post-mining land uses. Where coal companies and consultants are amenable, state RAs work to educate on the importance of monarch butterfly and pollinator friendly seed mixes. Some state RAs have seen voluntary adoption of these seed mixes and have approved adoption of best management practices (BMPs) for mowing and maintenance to effectively cultivate pollinator friendly habitat. The Ohio Department of Natural Resources/Division of Mineral Resources Management partnered with the USFWS to present educational information at a coal industry meeting to encourage potential habitat enhancement on mined lands. In addition, the encouragement of conservation buffers composed of native grasses and forbs in conjunction with agricultural production post-mining land use acreages is a fairly common practice among state RAs, particularly those coal mining states in the Midwest such as the Illinois Department of Natural Resources/Office of Mines and Minerals/Land Reclamation Division.

Strategies for Improvement of Current Efforts

Improvement of current efforts regarding mined land reclamation for pollinator species, including the monarch butterfly, should focus on educational outreach and increasing an understanding with potential partners about the limitations faced on mined lands. These limitations include but are not limited to funding, landowner buy-in, regulations, effectiveness of native forbs for erosion control, and opposition from other sectors. Strategies to address these limitations are outlined below:

- Although BMPs already exist for establishment of pollinator friendly habitat, coal regulatory programs require practices that are specifically tailored to mined lands that may still be in operation. For example, there will be limited or no capacity to burn on site, which is a major component of most BMPs for pollinator habitat. Bond release criteria affect all decisions made my permittees, including re-vegetation selection. Mined lands require BMPs that take into consideration the regulations governing reclamation and take into consideration the long-term goals of the companies. One approach to this issue is creating partnerships between stakeholders representing both mined land reclamation and conservation groups to draft appropriate mined land BMPs.

- Access to cost effective pollinator friendly seed mixes that also functions to adequately control erosion is limited for both AML programs and mine companies trying to meet reclamation and environmental standards. Seed mixes that contain native grasses and forbs are typically exponentially more expensive than standard pasture grass seed mixes. A company or state program that is reclaiming several hundreds of acres would need to have multiple thousands of dollars available in a budget to spend on native seeding materials. Concern has also been expressed that forb heavy seeding might contribute to sediment control issues leading to water quality violations and the need for expensive repairs on slopes. One approach to this issue is providing AML programs and permittees with incentives to purchase higher priced seed mixes, such as cost sharing. Additionally, entering into agreements with state agencies or conservation organizations to offset the cost of seed while committing to set aside acreage specifically for monarch habitat could be effective. Research through universities or state agencies to develop native pollinator friendly seed mixes that also control erosion could stimulate increased conservation efforts on mined lands.

- Education and outreach to coal mine operators, consultants, land owners, and state RA/AML programs is imperative for conservation efforts to take hold on mined lands. Resources that may benefit these stakeholders include explanations on how federal listing of the monarch butterfly could affect mining operations and permitting, and information explaining the human benefit of proactively conserving species in jeopardy.

- OSMRE plays an important role with state RA and AML programs. Many of these programs would benefit from an increased promotion of the FRA and Pollinator Advisory document and discussions on how this approach fits with regulations and program objectives. In addition, training/collaboration opportunities between OSMRE and the state programs would be beneficial. Conservation areas within cropland and Industrial/Commercial post-mining land use acreages present an untapped area for increasing pollinator habitat. Discussions between states and OSMRE regarding flexibility with these land uses might move additional conservation efforts forward. Initiatives involving cropland would require buy-in from the agricultural community, and assistance with outreach to those landowners might be beneficial. Exploring the use of federal grants through OSM for both Title IV and Title V projects, potentially including operators, as incentives to restore land as monarch butterfly habitat might offset some limitations for both programs.

- Coal mining operations typically receive negative feedback and opposition from non-profit groups, conservation agencies, and universities regarding potential adverse effects on the environment from mining. While this is an understandable reaction, a

conservation effort with a broad scope such as the monarch butterfly initiative provides an opportunity for those groups to offer technical assistance and partnerships to operators and consultants for the benefit of the environment as well as positive public relations messaging.

Potential Scale of Mined Land Efforts

Based on information obtained from OSMRE, approximately 1,234,624 acres of land are bonded through coal mining regulatory programs across the states of Texas, West Virginia, Ohio, Oklahoma, Pennsylvania, Kansas, Kentucky, Missouri, Arkansas, Illinois, and Indiana, all in various stages of operations and reclamation. The post-mining land uses of these acres vary between Fish and Wildlife Habitat types, Forest, Industrial/Commercial, Cropland, Pasture and others. Data collection, storage, and format varies widely among state RA programs. A total accounting of acres in permanent programs throughout the Midwest that are approved with a post-mining land use compatible with pollinator habitat but that have yet to be reclaimed is not possible at this time. However, several states responded to inquiries regarding the available potential acreage within their respective permanent programs. Looking specifically at Fish and Wildlife Habitat, Pasture/Hay, and limited Forest post-mining land uses, there are approximately 504,000 acres bonded and in various stages of operations or reclamation regulated by state RAs across Arkansas, Illinois, Indiana, Kentucky, Ohio, Oklahoma, Missouri, Texas, and West Virginia. Readers should understand that this number does not reflect Pennsylvania (bonded acres were not broken out by post-mining land use) and does not reflect each state's variation in post-mining land use terminology. For example, the acreage that Illinois contributed to this total does not reflect Fish and Wildlife Woody or Wetland nor does it reflect Forest post-mining land uses. Forest land uses were not reported from all responding states. The total number of the potential scale of regulated mined land acres is likely higher than that reported here. According to the states that responded to inquiries regarding AML acreages, there are approximately 18,900 acres across Indiana, Iowa, and Missouri of un-reclaimed project sites and Ohio reclaims about 1,500 acres per year. Mined lands provide a unique potential opportunity to increase pollinator habitat across the Mid-America region to benefit the monarch butterfly conservation initiative should states, OSMRE, and conservation groups find ways to communicate and learn from each other, and form positive collaborations.

3.5.2 – ENERGY GENERATION SITES

Electric power companies own and/or manage substantial land and associated natural resources across North America. This land management responsibility includes acres surrounding power plants and substations, separately owned parcels ranging from 1 to 10,000 acres, millions of miles of transmission and distribution rights-of-way, land previously mined for coal, recreation areas, and property leased to farmers, among others. With the power sector adopting more renewables, solar and wind farms are also becoming important considerations for habitat management.

While power companies have management responsibility, they do not always have full control to manage the sites. For example, some transmission lines may have easements with the property being owned by a federal or state agency (i.e. United States Forest Service, state Departments of Natural Resources, etc). In other cases, management of property that companies do own may have limitations, such as buffer acres around a power plant that must be managed to ensure the plant itself is accessible, physically safe, and emergency response ready. On the other

hand, some power companies may be able to include monarch-protection provisions in their property lease agreements to farmers.

There are already many case-studies of power companies proactively supporting monarch habitat on their preserved and recreation properties across the United States. The Electric Power Research Institute (EPRI) is currently collecting these case-studies from EPRI members. There may also be dual-purpose opportunities for even working acres to meet both their primary business purpose (i.e. power plant buffer, right-of-way) as well as those of monarchs and other species. However, there are many cases where property management would need to be modified to support the monarch, the costs of which would have to be approved by company boards, shareholders, and in some cases regulatory commissions.

Opportunities, hurdles, and realities must be carefully considered in relation to how power companies manage their land to focus on the monarch. While many scientific studies have been done to understand monarch biology, this information needs to be robustly considered as it relates particularly to the electric power industry. For example, many Integrated Vegetation Management (IVM) practices used on transmission line right-of-ways are compatible with providing habitat for monarchs, but there has not been a systematic review of these practices and their benefit or detriment to monarchs. The overuse of glyphosates as a contributor to monarch decline on corn and soy farms may not result in monarch impacts when application is targeted, limited, and managed under modern IVM practices. Careful consideration of specific BMPs, associated costs, and necessary approval needs to be assessed, as well as how monarch conservation objectives align with broader biodiversity and sustainability commitments already in place. Such assessment will be needed to make the case for conservation investments to shareholders, public utility commissions, and skeptical customers (electricity users).

In 2018, EPRI is launching a deep assessment to: consider power companies' role in monarch impacts and conservation; describe regionally-specific monarch conservation actions a power company can take that are meaningful; and describe barriers and solutions for the implementation of monarch conservation actions on the diverse types of power company property. Ultimately, power companies are mandated to provide safe, affordable, and reliable electricity. As with the majority of conservation opportunities, there may be economic, social, or environmental tradeoffs to consider related to monarch conservation and EPRI is working to understand these tradeoffs (see Fox 2016 for more information).

Next Steps for Energy Infrastructure Partners

- Continue to foster information-sharing and supportive partnerships through the Rights-of-Way as Habitat Working Group and the Electric Power Research Institute (EPRI);
- Support research that will help make the business case for investing in monarch and pollinator habitat establishment and management on abandoned/reclaimed mine lands and energy generation sites;
- Work to engage and educate mined lands partners in discussions around the potential for monarch and pollinator habitat on abandoned/reclaimed mine lands;
- Build networks or partnerships that will aid in tracking monarch habitat accomplishments and progress towards habitat goals on energy generation sites, including better data on milkweed baseline conditions and response. Include communication between U.S. Fish & Wildlife Service, current participants of the Rights-of-Way as Habitat Working Group, EPRI, state agencies, and the Integrated Monarch Monitoring Program (IMMP; see section 5.2).

3.6 – URBAN CONSERVATION AND ENGAGEMENT

Four out of five Americans live in large metropolitan areas (U.S. Census Bureau 2010), and roughly 4.7% of land area in the core monarch range is considered "developed" based on NLCD and US Census cover types (Bouman et al. 2017). Although urban areas have traditionally been viewed as biological deserts, recent work has discovered surprising potential for biodiversity. This is especially true for insect pollinators, which generally have relatively small habitat requirements when compared to larger taxa. Several American cities that have been surveyed support a higher diversity of bumblebee species, including the recently federally listed rusty patched bumblebee (*Bombus affinis*), than adjacent rural areas, supporting a conclusion that developed areas can support high priority and high impact conservation efforts (Hall et al. 2017; U.S. Fish and Wildlife Service 2017).

Similarly, urban and other developed areas may not seem at first glance to provide significant potential acreage for monarch habitat, yet the Urban Monarch Conservation Design project (www.fieldmuseum.org/monarchs) led by The Field Museum and the U.S. Fish and Wildlife Service has found that the potential for milkweed plants and monarch habitat within cities is much greater than initially thought. A large metropolitan area such as the Chicago region has over 18.5 million stems of milkweed already on the ground, with the potential to double this amount through the use of strategic engagement practices with different landowners. Based on analysis performed by The Field Museum (Mark Johnston, pers. comm.), urban areas in the north core monarch conservation unit may have the potential to contribute from 50 to 128 million additional milkweed stems, or 3.4 to 9.8 percent toward the north core conservation unit goal of 1.3 billion stems of milkweed added to the landscape. From the same analysis, urban areas in the south core conservation area have the potential to add from 20 to 51 million additional milkweeds stems to the as yet undetermined south core goal. Recent research suggests that monarch reproduction in residential gardens may provide increased recruitment when compared to natural areas, and that isolated patches of milkweed distributed at low densities across the landscape, such as in gardens, could significantly increase the number of eggs an individual monarch lays in her lifetime (Cutting & Tallamy 2015).

Furthermore, the education and outreach possibilities of monarch habitat projects within cities can reach millions of people who might otherwise be unconnected to and unaware of the threats to monarch butterflies specifically, and the role of nature in cities more generally. Monarchs in many ways are an ideal species to engage the public on conservation because they are captivating, charismatic and represent a powerful cultural symbol that can engage people to talk about conservation—and to each other. Monarchs are a convener: a species and a story able to connect people across a continent who witness the stunning migration in their own backyards. The collective impact of creating habitat at different scales and on a variety of land use types in urban regions throughout the monarch flyway is substantial. Additionally, creating diverse monarch habitat will also help conservation efforts for all pollinators, several of which are imperiled including the endangered rusty patched bumble bee.

In short, urban areas are important both for providing additional breeding and migrating habitat for monarch butterflies, other pollinators and even grassland birds, and for gaining critical support for monarch and pollinator conservation across the country. For this effort to be successful, however, the focus will need to be both on the most effective locations to place habitat at the local scale and developing and implementing the most effective strategies to engage different landowners. This latter aspect relies on employing social science methods to help understand the values, concerns and issues urban residents have, and finding where the

overlap and alignment may exist between these aspects and monarch conservation goals. The co-benefits of urban nature, and specifically pollinator habitat, intersects with a wide range of quality of life issues in urban communities including storm water flooding, health, vacant lot revitalization (Elmqvist et al. 2015), and culture heritage (Nocca 2017). Thus there are extensive opportunities to connect monarch efforts to other existing municipal or community-wide projects and programs.

While monarch habitat improvements in urban/developed areas serve a dual purpose—providing habitat for butterflies and socio-economic benefits for people—this section will mostly focus on the habitat potential existing in urban and developed areas, and the effective engagement of citizens and groups to develop habitat. A separate section of this document titled "Education and Outreach" will more explicitly address projects and programs that are aimed at communication outcomes for multiple audiences and increasing awareness. However, since people are the most prominent force in cities, this section will inevitably touch on the education and outreach that results from monarch habitat projects within municipalities and developed areas. For example, city park staff can contribute meaningfully to monarch and pollinator habitat by incorporating native vegetation into their landscaping, but these efforts would be incomplete without accompanying signage and outreach efforts that inform the visiting public about the purpose and benefits of these plantings.

Because every city or municipality will differ in what types of monarch conservation efforts it can pursue, this section will take a high-level view of potential strategies for monarch habitat conservation in a variety of settings within developed areas.

Current Urban Monarch Conservation Efforts and Recommendations

Efforts to conserve monarchs and their habitat occur across the core habitat areas at many different scales. A brief explanation of the different types of conservation in urban areas, recommendations for improvement, and examples of some types follow.

Habitat Creation

Although several threats impact monarch survival, a primary challenge in the core areas is loss of habitat, especially milkweed and nectar resources from anthropogenic causes (Pleasants 2017). Projects to plant milkweed and nectar gardens are common and increasing. They have their genesis in nation-wide efforts like Monarch Watch's Monarch Waystations, in municipalities responding to citizen concerns and creating gardens on city owned land, and residents creating habitat on their own property in response to monarch population declines. A common thread is the engagement of local citizens in action to benefit monarch butterflies. For many of these efforts, although a great deal of passion and knowledge is used at the inception, the long-term time and funds to maintain the projects remain a challenge.

Recommendations

- Engage municipality administrations in monarch conservation and habitat creation by introducing them to the broad variety of urban programs connected to monarchs that provide ideas and funding;
- Engage with youth, faith based and other community organizations to identify the alignment that may exist between conservation goals for monarch habitat creation and the existing issues and concerns different community groups are focused on. This can be done through targeted social surveys and interviews with key community leaders and practitioners;

- Co-develop mentoring and apprenticeship opportunities between community organizations and partners such as natural history museums, botanic gardens, and Master Gardener groups that connect monarch habitat to existing urban priorities (e.g., storm water flooding, access to green space, health etc.)

Examples of Urban Habitat Creation

- Monarch Watch Monarch Waystations
- Greener Nebraska Towns and Community as Habitat

Habitat Restoration

Municipalities and suburban homeowners have begun to realize that the management of their property can impact monarch reproduction and survival, especially the negative wildlife effects of the trend towards immaculate lawns and landscaping. Community resources, such as the Chicago Botanic Garden, the Tallgrass Prairie Center, and the Blank Park Zoo, have championed planting natural landscapes for pollinators and monarchs for years. In some areas, debates are developing against restrictive homeowner association covenants or municipal ordinances prohibiting taller vegetation. In less restrictive communities, homeowners and municipal property managers are allowing native vegetation that had typically been mowed to flourish again, providing milkweed and nectar resources for monarchs (Kessler 2012). Although a boon for monarchs, many of these efforts are rooted in the functional aspects of water management in an urban landscape - water gardens and filter strips help minimize minor flooding (Minnesota Board of Soil and Water Resources 2017). Common challenges remain time constraints and long-term funding.

Recommendations

- Engage municipal administrations in the advantages of native and more diverse vegetation in water management protocols;
- Engage community associations to inform them of monarch conservation needs, and the aesthetics and advantages of diverse monarch-friendly habitat plots in their communities;
- Engage garden clubs, Master Gardeners, and local volunteers to maintain restored habitat;
- Municipal funds saved from reduced mowing can be used towards maintenance of habitat plots.

Examples of Urban Habitat Restoration

- Fresh Kills Park, Staten Island, NY
- Silo City site - Buffalo, NY – Lower Great Lakes Fish and Wildlife Conservation Office

Citizen Science

One of the great resources for conservation in urban areas is the people. Engagement of this resource is the goal and challenge of urban programs from fair housing to gun violence reduction. For natural resource conservation, the urban populace is a powerful force.

Recommendations

- Partner with organizations such as Master Gardeners and Master Naturalists, whose motivated and science-literate members are required to donate a specified number of hours annually to community projects;

- Develop, host or endorse a mobile platform app such as iNaturalist to not only record data related to citizen science, but also to bring participants together as a community, enhancing participation and retention;
- Energize participants by demonstrating how their data and efforts are used in decision making for their community or beyond.

Examples of Urban Citizen Science

- Journey North and Monarch Joint Venture's National Monarch Monitoring Program are two examples of citizen science programs that can be adapted for use in urban landscapes.
- Urban Ecology Center, Milwaukee, WI

School Conservation

Part of changing attitudes and priorities of communities often start at community schools. Introducing urban school children to the natural world is a goal for many districts, and is often achieved through outdoor experiential activities such as planting gardens or involvement in science projects associated with the gardens. These experiences have generally improved grades, behavior, and environmental attitudes (Blair 2009). Additionally, students become involved with science projects that filter out into the community, enhancing the environmental impact. Gardens or other school environmental projects are started primarily to provide enrichment for students. A common challenge is ensuring the longevity of these programs when the driving force behind them, such as a teacher, parent, or administrator, leaves the school.

Recommendations

- Connect with local school districts to inquire about and aid planners in including monarch conservation in the basic curricula;
- Provide technical assistance and resources to teachers, including volunteer groups such as Master gardeners and garden clubs.

Examples of Urban Schools Conservation

- Eco-Schools USA
- Twin Cities Nature Connections Urban Wildlife Refuge Partnerships

Public Outreach

Over the last several years, natural resource managers, researchers, and policy makers have realized that reversing the monarch's population decline cannot be achieved by the US Fish and Wildlife Service or state fish and wildlife agencies alone. It will take a concerted effort by federal and state agencies, municipalities, private organizations, and landowners and citizens to restore enough habitat to support a robust monarch population (Thogmartin et al. 2017a). A common goal of invested entities is outreach to the public and organizations; to move them from apathy to interest to active engagement and action. Groups and individuals have used a broad variety of initiatives to catch the attention and imagination of target audiences, including monarch festivals with hands-on activities such as monarch tagging, demonstrations of citizen science programs like Journey North, and technical assistance for backyard gardeners.

Recommendations

- Engage and collaborate with municipal administrations, city and state agencies, and non-profit organizations to provide venues and opportunities for urban residents to learn about monarchs and experience hands-on activities;
- Provide training for volunteer groups such as Master Naturalists to act as sources of information for citizens about monarchs and their habitat requirements;
- Create a local program to register and recognize monarch habitats in the urban space.

Examples of Urban Public Outreach

- St Louis Audubon Society – Bring Conservation Home Program
- Fayetteville, AR Monarch Conservation Plan

Milkweed and Nectar Plant Seed Collection and Distribution

Research shows that a limiting factor for monarchs in their north core breeding area in the Midwestern U.S. is a lack of milkweed (Pleasants 2017), and there is a growing consensus that nectar plants are also lacking in many areas of both the southern and northern monarch range. A challenge in creating and restoring this habitat is a lack in at least some areas of ecoregionally-appropriate seeds of milkweed and nectar plants. Because milkweed is often looked upon with disfavor or as a "weed," and because it was a common native plant, diverse seed or seedling sources of milkweed species weren't easily available until recently (Borders & Lee-Mader 2014). However, many urban programs and initiatives have become involved with this challenge, and are both providing seeds and plants for growing and research, and exploring ways to harvest and use their own seed in local projects.

Recommendations

- If locally-sourced seed is unavailable, it may take several years to gather seed and propagate ecoregional varieties of milkweed and nectar sources. Training engaged volunteers such as Master Gardeners or the local native plant society are often productive avenues to explore;
- Local gardening enthusiasts can be recruited to plant and grow collected seed to produce additional seed for projects;
- A portion of collected seeds can be given to national or regional seed banks to make them available, over time, for a greater number of projects.
- Work with big box chains to supply a greater variety of untreated native plants, including a milkweed species, in urban centers.

Examples of Urban Seed Collection and Distribution

- Greenbelt Native Plant Center, New York
- Native Seed Network
- Monarch Watch Milkweed Market

Policy

Natural habitats in urban areas are frequently perceived as unsightly, or as attractants for vermin and pests. As such, municipalities often have regulations and policies to prohibit the establishment of natural areas except in a few designated locations. Conservation organizations, such as those working with the National Wildlife Federation's Mayor's Monarch Pledge, have approached city administrations with proposals to convert vacant and abandoned properties to monarch and pollinator habitat, and to revise mowing policies at parks and other municipal

properties to encourage monarch habitat (Fitzgerald 2015). Armed with research and studies that unveil the benefits of natural habitats, including aesthetic attributes and their role in actually helping to prevent the establishment of vermin and pests, changes in municipal policies have enabled groups to restore and plant monarch habitat in many municipalities.

Recommendations

- Framing inclusion of natural habitats in urban areas as components of an effective storm water run-off plan may allow for greater acceptance and broader implementation;
- Encourage local municipalities to sign the Mayor's Monarch pledge and adopt as many monarch friendly practices as they can;
- Provide technical assistance to municipal maintenance and parks departments regarding integrated pest management for both invasive plants and insect pests;
- Through engagement and education, provide assistance to community groups regarding mowing practices and vegetation restrictions in development and neighborhoods in order to allow for taller growing native vegetation.

Examples of Urban Policy

- Monarch Conservation in America's Cities: National Wildlife Federation
- Madison WI Pollinator Protection Task Force
- Minnesota Pollinator Friendly Cities Initiative

Management

The management, or maintenance, of monarch habitat is a key piece to a successful habitat creation or restoration. Failing to monitor a new project can often lead to its failure due to neglect, invasive weeds, the death of key plants, or destruction by groundskeepers or others as an eyesore. Education and support of the group or individuals initiating the project, or a formal hand-off to another engaged group for management is essential. Successful maintenance can be part of educational efforts, connected with using the garden or habitat for research purposes, or as part of faith organizations' service commitment to the community.

Recommendations

- Include maintenance requirements as part of the planning process for the habitat creation or restoration;
- Engage local groups who can take possession of the project in their community;
- Obtain buy-in from maintenance staff at schools, churches, and corporate campuses.

Examples of Urban Maintenance

- Milkweeds for Monarchs (St. Louis, MO)

Partnerships

Because of the diverse land use types that can potentially be utilized to establish or restore monarch habitat in urban areas, partnerships are a virtual necessity to be successful. Granting organizations for funds, municipal administration, various departments that control land management or use, and communities surrounding the project area all need to be part of the planning and implementation. The ability to think outside the box in relation to potential sites is helpful to engage partners. They need to focus on how supporting monarch habitat will benefit them in the long-term management of their properties.

Recommendations

- The benefits of providing monarch habitat go beyond conservation of a species: human health and well-being, urban water management, tourism, education, engagement of under-served populations, etc. should be clearly communicated;
- Partnerships should go beyond choosing a site and planting to include how it will be used by the community and who will maintain it.

Examples of Urban Partnerships

- Wildlife Habitat Council
- Mayor's Monarch Pledge
- Urban Monarch Conservation Design

Roles of State Agencies in Urban Monarch Conservation

As stewards of states' wildlife resources, state fish and wildlife agencies own and manage land for wildlife-based recreation. Although this includes non-consumptive uses such as wildlife watching, photography and nature study, a primary purpose of agencies is to provide resources and areas for hunting, trapping and fishing, uses that are often not compatible with urban land uses. However, state agencies can provide other resources to support urban monarch conservation outside their traditional role of providing consumptive outdoor recreation.

Increasingly, state fish and wildlife agencies are becoming less the purveyors of "hook and bullet," but providers of a more inclusive land and resource use conservation ethic. As such, state fish and wildlife agencies, as stewards of a state's wildlife resources, can provide valuable benefits to urban monarch conservation efforts. Additionally, work in urban areas is also an important "stepping stone" for state agencies more typically focused on conservation in larger, more rural areas. As urban and suburban dwellers become introduced to conservation issues—and monarch and pollinator habitat is an ideal entry point—they are more apt to continue to the next stepping stone, whether that is creating habitat, visiting larger wildlife areas, caring more deeply, or broadening their overall understanding of the role of and need for conservation.

Listed below is a sampling of possible partnerships and ways in which state wildlife agencies can assist urban monarch conservation efforts.

1. Technical support and/or resources for urban conservation efforts: State agency staff are highly experienced and trained in skills such as taxa identification, habitat restoration and enhancement, and data collection and analysis. Workshops and training days in these skills can aid urban groups in conservation efforts.
2. State agencies commonly produce educational items such as monarch brochures, game-sheets for public events, and monarch displays that would enhance education and outreach efforts by urban groups.
3. State agencies often support state or local grant programs or help by providing matches to groups seeking grants to fund urban monarch conservation.
4. Financial support for municipal programmatic items such as interpretive panels, seed packets, or pollinator plants can be provided in whole or in part by state agencies.
5. Communication support by state agencies highlighting municipal achievements in publications, online, and in social media helps to build a sense of community and ownership of conservation projects, aiding their longevity and effectiveness.

6. State agencies can provide staff to lead educational nature activities and/or conduct citizen science efforts on behalf of or in conjunction with a municipality such as butterfly counts or conservation weekends.
7. As urban volunteers become trained, they can aid state agencies by helping at public events where the agency has a booth or table.

Next Steps for Urban Monarch Conservation Partners

- Engage municipality administrations in monarch conservation and habitat creation by introducing them to the broad variety of urban programs connected to monarchs that provide ideas and funding;
- Engage with youth, faith based and other community organizations to identify alignment that may exist between conservation goals for creating monarch habitat and existing issues and concerns community groups are focused on. This can be done through targeted social surveys and interviews with key community leaders and practitioners;
- Co-develop mentoring and apprenticeship opportunities between community organizations and partners such as natural history museums, botanic gardens, and Master Gardener groups that connect monarch habitat to existing urban priorities (e.g., storm water flooding, access to green space, vacant lot revitalization, health etc.);
- Develop, host or endorse a mobile platform app such as iNaturalist to not only record data related to citizen science, but also to bring participants together as a community, enhancing participation and retention;
    - Energize participants by demonstrating how their data and efforts are used in decision making for their community or beyond.
- Provide technical assistance to municipal maintenance and parks departments regarding integrated pest management for both invasive plants and insect pests;
- Work with big box stores to supply a greater variety of native, non-treated plants, including a milkweed species, in urban centers;
- Build partnerships that will aid in tracking monarch habitat accomplishments and progress towards habitat goals on urban and developed lands, including better data on milkweed baseline conditions and response. Include communication between U.S. Fish & Wildlife Service, the Field Museum, Monarch Watch, state agencies, and the Integrated Monarch Monitoring Program (IMMP; see section 5.2).

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PART FOUR – OUTREACH AND EDUCATION

4.1 – OUTREACH AND EDUCATION

Monarch conservation has proven to be an international catalyst for conservation. Monarchs present unprecedented potential to engage a wide variety of individuals and groups in a wildlife conservation issue. Engaging and educating people about the threats to monarch butterflies and opportunities to support their recovery needs to be widespread across North America. This is necessary to achieve the scale and long-term nature of habitat restoration required for monarch butterfly population recovery. The consensus from the scientific community suggests that all people and all sectors must contribute to this recovery effort in an "All Hands on Deck" approach (Thogmartin et al. 2017).

Monarch butterflies are habitat generalists and nearly ubiquitous across the United States, which is both a challenge and an opportunity. It is a challenge since so many individuals and entities need to contribute towards monarch recovery to achieve the goals of this strategy, but an opportunity because every single resident CAN contribute to monarch recovery. The challenge for education and outreach practitioners is to communicate and engage carefully and purposefully, so that all potential actors—corporations, governments, farmers, communities and citizens—understand the scale of the task at hand but also the power each person holds to make a positive difference.

Using consistent, overarching messaging across a large geographic area regarding the threats and opportunities will facilitate collaboration and regional conservation. The overarching message for monarch conservation in the United States is relatively simple:

> *Monarchs need habitat with both milkweeds and diverse flowers throughout times of the growing season when they are present across their breeding and migratory range; these habitats should be sufficiently connected to ensure reproductive and migratory success.*

Beyond this simplified message, the following overarching messages are foundational for monarch conservation. They are designed to complement more detailed and nuanced messaging needed for specific audiences, such as school children of different ages, farmers and ranchers, educators, elected officials, land managers, communities and homeowners.

Overarching Monarch Conservation Messages

Status:

- The monarch butterfly population is in decline.
- Loss of habitat and specifically the decline of milkweed across the northern range of the eastern monarch population and loss or degradation of nectar resources in the southern range have been identified as the major factors leading to monarch declines.

The Mid-America Strategy:

- The Mid-America Monarch Conservation Strategy is based on voluntary, incentive-based approaches.
- The Mid-America Monarch Conservation Strategy is designed to facilitate proactive collaborative action to help the monarch and prevent the need for listing the monarch under the Endangered Species Act and therefore minimize potential regulatory actions.

Action:

- Monarch breeding habitat contains both milkweed host plants and a diversity of other blooming plants.
- A combination of early, middle and late blooming native flowering plants fuel pollinators and the monarch butterfly during breeding and migration.
- Native milkweeds are the necessary food for monarch caterpillars.
- Milkweed is a native plant and is acceptable to grow in yards, pastures, ditches, field edges and other landscapes. Native milkweed is preferred, and non-native milkweed species should be avoided.
- Reducing mowing and protecting existing habitat areas (breeding and migration) from potential pesticide drift are also actions to promote monarch recovery.
- Reducing unintended pesticide impacts by following best management practices will aid monarchs and monarch habitats.
- Monarch habitat also benefits honeybees and native pollinators, which are critical in the pollination of many agricultural crops as well as many other species of wild plants.

Involvement:

- Restoring the monarch population is going to take an all-hands-on-deck approach.
- There are opportunities at every scale to provide monarch habitat, from fallow fields, hedgerows, marginal cropland, field margins, and the yards and gardens around homes.
- Monarchs are a flagship species for pollinator, grassland and wildlife conservation.

Beyond messaging, many organizations have already invested significant time and resources into monarch- and pollinator-specific outreach and education campaigns. The Mid-America Monarch Conservation Strategy will avoid duplication and build on these efforts. Therefore, this chapter will focus on identifying the key communication priorities for the Strategy, recognizing that a robust community is already communicating about monarch conservation.

Successful communication requires three elements: 1) sufficiently describing what needs to be communicated, 2) correctly identifying the target audience, and 3) understanding why the message and audience is important to program success. The Strategy will benefit if these elements can be developed for three key areas of implementation.

Area 1: Informing the Board of Directors, key partners, and interested collaborators on the ongoing work of Strategy implementation. The purpose is to ensure eastern population monarch conservation efforts are coordinated and efficiently conducted. The method to do this will be through the webpage on the MAFWA website and through the biannual meetings of the Board of Directors.

Area 2: Informing the U.S. Fish and Wildlife Service of habitat management efforts implemented since 2014, and ongoing as the Strategy is implemented. The purpose is to prevent unnecessary regulatory actions. The method to do this is the use the Monarch Conservation Database being developed by U.S. Fish and Wildlife Service.

Area 3: Connecting the efforts of the Strategy Board of Directors, partners and collaborators with other landscape conservation efforts that provide mutual benefit to monarchs and other species. The purposes are to show the multiple species that benefit from habitat conservation and to ensure conservation actions are coordinated and efficient. The primary methods will be through the webpage found on the MAFWA website, links to other conservation partner webpages, and through publications and presentations. This area of communication will use the following broad goals and strategies as priorities for monarch conservation rather than priorities for just the Strategy.

Goal 1: Raise awareness to increase conservation actions and support for monarchs

The monarch butterfly and monarch migration have garnered significant attention internationally. Monarchs inspire people to get involved in conservation by creating and restoring habitat. Education and outreach are key to successful conservation and should be targeted to different audiences to maximize positive impact on monarch populations.

- Strategy 1A: Expand communication to all audiences to promote an 'all hands on deck' approach. Use partners and social networks to promote audience specific, science-based messaging.
- Strategy 1B: Utilize and promote Monarch Joint Venture as an information clearinghouse for monarch conservation and resources in the U.S.
- Strategy 1C: Shift perceptions of milkweed species and native plant habitat from 'weedy' to an acceptable and even desired component of North America's landscapes.
- Strategy 1D: Promote tools and talking points for consistent communication.
- Strategy 1F: Improve messaging to the media and press to reach the general public.
- Strategy 1G: Promote conservation tools and resources for habitat improvement.

Goal 2: Increase learning about monarchs and their habitat in settings appropriate to reach multiple audiences.

Traditional formal education settings such as classrooms and informal learning settings such as parks, nature centers, and agriculture information centers such as farm service offices present opportunities to share information, target messaging, facilitate habitat improvement and recruit volunteers.

- Strategy 2A: Support and utilize existing pollinator and monarch activities and resources such as relevant curricula, education materials, events and citizen science programs.
- Strategy 2B: Encourage educators to utilize monarch curriculum in their formal and informal education settings.
- Strategy 2C: Provide training to technical service providers including both government staff (e.g. NRCS) and Non-Government Organizations (NGOs) (E.G.

Pheasants Forever) that regularly work with private landowners to improve habitat.

- Strategy 2D: Clearly identify and provide technical service providers or other advisors with specific information about incentive programs and best practices (e.g. Farm Bill) to benefit monarchs in all landscapes.
- Strategy 2E: Increase capacity of knowledgeable advisors (e.g. technical service providers) supporting pollinator and monarch habitat implementation.
- Strategy 2F: Encourage use of monarch messaging with new audiences that have potential to either directly or indirectly impact monarch habitat conservation activities.
- Strategy 2G: Continue recruitment of and support for habitat, education and citizen science volunteers.

Goal 3: Foster networking between stakeholders involved in monarch conservation within states, among states and internationally.

Monarch conservation involves many stakeholders and partners which makes coordination challenging. Coordination and communication needs to be maintained to implement this strategy, accomplish the goals, and report progress. Evolving conservation action delivery, new scientific developments and goal refinement will need to be communicated.

- Strategy 3: Support conferences, webinars, field days, tours and other opportunities to share information and evaluate progress toward goals.
- Strategy 3B: Explore and support partnerships within states and between states.
- Strategy 3C: Maintain organizational structure that facilitates effective communication and reporting of accomplishments and changes between stakeholders engaged in this strategy.
- Strategy 3D: Maintain the monarch portion of the MAFWA website to keep participants and stakeholders apprised of monarch conservation coordination and activities within the Mid-America region.

Goal 4: Foster networking between state and federal agency stakeholders involved in monarch conservation between states.

Monarch conservation involves many states which makes coordination challenging. Coordination and communication needs to be maintained between state and federal agencies responsible for reporting progress toward accomplishing the goals of this strategy, revision of the strategy and associated goals, conservation action delivery and new scientific developments.

- Strategy 4A: Expand communication for MAFWA audiences and stakeholders through conferences, meetings, webinars, etc.
- Strategy 4B: Maintain organizational structure that facilitates communication.

Goal 5: Assess engagement needed to adequately address the monarch conservation issue, including measuring the success of outreach and communication strategies through social

science metrics to both evaluate and inform adaption of communication strategies and tactics.

In order to effectively communicate about monarchs with the appropriate audiences, a baseline needs to be established regarding monarch conservation concepts and the effectiveness of past and current tactics. This can be accomplished using social science to track, assess, and improve existing and planned efforts.

- Strategy 5A: Support and utilize social science data and expertise to develop and implement human dimensions research to support monarch conservation through targeted communication messaging and outreach products.
- Strategy 5B: Collect baseline social science information to inform the development and evaluation of conservation interventions, including communications and engagement efforts of the states involved in this plan.

Goal 6: Facilitate tracking of conservation efforts among all sectors and ensure transparency of results.

Tracking implementation of conservation actions will take place through many sectors and thousands of individuals. Streamlining the accountability of conservation actions is necessary to accurately connect actions to monarch population changes.

- Strategy 6A: Promote one tracking system that is user friendly for habitat creation and enhancement and milkweed planting across the breeding and migration geography.
- Strategy 6B: Promote citizen science across sectors to assess changes in monarch populations and habitat changes.

Next Steps for Outreach and Education

- Promote the use of the Monarch Conservation Database to as many monarch conservation partners as possible;
- Actively manage the Strategy webpage and related documents;
- Actively engage with leadership in each sector to communicate monarch conservation messages.

PART FIVE – RESEARCH, MONITORING, ADAPTIVE MANAGEMENT, AND INFORMATION MANAGEMENT

5.1 – RESEARCH

Monarch conservation research needs are diverse and continually evolving. A set of research topics (derived from a list compiled by the Monarch Joint Venture and state technical representatives) was prioritized by the Research, Monitoring, and Adaptive Management Technical Work Group with input from the Technical Steering Committee, including a survey completed by state technical representatives (see Appendix C for a complete list of questions and responses). Only ideas relevant to the eastern monarch population were included. (For other research ideas see the Monarch Joint Venture's Monarch Conservation Implementation Plan as well as a report by the Trinational Monarch Science Conservation Partnership: http://www3.cec.org/islandora/en/item/11763-monitoring-monarch-butterflies-and-their-habitat-across-north-america-inventory-en.pdf).

This section provides perspectives on research priorities related to conservation efforts proposed for this Strategy. Research questions were organized into 6 categories prior to the ranking exercise: Breeding, Habitat Creation, Migration, Overwintering, Human Dimensions, and Other. Survey respondents ranked questions within each category. The highest-ranking questions by category were:

- Breeding: For habitat establishment in intensively farmed landscapes within or near fields treated with pesticides, how does pesticide exposure impact monarch survival and recruitment?
- Migration: Are there large gaps in floral migration resources along the way? (i.e., how far can a monarch go before it has to stop and eat along migration? / map out floral resources)
- Habitat Creation: For the breeding zone: Where should we apply management treatments to effect the greatest change in populations at the lowest possible monetary and non-monetary costs to management agencies and societies?
- Overwintering: Determine areas of highest monarch overwintering contributions (repeat isotope analysis for relative breeding region contribution).
- Human Dimensions: What are the barriers to creating and maintaining monarch habitat by sector?
- Other: Determine exposure level risks for different chemicals, habitat types, or practices.

Given the importance of monarch breeding habitat in this Strategy, breeding season monarch research needs were of particular interest; those that ranked highest include:

1. For habitat establishment in intensively farmed landscapes within or near fields treated with pesticides, how does pesticide exposure impact monarch survival and recruitment?
2. How do small scale habitats (less than 1 acre) contribute to monarch conservation relative to large scale habitats?
3. What floral diversity, density, and species are necessary to be considered monarch breeding habitat / is ideal for monarch breeding and does this change with scale?
4. Need to validate / ground truth current assumptions regarding milkweed stem density by sector by state.

Additional information, along with the complete list of potential research needs, can be found in Appendix C.

5.2 – MONITORING

Two types of data collection will be needed to understand the progress being made on reaching habitat goals and the effects of habitat efforts: 1) Tracking habitat efforts regarding acres improved and management techniques used; and 2) Assessing the biological status of the habitat (stems and species of milkweed along with diversity and abundance of flowering nectar sources). Assessing the biological status of monarchs and their use of habitat (e.g. eggs, larvae, and adults) will also be useful information for helping to evaluate monarch response to habitat enhancement, but the primary metric for monitoring the eastern monarch population is the overwintering counts.

Tracking Habitat Efforts:

Tracking habitat restoration and enhancement activities will be essential for monitoring progress towards established goals, including progress towards the regional goal of 1.3 billion additional stems in the North Core conservation unit.

Additional milkweed stems resulting from habitat restoration or enhancement practices in various sectors can be extrapolated for the upper Midwest from published literature to fill in baseline and estimated post-effort milkweed density (Thogmartin et al. 2017). However, because of the limited data that was available to extrapolate those numbers across the region, many states and partners may wish to establish monitoring programs for their habitat efforts to determine baseline conditions and average milkweed and/or nectar plant response in various land categories and habitat practices specific to their states and conditions. This will provide more detailed data over time to supplement and calibrate existing models.

The Service is developing a Monarch Conservation Database (MCD) that will track two categories: 1) Conservation plans, such as this one; and 2) Conservation efforts that deliver habitat improvements for the monarch butterfly. The MCD is being designed to allow each agency, organization, or landowner to enter habitat improvement or management projects. It will include questions that will allow the Service to determine if the actions meet the Policy for the Evaluation of Conservation Efforts (PECE). More information on the MCD can be found at: https://www.fws.gov/savethemonarch/MCD.html.

Several states and working groups (e.g. the Rights-of-Way as Habitat working group at the Energy Resources Center, UIC) are developing their own tracking databases in different forms. Both Nebraska and Texas have variations of a milkweed mapper that allow citizens in their states to report species and numbers of milkweed seen. The MCD should provide a more unified system for tracking monarch habitat plans and efforts on a national scale and is being designed to accommodate bulk uploading from other databases where available. While coordination among agencies and partners is encouraged, there is no single entity in each state responsible for submitting all efforts and plans into the MCD. State and local governments, private and non-profit organizations, and individuals are responsible for entering their own monarch conservation efforts and plans into the MCD.

Tracking Biological Data on Monarchs:

There are several monarch monitoring programs already established that track various aspects of monarch reproduction, populations, biology, mortality, or movement. Most rely heavily on citizen science efforts for data collection. It is important that monitoring of similar aspects of monarch biology utilize the same protocols to the greatest extent possible, so that comparable data can be collected across regions and over time. This will increase the likelihood

that resulting data may be useful to help make regional or national inferences. Several existing monarch biological monitoring programs are described below.

Monarch Watch:

Citizen scientists tag monarchs for Monarch Watch. The purpose of tagging is to associate the location of capture with the point of recovery for each butterfly. The data from these recaptures are used to determine the pathways taken by fall migrating monarchs, the influence of weather on the fall migration, the survival rate of the monarchs, etc. Tags contain unique codes (three letters and three numbers), and each year receives its own unique series. Many questions remain unanswered about the fall migration of the monarch population east of the Rocky Mountains. What pathways do monarchs use each year and do the pathways vary among years? How is the migration influenced by weather? Data collected under this program could assist in answering these questions. Because monarchs have a certain "charisma" and a fascinating biology, this project is also a good way to introduce students to science and allow them to contribute to a scientific study. More information, including how to order tags, can be found at www.monarchwatch.org.

North American Butterfly Association (NABA):

Three of the main goals of NABA's Butterfly Count Program are to (1) gather data that will monitor butterfly populations, (2) give butterfliers a chance to socialize and have fun, and (3) raise public awareness by hosting events that will increase general interest in butterflies. A minimum of four observers and six party-hours best meets these three goals. Because some long-running existing counts do not meet the new guidelines, the four observer/six party-hour requirement is strongly suggested (but not required) for all count circles that were established prior to 2009 and required for counts established in 2009 or later. More information can be found at: http://www.naba.org/butter_counts.html.

Journey North:

Citizen scientists report monarch sightings as monarchs travel to and from Mexico to Journey North in order to help tell the species story of its annual migrations. Reported sightings include the first sightings in the spring for adult monarchs, eggs, larvae, and milkweed, as well as peak migration and overnight roosts in the fall. Additional sightings throughout the year can also be reported. These data can be used to track the spring and fall migrations, and the timing of the life stages of monarchs, including variability among years. More information can be found at: https://www.learner.org/jnorth/monarchs.

Monarch Larva Monitoring Project:

Citizen scientists collect data on milkweed density, monarch eggs and larvae, and other optional activities, such as larval monarch survival. Milkweed density is collected annually during the middle of the growing season by counting all milkweed plants at a site or estimating density by counting plants within arbitrarily located plots. To estimate immature monarch density, participants visit sites weekly and record the number of milkweed plants, monarch eggs, and different instar stages. Larval monarch survival is recorded by collecting and individually rearing larvae from monitoring sites, including sending parasitoids to the Monarch Lab at the University of Minnesota. The data are used to evaluate the distribution and abundance of immature monarchs and milkweed, as well as survival and parasitism rates, and have contributed

to numerous peer-reviewed scientific publications. More information is available at http://www.mlmp.org/.

Project Monarch Health:

Citizen scientists sample adult monarchs for *Ophryocystis elektroscirrha* (OE), a protozoan parasite that negatively impacts the health of monarch butterflies, including reducing their life span and flight abilities. Participants catch adult butterflies and/or rear caterpillars to adulthood to test for OE by pressing clear tape or a sticker against the ventral side of the monarch's abdomen. Butterflies are then released and samples are sent to Project Monarch Health at the University of Georgia for processing. Data are used to study how the prevalence of OE varies across seasons, years, and geographic locations, and have contributed to numerous peer-reviewed scientific publications. More information, including how to request an OE sampling kit, can be found at http://www.monarchparasites.org/.

Integrated Monarch Monitoring Program:

The Integrated Monarch Monitoring Program (IMMP) is a national initiative under development with a goal to monitor monarch butterflies and evaluate habitats to inform monarch conservation efforts throughout their breeding and migratory range. The IMMP is being designed by scientists from government agencies, universities, and non-governmental organizations within the Monarch Conservation Science Partnership (MCSP).

The IMMP relies on participation by natural resource managers, biologists, and citizen scientists to monitor monarch habitat using standardized protocols. The program has the following primary objectives:

- To provide geographically and ecologically representative information to update population and habitat models
- To track long-term changes in the distribution and abundance of monarch butterflies and their habitats
- To acquire and share information about how habitat conservation actions affect monarch butterflies and their habitat

The IMMP uses a spatially balanced, randomized sampling scheme to provide data from across the country and among land use types (e.g., public grassland, agriculture, rights-of-way). The IMMP protocols detail collecting field data on immature and adult monarchs, milkweed and nectar plants, and red imported fire ants (a predator present in the southern regions), with an additional activity of captive rearing field collected larvae to estimate the incidence of parasitism and disease.

Through this program, each state will have locations within each of the sectors which may be monitored for nectar plant diversity and milkweed stem numbers, and ideally monarch eggs and larvae on milkweed stems. Many volunteers may want to also monitor adult butterflies. Protocols for each of these components (habitat, eggs/larvae, and adults) can be found at https://monarchjointventure.org/get-involved/mcsp-monitoring.

5.3 – ADAPTIVE MANAGEMENT

Adaptive management acknowledges that there are multiple uncertainties related to the habitat and population management for a given species, some of which are known and others that may not yet be recognized; further, this approach allows changes to be made to a management strategy as needed once new information is acquired (Williams et al. 2009; Williams 2012).

As part of this Strategy for reversing the decline of monarch butterflies, monitoring and research will be used to help inform decisions as to whether conservation actions are positively impacting the species.

One example of an adaptive management process is the Project Management Cycle included in the *Open Standards for the Practice of Conservation* (Conservation Measures Partnership 2013). This five-step cycle is designed to measure and adapt conservation outcomes at any spatial or temporal scale and includes the following broad steps: conceptualize; plan actions and monitoring; implement actions and monitoring; analyze, use, adapt; and capture and share learning (figure 5.1). Adaptive management cycles are aimed at helping managers move beyond opportunistic conservation and better connect decisions to target species requirements and transparent scientific processes.

Figure 5.1 – Project Management Cycle from ***Open Standards for the Practice of Conservation*** *(Conservation Measures Partnership 2013).*

For monarchs, some landscape-scale conservation planning has been conducted (Thogmartin et al. 2017) and this Strategy aims to further those efforts. The fundamental objectives for milkweed and nectar resources may be achieved by a variety of means, and will differ by state and sector and over time. Habitat projects are done at a local scale, but their collective influence is assumed to move populations toward desired levels at a landscape or regional scale. To assess the correctness of this assumption, evaluation activities, such as outcome-based monitoring, are used to ensure management activities are yielding progress toward goals and assumption-driven research is conducted to improve future biological planning and conservation design (Sutherland et al. 2004; Lindenmayer & Likens 2010; Martín & Ballard 2010).

Taken together, these elements of the project management cycle comprise a process for incremental improvement in the delivery of conservation and in the status of populations. Ideally, this conservation delivery and status improvement is iterative and adaptive, allowing conservation entities to accommodate new stressors, opportunities, and species objectives as they develop (Johnson & Williams 1999; Williams et al. 2007; Lindenmayer & Likens 2009; Conservation Measure Partnership 2013). It also allows conservation entities to evaluate conservation targets and the effectiveness and appropriateness of conservation actions, based on new information, analyses, and insights from the results of outcome-based monitoring and assumption-driven research.

Other examples of conservation-related adaptive management processes include Partners-in-Flight's Five Elements Process (Will et al. 2005), The Nature Conservancy's Conservation by Design (Poiani et al. 1998, 2000; The Nature Conservancy 2006), and the Wildlife Conservation Society's landscape-species framework (Sanderson et al. 2002).

Mid-America Monarch Conservation Strategy Adaptive Management

Conceptualize:

Population Goal

This Strategy assumes an operating goal of providing monarch habitat conservation sufficient to sustain an average of six occupied overwintering hectares, until such time that new analyses or data indicate through an adaptive management process that a different goal or different activities are needed to sustain the eastern migratory monarch population. This is consistent with the monarch population target set forth in both the National Pollinator Strategy and tri-national goals (see Section 2.1).

Habitat Goal

This Strategy sets forth current habitat goals of 1.3 billion additional milkweed stems embedded in diverse grassland and open forest habitats in the North Core monarch conservation unit and increased seasonal nectar resources with an emphasis on enhancing native rangelands, prairies, and planted grasslands in the South Core conservation unit (specific targets still under development).

Uncertainties Around Goals

The information informing current goals is complex, based on several assumptions, and highly variable. These include assumptions around monarch populations and response, current milkweed and nectar habitat, probable increases in milkweed and nectar through management,

and many more. The clear goal of this Strategy is an outcome with adequate habitat to sustain the eastern monarch population; less clear is what specifically that will require in terms of conservation targets and actions.

Recent research has explored the wide variation and uncertainty in density estimates for overwintering monarchs, which has important implications for both the number of monarchs contained in 6 hectares of overwintering colonies and the amount of habitat necessary to support that target population. The simplest relationship is from a single study that calculated a relationship of 28.5 milkweeds per monarch necessary to produce one adult for migration to Mexico (Nail et al. 2015). The uncertainties around these values further complicate the practical and economic realities of the magnitude of changes in the landscape, particularly the agricultural landscape, that would be required to achieve what researchers hypothesize may be necessary.

This underscores the importance of an adaptive approach to assure that the most effective and efficient approaches are used. Implementation of the Strategy will greatly benefit from additional research and monitoring that better defines or determines the number of butterflies or hectares of overwintering habitat necessary to meet conservation goals for maintaining the species and the most efficient actions to achieve them. An adaptive management approach will provide mechanisms to formally evaluate and adjust actions, targets, and activities towards most effectively and efficiently achieving the overall goal.

Plan Actions and Monitoring:

For purposes of this Strategy, monarch conservation planning and conservation opportunity area design done by individual states will be the primary guides for targeting of conservation efforts by state (see Part 7 for example state summaries and conservation opportunity areas and links to state plans). Federal and local partners will be able to utilize that guidance for their efforts or may follow existing program guidance for their organizations. Though many states rely to a large extent on federal funding and programs to deliver conservation and must operate under federal requirements, each state will tailor actions and objectives to the specific needs of their state to the extent possible. These differences in approach will influence how conservation delivery occurs and subsequent mechanisms for evaluating conservation actions.

Implement Actions and Monitoring:

Habitat conservation at a landscape scale is the primary focus of this Strategy. Because state fish and wildlife and natural resource agencies have the authorities and accountability for monarch conservation across much of the region, they and their partners will be the primary engine that drives monarch conservation implementation.

Habitat creation and management are the primary conservation activities that state fish and wildlife agencies and other partners involved in this Strategy will engage in to benefit monarch populations. Over the course of this Strategy, many individuals, organizations, and agencies will be adding milkweed and nectar resources to the landscape over multiple sectors and land use categories (See Section Three).

Due to the inherent complexity in assessing population trends and divergence in data collection and approaches, the best available population estimate for the eastern monarch population is the area of the overwintering sites as measured by the number of occupied hectares in Mexico.

A number of citizen science programs currently exist to provide monitoring information about various aspects of eastern monarch populations. Currently, most of those estimates lack the statistical rigor to draw regional inferences, although strategies such as the Integrated Monarch Monitoring Program (IMMP) discussed earlier are working to provide a structure that might be able to do so in the future if adequately staffed and implemented. In the meantime, all participants in this Strategy will benefit from following standardized data collection methodologies and protocols for the respective aspects of monarch biology and habitat to improve comparability of data across sites, regions, and years.

Analyze, Use, Adapt:

States and partners will be able to use data gathered under research and monitoring programs to help revise the model inputs used to determine the amount of habitat needed in each sector for monarch recovery. For example, data on milkweed stems per acre are currently based on very limited published information yet are extrapolated across a large geographic area. Future research and monitoring will help determine whether actual results are higher or lower than current assumptions. This will allow model adjustments on a state by state basis to achieve more detailed estimates of the amount of milkweed or nectar resources.

Data on conservation efforts and monarch populations will be evaluated annually, with a formal review and analysis every five years. The first formal review will occur in 2023 and will consider monarch overwintering population estimates and trends, progress toward habitat goals, conservation practice costs and effectiveness, and new information from research and monitoring projects as related to the key assumptions and uncertainties (See Section 6).

Estimates of progress toward habitat goals will be made annually using information from the MCD and those values will be updated as research and monitoring programs provide more detailed estimates of milkweed stem densities by sector and state. Table 5.1 below shows an example of the evaluation factors that will be utilized by the MAFWA Monarch Technical Steering Committee as part of the adaptive management process.

Table 5.1 – Example of elements to be evaluated as part of the MAFWA Monarch Strategy adaptive management process.

Evaluated Element	Utilized Information	Trigger(s) for re-evaluation of goals and/or strategies
Overwintering Population Size	Annual overwintering population estimate based on monitoring efforts in Mexico.	Significant change in trend in hectare size
Emerging science	Peer-reviewed literature	New peer reviewed articles pertaining to aspects of the conservation strategy, the mitigation framework, or conservation practices become available
Breeding and Migrating Monarch Information	Various monitoring programs	Adult counts, egg and larval densities
Milkweed stem density estimates	Monitoring and research data specific to milkweed density	Stem densities differing from existing expectation as based upon Thogmartin et al. 2017
Habitat Restoration Goals	Restoration acreages/stem goals	Habitat goals no longer consistent with most recent peer-reviewed literature and/or national or international goals

Evaluated Element	Utilized Information	Trigger(s) for re-evaluation of goals and/or strategies
Habitat Restoration Progress	Habitat restoration acreages and/or milkweed stems reported to the Monarch Conservation Database	Time-specific goals not met by states or other entities that have established habitat goals
National Policies, Programs, Trends, and Impacts	Latest information on national policies & programs (e.g. Farm Bill) and their impacts on monarch habitat	Each time new policy or program takes effect and as agencies release reports

5.4 – INFORMATION MANAGEMENT

Monarch Conservation Database

The Service's Monarch Conservation Database (MCD) is expected to be available for data entry by mid-2018. It will allow for entry of data on conservation plans and conservation efforts. Conservation efforts are on-the-ground actions designed to improve the population status of monarchs. The database will help the U.S. Fish and Wildlife Service and conservation partners assess conditions for the monarch now and into the future, across the United States. See ttps://www.fws.gov/savethemonarch/MCD.html.

While the MCD will track conservation efforts/gains moving forward, it will also be necessary to track losses in habitat due to land conversion or other causes. There are a variety of data sources on land use and changes in land use that may provide the necessary data to evaluate this.

There is no single entity in each state tasked with entering monarch conservation plans and efforts into the Service's MCD. The Service is working with its federal agency partners to coordinate entry of project data from those sources (i.e. U.S. Forest Service, NRCS, FSA). At the state and local level, government agencies, private or non-profit organizations, and individuals will be responsible for entering their own information into the MCD. Entry of monarch conservation projects and plans into the MCD is very important, as this information will be evaluated by the Service in their listing decision process (see section 1.1 for more information about PECE).

Biological Monitoring Data

Given the wide range of this species and the number of existing monitoring programs, it is challenging to access all pertinent data to make inferences at the regional or national scale. Large programs such as the Integrated Monarch Monitoring Program that is currently under development will make data available to assist in the adaptive management process outlined above. Greater data sharing capacity and ease of access for the full breadth of biological monitoring programs would be helpful to adaptive management considerations moving forward.

Next Steps for Research, Monitoring, and Adaptive Management

Research:

- Support research to answer questions related to patch size, diversity, and distance between patches to assist with Conservation Design;
- Support research into impacts from pesticide and drift (e.g. how close can a roadside patch be to an active row crop field);
- Support research into genetic origins of overwintering monarchs and relative importance of production areas.

Monitoring:

- Work with partners to coordinate data entry for conservation efforts and attempt to ensure no efforts are missed or duplicated;

- Actively participate in the testing and implementation of the Monarch Conservation Database;
- Work with partners to monitor habitat baseline and improvement (especially milkweed) to help calibrate future models on conservation targets;
- Support biological monitoring programs for monarchs and participate to the extent possible; allow access to public lands for these purposes.

Adaptive Management:

- Keep governance structure for the Strategy in place to help facilitate and coordinate implementation, evaluate effort, and adjust course as needed through an adaptive management approach.

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PART SIX – CAPACITY, FUNDING, AND IMPLEMENTATION OF REGIONAL STRATEGY

6.1 – CAPACITY

the ability or power to do, experience, or understand something.

MAFWA has taken a leadership role in developing the Mid-America Monarch Conservation Strategy, recognizing the importance of this issue to citizens and land managers in the region and that the successful conservation of this species will require coordination across a large, diverse landscape. Landscape-level conservation efforts have been a tool of conservation for many years, although success only occurs with dedicated people committed to collaboration and sharing a common interest.

MAFWA's first step was to form a Board of Directors for the effort (see Appendix A). Directors of all states in MAFWA were invited to join in addition to inviting participation of key south-central monarch breeding and migratory flyway states and other regional AFWA associations. In addition, MAFWA created seven ex-officio advisory positions on the Board representing some of the diverse interests in monarchs and future conservation efforts among conservation and land management agencies and organizations. Response was immediate and positive for all states and most sector leaders.

The Board formed a technical steering committee and eight technical working groups to tackle various issues associated with monarch conservation, plus a policy team (Appendix A). State Wildlife Agency Directors or their designees participate on the Board and identified staff to participate in the development of the strategy, bringing considerable expertise in planning, writing, monarch conservation and other related issues. In addition, partner agencies and organizations were invited to join the technical work groups and responded enthusiastically. Agricultural interests participated in some work groups and the strategy greatly benefitted from their insights, particularly given the importance of the agricultural sector to monarch conservation. MAFWA contracted a Technical Coordinator to lead the development and writing of the plan (Claire Beck), and a Conservation Liaison to facilitate coordination and communication among and between state agencies and the Fish and Wildlife Service (Ed Boggess).

The most significant components of state capacity are the efforts of state fish and wildlife agencies working with their partners to develop state-specific management plans for monarchs and, in many cases, other pollinators. Every state planning effort has had active participation of many partners. Many states have identified monarchs as a Species of Greatest Conservation Need (Table 1.1) in their State Wildlife Action Plans, which represent a focus of the agency responsible for species conservation in the state as well as a potential funding mechanism for monarch conservation efforts. Most state agencies are currently at various stages of completion of their individual state management plans, while some have completed plans and are well into implementation.

Before state fish and wildlife agencies had begun organizing specifically around monarch conservation, the nonprofit conservation community had already established mechanisms highlighting the need for enhanced monarch conservation. A collaborative of many of those efforts is the Monarch Joint Venture (MJV). Since 2009, the MJV has brought together over 75 partners from across the United States in a unified effort to conserve the monarch migration. This diverse partnership ranges from government agencies to NGOs, businesses, and academic institutions that work together to implement science-based conservation actions in the form of education, habitat, and research. These actions are organized in an annually updated Monarch

Conservation Implementation Plan, which serves as a framework to guide conservation planning for individuals, partners, or other interested stakeholders nationally.

Several federal agencies have developed or are developing policy and programs to assist in the effort to conserve monarchs. Within Department of Interior, the Fish and Wildlife Service has been actively supporting monarch conservation at the international, national, and regional level. USDA Forest Service has developed extensive programs to support monarch conservation on federal forest lands, as well as providing assistance to private landowners. USDA Natural Resource Conservation Service (NRCS) has developed extensive programs to support monarch conservation on private lands and the Farm Service Agency (FSA) administers the Conservation Reserve Program, including CP42 Pollinator Habitat practices. State and federal transportation agencies have met to develop plans on how to enhance monarch conservation in road rights-of-way within their jurisdictions. Transportation and energy rights-of-way managers have begun to coordinate efforts that can enhance monarch and pollinator habitat such as demonstrated by the Rights-of-Way as Habitat Working Group coordinated out of the University of Illinois, Chicago. The Service is developing a comprehensive Monarch Conservation Database to track conservation efforts for monarchs. The Strategy will benefit from the comprehensive database for reporting plans and efforts as states and partners formalize monarch conservation efforts and report progress on implementation.

Many cities and their mayors have committed to and implemented monarch conservation programs within their jurisdictions, often coordinating with others. One example is efforts coordinated through the National Wildlife Federation Mayors' Monarch Pledge (365 signatory cities nationwide as of this writing; see https://www.nwf.org/Garden-for-Wildlife/About/National-Initiatives/Mayors-Monarch-Pledge-Signatories). Many urban monarch interests have also come together through collaboratives such as the Monarch Joint Venture and pilot programs such as Monarchs in the City coordinated by the Service and the Chicago Field Museum to pioneer innovative urban conservation design planning that also incorporates human dimensions data for expanded monarch and pollinator conservation in cities.

Nonprofit organizations and for-profit providers of native plants and seeds for grassland creation and restoration have already implemented seed collection and distribution programs to aid in the effort. Notable are efforts of Pheasants Forever/Quail Forever, National Wildlife Federation, Monarch Watch, and the Bee and Butterfly Fund to engage in this effort. Although many efforts are local in nature, sources of seed and plants for both reproduction and nectar are available. We fully expect additional production of regionally and genetically appropriate seed sources will become available to meet increasing needs from this effort.

More detailed information on all of these efforts is available in Section Three of this strategy detailing sector-specific approaches.

The Strategy also benefits from having a directly measurable outcome for these efforts. North American monarchs migrate to relatively small known areas to winter, where counts can be more readily obtained than for many species that are less visible and do not congregate. Estimates of the eastern population of monarchs are collected annually and made available each year. Although data have been collected for more than 20 years, scientists are still learning about the causes of population fluctuation.

The Mid-America Monarch Conservation Strategy benefits from a skilled team of monarch conservationists from a diversity of land use sectors and industries, a historical understanding of monarch numbers, a method for tracking both individual efforts and population trends, and a hierarchical framework for both organizing work and implementing conservation.

While faced with a seemingly daunting task, the capacity to seek the resources needed and implement the work is well established.

Partners and collaborators to this effort bring tremendous conservation capacity and commitment to future efforts. Monarch conservation efforts already accomplished since 2014 will be documented and aggregated through the Service's Monarch Conservation Database (MCD; see section 5.2). Through national, state, regional, and local plans, commitments to future conservation efforts will also be documented.

Total conservation capacity needs over the next 20 years to assure viable monarch populations are still being developed and will be dependent on specific conservation acreage targets as they are developed by sector. Progress towards targets will be dependent on human capacity and funding for expanded habitat enhancement, technical assistance, outreach, and cost-share to support public land conservation and voluntary, incentive-based private land programs.

It is likely that current rates of habitat conservation implementation benefitting monarchs will need to be significantly accelerated to meet the overall goals. This will become clearer with documentation of current efforts through the MCD and with further refinement of specific acreage targets to meet long-term conservation goals.

6.2 – FUNDING

The continuation of existing and identification of future funding sources is critical to successful implementation and completion of conservation actions for monarchs and their habitats, as well as for the continuation of the Strategy. In many cases this will involve the continuation or expansion of existing conservation delivery programs, although in some cases new programs may be developed.

Funding for the development of the Strategy has been from MAFWA member states, grants from the National Fish and Wildlife Foundation and U.S. Fish and Wildlife Service, and in-kind contributions from partners. Funding for current conservation programs that benefit monarchs has been from existing agency, nongovernmental organization, and private budgets and contributions.

Securing future funding from federal, state, local and private sources will be important as partners implement various aspects of the Strategy. Partners will continue to investigate and seek other funds as appropriate with future partners and collaborators as the specific capacity and program needs are more clearly identified.

Collaborative development and publication of realistic conservation strategies with priorities at the local and regional level is a critical element of jumpstarting species conservation. Support for future funding and on-the-ground projects will require development of clear goals and a communication plan useful for all partners. This Strategy is a major step in that direction, but more work is clearly needed as our understanding of specific conservation needs, capacities, and most effective and feasible approaches improves through work with technical experts and partners.

CURRENT FUNDING OPPORTUNITIES (NATIONAL AND REGIONAL)

Existing major funding opportunities for monarch habitat projects are listed below, along with an estimate of the duration of availability for these opportunities. This list is not intended to be exhaustive.

- National Fish and Wildlife Foundation Monarch Butterfly and Pollinator Conservation Fund
- USDA Farm Bill Conservation Programs administered by NRCS and FSA (ongoing – see agriculture and private lands section)
- U.S. Fish and Wildlife Service Partners for Wildlife program (ongoing)
- State and local programs such as private land technical and cost share assistance; soil and water conservation district assistance (ongoing; varies by state and local entity)
- Environmental Defense Fund Monarch Habitat Exchange (ongoing)
- Bee and Butterfly Habitat Fund (ongoing)
- State Wildlife Grants (ongoing)
- Monarch Joint Venture (ongoing)
- Monarch Watch (milkweed seeds and plants) (ongoing)
- Urban monarch conservation programs through parks and recreation or other sources (ongoing)

6.3 – IMPLEMENTATION AND NEXT STEPS

Most monarch conservation work outlined in this Strategy will be implemented at state and local levels through state fish and wildlife agencies and various partner agencies and organizations. MAFWA will continue to provide coordination and tracking assistance to state agencies through the governance structure described in section 1.2. This structure is intended to be maintained for the 20-year life cycle of the regional strategy, though funding for the Technical Coordinator is guaranteed only through October 2019 and the Liaison position only through September 2018. The governance structure will be maintained to provide ongoing coordination and oversight of progress towards implementation. Additionally, a formal review of the Strategy goals, objectives, tactics, and progress will be conducted every five years, beginning in 2023. This formal review will provide updates on habitat goal progress, monarch population status, new and relevant scientific analyses or findings, and any changes to goals or strategies suggested by new analyses and the adaptive management process. The activities that the MAFWA Monarch Governance Structure is committed to implementing for the 20-year lifespan of the Strategy are described in Table 6.1.

Table 6.1 - Actions and timeline for implementing administrative actions of the Mid-America Monarch Conservation Strategy; timeline subject to change based on the adaptive management process

Action	Initiation Year	Frequency	Completion	Group Responsible
Convene and maintain a Mid-America Monarch Board of Directors	2017	Meetings held at least once per fiscal year	n/a	MAFWA Executive Committee
Convene and maintain a Mid-America Monarch Executive Committee	2017	Meetings held at least bi-monthly	n/a	MAFWA Executive Committee
Convene and maintain a Mid-America Monarch Technical Steering Committee	2017	Meetings held at least bi-monthly	n/a	Mid-America Monarch Executive Committee
Appoint Technical Work Groups as needed	2017	n/a	n/a	Mid-America Monarch Executive Committee
Coordinate Technical Work Groups as needed	2017	n/a	n/a	Mid-America Monarch Technical Steering Committee

Action	Initiation Year	Frequency	Completion	Group Responsible
Coordinate a State Monarch Team for information sharing and coordination among State Fish & Wildlife Agencies	2016	Meetings held bi-monthly	n/a	Mid-America Monarch Technical Steering Committee
Review species status data and new pertinent scientific literature	2019	Annually	n/a	Mid-America Monarch Technical Steering Committee
Review performance of participating partners, including progress towards habitat goals as well as suggested actions/improvements by sector	2019	Annually	n/a	Mid-America Monarch Technical Steering Committee
Review and propose Strategy adaptations based on new information and performance reports	2019	Review information annually; produce report every five years beginning in 2023	n/a	Mid-America Monarch Technical Steering Committee
Assist State Fish & Wildlife Agencies with tracking habitat accomplishments using metrics related to state Strategy goals	2018	n/a	n/a	Mid-America Monarch Technical Steering Committee
Develop an outreach strategy to maintain awareness of the Regional Strategy	2018	n/a	October 2018	Mid-America Monarch Technical Steering Committee
Develop and maintain a website for the Regional Strategy to house information and updates	2017	Update as necessary	n/a	Mid-America Monarch Technical Steering Committee

Action	Initiation Year	Frequency	Completion	Group Responsible
Develop one or more habitat goals for the south core region	2017	n/a	December 2019	South Core Habitat Goals Technical Work Group
Host one workshop each for North Core and South core state agencies to coordinate and track implementation efforts	2019	Two workshops in 2019	December 2019	Mid-America Monarch Technical Steering Committee
Work with partners to develop acreage targets by sector that will be needed to meet population and habitat goals	2018	n/a	June 2020	Technical Steering Committee and State Monarch Leads

MAFWA has been awarded a new grant from the National Fish and Wildlife Foundation (NFWF) to continue regional monarch butterfly implementation and coordination work beyond the completion of this strategy document. The next phase of MAFWA's coordination work will focus on implementation and monitoring of this Strategy and continued coordination assistance for state agencies and partners. During the July 2018 through October 2019 term of this grant project, MAFWA and its partners will work towards the following near-term goals:

- Develop specific action items stemming from the recommendations contained in this strategy at a meeting in Fall 2018;
- Completion of state-level monarch conservation strategies as needed;
- Continued coordination of state-level collaboratives, consortia, etc.;
- Identify capacity/ funding shortfalls impacting implementation of this strategy;
- Assistance with tracking progress on habitat goals for each state;
- Assistance in developing habitat goals for the South Core region;
- Use adaptive management principles (see section 5.3) to adjust habitat goals and strategies as needed;
- Contribute to policy discussions that potentially affect monarch butterfly conservation efforts, including federal Farm Bill policy and Restoring America's Wildlife Act.

MAFWA will explore various options for coordinating and partnering with other organizations as conservation efforts are implemented to assure efficiency and avoid duplication of efforts. A fall 2018 meeting of national, regional, and state partners will be convened to discuss these and other issues, funded under the NFWF grant. Regional workshops in the northern and south-central regions covered by the Strategy will also be convened to facilitate conservation effort targeting, implementation, and coordination across state boundaries.

MAFWA and partner states and organizations are committed to achieving the goals of this strategy over the term of this plan for the long-term benefits to monarchs and for the larger

landscape conservation benefits to native rangelands and prairies, planted grasslands, other open lands, and the diversity of pollinators and wildlife that depend on them.

PART SEVEN – STATE MONARCH CONSERVATION SUMMARIES

7.1 – STATE SUMMARY INTRODUCTION

State fish & wildlife agencies are one of the primary entities for wildlife and habitat conservation in the United States and have a proven track record of achieving impressive conservation successes in the face of adversity. Furthermore, these agencies hold the legal authority for managing wildlife and their habitats within state borders. The conservation strategies suggested in this Regional Strategy document will be chiefly enacted by state fish & wildlife agencies and their state- and local-level partners. The remainder of this section includes summary information about state-level monarch conservation plans and initiatives in the 16 states participating in this Regional Strategy as well as for NEAFWA and the four states in that region that have portions of their states falling within the North Core conservation unit. Some of the states have already completed state-level monarch conservation plans, some states are in the process of creating such a plan, and some states are participating heavily in this Regional Strategy rather than creating a stand-alone document. Each of the states included in the remainder of this section is engaged in monarch conservation at local, state, and regional levels and is committed to doing their part to restore the eastern monarch population to a healthy level.

ARKANSAS

Monarch Habitat Goals

The State of Arkansas's goal is to provide high quality habitat comprised of nectar producing plants, including milkweeds that will be available to monarchs throughout the growing season on over 500,000 acres by the year 2023. Participation from many partners, representing several land use sectors will be necessary to reach this goal.

Current Monarch Conservation Activities

Arkansas has been working on monarch-specific conservation activities since 2015. Our monarch conservation efforts to date include:

Conservation Planning and Collaboration:

- On November 9 and 10, 2015, the first Arkansas Monarch Summit was held in central Arkansas. 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.
- As a result of the Summit, the Arkansas Monarch Conservation Partnership (AMCP) was created. The AMCP is a consortium of state and federal agencies, municipalities, non-governmental organizations, businesses, academia, and private individuals working together to conserve and protect monarch butterflies, pollinators, and their habitats. More information on the partnership and contact information can be found on our website at: www.arkansasmonarchs.org.
- A second Arkansas Monarch and Pollinator Summit was held on October 12, 2017. The goal of the second summit was to provide updated information on monarch and pollinator biology and conservation needs, recruit new members to the partnership, and unveil the draft statewide Arkansas Monarch and Pollinator Conservation Plan. Over 90 people attended.

Habitat Delivery:

- The Arkansas Game and Fish Commission (AGFC) has changed its Acres for Wildlife program seed mix to include milkweed and nectar plants to benefit monarchs and pollinators. This mix of native seeds goes to private landowners who are wanting to increase wildlife habitat on their property. Each year, approximately 150 acres are planted under the program.
- 114 acres of habitat restoration, including planting of native warm season grasses and pollinator friendly forbs, at AGFC's Fred Berry Conservation Education Center.

- The Arkansas Highway and Transportation Department has several plantings of native grasses and wildflowers completed along highways at 3 sites totaling 6.5 acres. In addition, they have identified over 100 locations statewide to implement wildflower plantings for pollinator habitat at interchanges and interstate and highway rights-of-way.
- The Arkansas Natural Heritage Commission has recently launched the Arkansas Native Seed Program. The primary goal of the program is to provide an ample supply of site-appropriate seed for restoration and other uses requiring native seed in Arkansas.
- The Nature Conservancy reclaimed a low diversity hayfield by burning and planting with a mix of native forbs, including milkweed, on 10 acres. Monarch caterpillars were observed at this site following restoration. An additional 60 acres is planned for restoration.

Outreach and Education:

- The monarch butterfly was featured as the cover story in the May/June Arkansas Wildlife magazine in 2016. The four page article summarized the biology and conservation status and threats to monarchs.
- A citizen science project entitled "The Arkansas Monarch Mapping Project" was launched in August 2017 on the iNaturalist platform. The objective of this effort is to collect observations of monarch adults and caterpillars in Arkansas and to increase awareness of the monarch and its needs. The public response was positive and the project will continue over the next several years.
- Students at Lawson Elementary School planted nine raised beds with native flowering plants, including 2 beds designed specifically for monarchs, to attract pollinators to the schoolyard. The project was sponsored by the Natural Resources Conservation Service and the Pulaski Conservation District.
- Through a grant opportunity 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 Botanical Garden of the Ozarks in Fayetteville, Arkansas was the site of a butterfly camp for children. Twelve children ages 8 – 10 participated in the four day camp during which they were engaged in activities which introduced them to the importance of butterflies and other pollinators.

<u>Specific Strategies for Reaching Monarch Habitat Goals</u>

Amendment 35 of the Arkansas State Constitution grants the Arkansas Game and Fish Commission "The control, management, restoration, conservation and regulation of birds, fish, game and wildlife resources of the State." Monarchs are not a protected species in Arkansas and therefore, are not regulated. Conservation of monarchs and pollinators has been a high priority for many agencies in the state since 2015. These agencies along with other entities and private individuals are part of the AMCP. This group includes representation for the majority of the

sectors outlined in the Mid-America strategy. The Arkansas monarch and pollinator conservation plan includes habitat goals for public lands, private lands, and rights-of-way.

Private Working Lands:

- Utilize Federal and state habitat programs to the maximum extent possible to increase milkweed and nectar plants on private lands.
- Ensure that adequate numbers of milkweeds and all-season nectar producing plants are included in the seed mixes in existing habitat restoration programs. Work with NRCS to ensure their guidelines include planting at least one species of milkweed and three late blooming fall nectar plants.
- Meet with the FSA to determine the feasibility of modifying Continuous Conservation Reserve Program (CCRP) practice CP-42 to include pastureland.
- Advise agricultural landowners and owners of recreational lands on ways to integrate monarch and pollinator conservation with land management practices.

Protected Lands:

- Provide input into long-range plans for agencies to ensure inclusion of pollinator friendly practices.
- Establish best management practices that include recommendation for seed mixes, establishment of milkweed and prairie plants, mowing, prescribed burning, pesticide mitigation, and other specific guidelines.
- Restore, create, enhance, and manage native habitats that support monarchs and pollinators.

Rights-of-Way:

- Work with the state highway department to plant native milkweeds and other nectar-producing plants on appropriate areas of ROWs.
- 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.
- 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.

Outreach and Education:

- Disseminate monarch and pollinator information to public through publication of at least one feature article on monarch efforts in one magazine per year.
- Promote monarch and pollinator curriculum as it becomes available and fits state standards and frameworks.
- Prepare and/or curate promotional items for the public (brochures, monarch and pollinator publication lists, etc).

- Promote the National Wildlife Federation Mayor's Monarch Pledge and recognize those who have enrolled.
- Encourage participation in citizen science initiatives.
- Promote habitat projects of all sizes, including schoolyard habitats, certified gardens programs, and plantings of natives at local businesses.

The goals laid out in the Arkansas monarch and pollinator conservation strategy were created for a timeline of 5 years with an end date of 2023. After five years, progress toward goals and objectives will be assessed and additional goals will be made. Arkansas did not set a goal of milkweed stems. This is because milkweed stems were not initially considered a limiting factor in Arkansas and the focus was on providing nectar for migrating monarchs. However, recent studies indicate that a higher proportion of overwintering monarchs originate from Arkansas than previously thought. In addition, there is evidence that a fifth generation of breeding monarchs occurs in Arkansas in the fall prior to the mass migration. Given this information, the plan may be modified in the next revision to include milkweed stem targets. The South Core working group is currently developing a model to establish milkweed stem targets and those would be taken into consideration when developing stem goals for the state. The current habitat goal is restoration, enhancement, and creation of 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 on 500,000 acres statewide.

Statement Regarding Likelihood of Implementation

It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding circumstances and political environments may change. However, Arkansas's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, we have devised strategies that will help each sector and partner to contribute meaningfully to our goals, and we believe that both long-term and short-term objectives are feasible and attainable.

ILLINOIS

Monarch Habitat Goals

Illinois' goal is to add 150,000,000 milkweed stems, along with appropriate nectar sources to the landscape by 2038, representing monarch habitat improvements on approximately [##] acres of land. To accomplish this goal, participation from agriculture, education, natural lands, rights-of-way, and urban stakeholders will be necessary. This summary serves as documentation of efforts thus far and provides a road map for the future.

Current Monarch Conservation Activities

Overview of the Illinois Monarch Project

In early 2016, the Illinois Department of Natural Resources and partners identified the need to coordinate monarch butterfly conservation activities across the state and to engage stakeholders in strategy development. An initial survey collected information from individuals and organizations on current monarch butterfly conservation activities occurring in Illinois. In September 2016 the Monarch Butterfly Summit was held by the Illinois Department of Natural Resources in Springfield, Illinois to convene key stakeholders and begin to develop a unified message and strategy for monarch butterfly conservation in Illinois. Since then, the Illinois Monarch Project was established to bring together representatives of natural lands, rights-of-way, urban, and agriculture sectors to address the stressors on monarch butterfly habitat, enhance existing habitat on the ground, and plan additional conservation actions for monarch butterfly. The vision of the Illinois Monarch Project is *inspired Illinoisans sustaining a culture of active monarch butterfly conservation and protection*. The mission is *preserving our natural heritage and ensuring future biodiversity through the protection of monarch and pollinator habitat*.

Illinois Monarch Project

- A leadership team consisting of representatives from each of the primary sectors organized and has met approximately monthly to guide the direction of the state effort. The current organizational structure of the Illinois Monarch Project is included at the end of this section. The team presently consists of state coordinator and volunteers serving at all levels. Role and responsibilities for all positions are being drafted.
- In July 2017, the Communications Committee developed and approved an official logo for the Illinois Monarch Project.
- In September 2017, the Community Engagement Committee developed an Education and Outreach Strategy.
- In October 2017, University of Illinois at Chicago received a $328,518 grant to support compilation of the Illinois state summary for the Mid-America Monarch Conservation Strategy, organize a second Monarch Butterfly Summit, prepare an Illinois Monarch Project Action Plan, and serve as the State Coordinator for the Illinois Monarch Project. The grant runs through September 2020.
- Basic information about Illinois' monarch conservation initiative is available at the Illinois Department of Natural Resources' website, but a more detailed website dedicated to the Illinois Monarch Project is under development.

- In the past 12 months, team members have spoken at nearly x events, delivering the message of monarch conservation to audiences across the state.
- Signage templates for partners to use at restored habitat sites are currently under development.
- Illinois Monarch Project members serve on four MAFWA Working Groups (Agriculture, Urban, Protected Natural Lands, and Rights-of-Way).
- For more information on the Illinois Monarch Project, please contact the State Coordinator:
  Iris Caldwell, University of Illinois-Chicago, iriscald@uic.edu, 312-355-1483.

Member Highlights

Illinois Department of Natural Resources (IDNR)

The Office of Resource Conservation has been implementing natural community management activities that provide diverse nectaring opportunities for monarchs and other pollinators since xxxx.

- Providing leadership and oversight to the Illinois Monarch Project, IDNR employees participate on sector-based workgroups and committees.
- Convening Directors from Illinois Department of Agriculture, Illinois Department of Transportation, and Illinois Environmental Protection Agency to discuss role of state agencies in monarch butterfly conservation in the state.
- Providing $328,518 through State Wildlife Grant to support hiring of a state coordinator and completing of Illinois contributions to the Mid-American Monarch Conservation Strategy.
- Promoting monarchs and pollinators since 2015 at the Illinois State Fair. Monarch-theme activities included constructing a butterfly house for people to walk through, distributing packets of milkweed seed, promoting management techniques, and providing monarch-theme games and activities for families.
- Collecting and cleaning milkweed seed and seed from other nectar-producing plants at Mason State Nursery for distribution to Project collaborators and the public.
- The Natural Heritage Stewardship Program administers about $1 million in contractual work per year out of the Natural Areas Acquisition Fund as well as $2.5 million in Federal Grants. A new program was established by legislation in 2017 to eventually provide grants to Conservation Land Trusts in Illinois for the stewardship of protected Illinois Natural Area Inventory sites.
- Evaluating Agricultural Lease Program policies to reduce the use of herbicides and pesticides on IDNR-supported agricultural fields.
- Education – letters and seeds to schools and libraries, state fair displays, and monarch outreach.

Illinois Department of Transportation (IDOT)

- Raising and releasing monarch butterflies in the atrium at IDOT headquarters to raise awareness of monarch butterflies among staff. Frequent social media updates on monarch progress are also utilized to promote conservation and provide information on IDOT's conservation topics.
- Starting in July 2017, the Pollinator Habitat Restoration and Preservation Program provides $500,000 for preservation of existing habitat areas or for restoration of pollinator habitat along right-of-way and at rest areas. IDOT's goal is to preserve existing habitat and remnant areas by restoring signs to prevent mowing and spraying as well as convert 100 or more acres of existing fescue/brome right-of-way to native habitat annually utilizing this funding.
- Beginning Spring 2017, the mowing policy for all IDOT-maintained right-of-way was amended to restrict mowing distances and frequency. It is estimated that over 80,000 acres is now being left as habitat that was previously maintained by regular mowing. Monitoring to date shows an increase density of 3000% in milkweed stems at unmowed sites.
- Providing leadership and oversight to the Illinois Monarch Project. IDOT employees participate on sector-based workgroups and committees.
- Conducted various educational outreach projects including: creation and registration of 24 Monarch Waystations at rest areas and district headquarters; Adopt-A-Planter contest at state headquarters, employees planted 37 entrance planters into habitat; handed out over 6,000 native wildflower seed packets and Operation Habitat fact sheets at the Illinois State Fair.

University of Illinois Chicago – Energy Resources Center

- Through State Wildlife Grant, serving as statewide coordinator, directing and facilitating leadership team activities, supporting work of sector groups, serving as primary point of contact for the Illinois Monarch Project, compiling sector-specific strategies into a statewide action plan, and overseeing work with project partners.
- Facilitating the Rights-of-Way as Habitat Working Group, which brings together energy and transportation organizations and promotes habitat restoration on the lands that they own and/or manage (rights-of-way and other landscapes).
- Working with rights-of-way organizations across the state to collect geospatial data and other habitat metrics in a comprehensive database.

Prairie Rivers Network

- Serving as an independent, state affiliate of the National Wildlife Federation and working with communities across the state to adopt the Mayors Monarch Pledge.

Pheasants Forever (PF)

- Through several grants, PF chapters have been able to leverage dollars to pay for small pollinator plantings and events. This program started in 2014 as a youth/school program

and has grown into chapters using both grant dollars and chapter funds to support pollinator plantings across the state. To date, chapters have assisted with 6,600 acres of pollinator habitat (total program acres, including work with CRP, IDOT, Ameren, etc.).

Field Museum

- The Keller Science Action Center partnered with the U.S. Fish and Wildlife Service (USFWS) and the Landscape Conservation Cooperatives to produce the Urban Monarch Conservation Guidebook and Tools.

Chicago Zoological Society

- The Chicago Zoological Society's (Brookfield Zoo) mission is "to inspire conservation leadership by connecting people with wildlife and nature."
- The Chicago Zoological Society (CZS) places a high priority on developing and supporting conservation leaders of all ages and backgrounds and does so through its Center for Conservation Leadership.
- Thanks to partnerships throughout our region—including Brookfield Public Library, Brookfield Beautification Commission, Cantata, Riverside Public Library, Riverside Brookfield High School—and working with you, one backyard at a time, we want to establish pollinator friendly neighborhoods.
- Our partners already have stepped up to help with our Communities and Nature Program. The Brookfield Beautification Commission and Riverside Brookfield High School, for example, helped us transform a vacant lot into Progress Park, a thriving, revitalized nature area that earned the 2012 Governor's Hometown Award for Beautification and Sustainability.
- The new park boasts a gorgeous butterfly garden that has attracted pollinators and provided them with a necessary food source; pavers etched with student-written poetry; Great Bear Wilderness-inspired benches; and a community art installation.
- Working with Scout groups has played an integral part of our Communities and Nature program. In one example of how everyone can do their part, our new friends, the Mueller family, asked for our guidance as their son built a butterfly garden for his community to earn his Eagle Scout rank. He wanted help in interpreting the life cycle of a butterfly and the importance of his garden.
- CZS is currently working with the Illinois Monarch Project developing goals and objectives for community engagement. We are also working to incorporate and execute appropriate interpretive techniques when facilitating programs and telling inspirational conservation stories so as to increase these types of community engagement.

Illinois Farm Bureau

- Serve as a membership organization for 3 out of 4 farmers in Illinois with a voting membership of 82,000.

- Lead on environmental issues as directed by the Illinois Farm Bureau Board of Directors and policy derived from grassroots members and process.
- Create programs and utilize communication tools to get information about pollinators and monarchs directly to farmers, including:
    - FarmWeek weekly publication with a circulation of 72,000.
    - RFD Radio Network with 81 radio affiliates across the state
    - Pollinator blog "The Buzz"
    - Conferences for farmer audiences
    - Direct information to the county Farm Bureau system in almost every county in Illinois
    - Implement the Agriculture in the Classroom Program which provides educational agriculture resources to more than 37,000 teachers in Illinois that directly reach 550,000 Illinois students.
- Provide staff support as the Agriculture Sector Leader for the Illinois Monarch Project planning effort and orchestrate and lead the agriculture subcommittee of that sector group.

United States Department of Agriculture (USDA) Farm Service Agency

- Implement the Farm Bill to Illinois producers through our 93 field offices across the state.
- Administer specific initiatives through the Conservation Reserve Program (CRP).
- Assist producers in establishing high quality native wildflowers that support the monarch butterfly and other pollinators throughout the growing season.
- Assist producers in establishing and maintaining over 104,000 acres of CRP pollinator habitat throughout the state.

The Nature Conservancy

- [Placeholder]

Illinois Department of Agriculture

- [Placeholder]

Illinois Corn Growers

- [Placeholder]

<u>Specific Strategies for Reaching Monarch Habitat Goals</u>

Regulatory Authority

In Illinois, the Illinois Department of Natural Resources has authority for the conservation, preservation, distribution, introduction, propagation, and restoration of the fauna and flora of the state (20 ILCS 805/805-105). Despite this general authority, monarch butterflies are not presently covered in the Illinois Wildlife Code (520 ILCS 5). That code defines "wildlife" as birds and mammals. If the monarch butterfly were to be listed by U.S. Fish and Wildlife

Service, the species would automatically be listed under the Illinois Endangered Species Act (520 ILCS 10). The species would then be regulated by the IL DNR. Under the authority of the Illinois Natural Areas Preservation Act (525 ILCS 30, and 17 ILL Adm Code 4015.10 part e) monarchs are protected on dedicated and registered sites covered by this Act.

- Illinois has a state endangered species list, and insects are eligible for listing under this Act. Fifteen insects are currently on the list. Illinois' Endangered Species Act can be found at: http://ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1730&ChapterID=43 (Also see 17 ILL Adm Code parts 1010, 1050, 1070, 1075, 1080).
- To date, the monarch butterfly has not been considered or listed as threatened or endangered in Illinois, but the species is listed as a "species of greatest conservation need" in Illinois' Wildlife Action Plan.

GOAL I: Create an active collaborative of diverse stakeholders to coordinate the development and implementation of conservation strategies for monarch butterflies and pollinator species.

Objective A: Identify and engage key stakeholders in monarch and pollinator conservation

Strategy 1. Organize statewide summits to broadly engage stakeholders, build collaboration, and communicate about the Illinois Monarch Project

Strategy 2. Build active participation in the Illinois Monarch Project from diverse stakeholders through committees and sector groups

Strategy 3. Invite participation in the Illinois Monarch Project through website and outreach materials

Objective B: Develop a governance structure to facilitate coordination among stakeholders for the development and implementation of monarch and pollinator conservation strategies

Strategy 1. Create an Illinois Monarch Project Charter to describe the organizational structure, roles, responsibilities, and other information related to Illinois Monarch Project operations

Strategy 2. Designate a State Coordinator to serve as a primary point of contact and coordination for the Illinois Monarch Project activities

Objective C: Develop the Illinois Monarch Project Action Plan to formalize monarch and pollinator conservation strategies, targets, and actions

Strategy 1. Task sector groups with identifying specific strategies, targets, and actions to meet statewide habitat goals for agriculture, natural lands, rights-of-way, and urban sectors

Strategy 2. Submit Illinois Monarch Project Action Plan to Executive Committee for formal approval by Fall 2019

Objective D: Obtain funding to support Illinois Monarch Project activities

Strategy 1. Obtain funding for State Coordinator and development of Illinois Monarch Project Action Plan

Strategy 2. Identify and apply for collaborative grants or other funding opportunities to support implementation of Illinois Monarch Project Action Plan

Objective E: Develop common messaging, resources, and tools to support monarch butterfly and pollinator conservation

Strategy 1. Form a Communications Committee to oversee the development of a website, brand, and communication materials

Strategy 2. Educate leaders, managers and decision-makers on monarch butterfly and pollinator conservation

Strategy 3. Provide tools and resources to support more efficient and effective conservation action

GOAL II: Education and outreach

Objective A: Align education and outreach activities with the Illinois Monarch Project's mission and goals

Strategy 1. Form a Community Engagement Committee to engage education and outreach stakeholders, develop education and outreach strategies, and support implementation of the Illinois Monarch Action Plan

Strategy 2. Develop a written Education and Outreach Strategy to guide educators and outreach specialists towards meeting specific objectives and targets in education and outreach initiatives

Objective B: Develop focused outreach and education campaigns for specific stakeholders

Strategy 1. Conduct extensive outreach and education to farmers and others in the agricultural community about the state of the monarch and this Illinois Monarch Project effort

Strategy 2. Conduct extensive outreach and education about programmatic and cost-share opportunities for farmers and landowners to install and enhance pollinator habitat

Strategy 3. Create landowner packets to share with private landowners with property on, near, or directly adjacent to habitat projects implemented by Illinois Monarch Project partners in order to build support and cooperation on habitat conservation projects and encourage landowners to adopt similar practices

Strategy 4. [Placeholder for urban/municipality/county outreach]

Strategy 5: [Placeholder for natural lands outreach]

Objective C: Distinguish the Illinois Monarch Project as the coordinated statewide effort to ensure the survival of monarchs and their successful migration through Illinois

Strategy 1. [Placeholder]

Objective D: 70% of program participants will actively engage in behaviors leading to an increase in Illinois breeding and feeding habitat for Monarchs.

Strategy 1. [Placeholder]

Objective E: 75% of program participants will be equipped and inspired to actively engage in Monarch butterfly conservation.

Strategy 1. [Placeholder]

Objective F: 80% of program participants will actively engage in behaviors that protect and sustain Illinois breeding and feeding habitat for Monarchs.

Strategy 1. [Placeholder]

GOAL III: Science and research

Objective A: Inform conservation strategies using the best available science on monarch butterfly and pollinator health and habitat

Strategy 1. Form Science Committee comprised of biological and conservation experts to support Illinois Monarch Project strategy development and implementation

Strategy 2. Summarize best available science and recommend best management practices

Strategy 3. Develop research agenda needed to support implementation of the Illinois Monarch Project Action Plan

GOAL IV: Conserve, enhance, and restore habitat on public and private lands to support populations of monarch butterflies and pollinator species.

Objective A: Conserve and manage existing monarch and pollinator habitat within the agriculture, natural lands, rights-of-way, and urban sectors

Strategy 1. Collaborate on the development and adoption of best management practices and create demonstration sites featuring their use.

Strategy 2. Identify existing habitat for conservation by sector

Objective B: Add 150,000,000 stems of milkweed (embedded in appropriate nectar sources) onto the landscape by 2035 through restoration and enhancement of habitat within the agriculture, natural lands, rights-of-way, and urban sectors

Strategy 1. Identify areas to create or enhance habitat by sector

Strategy 2. Collaborate on the development and adoption of best management practices and create demonstration sites featuring their use

Strategy 3. Increase use of prescribed fire, where appropriate, to promote floral diversity while ensuring pollinators have adequate refuge from fire (e.g., consider size of burn, location, and season)

Strategy 4. Develop a standard Illinois Integrated Vegetation Management (IVM) plan to support optimal timing and frequency of mowing and selective herbicide use on utility and transportation rights-of-way

Strategy 5. Establish Route 66 Corridor as showcase initiative to promote habitat restoration and enhancement across a variety of landscapes from Chicago to St. Louis

Strategy 6. Work closely with agencies that oversee Farm Bill conservation programs, including the USDA Farm Service Agency and the USDA Natural Resources Conservation Service, to identify opportunities to utilize and improve those programs to better benefit the monarch butterfly and pollinators

Strategy 7. Work closely to identify opportunities to utilize and improve non-Farm Bill conservation programs to better benefit the monarch butterfly and pollinators

Strategy 8. Work to increase availability of native seed and plant resources necessary to meet demand, with special emphasis on availability of regionally appropriate milkweed species

GOAL V: Monitoring and data collection

Objective A: Utilize geospatial data and analyses to identify and quantify baseline and potential habitat for monarch butterfly and pollinators across the agriculture, natural lands, rights-of-way, and urban sectors

Strategy 1. Convene geospatial experts to evaluate existing data available to inform conservation strategies

Strategy 2. [Placeholder]

Objective B: Standardize monitoring and data collection for monarch butterfly and pollinator habitat

Strategy 1. Adopt common monitoring protocols to allow diverse stakeholders to contribute to a common reporting platform

Strategy 2. Engage stakeholders in monitoring efforts

Strategy 3. Identify common tracking mechanisms for documenting progress on actions identified in the Illinois Monarch Project Action Plan

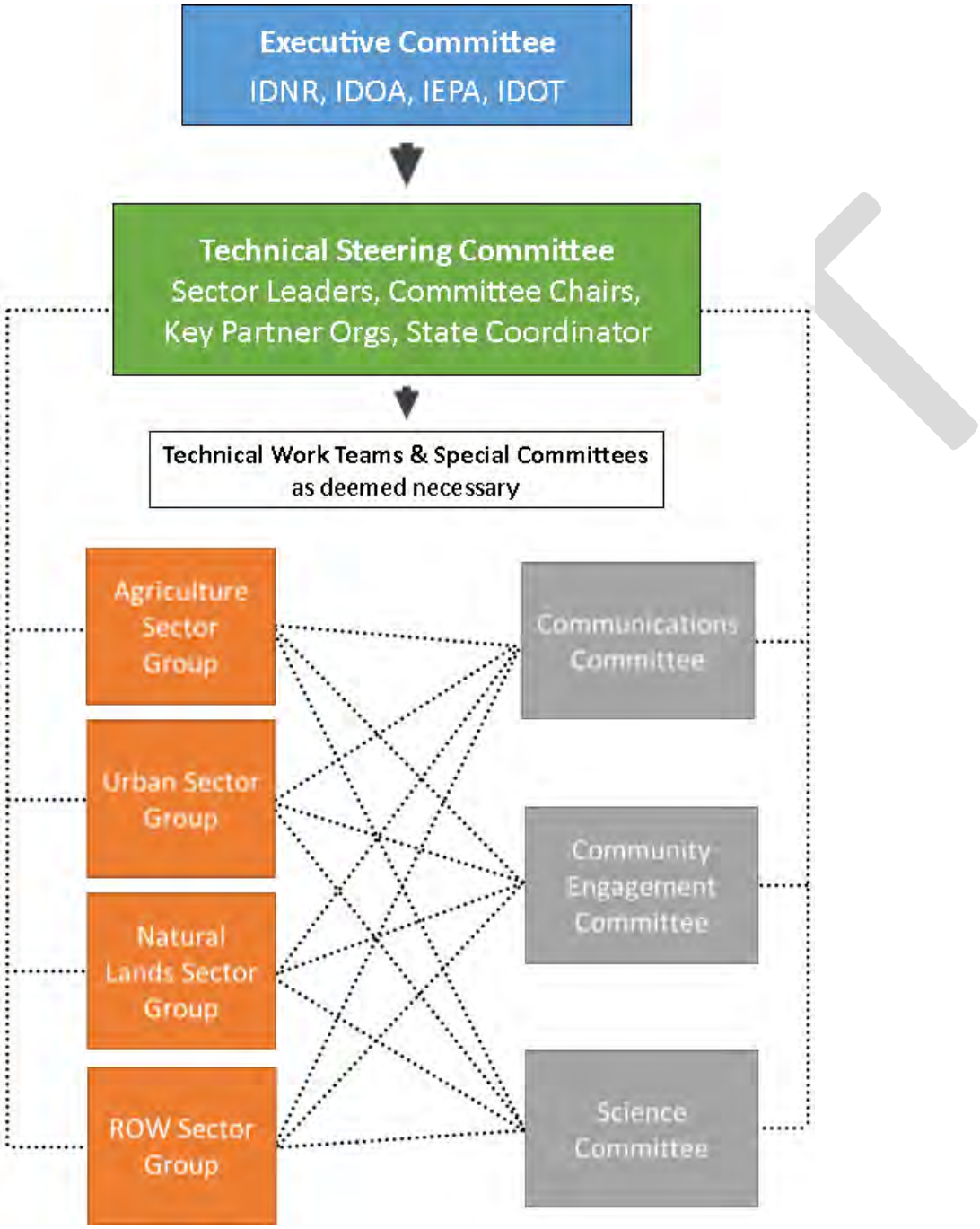
Statement Regarding Likelihood of Implementation

It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding circumstances and political environments may change. However Illinois' monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, we have devised strategies that will help each sector and partner to contribute meaningfully to our stem/acreage goals, and we believe that both long-term and short-term objectives are feasible and attainable.

Maps

[Placeholder for maps of priority conservation areas as available]

Illinois Monarch Project Organizational Chart



INDIANA

Monarch Habitat Goals

The State of Indiana's goal is to add **(TBD-Winter/Spring 2018)** milkweed stems, along with appropriate nectar sources to the landscape by 2038, representing monarch habitat improvements on approximately **(TBD-Winter/Spring 2018)** acres of land. Participation from many partners, representing several land use sectors will be necessary to reach this goal.

Current Monarch Conservation Activities

Indiana has been working on monarch-specific conservation planning since 2016, however beneficial monarch activities have been taking place for decades. Our monarch conservation efforts to date include:

Conservation Planning

Indiana held a Monarch Conservation Summit September 19th and 20th, hosted by the Indiana Wildlife Federation (Sol Center, Indianapolis). A great planning team had been meeting since early winter 2016 to make this successful including: Indiana Department of Natural Resources: Division of Fish and Wildlife, Division of Nature Preserves, Division of Parks and Reservoirs, Purdue University Forestry and Natural Resources, US Fish and Wildlife Service, USDA Natural Resource Conservation Service, US Forestry Service (Hoosier National Forest), Indiana Wildlife Federation, Indiana Chapter of the Nature Conservancy, and Indiana Native Plant and Wildflower Society.

- Keynote Speakers included Monarch researcher Dr. Karen Oberhauser and MAFWA Monarch Technical Coordinator, Claire Beck;
- The meeting was facilitated by Brooking Gatewood of Ag Innovations (her 7th state monarch summit) and was funded by a grant from the National Wildlife Federation;
- Approximately 60 individuals in attendance from over 40 different state and federal agencies, NGO's, Utility Companies, and Ag groups;
- Attendees laid the foundation for an IN Monarch Conservation plan, identified key sector groups (Public/Protected Lands, Private/Ag Land, Right of Ways, Urban/Suburban), and identified priorities and challenges to a state plan including Funding, Governance, Implementation, Outreach and Education, Monitoring and Research.

- Next steps established from the Summit included:

    - An initial draft governance structure and strategy to achieve a written IN Monarch Conservation Strategy and successful plan implementation was discussed and recorded. This included:
        - The need to fund and contract a plan writer (short term)
        - The need to fund and house and full time plan coordinator (potentially housed in DNR/DFW-long term)
        - The need to form work groups and group co-leads to provide key content to the plan writer.
        - The need for a steering committee to make final plan decisions.

- A small, interim "coordination team" was implemented to keep the ball rolling and to initiate the plan writing process post Summit, until a full-time coordinator position is able to be created and filled.
    - This team includes a representative from DNR (Ben Miller), IWF (Emily Wood), USWFS (Jeff Kiefer), NRCS (Brianne Lowe) and an Agricultural rep (TBD).
- Work Groups for drafting the plan were formed, including:
    - Public/Protected Lands,
    - Private/Ag Land
    - Right of Ways
    - Urban/Suburban
    - Habitat Goals/Allocation
    - Outreach and Education
    - Fundraising
- An initial steering committee made up primarily of the existing Summit planning team as well as the "coordination team" worked to fundraise for a contractor to assist in the coordination and drafting of the Indiana Monarch Conservation Strategy.
    - Over $12,000 was raised and is being housed by the Indiana Wildlife Federation.
    - RFPs were solicited in December 2017 and a contractor was selected in January 2018.
    - The steering committee will be meeting with the contractor in early February to get organized and work groups will begin meeting and drafting plan content, goals, objectives, and strategies shortly after.
    - The goal is to have a draft Indiana Monarch Conservation Strategy by April 2018 and a final plan ready for review May 2018.
- Indiana hopes to have as much substance (stem goals, objectives, strategies, etc.) as soon as possible for contribution in the Mid-America Monarch Conservation Strategy.

<u>Past and ongoing beneficial Monarch habitat activities (DRAFT EXAMPLE)</u>

This section will be updated and submitted to MAFWA as soon as it is available.

IN DNR, Division of Fish and Wildlife:

The Division of Fish and Wildlife is involved in a number of monarch, pollinator and wildlife friendly programs that result in the establishment of hundreds of acres of quality habitat on the ground through technical assistance and cost share opportunities. These programs include:

- Grasslands for Gamebirds and Songbirds-RCPP (EQIP, CSP, Gamebird Funds)
- CORRIDORS-River and habitat project partnership between DFW, INDOT, NRCS and PF/QF (EQIP)
- CRP (General, Continuous, SAFE, particularly CP42{pollinator})
- Cost Share Program
- Gamebird Program

- Urban Cost Share Program
- NE Wetland/Grassland Program (NAWCA Partnership)

IN DNR, Division of Nature Preserves:

- NRCS funded pollinator enhancement (seeds and plugs) at Loblolly Marsh, Jay County planned for 2017.
- Over the next 3 years, the USACE will have a contractor seed a 250 wetland restoration near Hobart, Lake County, with a mix rich with species for nectar and pollination.
- A re-forestation project at Moraine Nature Preserve in Porter County (40 acres) is being enhanced with species for pollinators.

TNC of Indiana:

TNC projects that have reasonably significant impact on local pollinator and monarch populations:

- The Efroymson Restoration at Kankakee Sands – Over 6,000 acres of agricultural land has been restored with 620 species of vascular plants seeded using local genotypes into the greater restoration. Eight species of milkweeds were included in these restorations.
- Milkweed Trail Development at Kankakee Sands - To increase pollinator outreach, we will create and install interpretive trails at Kankakee Sands that highlights the eight species of milkweeds at the site. Interpretive signage will explain pollinator declines and the role that ecological restoration can play in reversing this trend.
- Prairie Border Nature Preserve – TNC has restored approximately 300 acres of agricultural land to emergent wetland, wet prairie, mesic prairie and dry sand prairie and included in excess of 200 locally sourced plant species including four species of *Asclepias*.
- Houghton Lake Nature Preserve - TNC restored approximately 150 acres of adjacent row crop land to wetland, mesic and dry prairie. The planting included approximately 150 plant species with four species of *Asclepias*.
- Douglas Woods Nature Preserve - Almost 700 acres of row crop land has been hydrologically restored to create an upland - pothole mosaic at this 1,400-acre site. Each of the 30+ pocket wetlands restored across the site has been seeded or plugged to create a forb-rich wetland border to enhance pollinator habitat.
- Powerline ROW Vegetation conversion –In 2016 we initiated a strategy to enrich these ROWs by planting low diversity forbs and native grasses into these areas, including common milkweed. (Big Walnut and Greens Bluff)

Indiana Wildlife Federation:

- Supported the Mayor's Monarch Pledge with 11 cities now signed on in Indiana.

- Conducted numerous educational Monarch outreach events, handing out free milkweed plants and conducting monarch tagging events at public events.
- Presented numerous Backyard Habitat Workshops for pollinator friendly native gardens.

Indiana Dept. of Transportation:

- Initiating a new program that involves planting tall, warm-season grasses and a mix of 24 flowering plants along I-65 to serve a dual purpose as a natural snow fence in the winter and valuable monarch and pollinator habitat in the spring, summer and fall.
    - Starting out with 60 acres along I-65 — 30 acres each in the Crawfordsville and LaPorte districts.
    - The mix of 24 flowering plants in the 60 acres along I-65 is pollinator-friendly. The predominant plant, representing 17 percent of the mix, is common milkweed. The other 23 plants average less than 4 percent each of the mix. Before INDOT plants this acreage, existing noxious weeds will be eradicated.

IN NRCS:

- Environmental Quality Incentive Program (EQIP) Initiative prioritizing monarch habitat in an agricultural landscape as part of the Monarch Habitat Development Project (Monarch HDP).
- Conservation Reserve Program (CRP)- Monarch Plantings as part of CRP
- Conservation Stewardship Program (CSP) - Conservation Enhancements to plant monarch habitat within the agricultural landscape.
- Resource Conservation Partnership Program (RCPP)-Multi-state Regional Monarch habitat program initiated in 2017. Uses both EQIP and CSP to plant monarch habitat in agricultural landscapes.
- Agriculture Conservation Easement Program-Wetlands Reserve Easements- targeted effort to encourage the planting of monarch habitat on existing WRP and new WRE sites around the state.
- Conservation Technical Assistance- providing technical support and guidance to landowners interested in planting monarch habitat. Not necessarily tied to program financial assistance funds.

IN USFWS:

- Indiana PLO - The Partners for Fish and Wildlife Program received $82,000 in habitat funds in FY16 specifically to benefit monarch habitat, which was primarily used to partner with landowners and other conservation partners to establish diverse grassland plantings on private lands. A total of 47 projects for 370 acres were completed in

FY16. Additionally, the PLO is involved in the Monarch Wings Across the Eastern Broadleaf Forest NFWF grant to focus on seed collection and habitat restoration.

- Big Oaks NWR - The refuge developed a partnership with a dozen schools in Jennings Co. to develop monarch gardens on the school grounds. BONWR is also working with the Army to revise the mowing policy for the 30 miles of roads within the refuge to benefit monarchs.

- Muscatatuck NWR - The refuge hosted a ROW management workshop that brought together utility companies, contractors, and biologists to discuss alternative ROW management practices that would be beneficial to pollinators and other wildlife.

- Patoka River NWR - Refuge staff have worked with their cooperative farmers to establish 100' buffers around all refuge ag lands for pollinators, as well as managing reclaimed coal mine lands for diverse forb communities and milkweed. Volunteers have put in pollinator gardens and monarch waystations at trailheads.

- Bloomington ES - The ES staff have utilized several outreach efforts focusing on monarchs and pollinators, including hosting booths at BugFest and the Midwest Bat Festival. They are also working with transportation agencies and other entities to encourage pollinator-friendly practices in new projects.

- For more information about Indiana's Monarch Conservation efforts, please contact either Ben Miller (Indiana DNR) at Bmiller2@dnr.in.gov or Emily Wood (Indiana Wildlife Federation) at Wood@indianawildlife.org .

Specific Strategies for Reaching Monarch Habitat Goals

In Indiana, there is no department or agency which has the legal authority for Monarch Butterfly management. While Indiana does have its own threatened and endangered species legislation, insects are not eligible for listing under state threatened and endangered species statute. The monarch is also not included as a species of greatest conservation need or concern in our most recent State Wildlife Action Plan (SWAP), a 10 year process that identifies threats to habitats and wildlife species, due to no insects being specifically listed or considered for this designation. However, SWAP did identify grassland habitat loss as one of the greatest threats to wildlife species in Indiana. A focus on grassland habitat will allow resources, programs and partnerships to be focused on habitats that can be established and managed for the Monarch Butterfly as well.

With all this said, it is clear that Indiana has a critical need to collaboratively engage all partners with a role to play in monarch protection and recovery and develop a truly collaborative and cohesive Indiana Monarch Conservation Strategy. Most authority designation related to the monarch lies in the different authorities of habitats across the state. We hope to engage all of these sectors in our conservation plan to have the biggest statewide impact and participation as possible.

***ALL STRATEGIES, STEM GOALS and LIKIEHOOD OF IMPLEMENTAON BELOW ARE STILL IN DEVELOPMENT IN INDIANA AND CANNOT BE REPORTED AT THIS TIME. THESE WILL ALL BE ADDRESSED IN OUR INDIANA MONARCH CONSERVATION STRATEGY DRAFTING PROCESS AND WILL BE SUBMITTED FOR INCLUSION IN THE MID-AMERICA MONARCH STRATEGY AS SOON AS POSSIBLE.**

IOWA

Monarch Habitat Goals

The State of Iowa's goal is to add 160,000,000 milkweed stems, along with appropriate nectar sources to the landscape by 2038, representing monarch habitat improvements on up to 830,000 acres of land. This stem goal represents 12.3% of the overall goal for the Northern Breeding Core of 1.3 billion additional stems. Participation from many partners, representing several land use sectors will be necessary to reach this goal.

Current Monarch Conservation Activities

Iowa has been working on monarch-specific conservation activities since 2014. Our monarch conservation efforts to date include:

- The Iowa Monarch Conservation Consortium was established in the spring of 2015 and to date has a wide mix of members (organizations with a presence in Iowa) and partners (organizations outside of Iowa). This group has developed the *Iowa Monarch Conservation Strategy (v2*).
- The Iowa DNR has been a partner member of Monarch Joint Venture (MJV) since 2011. In partnership with MJV, Iowa DNR has included native milkweed and nectar plants in prairie restoration efforts and continues to restore more habitat for monarchs each year. The DNR's native prairie reconstruction efforts on DNR-managed lands have averaged about 1,900 acres per year since 2000.
- As of 2016, Iowa has over 175,725 acres enrolled in the Conservation Reserve Program CP-42 Pollinator Enhancement Practice which represents 55% of available acres nationally. Iowa also had 180 acres of EQIP monarch initiative plantings as of 2016.
- In addition, members of the Iowa Monarch Conservation Consortium have collectively added or enhanced many acres of monarch habitat in Iowa since 2014. These partners include Iowa DNR, Iowa Department of Agriculture and Land Stewardship, many County Conservation Boards, Iowa Nature Conservancy, Iowa Natural Heritage Foundation, BASF, Bayer, Dupont-Pioneer, Monsanto, Syngenta, and the US Fish and Wildlife Service. Members are added regularly, and a complete list can be found online. (https://monarch.ent.iastate.edu/consortium-members). Together these partners have contributed around 225,460 acres of monarch habitat through summer of 2017. The Consortium is currently working to determine whether these are unique acres or whether some of them are counted by more than one partner, thereby inflating the number.
- Under both the Blank Park Zoo's Plant.Grow.Fly. Program and the National Wildlife Federation's Mayor's Monarch Pledge, Iowa continues to register pollinator gardens.
- Besides increasing habitat for monarchs, the Consortium is actively engaging Iowa citizens through outreach efforts including news releases, field days, social media posts and having a presence at many public events. Blank Park Zoo hosts an annual Monarch Festival each September in Des Moines.
- Iowa State Universities and the other research members of the Consortium are actively gathering and analyzing data on a variety of monarch related topics, including habitat

(combining nutrient reduction strategies with monarch habitat needs, examining seed mix responses, patch size and arrangement), climate change, and impacts of pesticides.
- For more information about the Consortium, please visit: https://monarch.ent.iastate.edu/

Specific Strategies for Reaching Monarch Habitat Goals

- In Iowa, the monarch is classified as a non-protected, non-game species. The Iowa DNR, through the Natural Resource Commission, has the authority to classify the monarch as threatened or endangered under Iowa law through the rulemaking process. The monarch is currently listed as a Species of Greatest Conservation Need in the Iowa Wildlife Action Plan (IWAP 2015); however, this classification does not provide any legal protection for the species.

- The Iowa Monarch Conservation Consortium invites organizations to join. Directions for doing so can be found at https://monarch.ent.iastate.edu/would-your-organization-join-consortium Currently, the Consortium is working on Best Management Practices for Agricultural Lands (including those enrolled in CRP-type easements and Recreational Landowners); Urban (including Backyard Gardeners, Schools and Churches); Governmental and Non-governmental Conservation lands; and Rights-of-ways. To date, a popular "5 Ways to Help Monarchs" postcard has been distributed and is available here: https://monarch.ent.iastate.edu/files/file/monarch-5-actions.pdf and briefly described below:

Private Working Lands and Recreational Landowners:

- *Take advantage of Farm Bill (or other) programs to establish monarch breeding habitat. Increasing the number of milkweeds and nectar-producing plants are vitally important for monarch and other pollinator conservation. Contact your local USDA service Center for more information.*

Urban, Backyard Gardeners, Schools and Churches:

- *Establish a Monarch Waystation, a garden with both nectar and milkweed plants, where monarchs can find nectar and reproduce.*
- *Register your garden at either Monarch Watch: http://www.monarchwatch.org/waystations/certify.html or the Blank Park Zoo: https://www.blankparkzoo.com/conservation/plantgrowfly/register-your-garden/*

Rights-of-Way:

- *Use monarch-friendly weed management recommendations for roadsides and other rights-of-ways. The Integrated Roadside Vegetation Management program at the University of Northern Iowa provides information on maintenance of roadsides using management strategies that reduce mowing and application of herbicides, which*

supports monarch and pollinator habitat along roadsides. See https://www.tallgrassprairiecenter.org/irvm for more information.

Governmental and Non-governmental Organization Conservation Lands:

- *Plant and maintain milkweed and floral resources in grasslands and on other managed lands.*
- *Establish best management practices that include recommendations for seed mixes, establishment of milkweed and prairie plants, mowing, prescribed burning, pesticide mitigation, and other specific guidelines.*
- *Set up demonstration sites to portray use of monarch and pollinator habitats in Iowa's State Parks.*

For All Sectors:

- *Follow federal pesticide labels and state regulations when applying pesticides labeled as toxic to bees to avoid unnecessary exposure to monarchs and other pollinators. Adjust spray equipment to reduce drift by using low pressure, large droplets, and low boom heights. Avoid applications when wind speed is above 10 miles per hour or wind direction is toward monarch habitat.*

- The Iowa Monarch Conservation Consortium has an Information, Education, and Outreach working group established. This group is working on a communications plan which will be added to Iowa's Strategy.

- Since the end of 2014, we estimate that Iowa has added 5,015,078 stems of milkweed on 25,342 acres of public land. In 2015 and 2016, Iowa gained 231,623 acres of CRP, which, if 50% of those went in with a stem density of 200, would mean an additional 23,104,394 stems. Iowa is completely within the North Core Breeding range for the monarch. Our targets for reaching our overall goal of 160,000,0000 stems by 2038 are:

Acres	**Range**		**Stems****	**Range**	
Urban/Suburban	39,774	198,870	Urban/Suburban	1,300,000	5,600,000
Public Lands*	144,041	156,674	Public Lands*	28,527,789	31,030,041
Other*	62,749	67,049	Other*	12,549,800	13,409,800
Rights of Ways	19,000	21,000	Rights of Ways	6,156,000	6,804,000
Agricultural	214,000	387,000	Agricultural	78,000,000	131,000,000
Total	**479,564**	**830,593**	**Total**	**126,533,589**	**187,843,841**

*This includes the stems established since January of 2015.
**New stems include stems derived from new seeding and subsequent propagation.

Several assumptions exist for reaching these goals including:

- Organizations, businesses, and landowners will have access to technical information (e.g. best management practices) and technical support service providers (e.g., support for habitat site selection and site preparation, planting and maintenance).
- Sufficient public/private funding to defray costs for establishing and maintaining monarch habitat.
- Adequate seed availability.
- New and existing monarch habitat will be properly maintained.
- Stem densities from Thogmartin et al. 2017 and/or those detailed in the Iowa Plan using propagation estimates from ISU are accurate or under-estimated.
- Iowa DNR Seed Production Unit can continue to produce seed for 1,900 acres per year for public land.
- Existing grassland acres which are disturbed through fire, disking, etc., increase milkweed stem density, if milkweed is already there, at the same density as planting new prairie.
- Public land acquisition continues at or above the current rate.
- Funding sources allowed to be used for nongame wildlife continue.
- Federal cost-share programs for private landowners (e.g., USFWS Private Lands Programs, USDA NRCS WRE Programs, and NRCS FSA CRP Programs) continue at or above current levels.
- Government (county, state, and federal) staffing levels continue at or above the current level.
- The Iowa Roadside Vegetation Management Program continues to obtain grants allowing it to continue providing counties seed sufficient to plant 950 to 1,050 acres per year.
- Iowa DOT continues to plant monarch suitable habitat following new roadway construction.
- Agricultural landowner participation is adequately estimated as described under Agricultural Assumptions in the Iowa Plan.

Statement Regarding Likelihood of Implementation

It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding circumstances and political environments may change. However Iowa's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners within the Iowa Monarch Conservation Consortium. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, as evidenced within Version 1 of the *Iowa Monarch Conservation Strategy* (v2) (available here: https://monarch.ent.iastate.edu/files/file/iowa-monarch-conservation-strategy.pdf), we have devised strategies that will help each sector and partner to contribute meaningfully to our stem/acreage goals, and we believe that both long-term and short-term objectives are feasible and attainable.

Priority Areas

The entirety of Iowa falls within the Northern Core breeding zone for the monarch and we believe restoration and enhancement anywhere within the state will provide valuable habitat for the monarch.

KENTUCKY

Monarch Habitat Goals

The State of Kentucky's goal is to add 54,424,000 milkweed stems, along with appropriate nectar sources to the landscape by 2038. Participation from many partners, representing several land use sectors will be necessary to reach this goal.

Current Monarch Conservation Activities

Kentucky has been working on monarch-specific conservation activities since 2016. Our monarch conservation efforts to date include:

- Kentucky Monarch Summit February 2016
- Kentucky monarch work group facilitated sessions spring 2016
- Kentucky Monarch Conservation Plan Development Fall 2016/Spring 2017
- Kentucky Monarch Conservation Plan Finalization Summer 2017

While there is not a count of stems added to the Kentucky landscape since 2014, there have been grassroots efforts across the state to promote planting and maintaining milkweed and nectaring plants. Efforts to promote habitat have been nurtured by garden clubs, civic groups, state and federal agencies, and non-governmental organizations.
To receive additional information concerning Kentucky's monarch conservation efforts, please contact FWwildlifediversity@ky.gov.

Specific Strategies for Reaching Monarch Habitat Goals

Kentucky Department of Fish and Wildlife Resources is the state trust agency and has defined wildlife as "…..any wild mammal, bird, fish, reptile, amphibian, or other terrestrial or aquatic life…". In addition, the KDFWR has full authorities under the agency's Section 6 agreement, as defined by the Endangered Act. With a commitment and responsibility to manage wildlife, habitat conservation and management for the monarch butterfly is an obvious priority. The KDFWR is working across the state, federal, and private sector to solidify partnerships to address this pressing and diverse habitat need. By involving partners in plan development process, we have worked to create buy-in and foster a sense of trust and willingness to meet this conservation challenge.

Education and Outreach

Overview: Although the migration of the monarch butterfly is one of the most intriguing phenomena in the natural world, we also depend on these butterflies for our food and wildflower diversity. Monarchs serve key roles in pollination, both for food production and for wildflower gardens (75% of wildflowers need pollination to flower). By instating education and outreach efforts across Kentucky, we can raise awareness about the importance of the monarch and its lifecycle. Through the formation of a network of engaged volunteers and interest groups, we can create and maintain monarch habitat and spread the message about the importance of these conservation efforts.

Goal: Enhance public knowledge of monarch butterflies, the plight of the monarch, and ways that citizens of the commonwealth can become involved in helping this species.

Challenge 1: Identify and expand communication to target audiences.

Strategy: Identify priority audiences for monarch conservation.

Strategy: Utilize varying communication methods and strategies based on target audience. (e.g., presentations at industry meetings or workshops, presentations for local and state government agencies, social media, radio, direct communication, print)

Strategy: Measure change in support and participation of monarch conservation among target groups by developing effectiveness measures. Adapt and change messaging approach to target audiences if not creating desired response.

Assessment: Priority monarch conservation audiences will be identified and participation/support levels in monarch conservation will be quantifiable. All strategies will be implemented within the 5-year benchmark.

Challenge 2: Increase public knowledge of the monarch butterfly and its life cycle. Public awareness is increasing as studies and reports demonstrate a dramatic decline in migrating monarchs, bees and other pollinators. If Kentucky can create a "buzz" around monarchs and raise awareness and knowledge, then progress can be made.

Strategy: Create, promote and maintain Kentucky-specific social media sites. Rely on existing website resources (Monarch Joint Venture) for streamlined information. Explore feasibility of a link to Kentucky-specific materials within these existing websites.

Strategy: Utilize local media outlets, newspaper articles, television, radio, and podcasts.

Strategy: Create "branded" signage at KY welcome centers and rest stops and provide informational brochures.

Strategy: Recruit a celebrity spokesperson to be the face of Kentucky's monarch outreach.

Strategy: Develop public service announcements.

Strategy: Partner with the Monarch Conservation Science Partnership and Monarch Joint Venture to integrate a statewide citizen science program in Kentucky aimed at inventorying milkweed stems and recording monarch eggs and caterpillars.

Assessment: All strategies should be implemented in 5 years, and a third of the school-aged population of the state should be able to recognize a monarch butterfly within 5 years (assessed via online survey tool).

Challenge 3: Educate the public about the importance of and current threats to monarchs and other pollinators. Through establishing a network of informed educators, supportive materials and increasing Certified Monarch Waystations, this effort could have enormous impact.

Strategy: Recruit and train "monarch ambassadors" (including children) across the state who will conduct outreach to teach about monarchs.

Strategy: Create educational materials (videos, articles, PowerPoint programs and teaching aids) as tools for the ambassadors and other educators/presenters.

Strategy: Adapt Kentucky Department of Fish and Wildlife Resources' Backyard Wildlife program to include information on Monarch Waystations.

Strategy: Identify and adapt (as needed) existing educational presentations and material on monarchs and certified monarch waystations.

Strategy: Fund and develop locally appropriate native pollinator seed packets to be distributed with educational materials.

Strategy: Use social media sites to steer Kentucky's public to existing FAQ and "ask the expert" resources. Encourage residents to post images, suggestions and comments on social media sites.

Strategy: Increase knowledge of large landowners, both public and private, about monarchs and their plight.

Strategy: Increase school districts' knowledge about monarch waystations and pollinator gardens as tools to teach the Kentucky Academic Science Standards.

Strategy: Promote Certified Monarch Waystations and more than double the number in the state, with a goal of establishing 1,000.

Strategy: Develop a Monarchs Across Kentucky curriculum using existing curriculum that can be found at the University of Minnesota Monarch Lab (http://monarchlab.org/education-and-gardening/curricula) to supplement current curricula programs such as Project WILD.

Assessment: In 5 years, the monarch ambassadors will have worked with residents in every county, 1,000 new monarch waystations will be developed and certified with Monarch Watch, and more educational materials will be available.

Challenge 4: Promote public awareness on the harmful effects of spraying pesticides, especially neonicotinoids, on plants that that are important to monarchs and other pollinators.

Strategy: Enlist plant nurseries and sellers, including large-scale sellers like Lowe's, Home Depot, etc., to educate customers on use of pesticides, especially neonicotinoids.

Strategy: Encourage retailers to start selling flowers and garden plants free of neonicotinoids.

Strategy: In lieu of the above, ask retailers to label products that contain neonicotinoids.

Strategy: Work with retailers to create educational signage and material regarding impacts of neonicotinoids.

Strategy: Request that retailers post signage that explains the risks of neonicotinoids.

Strategy: Distribute existing neonicotinoid educational materials developed by other organizations.

Assessment: 50% of Kentucky nurseries have signage and/or educational materials about neonicotinoids. All strategies will be employed by the 5-year benchmark.

Challenge 5: Increase public awareness on where milkweeds and native nectar producing plants are available for purchase.

Strategy: Provide current lists of where pesticide-free, native milkweed plugs and seeds, as well as native nectar plants, can be purchased.

Strategy: Use existing educational products such as brochures, website content and social media content to promote information about the importance of planting nectar-producing flowers and providing recommendations about which flowering plants have the greatest importance for monarch survival. Many of these educational products can be found at the Monarch Joint Venture website (http://monarchjointventure.org/)

Strategy: Use existing educational material: presentations, brochures, publications, website content and social media content to share how to identify monarch eggs and caterpillars. Again, many of these resources can be found at the Monarch Joint Venture website.

Assessment: In 5 years, we will have a database available on the website with information about where to purchase milkweeds and other native nectar producing plants. We will have educational materials available for download from the website.

Challenge 6: Support local specialist groups.

Strategy: Identify local networks of ambassadors and develop a monarch conservation training program. Ambassadors will be trained in education, habitat development and research efforts. Develop programs based on audience and region of the state.
Strategy: Develop science-based resources to aid ambassadors in communicating the principles of monarch conservation, including habitat, research and education.
Strategy: Support local monarch efforts with financial resources and outreach materials.
Strategy: Provide information on potential funding mechanisms for the installation (and certification) of monarch waystations and pollinator gardens.

Assessment: Two of these five strategies will be completed by the 5-year benchmark. Within 10 years, priority audiences will be identified and outreach toolkits will be available for ambassadors. An effective and comprehensive training program will be developed and implemented for the network of local ambassadors.

Challenge 7: Outreach to Civic Groups. Engage environmentally-conscious civic groups across the state (e.g. garden clubs, FFA, 4H, Boy Scouts, Girl Scouts, etc.) in monarch conservation (i.e. train-the-trainer).

Strategy: Meet with at least one civic group per county regarding the urgent need for monarch conservation.

Strategy: Secure annual funding for seed packets to encourage citizens to develop pollinator plantings.

Strategy: Secure annual funding to develop signage for landowners engaged in monarch conservation.

Strategy: Identify and distribute existing monarch conservation and Monarch Waystation educational materials to civic groups through conferences, community events and other civic activities. Encourage civic groups to distribute these materials to their members.

Assessment: All strategies will be implemented by the 5-year benchmark.

Private Lands Habitat Management

Overview: Monarch butterfly (*Danaus plexippus*) populations have experienced alarming reductions during the past 20 years, with the decline in the subspecies (*Danaus plexippus plexippus*) that breeds east of the Rocky Mountains being of particular concern. Multiple generations of monarchs use summer habitat in Kentucky, and it is assumed that loss of monarch habitat in the state has contributed to population declines. With 95% of Kentucky under private ownership, collaboration with these landowners will be essential for monarch conservation efforts in the state to be successful.

***Goal**: Form monarch conservation partnerships with private landowners across Kentucky to maintain quality monarch habitat through establishment and management of new plantings or management of existing habitat.*

Challenge 1: **Implement Non-corporate Pollinator Plantings**
Partner with private, non-corporate landowners (e.g. production & hobby farmers, wildlife enthusiasts, non-profit organizations) across the state to establish quality pollinator plantings that include milkweeds and nectar producing plants for monarchs and other pollinators.

Strategy: Use existing United States Department of Agriculture (USDA) program incentives to establish pollinator plantings in every Kentucky county on private non-corporate land.

Strategy: Establish 100 acres of new pollinator plantings in the Conservation Reserve Enhancement Program (CREP) area, the Livingston county Quail Focus Area, and the Shaker Village Quail Focus Area.

Strategy: Secure annual funding to support purchase of seed (bulk & individual packets) for pollinator plantings on private non-corporate land that is not eligible for USDA program incentives.

Strategy: Secure Milkweed from Monarch Watch for two large-scale (2 acres minimum) private Monarch Waystation restoration efforts (to be identified). http://monarchwatch.org/bring-back-the-monarchs/milkweed/free-milkweeds-for-restoration-projects/

Strategy: Secure annual funding to develop signage for private non-corporate landowners engaged in monarch conservation.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 2: **Implement Corporate Pollinator Plantings**
Partner with private, corporate landowners across the state (e.g. utility companies, coal companies, horse farms, distilleries, golf courses, nursing homes) to establish quality pollinator plantings that include milkweeds for monarchs and appropriate nectar producing habitat.

Strategy: Use KDFWR's KY Business Conservation Partnership program to establish at least one new pollinator planting per county on private corporate land while emphasizing maintenance, employee, and public relations benefits (i.e. less mowing costs, wildlife viewing areas for relaxation, good environmental stewardship).

Strategy: Secure annual funding to develop signage for private corporate landowners engaged in monarch conservation.

Strategy: Secure annual funding to purchase seed (bulk & individual packets) for pollinator plantings on private corporate land that is not eligible for USDA program incentives.

Assessment: Two of three strategies will be implemented by the 5-year benchmark.

Challenge 3: **Implement Backyard Pollinator Plantings**
Partner with landowners across the state to establish quality pollinator plantings including milkweed and nectar producing habitats in "backyard" type settings within urban and suburban areas.

Strategy: Coordinate with University of Kentucky Master Gardener programs to install and certify a minimum of one new private Monarch Waystation in each participating county.

Strategy: Use KDFWR's Backyard Wildlife program to establish at least one new pollinator planting per county in non-traditional areas such as schools, churches, cemeteries, urban/suburban sites, homeowner association properties, community gardens, etc.

Strategy: Secure annual funding for the purchase of seed (bulk & individual packets) for pollinator plantings in non-traditional areas.

Strategy: Secure annual funding to develop signage for non-traditional landowners engaged in monarch conservation.

Assessment: Two of three strategies will be implemented by the 5-year benchmark.

Challenge 4: Management of Existing Monarch Habitat
Private land owners have diverse land use interests making it difficult to orchestrate monarch habitat management and inventories on private land. Effective management is necessary to sustain milkweed and complimentary pollinator species in existing monarch habitat. Landowners need concise and clear direction on how to manage newly created and existing habitat.

Strategy: Identify and promote Best Management Practices (BMPs) for monarch habitat.

Strategy: Develop at least one printed and one online educational tool to communicate identified management practices.

Strategy: Secure funding for publication of printed monarch habitat management material.

Strategy: Distribute monarch habitat management material to private landowners via University of Kentucky Extension Office educational outreach classes, Master Gardening programs, state garden clubs, and public/private arboretums.

Strategy: Train appropriate agencies and non-governmental organizations (Kentucky Department of Fish and Wildlife Resources, University of Kentucky Extension, USDA Natural Resources Conservation Service, USDA Farm Service Agency, The Nature Conservancy, Kentucky Farm Bureau, and Kentucky Department of Agriculture) on

delivering sound monarch habitat management recommendations that should be shared as part of an overall monarch awareness and habitat management message.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 5: **Reduced Mowing Campaign**
Minimize annual mowing by farmers, businesses, and other private landowners.

Strategy: Develop brochure explaining the need for and benefits of less mowing.

Strategy: Publish newspaper articles in major media markets addressing the impact of excessive mowing on monarchs.

Strategy: Utilize USDA Farm Service Agency's newsletter to increase awareness of effects of mowing on monarchs.

Strategy: Collaborate with USDA to limit annual mowing requirements in Farm Bill programs.

Assessment: Two of four strategies will be implemented by the 5-year benchmark.

Challenge 6: **Demonstration Sites**
Develop monarch habitat demonstration sites around the state to facilitate awareness of the issue and show examples of high quality monarch habitat.

Strategy: Develop at least one demonstration site per county, possibly at University of Kentucky
Extension offices.

Strategy: Post signage at demonstration sites explaining the need for monarch conservation and where to obtain more information.

Strategy: Facilitate annual monitoring of demonstration sites (citizen science or grant funded) to evaluate maintenance needs.

Assessment: All strategies will be implemented by the 5-year benchmark.

Public Lands Habitat Management

Overview: Public lands, which comprise less than 5% of Kentucky, are ideal sites for implementation of monarch protection because they serve as an interface between people and nature. Public lands offer several potential benefits: demonstration areas, trained land management staff, trained educators and interpreters, easy access, and readily accessible audiences. Monarch habitat restoration on public land associates agencies with positive actions and results. Funding sources are more likely to be available for public lands. Some public land organizations even have the capacity to create vast monarch habitat and provide the manpower and equipment for maintenance.

Goal: Establish a strategy for identifying practitioners within each public land agency who have decision-making powers about implementing a Monarch Habitat Management plan and then sharing scientific information documenting the need to create more monarch habitat with these practitioners.

Challenge 1: Identify relevant public land entities and determine the proper contact(s) for discussing monarch habitat initiatives.

Strategy: Develop a list of all the public land holding agencies in the state, with contact information for the appropriate person(s).

Assessment: All strategies will be implemented within 1-year.

Challenge 2: Convince diverse agencies with different priorities that monarch conservation is important enough for action.

Strategy: After identifying individual land managers, schedule face-to-face meetings to present information regarding the monarch program.

Strategy: Visit potential habitat sites with land managers and discuss restoration options.

Strategy: Assist land managers with development of restoration and management plans for sites.

Strategy: Provide land managers with accurate data on unit costs for installing and maintaining monarch habitat.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 3: Build a network of public land managers interested in developing monarch habitat and establish lines of communication between them.

Strategy: Collect contact information from all the identified public land managers throughout the state that are interested in participating in the monarch restoration program.

Strategy: Establish a user-friendly communication forum for all these individuals to discuss ideas and share experiences (e.g. possible monarch restoration list-serve).

Strategy: Host several meetings during the year at various locations so individuals can continually develop and share ideas as well as see what others are doing.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 4: Establish large areas of continuous monarch habitat.

Strategy: Once information is gathered on all the various public land agencies across the state, target restoration efforts towards larger tract sizes.

Strategy: Develop and/or provide guidance to land managers detailing the process for establishing high quality monarch and pollinator habitat.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 5: Promote consistency among public lands/agencies—establish consistent messaging while still allowing various land management actions that suit the policies and needs of diverse agencies.

Strategy: Identify key points for agencies to emphasize with the public regarding monarch restoration.

Strategy: Develop multiple restoration and management guidelines to fit different situations.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 6: Acquire additional public land to protect and restore pollinator habitat.

Strategy: Secure annual funding for Kentucky Heritage Land Conservation Fund and similar programs to purchase and protect suitable lands for monarchs and other pollinators.

Assessment: Strategy will be implemented by the 5-year benchmark.

Challenge 7: Elevate importance of eight key Best Management Practices when evaluating projects for conserving pollinator habitat.

Strategy: Align with regional and national initiatives to promote the following Best Management Practices for pollinator and monarch habitat

i. Focus on high quality foraging habitat.
ii. Identify important pollinator reproduction sites.
iii. Determine important nesting and overwintering sites.
iv. Identify pollinators of sensitive or at-risk plant species on Federal, State, local or non-governmental organization lists.
v. Identify and remove invasive species to improve pollinator habitat.
vi. Strive to use local, genetically appropriate native seeds.
vii. Implement adaptive management of pollinator habitat.
viii. Engage and inform the public.

Assessment: Strategy will be implemented by the 5-year benchmark.

Right-of-Way (ROW) Management

Overview: Right-of-Ways (ROWs) have been identified as a significant opportunity for monarch habitat implementation at the landscape level. Thousands of acres of transportation, utility, and other ROWs dissect Kentucky from east to west, north to south. These areas present prime opportunity to convert traditional grass monocultures to expansive areas of optimal pollinator habitat. Ultimately, the availability and scale of ROWs may prove to be a hallmark in monarch butterfly recovery.

Goal: Form partnerships, develop planting/mowing plans, and identify site selection parameters with various public and private entities to convert ROWs into significant pollinator habitat.

Challenge 1: Germination and weed competition have proven to be a major hurdle for establishment of desirable species within ROWs. Therefore, we need to determine the best planting procedure to reduce weed competition and increase germination of milkweed and other desirable species within ROWs.

Strategy: Work with Kentucky Transportation Cabinet, seed companies, and others to discuss planting procedures.

Strategy: Review previous planting plans from Kentucky Transportation Cabinet and other entities to determine what methods proved to be effective in ROWs.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 2: Develop prioritized list of focal areas in which to begin ROW plantings and determine which entities to target.

> **Strategy:** Coordinate with stakeholders, including Kentucky Transportation Cabinet, to determine which sites may provide the greatest benefit to monarchs and pollinators.
>
> **Strategy**: Meet with stakeholders to determine overall interest in ROW plantings.
>
> **Strategy**: Identify five sites for ROW planting.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 3: Determine seed availability, cost of seed and equipment needs.

> **Strategy:** Meet with seed producers to establish cost and availability.
> **Strategy:** Discuss the feasibility of developing these ROW sites as potential seed sources. This may involve new equipment or retrofitting existing equipment to harvest seed properly.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 4: **Finalize proper mowing regimes and application techniques of specific herbicides to reduce non-native invasive plant competition and maximize growth of beneficial species.**

> **Strategy:** Work with stakeholders, including Kentucky Transportation Cabinet, to determine when to mow while keeping traffic safety concerns in mind.
>
> **Strategy:** Work with ROW stakeholders to take proactive measures preventing the spread of non-native invasive plants into restoration areas.
>
> **Strategy:** Coordinate pro-active measures to control the spread of undesirable species into restoration areas (e.g. signage for restoration areas, clean equipment policies).

Assessment: Strategy will be implemented by the 5-year benchmark.

Funding

Overview: Effective rare species management and habitat management is expensive, and requires long term foresight and support. As a migratory species, monarch butterfly conservation is particularly costly because of the wide geographical range where appropriate habitat is needed. Effectively two thirds of Kentucky is potentially important to migrating monarchs. Successful monarch conservation will require long-term funding for habitat restoration, management, education, and research. The most cost-effective strategy is to improve general pollinator habitat, including both milkweed species and other nectar plants, on sites where milkweed species are naturally present.

Goal: Generate funding mechanisms to support monarch conservation, including habitat restoration, management, education, and research.

Challenge 1: Funding is needed to establish and/or manage monarch habitat on private land throughout Kentucky, in both large and small areas. Approximately 95% of Kentucky is privately owned.

Strategy: Utilize existing USDA Farm Bill Programs including the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), the Environmental Quality Incentives Program (EQIP), and the Wetland Reserve Enhancement Program (WREP) to improve existing or potential pollinator habitat, including lands currently enrolled in these programs and new contracts.

i. Work to establish pollinator habitat management, such as fescue conversion, as a ranking criterion in target areas to direct more funding to practices benefitting monarchs and other pollinators.

ii. Set a goal of enrolling 1,000 to 1,500 acres per year in pollinator habitat management on EQIP tracts.

iii. Set a goal of directing mid-contract management of CRP and CREP land to improve pollinator habitat on at least 45,000 acres.

Strategy: Utilize United States Fish and Wildlife Service (USFWS) Partners for Wildlife program to establish pollinator habitat in appropriate areas.

Challenge 2: Funding is needed to establish monarch habitat on public land throughout Kentucky, in both large and small areas. Kentucky's public lands are owned by an assortment of organizations with varying missions.

Strategy: Apply to the National Fish and Wildlife Foundation (NFWF) Monarch Conservation Fund for $50,000 to $250,000 to form a multi-agency collaborative effort to manage pollinator habitat on public lands throughout Kentucky, to include invasive species removal and prescribed fire on grasslands with natural milkweed populations (http://www.nfwf.org/monarch/Pages/home.aspx).

Strategy: Apply to the Kentucky Heritage Land Conservation Fund (heritageland.ky.gov) for funding of monarch habitat management on state-managed natural areas such as Wildlife Management Areas, Nature Preserves, Parks, Wild Rivers watersheds, and Conservation Easements to include invasive species removal and prescribed fire on grasslands with natural milkweed populations. Utilize this as non-federal match for appropriate federal grants, including NFWF, where possible.

Strategy: Work with the Kentucky Department of Transportation to apply up to $75,000 in Transportation Enhancement Funds to benefit pollinator habitat on highway rights-of-way and other sites.

Strategy: Utilize $25,000 in Imperiled Bat Conservation Funds to enhance pollinator habitat on appropriate sites as prey sources for rare bats.

Strategy: Explore private funding sources, such as the Doris Duke Foundation and other charitable foundations.

Strategy: Collaborate with conservation partners to direct agency program funding towards pollinator habitat improvement on appropriate sites.

Strategy: Work to secure annual funding for Kentucky Heritage Land Conservation Fund (KHLCF) to acquire and protect natural areas with significant or appropriate monarch and pollinator habitat.

Challenge 3. Milkweed species, which are host plants to monarch butterflies, are expensive to propagate and the supply is limited.

Strategy: Identify funding sources for local propagation of milkweed species.

Challenge 4. Funding is also needed to educate the public on the importance of monarchs as pollinators.

Strategy: Identify sources of funding for educational programs and publicize through Kentucky Association for Environmental Education, such as the stipend for "Got Milkweed" training for teachers. (http://pages.stolaf.edu/mohl/2016/04/06/2016-summer-workshops-for-teachers/)

Challenge 5. Research funding is crucial to setting monarch population benchmarks in Kentucky and identifying sites with high quality pollinator habitat to facilitate directing limited funding to the best possible areas.

Strategy: Identify research funding sources, and coordinate with existing research entities to ensure monarch conservation research needs are appropriately addressed.

Assessment: Half of these strategies will be employed by the 5-year benchmark.

Research and Monitoring

Overview: A carefully constructed and implemented monitoring and research plan is of critical importance to the Kentucky Monarch Plan. It should provide objective and quantifiable parameters to measure the progress and effectiveness of individual efforts within the scope of the project (i.e. number of monarch stations established, acres of habitat restored). A comprehensive monitoring plan will track the collective impact of all efforts on the recovery of the monarch. A sound monitoring plan will add relevance to the project and enable informed decision making.

Goal: We will utilize existing resources to develop a Kentucky monitoring protocol for monarch butterflies and habitats that is practical and designed to yield consistent results, if implemented by individuals of a variety of backgrounds with minimal training.

Challenge 1: **Define "suitable habitat" for monarch butterflies.**

Strategy: Identify experts who are familiar with current research.

Strategy: Develop a list of highest-priority research questions regarding regionally specific habitat requirements for monarchs.

Strategy: Engage university researchers in dialogue regarding monarch research priorities.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 2: Compile Best Available Science to **define best management practices for monarch habitat restoration and management in Kentucky.**

> **Strategy**: Form a committee of experts including land managers from Kentucky State Nature Preserves Commission, Kentucky Department of Fish and Wildlife Resources, The Nature Conservancy, monarch citizen scientists and others to generate a report on currently known best management practices as well as specific management questions that need to be addressed.
>
> **Strategy**: Share management protocols with managers involved in monarch habitat restoration.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 3: **Determine location, distribution, and status of current and potential monarch habitat.**

> **Strategy**: Create comprehensive database for monarch habitat based on nature preserves Natural Area Inventory (NAI) database, Biotics.
>
> **Strategy**: Inventory new areas, update older records from NAI database.
>
> **Strategy**: Identify potential corridors and key areas for habitat establishment/protection.
>
> **Strategy**: Create report/product that can be shared with monarch taskforce.

Assessment: Two of four strategies will be implemented by the 5-year benchmark.

Challenge 4: **Determine the best methodology for monitoring populations in Kentucky.**

> **Strategy:** Seek advice from experts for input and review of existing protocols.
>
> **Strategy:** Select or adapt the most suitable monitoring protocol based on expert input.
>
> **Strategy:** Determine who will conduct monitoring and who/how data will be tracked.

Assessment: All strategies will be implemented by the 5-year benchmark.

Challenge 5: Develop monitoring and reporting tools to identify and track the location and status of monarch habitat.

> **Strategy:** Coordinate with Monarch Watch to locate and track Monarch Waystations on private land in Kentucky and to obtain permission to add private landowner contact information to a Kentucky Monarch Habitat database.
>
> **Strategy:** Build a database of Monarch Waystations in Kentucky and quality of habitat at each waystation
>
> **Strategy:** Develop a self-reporting tool for landowners to provide information on their monarch habitat including size, quality, and contact information.

Assessment: Two of three strategies will be implemented by the 5-year benchmark.

Challenge 6: Monitor monarch migration in Kentucky.

Strategy: Use Journey North tools to track and record Kentucky monarch sightings.

Strategy: Leverage public interest using citizen science engagement for tracking Kentucky monarchs.

Strategy: Train educators, scientists, and individuals in tracking and tagging Kentucky monarchs.

Assessment: All strategies will be implemented by the 5-year benchmark.

2023	**2028**	**2033**	**Total by 2038**
13,606,000 stems	27,212,000 stems	40,818,000 stems	54,424,000 stems

Statement Regarding Likelihood of Implementation

It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding circumstances and political environments may change. However, Kentucky's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including but not limited to federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, we have devised strategies that will help each sector and partner to contribute meaningfully to our stem/acreage goals, and we believe that both long-term and short-term objectives are feasible and attainable.

KANSAS

Monarch Habitat Goals

The Kansas Monarch Plan is largely being built upon the concept of improving the development, delivery, and effectiveness of technical and a financial assistance on private lands to successfully deliver habitat management practices to private landowners. In Kansas, approximately 93% of the land is under private ownership with approximately 87% of those acres currently used for agricultural purposes. Working to conserve and enhance these lands for monarchs will be based on voluntary actions by private landowners and must be planned to maintain or improve profitability to the agriculture producer.

The Kansas Department of Wildlife, Parks and Tourism is currently working with partners in the development of goals, objectives, strategies, and action items as part of the Kansas Monarch Conservation Plan (hereafter, "Kansas Plan"). Goals and objectives of the plan will include components to increase visibility of monarch and native pollinator conservation needs and benefits, increase outreach and educational opportunities targeted toward specific audiences, improve habitat across the state, encourage more robust research and monitoring efforts, and offer best management practices ("BMPs") for a variety of land uses. Habitat improvement goals are still to be determined for the Kansas Plan, but Kansas is actively engaged with MAFWA and others on the development of the Southern Core Habitat Allocation Tool. Possible metrics to be considered are acres of beneficial habitats that include both milkweed and growing season-long nectar resources, and/or connectivity of beneficial habitats.

Current Monarch Conservation Activities

The Kansas Monarch Conservation Plan Summit (Summit) was held on June 7-8th in Topeka, KS, with a total of 106 people and 63 organizations participating in the KS Monarch Taskforce. This Taskforce includes 36 women and 70 men representing: 22 Conservation NGOs, 11 Ag NGOs, 8 Rights-of-Way Industry, 7 Federal Agencies, 6 Ag Industry, 5 State Agencies, 3 Academic Entities, and 1 Native American Tribe. We created a listserv for the KS Monarch Taskforce that we use to keep members updated on the Kansas Plan's progress. It also serves as a platform to share upcoming events and resources as they relate to monarchs and other native pollinators. Details regarding the sector group goals are below in the Specific Strategies for Reaching Monarch Habitat Goals.

Kansas, as a collaborative community, has been working on monarch-specific conservation activities since 2008. Our monarch conservation efforts from 2014 - Present include:

1. Kansas Department of Wildlife, Parks, and Tourism

- Implemented or facilitated the implementation of rangeland and cropland management practices that should improve habitat for monarch butterflies.
    - Rangeland Practices
        - Prescribed Burning – 32,118 acres
        - Invasive Brush Management – 17,965 acres
        - Invasive Herbaceous Weed Control – 32,030 acres
        - Prescribed Grazing Plans – 18,429 acres

    - Cropland Practices
        - Conversion of Cropland to Native Plants – 4,115 acres
        - Forb Interseeding in CRP – 480 acres
        - Pollinator plots in Cropland Settings – 154 acres
        - Cover Crop Plantings – 2,234 acres
- Other Agency Activities
    - 25 small pollinator plots (0.1-5.1 acres)
    - 6 outreach and education field days
    - 3 field days focused on early successional habitat management
    - 79 staff biologists attended monarch conservation planning training events
- Nature Centers
    - Great Plains Nature Center
        - Annual Pollinator Party - 2014, 2015, 2016
            - Total attendance 2,465
    - Kansas Wetlands Education Center
        - Annual Butterfly Festival
        - Monarch tagging
        - Monarch-centered school programs
            - 500 attendees to date
        - Collect and propagate milkweed seed for local distribution

2. Kansas Farm Service Agency

Kansas CRP enrollment:

- 2,068,269 acres as of January 2017 (total excludes non-grassland practices such as field windbreaks and food plot acres)
    - 4,452 acres of CP-42 pollinator habitat

3. Kansas, United States Fish and Wildlife Services Partners for Fish and Wildlife Program

- Enhanced or restored 100,335 acres of private lands that benefit monarchs and other native pollinators from 2014-2017

4. Kansas, United States Fish and Wildlife Services National Refuge System

- 26,900 acres of refuge lands that are under active Monarch habitat management in 2017.

5. Kansas Grazing Lands Coalition

- Delivered 15,000 acres of monarch habitat improvement projects through the 2015 NFWF Monarch Grant Funds program from 2015-2017.

6. Kansas Department of Transportation

- Native-only grass/forb plantings on all managed rights-of-way since 2008
- Updated seed mix to include more milkweed species and expand bloom period.

- Adapt mowing and spraying practices
    - Allow native plants to finish flowering cycle
    - Focus spraying on invasive plants
- Contribute to 5-state initiative to create pollinator habitat along I-35 corridor
- Create 15 acre pollinator plot at rest area
- Education website on raodways and pollinators

6. Kansas Pheasants Forever/Quail Forever

- Created/restored 7,638 acres of native habitat for wildlife and pollinators since 2014.

7. Kansas Turnpike Authority

- Maintain ~6,000 acres of right-of-way as native prairie
    - Pollinator friendly mowing plan
    - Implement prescribed fire plan
    - Reseed using native seed mixes

8. Westar Energy

- Manages 14,000 acres of native grasslands.
    - Conservation Activities:
        - Altering burn patterns to promote late season milkweed growth.
        - Brush/tree control
    - Outreach
        - Fund and construct pollinator gardens at schools
        - Funded pollinator gardens at state parks

9. Monarch Watch

- Monarch Watch maintains an active blog that keeps visitors updated on monarch conservation issues, seasonal movements, tagging events, species biology, and The Monarch Highway Project.
- Manages 529 Monarch Waystations
- Distrubute milkweed plugs (23,000 to date)

10. Grassland Heritage Foundation

- Manages 80 acres of their public prairie for monarchs and other native pollinators
- Institute new scholarship specifically aimed at supporting native pollinator research on native prairies.

11. Kansas State University Southwest Research and Extension Center

- Create extension bulletin on small-scale monarch habitat creation
- Provide outreach in western Kansas for pollinator friendly gardens

12. Kansas Native Plant Society

- Provides fact sheets
- Maintains a graduate scholarship on grassland research focused on pollinators

13. US Environmental Protection Agency

- Educational outreach including 1.5 acre pollinator garden
- Promote pollinator habitat on EPA and Superfund Sites

14. US Department of Army, Fort Leavenworth & Fort Riley

- Maintain three pollinator gardens
- Brush removal and restoration of grassland habitat
- Adopt pollinator friendly mowing practices
- Support research on pollinator habitat
- Selective spraying of brome
- Prescribed burning for prairie management

15. Southeast Audubon Society

- Monarch tagging
- Educational outreach focused on pollinators

16. Dyck Arboretum of the Plains

- Establish 70 Monarch gardens at schools
- Hosts state's largest native plant sales event including presentations on the importance of native plants and pollinators
- Native prairie restoration consutling

17. Prairie Band Potawatomi

- Partnership with NRCS to examine benefits of cover crops on pollinator communities

18. Kansas Sierra Club & K-State Extension Master Naturalists

- Educational outreach
  - 250 plus monarch programs
- Monarch tagging
- Developed children's book about Monarchs

19. Tallgrass Prairie National Preserve, National Park Service

- Developed pollinator plots
- Educational outreach

20. Kansas Wildlife Federation

- Two pollinator restoration projects
- Educational outreach

21. Dow AgroSciences and Mycogen Seeds

- Coordinate with counties and state to improve chemical and application procedures
- Partnered with Kansas Grazing Lands Coalition on NFWF Monarch Habitat Grant award

22. Kansas City Native Plant Initiative

- Restored 130+acres of urban habitat to pollinator gardens
- Multiple school plantings
- 175 homeowner pollinator plantings
- Educational outreach
- Native plant sales

23. Topeka Zoo and Conservation Center

- Educational outreach including the establishment of pollinator gardens and a butterfly enclosure on zoo grounds
- Establish demonstration prairie for Kansas Museum of History

Specific Strategies for Reaching Monarch Habitat Goals

The Kansas Nongame and Endangered Species Act of 1975 K.S.A. 32-957 provides management and regulatory authority to Kansas Department of Wildlife, Parks and Tourism (KDWPT) for the conservation of nongame and state threatened and endangered species. As further defined in statute, nongame wildlife includes invertebrates within the animal kingdom. The monarch butterfly, in Kansas, is currently considered a nongame species and is listed as a species of greatest conservation need within the state's State Wildlife Action Plan, but is not designated as "threatened" or "endangered" under the state statute. Therefore protections against "take" are not available for monarchs and no critical habitat has been designated for the species.

The Kansas Plan is organized in by sectors: 1) Grasslands (private, public, and protected); 2) Croplands; 3) Rights-of-Way (state, county, township, and industry); 4) Urban (urban greenscapes and gardens) and Outreach; and 5) Research and Monitoring. Sector workgroup members are all volunteers from the broad group that attended our Summit as well as other interested parties. This wider membership, from which workgroup members volunteered, is the collection of people/organizations composing the KS Monarch Taskforce.

***Grasslands Sector**:*

Goal # 1: To maintain, enhance and create monarch habitat in grassland systems.

Objective # 1: Identify target areas that are critical to monarch breeding and migration.

Strategy # 1: Quantify habitat, resources, and management practices already on the landscape (other than grassland roadsides) that are under management specifically for pollinators.

Objective # 2: Increase heterogeneity-based habitat management that benefits

profitability & pollinators on working lands in target areas.

Strategy # 1: Increase patch-burn grazing in critical monarch areas by identifying and overcoming barriers to wider utilization of the practice.

Strategy # 2: Reduce broadcast pesticide application on grazing lands by providing education to landowners/managers as well as promoting spot spraying and plant management practices that consider the importance of forbs/legumes to beef production and the ecosystem.

Strategy # 3: Decrease invasive woody plant cover in grasslands.

Strategy # 4: Convert monotypic non-native grasslands to native grasses and forbs.

Strategy # 5: Educate landowners/managers for early detection and rapid control of invasive non-native plants (particulary sericea lespedeza and Old World bluestems).

Strategy # 6: Encourage appropriate timing of mowing/haying to increase pollinator habitat and floral resources.

Objective #3: Improve Monarch habitat on existing/expiring CRP

Strategy #1: Develop BMP's for CRP enhancement and management specifically for Monarchs on existing and expiring CRP acres.

Strategy #2: Focus additional resources within targeted areas of potential CRP benefit to Monarchs.

Strategy #3: Facilitate conversion of expired CRP to working grasslands through education efforts so Monarch habitat can be maintained or improved.

Strategy #4: Encourage use of prescribed grazing as a CRP management tool to increase stand heterogeneity.

Goal # 2: Outreach and Education on monarch conservation needs and practices for landowners and managers.

Objective # 1: Educate landowners and managers on the value and importance of pollinator conservation.

Strategy # 1: Develop quick, concise, constant message document that includes program opportunities.

Strategy # 2: Create one page producer-oriented document to define Best Management Practices

Strategy # 3: Develop grassland diversity workshops emphasizing the nutritional value of forbs in beef production.

Objective # 2: Enhance grassland management on state and federal public lands using the same BMPs recommended to producers.

Strategy # 1: Use as demonstration sites for managers to walk and see how pollinator-friendly practices are achievable and profitable.

Croplands Sector:

Goal # 1: Enhance available habitat, and to the extent possible, create new habitat opportunities within cropland systems.

Objective # 1: Encourage full use of current FSA and NRCS programs beneficial to monarchs.

Strategy # 1: Create a crop budgeting tool that compares the costs and benefits of commercial crop planting versus establishing monarch habitat as part of a cropping system.

Strategy # 2: Demonstrate precision agriculture applications than can be used to identify crop acreage best suited for monarch, pollinator, and beneficial insect habit.

Strategy # 3: Work with landowners and tenants to enhance their management of acreage currently enrolled in FSA, NRCS, and NGO wildlife habitat and cover crop programs so they better benefit monarchs, pollinators, and beneficial insects.

Strategy # 4: Work with landowners and tenants to identify and manage non-crop areas within their cropping systems, such as edge habitat, fencerows and corners, to enhance monarch habitat.

Objective # 2: Work with landowners and tenants to identify and manage playas as native plant communities to increase habitat for the monarch, pollinators, and beneficial insect habitat creation and enhancement.

Strategy # 1: Create and demonstrate crop and livestock budgeting tools that compare the costs, benefits, and soil and water health improvements of reestablishing native plant communities in playas.

Goal # 2: Reduce exposure to pesticides near croplands.

Objective # 1: Work with landowners and tenants to enhance their management of cropland acreage to reduce potential mortality to monarchs, pollinators, and beneficial insects.

Strategy # 1: Increase and improve education and awareness among landowners, tenants, and applicators on the strategies and practices of Integrated Pest Management (IPM) to control crop pests with minimal pesticides, as well as improve timing and precision of pesticide application.

Right of Ways Sector Group:

Goal # 1: Maintain native grassed right-of-way areas and minimize disturbance to existing prairies.

Objective # 1: Elevate avoidance of Native Grassed Areas when siting new development.

Strategy # 1: Inform and send out correspondence to permitting departments, consultants, and others who make decisions regarding where to place facilities, lines, and roads to consider such native grassed areas crucial pollinator habitat and to weigh these areas heavily in studies, environmental assessments, etc.

Objective # 2: Create or revise regionally-specific native grass-forb seed mixes to better suit monarch/pollinator resource needs.

Strategy # 1: This mix shall contain milkweed species, as well as spring, summer, and fall monarch nectar forbs specific to the region where utilized. Decrease the percentage of grasses in the mix, in particular taller growing and/or more aggressive grass species to reduce competition with forbs. Adapt and revise mix over time, utilize expert review of mix.

Objective # 3: Revise mowing policies to avoid critical monarch migration and breeding periods.

Strategy # 1: Limit mowing to early spring and late fall when not in car zones or other safety critical areas.

Strategy # 2: Reduce mowing to 2-3 year mowing cycle where possible.

Objective # 4: Revise herbicide application policies to avoid broadcast or widespread applications which negatively impact pollinator habitat, and unnecessarily increase costs.

Objective # 5: Improve implementation and compliance of monarch/pollinator BMPs within companies and agencies.

Strategy # 1: Conduct annual education of field and district employees that focuses on beneficial forbs vs. noxious weeds and invasive plants, and the value of native forbs, milkweeds, and native grasses.

Goal # 2: Restore rights-of-way to native grass-forb communities, where appropriate.

Objective # 1: Identify right-of-way sites to restore and enhance monarch habitat.

Strategy # 1: Restore/enhance using regionally specific milkweed seeds and plugs, and nectar forbs in areas that include: A.) native grass but few beneficial forbs; B.) convert cropland, urban, and industrial right-of-ways to native grass-forb areas, particularly in areas that are critical to monarchs and/or will serve as high traffic public demonstration sites.

Strategy #2: Identify and control woody species encroachment in rights-of-way to improve habitat and reduce woody species seed sources.

Objective # 2: Document and monitor selected restored sites.

Strategy # 1: Use photos and location identifiers to record pre-existing site conditions and restoration efforts; document success of restoration using plant surveys and site conditions to monitor success.

Goal # 3: Influence right-of-way companies and agencies with outreach and education.

Objective # 1: Educate companies and agencies on monarch conservation practices.

Strategy # 1: Develop quick, concise, constant message document that includes spot spraying practices mowing practices, proper native forb/grass identification.

Strategy # 2: Present annually at a minimum of one each of the following meetings or similar events: A.) County Weed Training Event; B.) Kansas County Highway Association Event; C.) Rural Electric Coop Meetings; and D.) Utility Company or Representative Conference or Training Events.

Strategy # 3: Partner with Kansas Native Plant Society or other entity to produce a commonly misidentified "weeds" brochure for distribution to county weed applicators to ensure beneficial forbs are not mistaken as noxious weeds, and to provide education regarding the importance of forbs to ecosystem health.

Objective # 2: Educate the public on right-of-way monarch conservation practices.

Strategy # 1: Use existing industry, agency, community, and academic educational programs and documents to enhance the public's understanding of monarch conservation. Consider using: A.) websites, newsletters, signage, displays, and other media; B.) utilize ROW restoration projects and volunteers, other public and private lands demonstration sites; and C.) foster other monarch educational opportunities and events.

The State of Kansas is currently working with partners in the development of goals and objectives included in this work is the planning for targeted goals based on a 5-year basis such as listed below; however, at this time we do not have that information to provide.

MICHIGAN

Monarch Habitat Goals

Over the past three years the State of Michigan has worked with a diverse group of organizations to develop a Monarch and Wild Pollinator Strategy. Our goal over the next couple of years is to continue building and strengthening our partnerships while simultaneously identifying monarch and wild pollinator habitat goals for Michigan.

Current Monarch Conservation Activities

The Michigan Department of Natural Resources (MIDNR) and many of our conservation partners have been working on monarch-specific conservation activities since 2015. Our monarch conservation efforts to date include:

- The Michigan Pheasant Restoration Initiative is a grass roots conservation effort that started in 2011 and has a goal of restoring, enhancing or maintaining 25,000 acres of high quality grassland habitat on public and private lands by 2021. High quality grasslands include a diverse mix of forbs and are a great source of nectar for monarchs and wild pollinators.
- MIDNR created a communication strategy in 2015 which identified four goals:
    - To educate public on monarch conservation and provide a call for action.
    - To provide a platform for students to understand monarch lifecycle and contribute to monarch conservation.
    - To trigger the conservation funding story.
    - To be a leader in Michigan Monarch Conservation.
- MIDNR participated in the planning of the October 2015 conference in Iowa to initiate the Midwest states collaborative monarch conservation effort.
- MIDNR hosted a Monarch butterfly and Wild Pollinator Summit on September 21 and 22, 2016. Over 60 people attended the summit and included leaders from 35 key partners in Michigan. The purpose of the summit was to begin drafting Michigan's Monarch and Wild Pollinator Conservation Strategy.
- To help guide development of Michigan's Monarch and Wild Pollinator Conservation Strategy a Steering Committee was formed, which includes the following organizations:
    - U.S. Fish and Wildlife Service
    - U.S. Forest Service
    - Natural Resource Conservation Service
    - Michigan Farm Bureau
    - Michigan State University
    - Michigan State University Extension
    - Grand Valley State University
    - Michigan Department of Transportation
    - National Wildlife Federation
    - Michigan Environmental Council

- MIDNR hosted a second Monarch butterfly and wild pollinator Summit on March 28, 2017 to continue development of Michigan's Monarch and Wild Pollinator Conservation Strategy.
- MDNR and USFWS partnered with USDA NRCS to establish an annual fund pool of $100,000 for monarch habitat in the Environmental Quality Incentives Program (EQIP).
- MDNR and Pheasants Forever have submitted a new CRP Monarch and Pheasant SAFE proposal to USDA to target 40,000 acres of new diverse native grassland habitat in southern Michigan.
- The USDA Conservation Reserve Program (CRP) offers a pollinator practice in Continuous CRP for pollinator/Monarch habitat.

Specific Strategies for Reaching Monarch Habitat Goals

The MIDNR has the authority under Part 365, Endangered Species Protection, Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, MCL 324.36501 to 324.36507 (Part 365), to list rare flora and fauna on Michigan's list of threatened and endangered species. The Monarch is not a state listed species, but is considered a Species of Greatest Conservation Need in the Michigan's State Wildlife Action Plan (2015). The MDNR manages approximately 4.6 million acres of lands throughout the state. However, to reverse the decline of the monarch and reach Michigan's goal of improving monarch habitat, many organizations will need to participate.

To facilitate coordination and cooperation amongst a diverse group of organizations, Michigan, in partnership with 35 other organizations, drafted Michigan's Monarch and Wild Pollinator Conservation Strategy. Below is a summary of our goals and strategies.

Goal 1: Create, restore and enhance habitat to support the monarch butterfly and wild pollinators

- Strategy 1.1: Create, restore and enhance habitat on public land for monarchs and wild
- Strategy 1.2: Create, restore and enhance habitat on private land for monarchs and wild pollinators
- Strategy 1.3: Identify native plant producers who are propagating appropriate milkweed and forb seeds and plugs in Michigan.
- Strategy 1.4: Develop and distribute best management practices guidelines (for urban/ suburban, right-of-ways, agriculture, grasslands/ open lands) to create, restore and enhance monarch and pollinator habitat

Goal 2: Enhance education and awareness about monarch butterfly and wild pollinators and their ecological and economic importance

- Strategy 2.1: Assess status of currently available educational materials, identify gaps and develop materials as necessary
- Strategy 2.2: Compile and synthesize information on pollinator habitat management strategies
- Strategy 2.3: Develop communication strategy tailored to specific audiences

        - Three potential audiences were identified (K-12 children, gardeners/landscapers, and farmers/growers) where organizations identified collaboration was feasible.
    - Strategy 2.4: Develop communication tools and strategy for peer to peer practice encouragement
    - Strategy 2.5: Increase awareness of the importance of monarch and pollinator conservation
    - Strategy 2.6: Educate leaders, managers and decision-makers on monarch and pollinator management
    - Strategy 2.7: Promote urban community gardening for pollinators and monarchs

Goal 3: Integrate monitoring and research into habitat management and education and outreach to create and implement an adaptive management process to increase overall effectiveness of monarch and wild pollinator conservation

- Strategy 3.1: Adopt common monitoring protocols to allow diverse stakeholders to contribute to a common reporting platform
- Strategy 3.2: Identify baseline and population trends for monarchs and key pollinators
- Strategy 3.3: Identify and define suitable habitat for monarchs and pollinators in Michigan
- Strategy 3.4: Inventory existing monarch and pollinator suitable habitat
- Strategy 3.5: Develop a system for assessing priorities for habitat investments Identify research priorities for Michigan
- Strategy 3.6: Identify research priorities for Michigan
- Strategy 3.7: Contribute to identifying and evaluating drivers of monarch and pollinator declines locally and nationally
- Strategy 3.8: Communicate data collection results with a diverse set of stakeholders with emphasis on peer reviewed literature

Goal 4: Review existing policies, regulations and laws and recommend changes or amendments to promote conservation of pollinator services and monarch breeding and migration

- Strategy 4.1: Identify land use policies and practices that impact pollinator conservation and management, and determine affects to stakeholders
- Strategy 4.2: Identify laws and regulations at all scales of government that impact pollinator conservation and management, and determine affects to stakeholders
- Strategy 4.3: Recommend changes or amendments to existing policies, laws and regulations to promote monarch and pollinator conservation
- Strategy 4.4: Communicate the economic value of pollinators and conservation strategies (using cost/benefit analysis) and make recommendations to policy makers
- Strategy 4.5: Develop model guidance and policies for pollinator conservation

Goal 5: Promote an active collaborative partnership between a diverse set of stakeholders to identify shared priorities for monarch and pollinator conservation

- Strategy 5.1: Identify and engage relevant stakeholders in monarch and pollinator conservation
- Strategy 5.2: Develop governing body to facilitate coordination among stakeholders to implement plan
- Strategy 5.3: Facilitate information exchange and coordinate amongst stakeholders to ensure conservation is implemented across landscapes and geographic regions
- Strategy 5.4: Determine where shared interests/conflicts lie and identify process of collaboration
- Strategy 5.5: Develop common reporting platform
- Strategy 5.6: Determine messages and how to distribute messages down through stakeholders
- Strategy 5.7: Develop process to coordinate beyond state boundaries

Statement Regarding Likelihood of Implementation

Michigan's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, our on-going partnerships and Michigan's Monarch and Wild Pollinator Conservation Strategy are designed to help each partner contribute meaningfully to monarch and wild pollinator conservation.

MINNESOTA

Current Monarch Conservation Activities

Although a number of state, federal, local, non-governmental organizations and private citizens are implementing conservation efforts to benefit the monarch butterfly and other native pollinators, this summary focuses on efforts by state agencies. Future summaries will include efforts by the broader conservation community. Minnesota's state agencies have been working on pollinator conservation activities that benefit monarchs since 2013 when the MN Legislature directed the Department of Natural Resources (DNR) to develop best management practices (BMPs) and habitat restoration guidelines for pollinator habitat enhancement or restoration on state-owned lands (MN § 84.973 Pollinator Habitat Program). The DNR requires the use of these BMPs and guidelines on all habitat enhancement or restoration of lands under the agency's control. Additionally, prairie restorations conducted on state lands or with state funds must include a diversity of native species selected to provide habitat for pollinators throughout the growing season.

In 2016, the Minnesota Department of Agriculture (MDA) published a review of neonicotinoid pesticides and their impacts on pollinators, including monarchs. The report spurred Governor Mark Dayton to issue Executive Order 16-07 outlining steps to reverse pollinator decline and restore pollinator health in the state. Under this order, the governor established two advisory bodies: the Governor's Committee on Pollinator Protection, a cross-sector external stakeholder group, and the Interagency Pollinator Protection Team, comprised of representatives of ten state agencies. The interagency team established goals and indicators and published its first annual report in 2017. Additionally, the executive order provided specific direction to state agencies to implement recommendations in the neonicotinoid review, support pollinators through habitat restoration and enhancement, and make changes to programs, policies, and plans that benefit pollinators.

Specific monarch conservation actions by state agencies include:

Board of Water and Soil Resources (BWSR)

- **Pollinator Initiative** – BWSR developed a pollinator plan in 2013, which was updated in 2017. A key part of BWSR's Pollinator Initiative to incorporate pollinator habitat into all types of conservation projects is the BWSR Pollinator Toolbox that provides guidance for partners on methods to effectively restore pollinator habitat.
- **Pollinator Seed Mixes** – Several new "Pilot" Seed Mixes have been developed for pollinator plantings, including regional pollinator plot mixes. Landowner guidance has also been developed on the use of pollinator seed/packets to encourage the use of native species and prevent the use of invasive species.
- **Pollinator Friendly Solar Certification** – In 2016, legislation was passed allowing solar energy developers to claim that their projects were Habitat/Pollinator friendly if they met certain requirements defined by BWSR. Staff have refined guidance for "Habitat/Pollinator Friendly Solar Certification." Solar habitat seed mixes have been developed and a new shade mix for use under panels is in development. BWSR is also on a technical advisory panel for a National Renewable Energy Lab study investigating the success of solar habitat plantings around the country.

- **Pilot Pollinator Habitat Mapping** – In 2017, BWSR worked with conservation partners to conduct pilot pollinator habitat mapping in Washington County to identify "refuge" areas in need of protection and restoration and new "sweet spots" for planting. Habitat mapping is also underway now for Minneapolis.
- **Buffers/Riparian Filter Strips –** In 2015, Minnesota's buffer law required the establishment of new perennial vegetation buffers of up to 50 feet along lakes, rivers, and streams and buffers of 16.5 feet along ditches. Vegetation options for landowners include prairie vegetation, hay and forage crops including flowering species, and woody vegetation that could provide benefits to pollinators, including monarchs.

Department of Natural Resources

- **Pollinator BMPs** – The DNR established several best management practices for creating, restoring and enhancing habitat for native insect pollinators on DNR-managed lands and state-funded prairie restoration projects.
- **Native Pollinator Action Plan** – The DNR has hired a Pollinator Coordinator and is writing a Native Pollinator Action Plan to guide its actions across the agency's divisions, regions, and responsibilities.
- **Diverse Restoration Seed Mixes** – The DNR is harvesting seed mixes from prairie sites with 60-80 species, including milkweed, to use in restoration projects.
- **Prairie Conservation Plan** – The Minnesota plan was developed by federal and state agencies and local conservation organizations. It identifies core conservation areas and creates a vision of a connected landscape from Canada to Iowa that generally forms a north-south corridor ideal for migratory insects, including the monarch butterfly. The plan also calls for local ecotype, soil-appropriate seed mixes for restoring and enhancing prairie parcels.
- **Prairie Acquisitions, Restorations, & Enhancement** – Minnesota has a unique source of funding for habitat protection, restoration, and enhancement. The Clean Water, Land, and Legacy Amendment to Minnesota's Constitution in 2009 established a 3/8- cent sales tax and dedicates a third of the revenue to the Lessard-Sams Outdoor Heritage Fund. A significant portion of this fund is allocated to land acquisition and enhancement of prairie. The DNR, along with other entities such as The Nature Conservancy and the US Fish and Wildlife Service, utilize this funding as well as other funding sources to protect prairies. Funding from the Lessard-Sams Outdoor Heritage Fund for prairie protection, restoration, and enhancement has averaged about $40M per year for grassland and wetland acquisitions and $10M per year for enhancements.
- **Habitat Restoration & Enhancement on DNR-Owned and –Managed Lands** – Since 2014, the DNR established over 10,000 acres of grassland and wetland in Wildlife Management Areas (WMAs); 1400 acres in State Parks, and #### acres in Scientific and Natural Areas.
- **Pollinator Objectives in the State Wildlife Action Plan –** Minnesota's Wildlife Action Plan 2015-2025 identified the monarch butterfly and several other native pollinators as

Species in Greatest Conservation Need (SGCN). The plan promotes a Wildlife Action Network that represents quality habitats for terrestrial and aquatic SGCN throughout the state. Promoting the implementation of best management practices to benefit the monarch butterfly and other native pollinators is one of the conservation actions called for throughout the network. Although the plan's primary focus is on improving and connecting habitats within the Wildlife Action Network, a small group of species specific actions are called for in the plan, including implementing survey and research projects to understand the causes(s) of pollinator declines.

Minnesota Department of Transportation (MNDOT)

- **Native Seed Mixes & Guidance**- MNDOT collaborated with DNR and BWSR on the development of 23 native seed mixes containing pollinator-friendly species and made them available to state agencies and local units of government. MNDOT used seed mixes on 36% of its project acres, resulted in planting 2709 acres of pollinator-friendly habitat. MNDOT developed an online tool and guidance to assist public and private designers in choosing the right seed mix for a given project.
- **Integrated Roadside Management Guidelines** – MNDOT and several other partners are developing guidance on "Maintaining Roadside Plant Diversity, Guiding Principles for Integrated Roadside Management" to help maintain plant diversity when invasive species are being treated along roadsides.
- **Monarch Highway** – MNDOT is part of the interstate Monarch Highway effort, which will provide joint educational materials, vegetation management practices, and strategies for pollinator seed mixes for states along the I-35 corridor. Minnesota has so far implemented the Albert Lea monarch way station.
- **Monarch Candidate Conservation Agreement with Assurances** (CCAA) – MNDOT has initiated the development of a CCAA to address monarch conservation
- **National Cooperative Highway Research Program (NCHRP) Monarch Roadsides Project** – MNDOT is a participant in the effort to evaluate the suitability of roadway corridors for use by monarch butterflies.

Minnesota Department of Agriculture

- **Pollinator Summit** – In February 2016, Environmental Initiative, on behalf of the MDA, convened a wide spectrum of Minnesota's insect pollinator experts and interested stakeholders – from beekeepers to landscapers to farmers – for a day of collaboration to identify solutions that will protect and support Minnesota's insect pollinators.
- **Implementation of Review Recommendations** – MDA has prioritized two recommendations from the neonicotinoid special registration review: 1) Verification of Need policy to reduce the unnecessary use of neonicotinoids, and 2) increased use inspections for insecticides that are highly toxic to pollinators.

- **Minnesota Pollinator Promise** – MDA runs the "Minnesota Pollinator Promise," which asks Minnesotans to pledge to do at least one thing to help pollinators. The promise has high visibility at the state fair, where MDA has also distributed more than 60,000 native seed packets.
- **Pollinator BMP Guides** – MDA has produced BMP guides for various landscapes, including residential, agricultural, and right-of-way lands.
- **Pollinator BMPs in Pesticide Applicator Training** – MDA includes information about best management practices to prevent harm to pollinators in pesticide applicator education programs. The MDA works with the University of Minnesota to prepare pesticide manuals and license pesticide applicators. The pesticide applicator exam and training include information on how pesticides may affect pollinators, and include BMPs that applicators can use to reduce harm to pollinators and their habitat.

<u>Minnesota Department of Administration (Admin)</u>

- **Lease Language** – Admin modified its commercial building lease terms and conditions of its leases with private landlords to include language requiring the use of pollinator friendly plants and prohibiting the use of certain pesticides unless no other suitable product is available. This language is getting incorporated across the state as leases on buildings expire.
- **Updated Design Guidelines** – Admin requires that landscape products for all state building construction and renovation projects must be neonicotinoid-free. This will impact new construction and major renovations for facilities.
- **State Capitol Pollinator Gardens & Landscaping Plan** – Admin placed educational signage around pollinator gardens at the Capitol Complex, to help engage visitors to the Capitol with the pollinator issue. Also, Admin updated its landscaping plan to include only neonicotinoid-free plants on the Capitol Complex.
- **Pollinator-friendly Procurement Options** – The central procurement office has contract options available for state agencies and local units of government to purchase seeds that are neonicotinoid-free and support pollinator habitat.

<u>Other State Agencies</u>

- Environmental Quality Board (EQB)
    - Facilitates and supports the Governor's Committee on Pollinator Protection and Interagency Pollinator Protection Team
    - Coordinates Pollinator Educator Consortium
    - Assists with design of pollinator exhibit for State Fair Eco Experience and Minnesota libraries
    - Compiles state agency pollinator resources on EQB website
- Minnesota Pollution Control Agency (MPCA)
    - Conducts pollinator outreach and education through the State Fair Eco Experience
    - Work with BWSR to use closed landfills as seed mix test sites
- Minnesota Zoo

    - Hosts the Prairie Butterfly Conservation Program
    - Conducts research on pesticide drift risk
    - Provides education and outreach to 1.3 million visitors/year
- The Department of Corrections is working to increase pollinator habitat at its facilities. As of 2017, the department restored 13 acres of pollinator habitat and planted over 200 fruit trees Corrections property.
- The Department of Education is helping to develop traveling exhibits on pollinators to be displayed at libraries across the state, to help promote understanding and awareness of pollinator issues.
- The Department of Health studies the impact of pesticides on human health. They need to consider human health impacts that would arise from any alternatives to neonicotinoids.

Research

- Many conservation partners, including BWSR, are collaborating with the University of Minnesota Bee Lab on research designed to better understand what bee species are using conservation lands and how we can better plan, select, and design projects to protect and restore pollinator populations.
- The DNR conducted *Lepidoptera* surveys in southwestern and southeastern Minnesota and moth surveys in southeastern Minnesota, the Saint Croix River Valley, and the North Shore of Lake Superior. A total of 900 species were documented, of which about 800 are moth species.
- Many pollinator research projects are funded through the Legislative-Citizen Commission on Minnesota's Resources (LCCMR).

Specific Strategies for Reaching Monarch Habitat Goals

The commissioner of the DNR has "charge and control of all the public lands…and wild animals of the state" (MN § 84.027), and is responsible for a) developing BMPs and habitat restoration guidelines for pollinator habitat enhancement on DNR lands through the Pollinator Habitat Program, and b) including a diversity of native species for pollinator habitat in prairie restorations (MN § 84.973). This authority extends to DNR-owned and -managed lands as well as projects executed with DNR funds. The DNR maintains many strong partnerships with federal agencies, other state agencies, and conservation organizations that are also working toward pollinator conservation. Additionally, the governor's 2016 executive order established an ongoing effort among state agencies to protect pollinators and report on progress to the public.

HABITAT STRATEGIES

Protected Lands (public and private)

- Conduct pollinator habitat inventory and analysis to identify existing habitat for conservation and high-priority areas for protection, restoration, and enhancement.
    - Set acreage targets for protection, restoration, and management of pollinator habitat on DNR-owned and –managed lands.
    - Refine the monarch model tool to establish appropriate goals for Minnesota.

    - Expand BWSR's pilot mapping project to include other counties and cities across Minnesota to identify existing and potential pollinator habitat areas.
- Plant and maintain milkweed and nectar plants in grasslands and other managed lands.
    - Protect, restore, and enhance pollinator habitat on DNR-owned and -managed lands (Wildlife Management Areas (WMAs), Scientific and Natural Areas (SNAs), and State Parks and Trails).
    - Utilize the Lessard-Sams Outdoor Heritage Fund to acquire, restore, and enhance public lands in priority areas identified in the Minnesota Prairie Conservation Plan, Pheasant Plan, and State Wildlife Action Plan that have the potential to support monarchs and other pollinators. Since 2009, government agencies, with help from private partners, acquired 67,000 acres through fee title or easement, restored 5,000 acres, and enhanced 237,000 acres in Prairie and Transition Sections.
    - Incorporate pollinator habitat protection and restoration planning into conservation easement projects. Over the next five years as part of a new CREP (Conservation Reserve Enhancement Program) initiative with conservation partners, BWSR is planning to restore 60,000 acres of prairie and wetland with a focus on using seed mixes that benefit monarchs.
    - Protect pollinator habitat through wetland protection and restoration (BWSR)
    - Encourage the development of seed sources for use in restoring and enhancing habitats
- Collaborate with state agencies, federal agencies, and conservation partners to increase impact, create efficiencies, and share resources.
- Best Management Practices
    - Update and maintain vegetation policies and guidance for local seed and plant source selection for conservation, as well as restoration planning and design. (BWSR)
    - Refine outreach and technical resources for pollinator habitat (BWSR)

<u>Private Agricultural Lands</u>

- Develop guidance for land managers to protect conservation projects from insecticide drift. (BWSR, in partnership with Xerces Society)
- Improve riparian buffer diversity to include flowering plants that support pollinators and to pursue opportunities to restore larger areas of refuge and pollinator corridors to connect habitat. BWSR is looking to put at least 20 species in a mix for riparian buffers.
- Update and maintain vegetation policies and guidance for local seed and plant source selection for conservation, as well as restoration planning and design. (BWSR)
- Incorporate pollinator habitat into agricultural conservation practices. (BWSR)

<u>Rights-Of-Way (Transportation, Electric, and Oil/Gas)</u>

- Complete guidance document on maintaining roadside plant diversity and conduct outreach to stakeholders.
- Use (and specify to contractors) seed mixes which include native pollinator plants, including milkweed, on MNDOT roadside projects.
- Increase use of native seeding on roadside projects to 75%.
- Expand MNDOT's prescribed fire program.
- Educate MNDOT maintenance forces (mower operators and herbicide applicators) on milkweed vs. weed identification and location of known populations of less common milkweed species.
- Establish highway rest area demonstration areas with native plantings.
- Integrate Monarch Way Stations into rest areas.
- Complete and implement the Monarch Highway within Minnesota.
- Complete and implement the Monarch Candidate Conservation Agreement with Assurances (CCAA).
- Utilize results of NCHRP Monarch Roadsides Project to inform management.
- Continue the Roadsides for Wildlife program.

<u>Other Energy Infrastructure (Mined Lands and Energy Generation Sites)</u>

- BWSR will develop and maintain a list of projects meeting Pollinator Friendly Solar Certification requirements.

<u>Urban and Developed Lands:</u>

- Develop a pilot program to test pollinator-friendly seed mixes on the buffer areas at some of the 109 MPCA-managed closed landfills.
- Protect, restore, and enhance pollinator habitat on other state-owned and –managed lands (e.g. demonstration gardens at State Capitol Complex and Governor's Residence, Department of Corrections building grounds).
- Incorporate pollinator habitat into urban water quality projects (BWSR)

EDUCATION AND OUTREACH

- Establish the Minnesota Pollinator Education Consortium to unify pollinator education messaging, create effective education strategies, and share resources among a broad spectrum of partners.
- Conduct public outreach and education on monarch habitats and pollinator benefits. (MNDOT, DNR)
- Share key messages about pollinators with the public.
- Provide accessible information on pollinator conservation for a diversity of stakeholders.
- Inspire public participation in protecting native pollinators and their habitat.
- Work with partners to advance their goals related to native pollinators.
- Collaborate with other organizations to create, enhance, and monitor monarch habitat on non-DNR public lands and private lands.

Statement Regarding Likelihood of Implementation

It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding and political environments may change. However, Minnesota's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, we have devised strategies that will help each sector and partner to contribute meaningfully to our stem/acreage goals, and we believe that both long-term and short-term objectives are feasible and attainable.

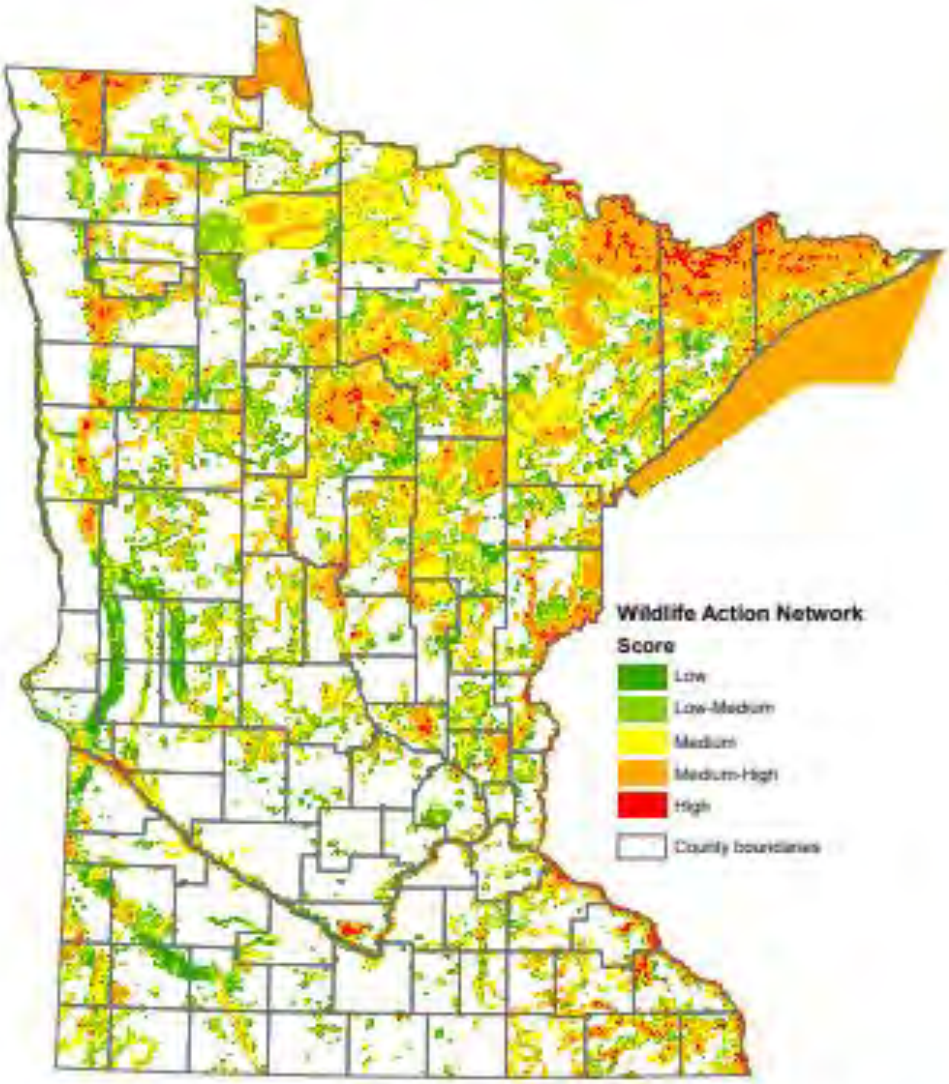
Maps

The maps below indicate targeted areas of interest for habitat restoration and enhancement for many species of wildlife including focused efforts for monarch and other native pollinators; however, efforts for monarch habitat are currently underway throughout the entire state of Minnesota and are not limited to only the areas referenced in the maps provided. [Low quality images are copied into the document, and higher quality images can be found via the hyperlinks provided.]

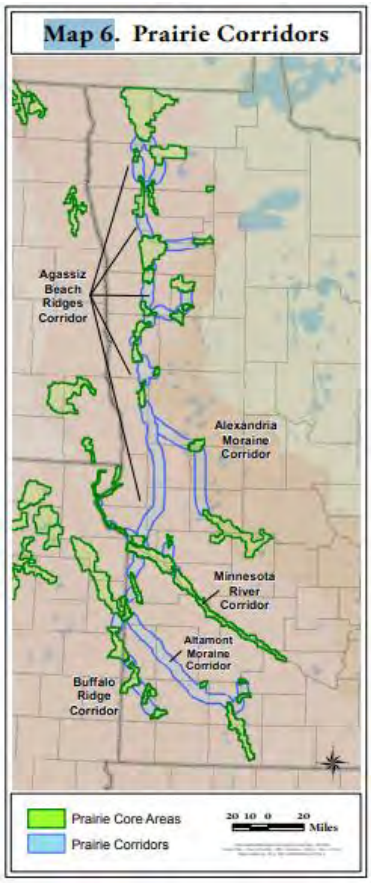
Minnesota's 2015-2025 Wildlife Action Plan – Wildlife Action Network Map

Minnesota Prairie Conservation Plan, p. 28– Cores and Corridors Map

Minnesota's 2015-2025 Wildlife Action Plan
Wildlife Action Network



The Wildlife Action Network is composed of mapped terrestrial and aquatic habitats, buffers, and connectors that represent a diversity of quality habitats that support Species in Greatest Conservation Need (SGCN). Scores are based on five scalable metrics: SGCN population viability scores, SGCN richness, spatially prioritized MN Biological Survey Sites of Biodiversity Significance, ranks of Lakes of Biological Significance, and Stream Indices of Biological Integrity (IBI). Lower scores (green) in a given area indicate the metric scores for any of these five components were either relatively low or zero, while high scores (red) indicate that multiple metrics of high scores overlap. For example, a red area could indicate several good or outstanding SGCN populations and/or high SGCN richness (including species that did not have population maps available) along with a high score from another prioritization layer. See Chapter 1 and Appendix E of the 2015-2025 MN Wildlife Action Plan for more information. The area in northeastern Minnesota delineating a portion of Lake Superior represents Minnesota's managed area of the lake.


Map 6. Prairie Corridors
Agassiz Beach Ridges Corridor
Alexandria Moraine Corridor
Minnesota River Corridor
Altamont Moraine Corridor
Buffalo Ridge Corridor
Prairie Core Areas
Prairie Corridors
20 10 0 20
Miles

MISSOURI

Monarch Habitat Goals

Monarchs have lost significant habitat acreage primarily due to land use changes, development, and agricultural land management. Our biggest challenge is mitigating losses or habitat restoration on privately owned and controlled lands. The limited capacity to produce the required quantities of seed and plants/plugs is a significant restriction that must be promptly addressed if public interest and momentum are to be successfully harnessed. Missouri's objective is to restore and/or enhance 385,000 acres (19,000 acres per year) of new pollinator habitat with 200 milkweed stems/acre (77 million total stems) and diverse nectaring species by 2035 (Table 1). This objective is a step-down calculation based on the national pollinator acreage goal stated in the National Strategy to Promote the Health of Honey Bees and Other Pollinators (The White House 2015). Missouri's hope in achieving this habitat objective is to help address habitat loss for monarchs and render the need for future listing under the ESA, for this and other pollinator species unnecessary.

2020 (15%)	**2025 (50%)**	**2030 (80%)**	**Total by 2035**
11.55 million Stems @ 200 SPA	38.5 million Stems @ 200 SPA	61.6 million Stems @ 200 SPA	77 million Stems @ 200 SPA

Table 1

In July 2016, the Missourians for Monarchs Collaborative — comprised of citizens, conservation and agricultural organizations, government agencies, utilities, academia, agribusinesses and other non-governmental organizations — finalized the "Missouri Monarch and Pollinator Conservation Plan." Through the Collaborative, we will work to coordinate and mobilize public and private stakeholders to increase and sustain monarch and pollinator habitat through planting, restoration, and land management. A major emphasis will be identifying limitations and obstacles to achieving the objective and collectively finding practical solutions for creating monarch and pollinator habitat. For more detailed information regarding Missouri's goals, objectives, and strategies, please reference the "Missouri Monarch and Pollinator Conservation Plan."

Current Monarch Conservation Activities

Missourians for Monarchs is comprised of nearly 40 organizations. A steering committee meets quarterly to provide leadership and oversight for implementation of the statewide Missouri Monarch and Pollinator Plan. Monarch conservation activities occur both collaboratively among partners and individually. To date, these efforts include:

Governance and Funding

Six partners – Missouri Department of Conservation (MDC), Missouri Farmers Association (MFA), Monsanto, Natural Resource Conservation Service (NRCS), Quail Forever, U.S. Fish and Wildlife Service (USFWS) – financially support supervision, housing, and oversight of the Missourians for Monarchs Coordinator position, who is tasked with oversight for implementing the "Missouri Monarch and Pollinator Conservation Plan"

Partnering among the Collaborative members has funded eight Farm Bill Wildlife Biologist positions and two Coordinating Biologist positions to help deliver Farm Bill programs to landowners, including support for monarch initiatives

In 2016, the Collaborative secured a $249,965 National Fish and Wildlife Foundation grant to support five monarch-related projects over the next two years
In 2017, the Collaborative was awarded a $247,493 National Fish and Wildlife Foundation grant for six monarch-related projects to be completed during the next three years

Habitat Conservation and Restoration
Receipt of $200,000 grant from the National Fish and Wildlife Foundation in 2015 for restoration of 333 acres of habitat at two National Wildlife Refuges in Missouri
Receipt of $229,868 grant from the National Fish and Wildlife Foundation in 2015 to create 1,400 acres of restored monarch habitat on both public and private lands
Providing $250,000 to incentivize USDA Conservation Reserve Program plantings for monarchs along the Interstate 35 corridor
Obligation of $441,125 in FY16 funds to monarch habitat efforts
Allocation of $31,292 in FY17 funds to monarch habitat efforts (as of 5/31/17)
Providing cost-share opportunities for private landowners for pollinator and monarch habitat conservation efforts
MDC Landowner Assistance Program (LAP) provides cost share to establish 900 acres of diverse grassland habitat each fiscal year
Providing technical assistance and recommendations to over 10,000 private landowners annually
Protecting monarch habitat on original and restored prairie through invasive species removal and prescribed burning
Establishing pollinator habitat in transmission rights of way
Restoration of pollinator habitat on dozens of sites across the state
Restoration of pollinator habitat on 32 acres in north-central Missouri at Associated's Thomas Hill Energy Center
Provide support for NextGen Habitat Projects through the Bee & Butterfly Habitat Fund
Providing financial and technical assistance to deliver monarch and pollinator conservation through the Monarch Butterfly Habitat Development Project, which is a component of the Environmental Quality Incentives Program (EQIP)
Promoting native host (milkweed) and nectaring plants through the Missouri Prairie Foundation's Grow Native! Program's "Monarch Café" and "Pollinator Buffet" plant tags

Research and Monitoring
Collaborate with federal partners to adapt CRP and NRCS specifications to include milkweed in wildlife friendly mixes (3-4% milkweed)
Conducting pollinator research on several issues including neonicotinoids, insecticide-free food plots and insect recolonization of grasslands
Milkweed production plots at George O. White State Forest Nursery for use on public land plantings

Education and Outreach
In June 2016, the Collaborative worked to enhance public awareness and education of monarch conservation by hosting a series of events during Pollinator Week, June 19-25. This included media relations efforts to receive press coverage for the announcement of a gubernatorial proclamation of Pollinator Week, a private reception/dinner for key stakeholders, and a public education event attended by more than 1,400 individuals.

In July 2017, the Collaborative, in partnership with the City of Columbia, hosted a monarch monitoring event. In addition to those who personally attended, media coverage encouraged others to participate in this citizen science endeavor.
Missourians for Monarchs has established a presence in social media to deliver monarch conservation information. From September 2016 to September 2017, the Collaborative's followers on Facebook doubled.
The Collaborative received a $7,500 grant from the Monarch Joint Venture to create a video promoting the installation of monarch and pollinator habitat.
Designs for a Missourians for Monarchs' website is currently underway, which will serve as a clearinghouse for monarch conservation information.
In the past 12 months, the Collaborative's coordinator has spoken at nearly two dozen events, delivering the message of monarch conservation to audiences across the state.
The Collaborative's coordinator has served on two MAFWA Working Groups. Other members of the Collaborative also serve in this regional effort.
Provide $10,000 to fund mini-grants for 4-H Monarch Habitat Demonstration plots
Co-hosting Pollinator Plots field days through the PF/QF Youth Pollinator Habitat Program
Creating monarch habitat demonstration gardens about Kansas City and hosting educational events.
MDC has installed demonstration projects with Missouri Cattlemen's Association, Association of Missouri Electrical Cooperatives and the University of Missouri's A.L. Gustin Golf Course
Hosting numerous educational events
MDC has been working on monarch-specific conservation activities since 2015 and natural community management activities that provide diverse nectaring opportunities for monarchs since 2004
22 Missouri cities have signed the National Wildlife Federation's Mayors' Monarch Pledge
The Collaborative recently completed three best management practices documents that were designed to help production landowners implement pollinator practices on their property while maintaining profitability.
The Collaborative developed a cost share folder for pollinator enthusiasts interested in financial incentives from State, Federal and NGO funding partners.

Specific Strategies for Reaching Monarch Habitat Goals

In Missouri, there is no agency that claims legal authority for monarch butterfly management. However, the Missouri Department of Conservation (MDC) has constitutional authority over the native fish, forest and wildlife resources in the state. According to the Missouri Wildlife Code, MDC has authority over all native wildlife and certain invertebrates (American burying beetle, mussels, tumbling creek cave snail, Hind's emerald dragonfly). MDC has regulatory control of insects on all MDC owned or leased lands. The department also has the authority to list species as endangered when necessary. If an insect species is listed by federal agencies, it would then fall under the regulatory code enforced by MDC.

Missouri has a State Endangered Species list, and insects are eligible for listing under MDC's code. Two insect species are currently considered state endangered. The list and associated language is in the Missouri Wildlife Code, in Chapter 4:
http://www.sos.mo.gov/cmsimages/adrules/csr/current/3csr/3c10-4.pdf

Some of the permitting and other specifics are described in other chapters of the code. The full code can be found here: http://www.sos.mo.gov/adrules/csr/current/3csr/3csr.asp.
To date, the monarch butterfly has not been considered or listed as threatened or endangered in Missouri, but the species is listed as a "species of greatest conservation need" in MDC's most recent SWAP plan.

HABITAT CONSERVATION, ENHANCEMENT, and RESTORATION

Monarchs have lost significant amounts of habitat mostly due to land use changes, development, and agricultural land management. Our biggest challenge is how to mitigate losses or completely restore habitat on lands that are almost completely in private hands and control. Further complicating the problem is the limited capacity to produce the seed, plants/plugs in needed quantities, a major restrictive factor that must be quickly addressed if public interest and momentum are to be successfully harnessed. Our intention is to work toward a Missouri 20-year habitat objective of creating 385,000 acres (19,000 acres per year) of new pollinator habitat with 200 milkweed stems/acre and diverse nectaring species . This objective is a step-down from the USFWS 20-year national plan to develop 7 million acres of habitat with 1.25-1.5 billion additional milkweed stems. It is our hope that achieving this habitat objective will help to address the threat of habitat loss for monarchs and render the need for possible future listing of this and additional pollinator species under the ESA as unnecessary.
Through the Collaborative, we will work to coordinate and mobilize public and private stakeholders to increase and sustain monarch and pollinator habitat through planting, restoration, and management. A major emphasis will be to identify limitations and obstacles to achieving the objective and collectively find practical solutions for creating monarch and pollinator habitat.

GOAL I: To conserve, enhance, and restore habitat on public and private lands to support populations of monarch butterflies and pollinator species.

Objective A: Conserve and manage existing monarch and pollinator habitat, and create 385,000 acres (19,000 acres per year) of additional habitat with 200 milkweed stems/acre by 2036.

Strategy 1. Inventory Habitat Conditions/Identify Target Geographies – Identify existing habitat for conservation and high priority geographies for enhancement and restoration. Use gross determinations from existing information for initial, short-term work but refine information and scale over time to improve decision-making and priority-setting.

Strategy 2. Public Land Management – Convene and engage partners with public land stewardship responsibilities in determinations about commitment, priorities, targets, capabilities, and effort commensurate with their authority and limitations. Seek opportunities for coordination and collaboration, information sharing, and pooling of resources.

Strategy 3. Private Land Management (Non-agricultural) – Engage communities and their residents in discussions about the role they can play in monarch and pollinator conservation. Help identify opportunities for voluntary habitat conservation and enhancement.

Strategy 4. Private Land Management (Agricultural) – Collaborate with agricultural partners and interests to identify and promote proactive actions by farmers and ranchers that work to support monarchs and pollinators in production agricultural landscapes.

Strategy 5. Technical Assistance – Develop methods by which private landowners can access necessary information, equipment, and contractual services for developing and managing monarch and pollinator habitat.

Strategy 6. Financial Incentives and Assistance – Seek to develop, provide, and promote financial incentives (e.g., cost-share opportunities) that will enhance the affordability of establishing monarch and pollinator habitat on private lands.
Actions/Tasks:
a. Form a state, federal and NGO work team to examine existing cost-share/incentives and provide suggestions for additions, improvements, or new programs.
b. Seek grant opportunities to fund additional incentives for monarch and pollinator plantings on private lands.

Strategy 7. Seed and Plant Resources – Work to increase availability of native seed and plant resources necessary to meet demand, with special emphasis on availability of regionally appropriate milkweed species. Promote the commercial native seed and plant industry in ways that further create and meet demand expectations.

OUTREACH AND EDUCATION
Successful action begins with a clear understanding of the problem we are trying to solve and how not solving the problem stands to affect us all. This means providing factual information about the plight of monarchs and pollinators in a timely manner, reaching stakeholders and individuals alike.

Fundamentally, we desire to create a level of awareness and urgency that motivates people, groups, and organizations to take the steps necessary to offset impacts to these species by arming them with the knowledge and resources they need. Through outreach, education and marketing we will work with the public and partners to achieve our mission, with a special emphasis on reaching individuals, youth and community-based groups and organizations, minorities, and people with limited resources. Our role will be as a coordinator and facilitator bringing together informational and educational materials, resources of existing programs, and supporting the substantial grassroots efforts that already exist. Moreover, we will work to ensure connectivity so everyone may realize the part they play and their relative contribution to the overall statewide effort.

GOAL I – To establish the Missourians for Monarchs as a leader and clearinghouse for information about monarch butterflies and pollinator conservation in Missouri.

Objective A: Officially, launch the Missourians for Monarchs Collaborative.

Strategy 1. Take formal steps to elevate the profile of Missourians for Monarchs statewide using media and partner communications outlets.

Strategy 2. Design, develop and rollout an official Missourians for Monarchs website in concert with or ahead of the Collaborative launch.

Objective B: Develop and initiate a broad Missourians for Monarchs marketing campaign to create statewide awareness of the plight of the monarch and pollinators targeting the general public.

Strategy 1. Establish a marketing work group for the purpose of developing and implementing a marketing campaign targeting the general public.

Strategy 2. Assess public and partner awareness and understanding of monarch and pollinator issues through general polling and/or representative surveys. Initiate a baseline survey with planned follow-up surveys.
Actions/Tasks:
a. Explore opportunities with partners and institutions of higher education (e.g., graduate study) for developing and supporting a general survey for determining public awareness.

Objective C: Promote the mission and work of the Missourians for Monarchs through strategic integration of traditional and non-traditional methods of media and marketing.

Strategy 1. Identify and prioritize communication and information delivery objectives; determine the need for Missourians for Monarchs-specific information, materials, or displays. Determine available traditional and non-traditional media outlets and high profile events to deploy information according to delivery objectives and target audiences.

Objective D: Work with partners to identify or develop methods to train contractors, farmers, partners and individuals on proper establishment and maintenance of quality monarch and pollinator habitat.

GOAL II - To engage and involve youth-focused groups/organizations, minorities, and people with limited resources in all aspects of monarch butterfly and pollinator education and conservation.

Objective A: Develop outreach and educational components with an emphasis on youth, minorities, and people with limited resources that may be used or easily adopted by existing groups.

Strategy 1. Outline desirable concepts to be included as part of efforts to reach youth, minorities, and people with limited resources, and begin assembling components or tracts from existing sources, or develop new elements as needed. Emphasis will be on learning and activities that enhance understanding and direct participation in monarch conservation.

GOAL III – To engage and involve Missouri cities and communities in all aspects of monarch butterfly and pollinator education and conservation.

Objective A: Increase the awareness of Missouri city and community leaders about the monarch and pollinator issues, and seek their support and action to aid in the conservation of these species.

Strategy 1. Provide cities and communities with basic information about monarch and pollinator habitat needs and the opportunities for conserving and enhancing habitat. Engage local citizens to lead discussions about the potential for community efforts.

Objective B: Actively promote, support, and engage the Missourians for Monarchs – Naturalists and Gardeners (Network) and Regional Coordinators; Master Naturalists, Master Gardeners, and Federated Garden Clubs in their work toward enhancing monarch habitat.

Strategy 1. Enable the Missourians for Monarchs – Naturalists and Gardeners to promote the creation, maintenance and expansion of monarch/pollinator habitat in the most effective manner relevant to the overall state habitat goals.

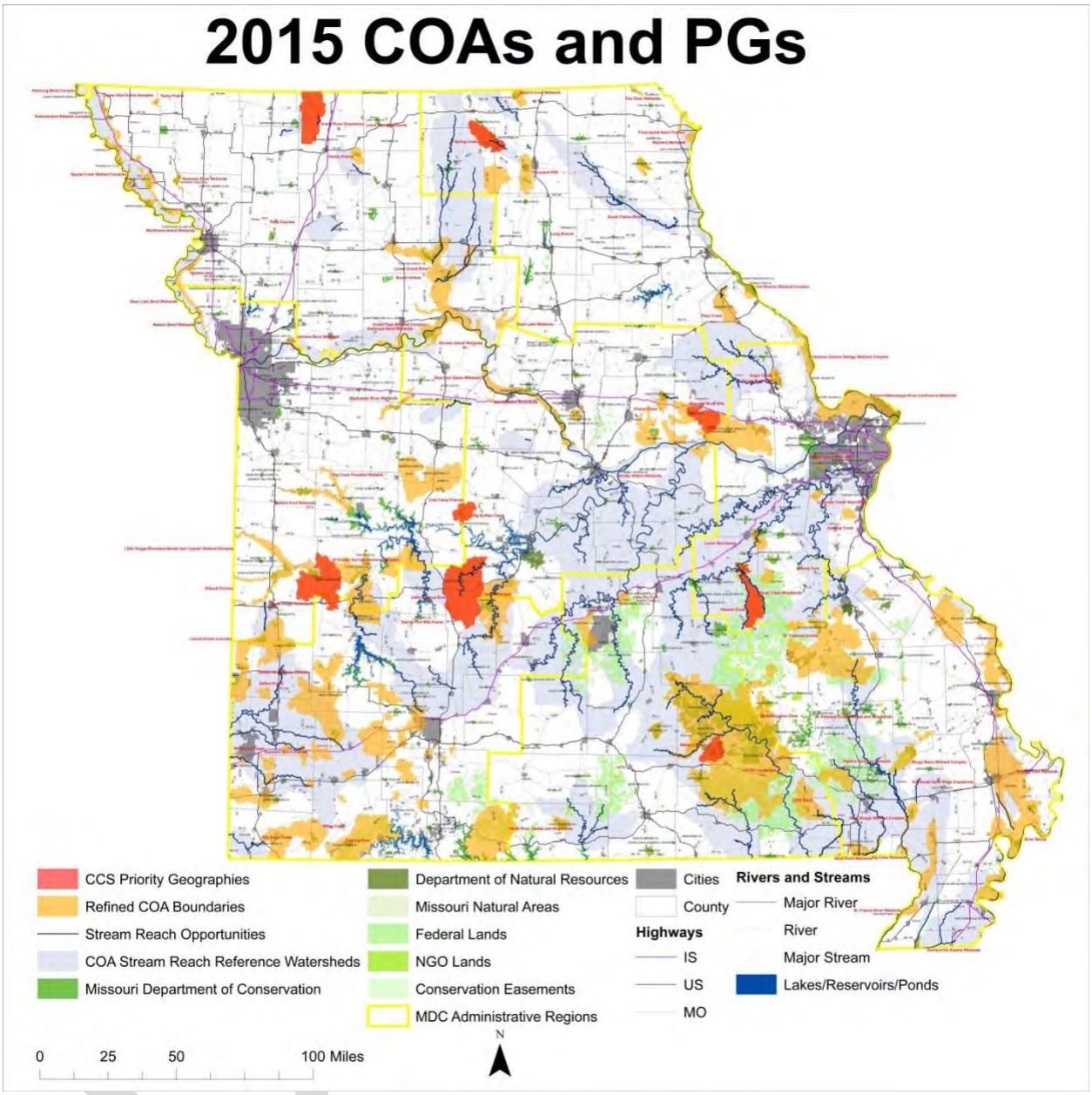
Statement Regarding Likelihood of Implementation

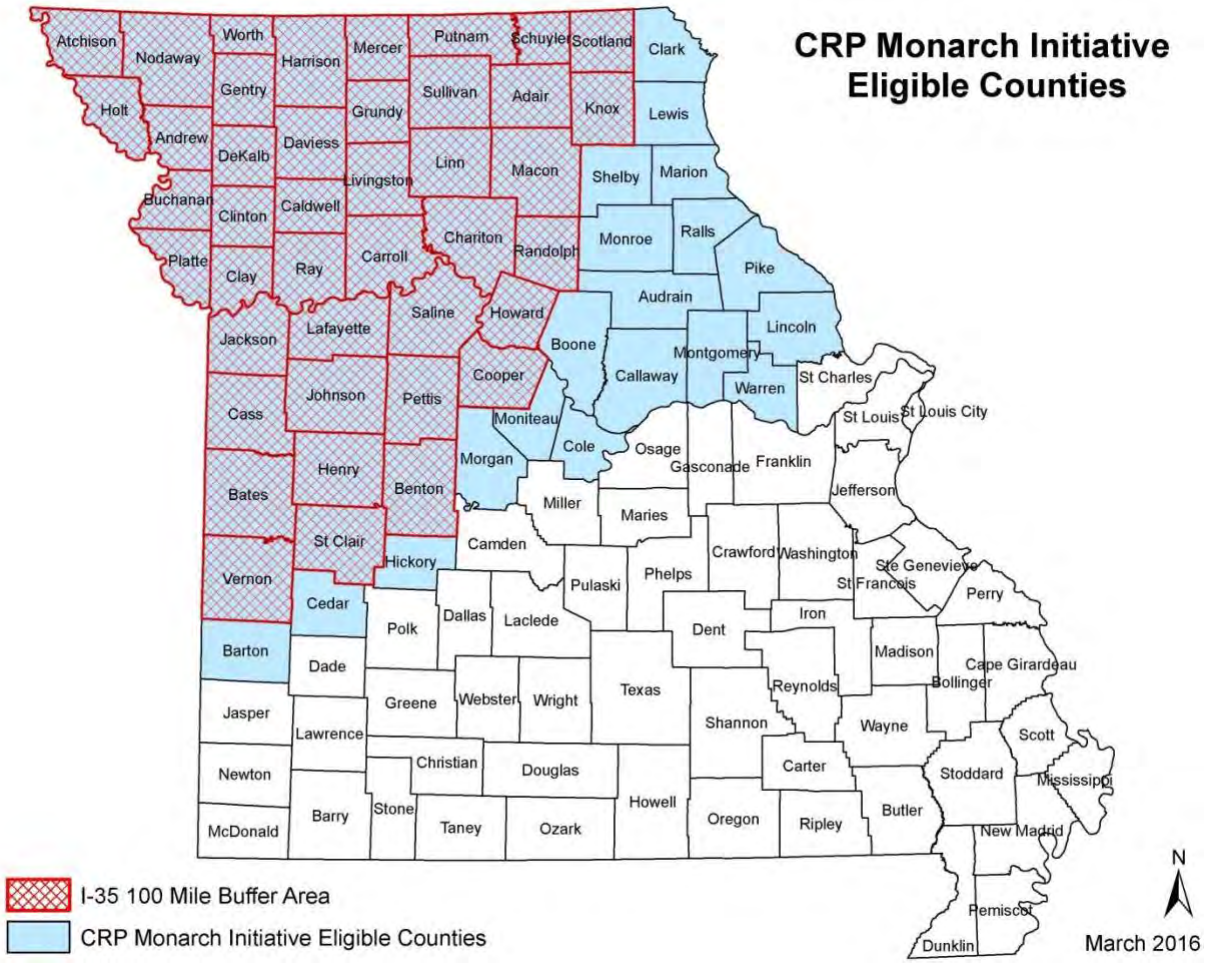
Due to dynamic funding sources and changing political environments, execution of this Strategy is not guaranteed. However, Missouri's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, strategies have been devised that will help each sector and partner contribute meaningfully to our stem/acreage goals, and we believe both long-term and short-term objectives are feasible and attainable.

Maps

The below maps indicate targeted areas of interest for monarch habitat restoration and enhancement; however, efforts for monarch habitat are currently underway throughout the entire state of Missouri and are not limited to only the areas referenced in the maps provided.

2015 COAs and PGs




CRP Monarch Initiative
Eligible Counties
Atchison
Nodaway
Worth
Harrison
Mercer
Putnam
Schuyler
Scotland
Clark
Gentry
Sullivan
Adair
Knox
Lewis
Holt
Andrew
DeKalb
Daviess
Grundy
Linn
Macon
Shelby
Marion
Buchanan
Clinton
Caldwell
Livingston
Chariton
Randolph
Monroe
Ralls
Pike
Platte
Clay
Ray
Carroll
Saline
Howard
Audrain
Jackson
Lafayette
Boone
Montgomery
Lincoln
Cooper
Callaway
Warren
St Charles
Cass
Johnson
Pettis
Moniteau
St Louis
St Louis City
Henry
Morgan
Cole
Osage
Gasconade
Franklin
Bates
Benton
Miller
Maries
Jefferson
St Clair
Camden
Crawford
Washington
Ste Genevieve
Vernon
Hickory
Pulaski
Phelps
St Francois
Perry
Cedar
Polk
Dallas
Laclede
Dent
Iron
Barton
Dade
Madison
Cape Girardeau
Bollinger
Greene
Webster
Wright
Texas
Reynolds
Jasper
Lawrence
Shannon
Wayne
Scott
Christian
Douglas
Carter
Stoddard
Mississippi
Newton
Howell
Barry
Stone
Taney
Ozark
Oregon
Ripley
Butler
McDonald
New Madrid
Pemiscot
Dunklin
N
I-35 100 Mile Buffer Area
CRP Monarch Initiative Eligible Counties
March 2016

NEBRASKA

Monarch Habitat Goals

The State of Nebraska's goal is to add 62.5 million milkweed stems in the eastern portion of Nebraska considered the tallgrass prairie ecoregion by 2035, along with appropriate nectar resources. Additional milkweed will be added across the mixed and shortgrass prairie ecoregions of Nebraska. The majority of milkweed stems will be added to existing grassland on both public and private ground. Rights-of-way and crop-land that is marginal or less frequently productive are also important locations for adding milkweed. Urban landscapes and acreages are also necessary to achieve this goal in Nebraska.

Current Monarch Conservation Activities

Nebraska has been working on monarch-specific conservation activities since 2015. Our monarch conservation efforts to date include:

- A state wide summit with stakeholders engaged in monarch and pollinator conservation in February of 2016.
- Follow-up sector based meetings were held to follow up on implementation.
- The Nebraska Monarch and At-Risk Pollinator Conservation Plan was completed.
- An online milkweed tracker was launched for the public and conservation partners to enter their milkweed contributions.
- A study was initiated to quantify the potential of milkweed additions across sectors to inform future actions to increase milkweed in each sector.
- The Nebraska Game and Parks Commission - State Park Division has actively planted pollinator habitat with milkweeds in 15 State Parks through a National Fish and Wildlife Foundation Grant.
- The Nebraska Game and Parks Commission – Public Lands Section actively manages approximately 60,000 acres annually for early successional habitat that favors milkweed establishment and maintenance. Milkweed production plots have been installed for future restorations.
- The Nebraska Game and Parks Commission – Private Lands Section works collaboratively with multiple partners including Pheasants Forever to restore grasslands with diverse forbs – including milkweed. This section improves approximately 62,000 acres annually.
- The Nebraska Game and Parks Commission – Communications Division is actively promoting pollinator habitat through social media, the NEBRASKAland magazine and other avenues.
- The Nebraska Game and Parks Commission in cooperation with Pheasants Forever held multiple monarch tagging events to educate the public on the monarch conservation crisis and to enlist citizen scientists.
- The Nebraska Department of Transportation has added milkweed to their right-of-way seed mixes.
- The Nebraska Game and Parks - Fisheries Division has installed pollinator plots on Hatchery Property that also serve as an education tool for the public.

- The Nebraska Department of Transportation and the Nebraska Game and Parks Commission are partnering on a community engagement – trail restoration project that will plant 10,000 milkweeds over several years.
- The Nebraska NRCS initiated a Monarch Initiative in 2016 that allocated $100,000 specifically for monarch habitat development and technical assistance.
- The Nebraska Game and Parks Commission engaged Master Naturalist Volunteers to conduct butterfly surveys.
- Education and Outreach efforts include the project, "Monarchs on a Mission" to promote monarch and milkweed conservation needs, multiple articles, presentations and press releases.
- The past two years, Nebraska's Governor has declared a week in June as pollinator week and education events are scheduled statewide to promote pollinators, pollinator habitat and monarchs.
- The Nebraska Game and Parks Commission, in collaboration with the Iowa Department of Natural Resources, is implementing grassland improvement to benefit monarchs and other at-risk pollinators.
- The Prairie Corridor is in progress by the City of Lincoln that is restoring grassland habitat and increasing connectivity between Audubon Spring Creek Prairie and Pioneers Parks which is a Lincoln city park. The grassland restorations include milkweed and nectar flowers and will include educational information for the thousands of individuals that will utilize the trail system embedded in the corridor.

Specific Strategies for Reaching Monarch Habitat Goals

The Nebraska Game and Parks Commission has legal authority for species considered threatened or endangered with extinction, including insects under the Nebraska Nongame and Endangered Species Conservation Act (37-807) which includes "any species of wildlife or wild plants whose continued existence as a viable component of the wild fauna or flora of the state is determined to be in jeopardy or any species of wildlife or wild plants which meets the criteria of the Endangered Species Act." (37-802(1)). Threatened species means, "any species of wild fauna or flora which appears likely to become endangered, either by determination of the Commission or by criteria provided by the Endangered Species Act." (37-802(7)). If an insect is listed by federal agencies, it would then fall under the regulatory code enforced by NGPC.

The monarch is considered an "emerging issue" under the Nebraska State Wildlife Action Plan and a provisional Tier 1 species. It is anticipated to be added as a Species of Greatest Conservation Need in the next revision anticipated in 2021.

Nebraska completed a "Conservation Strategy for Monarchs (*Danaus plexippus*) and At-Risk Pollinators" in 2017. Many partners in addition to the Nebraska Game and Parks Commission are committed to improving habitat for the monarch butterfly.

Habitat Conservation Enhancement and Restoration

The tallgrass prairie of Nebraska has largely been converted to other uses. Approximately two percent remains mostly as remnants less than eighty acres in size (Schneider et al. 2011). Remaining remnants are primarily used for grazing. In Nebraska's State Wildlife Action Plan, the Nebraska Natural Legacy Project identified Biologically Unique Landscapes (BULs) as areas with a greater proportion of intact landscapes. Within the tallgrass prairie, there are 13 BULs, with a total of 39 statewide. The BULs will be priorities for habitat restoration, but

all areas of Nebraska have opportunities to benefit monarchs. Grassland restorations designed to improve pheasant habitat also benefit monarchs as they typically include milkweed and many pollinator friendly plants. Nebraska's Berggren Plan for Pheasants has identified focal areas, so milkweed additions will also be focused in these areas.

Private Working Lands:

- Work collaboratively with agricultural producers to find voluntary opportunities to maintain, enhance, and restore grassland habitat with milkweeds and high-diversity native forb-rich plantings. This will use many existing programs such as the Farm Bill (Environmental Quality Incentives Program (EQIP)), Conservation Reserve Program (CRP) and Conservation Practices (CP)) and Wild Nebraska to enhance habitat, increase the number of milkweed stems and increase nectar resources.
- Nebraska Game and Parks Commission Private Land Biologists and cooperative partner positions with Pheasants Forever, Quail Forever, the Natural Resources Conservation Service and the Northern Prairies Land Trust will also provide technical assistance to landowners interested in enhancing and creating habitat.
- The Nebraska Game and Parks Commission will work in cooperation with partners such as the Partners for Fish and Wildlife Program of the US Fish and Wildlife Service, Ducks Unlimited, The Nature Conservancy, Natural Resource Districts, Audubon Nebraska, The Crane Trust, Prairie Plains Resource Institute and others to enhance habitat.
- The Nebraska Game and Parks Commission will continue collaboration with the State NRCS Biologist as Farm Bill Programs will be critical will be critical for achieving an additional 62 million milkweed stems in Nebraska.
- Milkweed seeds have already been added to pollinator plantings, and will continue to be a component of seed mixes on grassland restorations.
- The Nebraska Game and Parks Commission has Focus on Pheasant Areas within the North Core region where resources are creating early successional habitat to benefit pollinators. These seed mixes will contain milkweed and combine efforts to benefit pheasants and monarchs.
- Private land work will be focused in Biologically Unique Landscapes as identified in the State Wildlife Action Plan, but will opportunistically work in all areas.
- Following a second evaluation of milkweed establishment in CRP-CP42, NGPC biologists will collaborate with the NRCS regarding seed mixes and implementation with the intent to increase milkweed density in seeded areas.

Protected Lands:

- The Nebraska Game and Parks Commission will maintain, enhance, and restore grassland habitat with milkweeds and high-diversity native forb- rich plantings.
- The Nebraska Game and Parks Commission will conduct inventory of grasslands and food plots on Wildlife Management Areas to determine where milkweed is absent, thus benefiting from seeding or where altered management will favor milkweed expansion.
- The Nebraska Game and Parks Commission will continue to evaluate and establish best management practices for milkweed establishment and maintenance.
- Establish and maintain demonstration sites, especially on State Park and State Recreation Areas to portray use of monarch and pollinator habitats.

- Establish best management practices that include recommendations for seed mixes, establishment of milkweed and prairie plants, mowing, prescribed burning, pesticide mitigation, and other specific guidelines.
- Spot spraying rather than broad herbicide application will be used to prevent damage to milkweed.
- The Public Lands Section will hold an evaluation meeting regarding milkweed establishment, best practices and lessons learned every other year.

Rights-of-Way:

- The Nebraska Game and Parks Commission will collaborate with the Nebraska Department of Transportation to improve roadside habitat and post construction habitat to benefit monarchs.
- The Nebraska Game and Parks Commission will communicate to local county entities regarding modifications to current roadside management that will improve habitat for monarchs.
- The Nebraska Game and Parks Commission will continue collaborative research efforts to further refine Right-of-Way habitat current status and opportunities for improvement.
- The Nebraska Game and Parks Commission will communicate opportunities to improve habitat with Nebraska Public Power, Omaha Public Power and Lincoln Electric System.

Other Habitat Opportunities:

- The Nebraska Game and Parks Commission will continue to provide information for individuals interested in improving habitat in urban landscapes and rural areas with potential for habitat restoration.

Statement Regarding Likelihood of Implementation

It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding circumstances and political environments may change. However, Nebraska's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, Nebraska has a strong tradition of private lands delivery and cooperation among partners. We have devised strategies that will help each sector and partner to contribute meaningfully to our stem/acreage goals, and we believe that both long-term and short-term objectives are feasible and attainable.

Maps

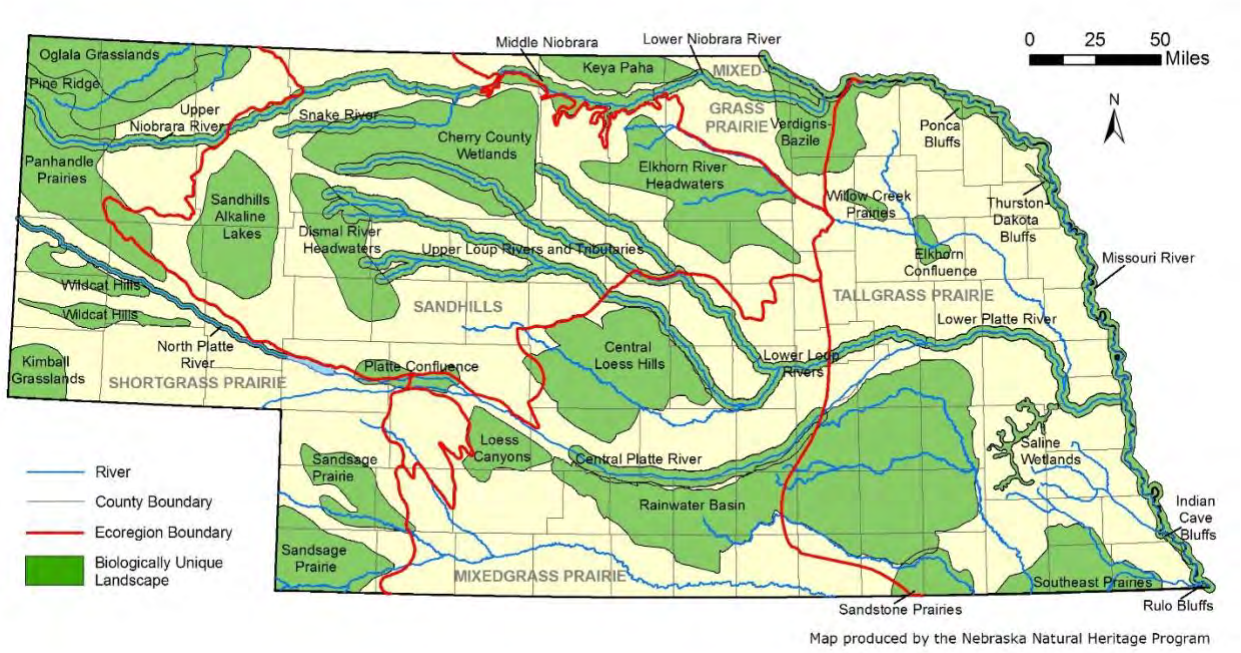


Figure 1: The entire state of Nebraska is within the monarch breeding range, and all areas of Nebraska provide opportunities to improve habitat, but efforts will be focused in the Tallgrass Prairie Ecoregion as identified in Nebraska's State Wildlife Action Plan (Nebraska's Natural Legacy Project) and within the Biologically Unique Landscapes.

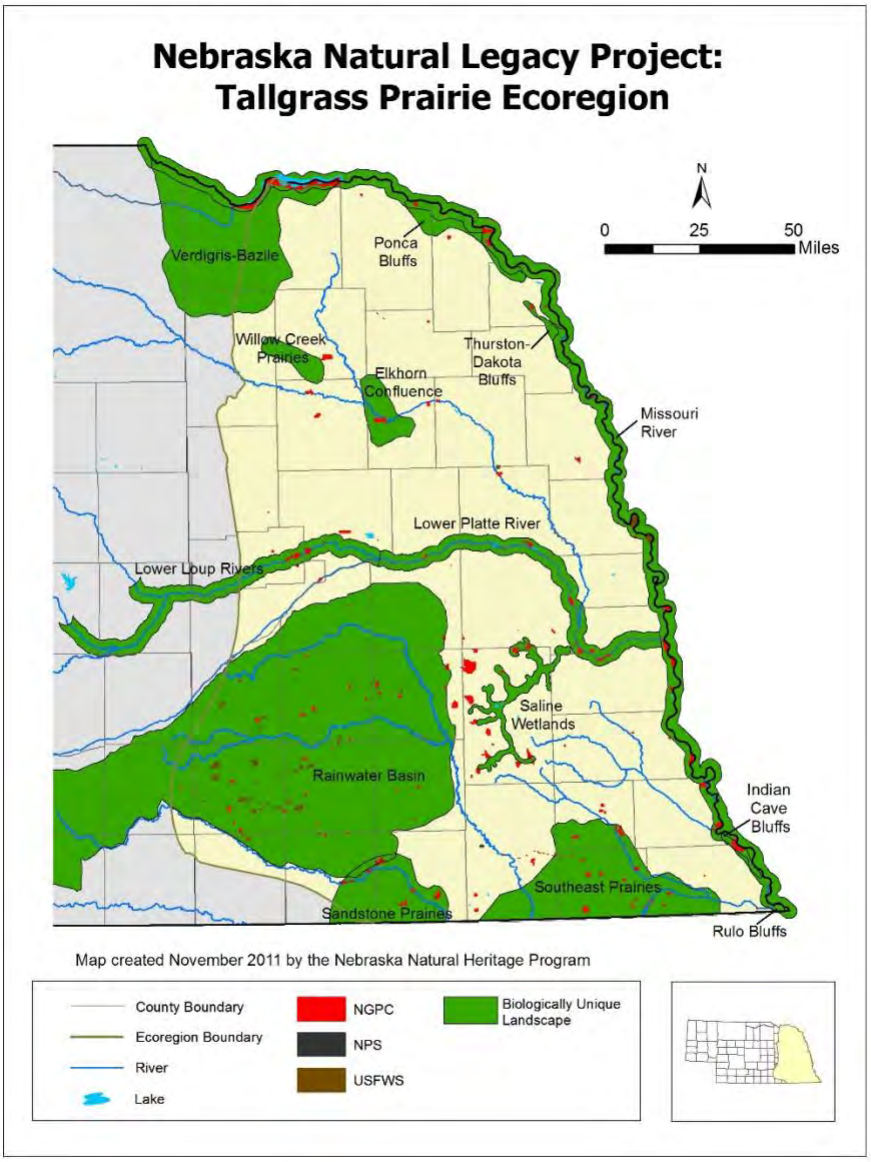


Figure 2: Public land provides many opportunities, but the majority of potential habitat for monarch restoration is on private land in the tallgrass prairie ecoregion.

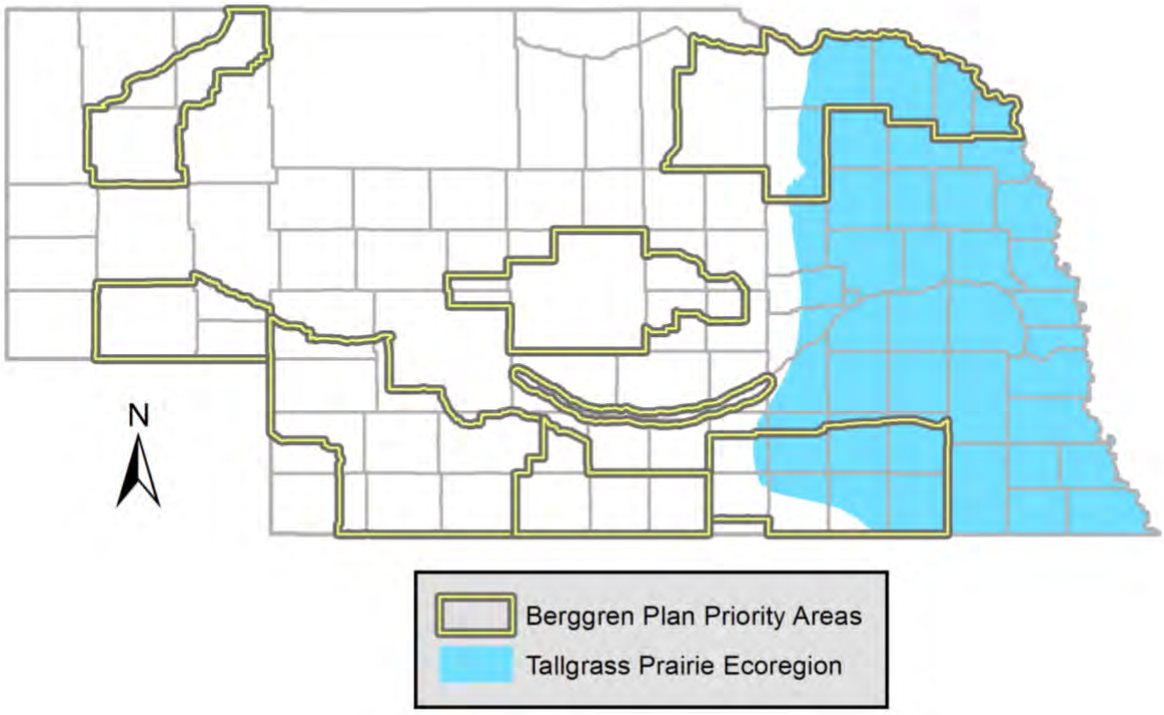


Figure 3: Berggren Priority areas are targeted for restoring habitat for pheasants and will be adding milkweed and pollinator friendly plants to the landscape to benefit monarchs. Tallgrass prairie will be the primary focus area, but habitat for monarchs will be improved in all Berggren Priority Areas.

Literature Cited:

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NORTH DAKOTA

Monarch Habitat Goals

The State of North Dakota's goal is to add 35 million milkweed stems, along with appropriate nectar sources to the landscape by 2038. Participation from partners and adequate funding will be necessary to reach this goal.

Current Monarch Conservation Activities

North Dakota has been actively working on monarch-specific conservation activities since 2015. Our monarch conservation efforts to date include:

- Development of a North Dakota Monarch Butterfly and Native Pollinator Strategy in December 2016 and a commitment to incorporate annual updates through 2020.
- Pollinator plots and demonstration sites are being developed throughout the state on private and public land (figure 1).
- Conducted outreach and education efforts to inform the public about the decline of monarchs.
- Hosted a Monarch Butterfly Conservation Planning Update on November 2, 2017 with more than 30 participating from 16 agencies/organizations.
- Established a network of more than 75 federal and state agencies, non-governmental conservation organizations, and agriculture associations and groups.

Specific Strategies for Reaching Monarch Habitat Goals

Under N.D.C.C. §20.1-01-02, invertebrates are included in the definition of "wildlife." The North Dakota Game and Fish Department (NDGF) has regulatory authority over all wildlife in the state. The North Dakota Department of Agriculture has regulatory authority over noxious weeds under N.D.C.C. §4.1-47 and oversees county and city noxious weed lists. Currently, no milkweed species are on the state noxious weed list. Since 2014, two counties have removed milkweed from their county noxious weed list and as of 2018, four counties list common milkweed. The NDGF only maintains habitat authority over lands it owns in fee title or manages per lease agreement. North Dakota is approximately 45 million acres in size but less than 3 million acres are owned in fee title by state or federal land management agencies. The vast majority of North Dakota is privately owned and governing agencies have no authority over the habitat on private land unless conservation agreements are in place. Therefore, efforts to conserve monarchs on private land will be essential to meeting habitat goals.

- Public Land Sector - In North Dakota, a considerable amount of federal and state land is native prairie. Defoliation tools such as burning and grazing are being utilized to maintain or increase nectar and larval sources on native prairie. Public land managers are also converting tame grassland to multi-species native vegetation mixes that will include milkweed. Numerous pollinator demonstration sites are being developed in publicly accessible areas.
- Private Land Sector - More than 93 percent of North Dakota is privately owned. Conservation agencies are proving cost-share and technical assistance to landowners for developing grass/pollinator plantings or implementing land management techniques to

improve pollinator habitat such as grazing systems. Interest is increasing in Precision Agriculture, with a goal of increasing farm profitability on less or nonproductive crop acres by converting those areas to habitat.

- Public and Private Sectors – Public sectors of government such as the Department of Transportation are incorporating pollinator species into seed mixes for reclamation projects and mitigation sites. Mowing policies are also being reviewed to facilitate pollinator management. Efforts are ongoing to incorporate milkweed and native pollinator sites into urban greenspace and encouraging homeowners to plant pollinator gardens. As the interest in helping monarchs intensifies, the number of potential other public and private sectors, and new partners, will increase.

The North Dakota Monarch and Native Pollinator Strategy includes a list of Best Management Practices. However, there is a need to refine the practices including recommended seed mixes, guidelines for establishing milkweed and nectar plants, effects of management practices on milkweed, mowing guidelines, and other strategies as we continue to learn more about the specific needs of monarchs in North Dakota.

Education is perhaps the most critical tool for conserving monarchs. Partners are working to broaden awareness of monarchs and providing technical and informational support for how to help increase the population. Communication tools such as websites, TV programs, news releases and social media have been utilized to disseminate information. Efforts are also ongoing to incorporate pollinator education products for teachers and schools, such as the Urban Pollinator Program.

Relatively little effort has been expended in North Dakota with respect to researching or monitoring insect species. In 2017, two large-scale research projects on monarchs and other priority insect species were initiated. There are also efforts to identify key nectar sources for adult monarchs. The results of these projects will provide much needed information on the distribution and habitat requirements of monarchs in North Dakota.

The goal for North Dakota is to add 35 million stems by the year 2038. The first target year, 2023, will include all additions since 2014.

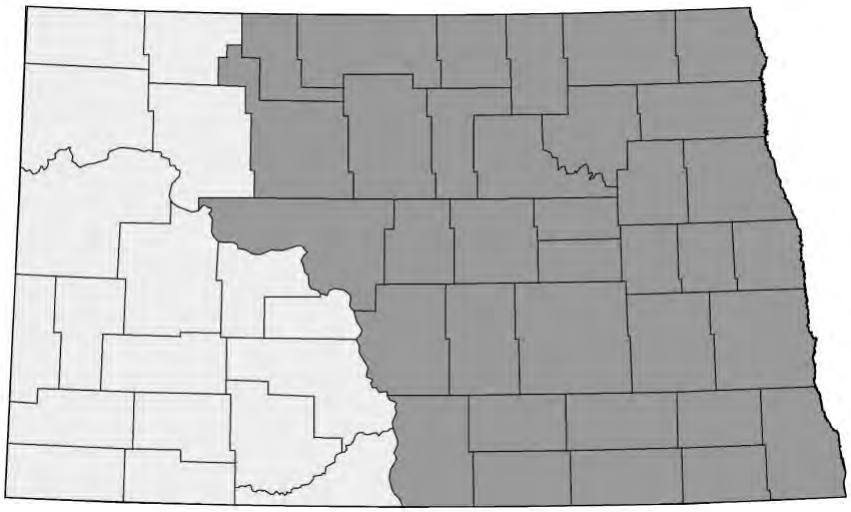
2023	**2028**	**2033**	**Total by 2038**
14 million stems	24.5 million stems	31.5 million stems	35 million stems

Statement Regarding Likelihood of Implementation

The partners of the North Dakota Monarch Butterfly and Native Pollinator Strategy will commit to implementing conservation efforts identified in the attachments of the Strategy to sustain and increase the monarch population in North Dakota. There is general consensus among North Dakota partners that developing diverse habitats is the key to preserving monarchs. Partners are committed to implementing management actions that conserve, restore and enhance monarch habitat, including milkweed and appropriate nectar plants. However, a major limiting factor for implementation is funding availability and the uncertainty of future funding constraints.

Maps:

Emphasis for monarch conservation activities will be the eastern 2/3 of North Dakota (dark gray), although monarchs and milkweed are found statewide. All relevant activities throughout the state will be considered for inclusion in the USFWS Monarch Conservation Database.



In 2015, the Lewis and Clark Wildlife Club established a pollinator garden at the Johnny Gisi Memorial Park in Bismarck.

OHIO

Monarch Habitat Goals

Monarchs have lost significant habitat primarily due to land use changes. The State of Ohio's goal is to add 95M milkweed stems (plants), along with appropriate nectar sources to the landscape by 2035, representing habitat improvements on approximately 1.85M acres of land. This goal is a step-down for Ohio based on the monarch population target stated in the National Strategy to Promote the Health of Honey Bees and Other Pollinators (Pollinator Health Task Force 2015). Participation from many partners will be necessary to reach this goal. Achieving this goal will help address habitat loss for monarchs and other pollinators so the need for future listing under the ESA is unnecessary.

Current Monarch Conservation Activities

Ohio has been working on monarch-specific conservation activities since 2014. Our monarch conservation efforts to date include:

- In 2014, the Ohio Pollinator Habitat Initiative (OPHI) was created by the U.S. Fish and Wildlife Service and the Ohio Department of Natural Resources (ODNR) – Division of Wildlife. The partnership now includes more than 75 diverse partners including Ohio Department of Transportation (ODOT), The Ohio State University, Pheasants Forever, Ohio Department of Agriculture Soil & Water Conservation, Ohio State University Extension, and Monarch Joint Venture. The mission is to "create and improve pollinator habitat across the State of Ohio and increase and improve pollinator conservation for all Ohioans." The motto is "All you can, where you can."
- Monarch butterfly was added to the 2015 Ohio State Wildlife Action Plan as a Species of Greatest Conservation Need.
- Starting as a 7 county area pilot project in 2015, OPHI in cooperation with Ohio Soil and Water Conservation Districts (SWCDs) along with multiple state partners including ODNR, Ohio Department of Rehabilitation and Correction (ODRC), Waste Management, Ohio Environmental Protection Agency, and ODOT have organized an annual milkweed pod collection. The program expanded statewide in 2016 with 19M milkweed seeds (2,500 gallons of pods) collected. Seeds are used in the DRC horticulture program to grow plants for statewide OPHI projects, provided to SWCDs for public distribution, or are packaged with other forbs for OPHI public events.
- ODNR participated in the planning of the October 2015 conference in Iowa to initiate the Midwest states collaborative monarch conservation effort.
- ODNR partnered with the Midwest Association of Fish and Wildlife Agencies and the National Wildlife Federation on two grants to fund the production of this strategy. ODNR provided cash match and staffing on the executive and technical committees.
- OPHI partners have participated in 60+ outreach events to promote awareness of monarch and pollinator declines and actions to reverse the decline.
- OPHI has created a successful social media presence through Facebook and Twitter to reach a broad audience sharing information and news from OPHI.
- The OPHI web site has information about habitat creation projects and educational resources about pollinators.
- OPHI hosted the first annual symposium August 31, 2016 with more than 400 attendees participating.

- The Ohio Department of Transportation has created more than 400 acres of roadside pollinator habitat and a statewide roadside pollinator habitat creation and maintenance handbook.
- In 2018, the Ohio Department of Transportation is implementing its Integrated Roadside Vegetation Management plan that includes a delayed mowing schedule and selective specific herbicide practices. This plan will directly benefit monarchs, pollinators, and other wildlife.
- The U.S. Fish and Wildlife Service's Ecological Services Field Office, Ottawa National Wildlife Refuge, and the Ohio Private Lands Office have contributed in the conservation efforts taking place in Ohio through the OPHI. Goals are to promote pollinator conservation through education and outreach, establish more upland pollinator habitat in strategic locations across the state while at the same time increasing valuable nectar plants during all blooming periods and adding milkweed stems across the Ohio landscape to benefit the monarch butterfly and other pollinators.
- The Service's Private Lands Office in Ohio, the Partners for Fish and Wildlife Program, has been restoring upland pollinator habitat during its 30 year history. From 2014 to 2017, the Program has worked with numerous conservation partners in Ohio to restore 1,360.45 acres (88 sites) of upland pollinator habitat on private land.
- A new U.S. Department of Agriculture (USDA) conservation program was established in Ohio called Monarch SAFE (State Acres for Wildlife Enhancement) that has an allotment of 30,000 acres in 44 counties.
- The USDA Conservation Reserve Program (CRP) has a pollinator practice in Continuous CRP for pollinator/Monarch habitat.
- The USDA Conservation Program Environmental Quality Incentives Program (EQIP) has a monarch initiative program.
- For the last couple of years ODNR has monitored USDA programs for milkweed and contacted landowners willing to have milkweed planted, or if it exists, landowners that will allow harvest of milkweed pods.
- The Wetland Reserve Easement Program includes planting milkweed on newly restored sites.
- Since 2015, more than 12,000 acres of monarch and pollinator habitat and more than 25 million milkweed seeds were planted. To get involved in Ohio's monarch conservation initiative, see http://www.ophi.info/home.html "How to get involved."

Specific Strategies for Reaching Monarch Habitat Goals

- The Ohio Department of Natural Resources Division of Wildlife has the authority to include native wildlife under Ohio Revised Code 1531.25 on the Endangered and Threatened list. The Monarch is not included in this list to date but it is included as a Species of Greatest Conservation Need in the Ohio's State Wildlife Action Plan (2015). The Division manages or cooperates in managing more than three-quarters of a million acres of diverse wildlife lands throughout the state (212,000 acres of public land/Wildlife Areas and 258,000 acres included in private lands programs). However, to reverse the decline of the monarch and reach Ohio's goal of improving monarch habitat on approximately 1.85M acres of land, many entities will need to participate. Some of the actions partners in the state of Ohio will conduct include:

Private Agricultural Lands:

- Provide assistance to agricultural landowners and owners of recreational lands and hobby farms on ways to integrate monarch and pollinator conservation with land management practices.
- Increase target milkweed stem density in CP-42 plantings.
- Work with existing landowner assistance programs to include requirements to integrate monarch and pollinator conservation with land management practices.

Protected Natural Lands:

- Plant and maintain milkweed and floral/nectar resources in grasslands and on other managed lands.
- Establish best management practices that include recommendation for seed mixes, establishment of milkweed and prairie plants, mowing, prescribed burning, pesticide mitigation, and other specific guidelines.
- Set up demonstration sites to portray use of monarch and pollinator habitats.

Rights-of-ways and Energy Infrastructure:

- Work with local governments and ODOT to provide monarch-friendly mowing practices and habitat enhancement opportunities with consideration of limitations of rights of ways.

Outreach and Education:

- Increase monarch conservation educational programming for targeted audiences.
- Provide technical assistance/ guidelines for small scale habitat development (gardens and urban greenspaces).
- Work with parks and nature centers to provide information on monarch and pollinator decline and habitat enhancement demonstration projects.

➢ Monarch Goals by Milkweed Stems and Estimated Acreage

2020	2025	2030	Total by 2035
23,794,139 Stems	47,588,277 Stems	71,382,416 Stems	95,176,554 Stems
461,700 Acres	923,399 Acres	1,385,099 Acres	1,846,798 Acres

Statement Regarding Likelihood of Implementation

Ohio's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, we have devised strategies that will help each partner to contribute meaningfully to Ohio's milkweed stem and acreage goals. Both the long-term and short-term objectives are feasible and attainable.

Maps

To be included

OKLAHOMA

Monarch Habitat Goals

Oklahoma is within the region known as the "South Core", one of two areas created by the U.S. Fish and Wildlife Service to address the different habitat types, threats, and other factors affecting the eastern population of the monarch butterfly. Along with representatives from the states of Texas, Kansas, Arkansas, and Missouri, staff from the Oklahoma Department of Wildlife Conservation are currently working on determining monarch habitat baseline conditions in this region. Once a baseline is established, a regional conservation target (or set of targets) will be determined for the South Core, and Oklahoma will take a portion of that target to be implemented within the state.

The current extent and condition of monarch butterfly habitat in the state of Oklahoma is generally unknown, but thought to be in fair-to-good condition overall. Recent scientific research has indicated that the prevalence of milkweed plants may not be a current limiting factor within the state. Of the 34 potential native host plants (i.e., Family Apocynaceae, Subfamily Asclepiadoideae) in Oklahoma, green antelopehorn is the one most commonly used as a host plant by monarch butterflies. This plant is most widely distributed throughout the central portion of the state, and can be found in native and exotic grasslands, forest edges, roadsides, and disturbed areas. Research has shown that green antelopehorn is adapted to periodic disturbance by grazing and fire, both of which have an effect on milkweed availability during monarch migration periods (Baum and Sharber 2012, Baum and Mueller 2015). Recent evidence has shown that appropriately timed mowing and burning can stimulate new growth on milkweeds, which may be a benefit to monarch fall reproduction and the fifth-generation. Another milkweed species deemed critical for monarch butterflies in the Southern Great Plains, but perhaps to a lesser extent in Oklahoma, is spider milkweed (*A. asperula*).

Current Monarch Conservation Activities

Oklahoma has been working on monarch-specific conservation activities since 2016. Our monarch conservation efforts to date include:

- The Oklahoma Department of Wildlife Conservation hosts a monarch tagging event demonstration with school groups composed of children of various ages. This event takes place every August on a state-owned wildlife management area.
- Outreach and education focused on establishing native plants and pollinator gardens through various outlets, including printed material (Landscaping for Wildlife book), programs (PowerPoint presentations to various state garden clubs and plant societies), and online (monthly email newsletter promoting monarch butterflies and other nongame species).
- In 2016, Oklahoma held its first-ever statewide Monarch Summit. Attendees representing over 60 organizations attended.
- In January 2017, the Oklahoma Monarch and Pollinator Collaborative (OMPC) was formed for the primary purpose of developing and subsequently overseeing a statewide plan to address the decline of the Monarch Butterfly. The OMPC steering committee meets monthly via conference call to discuss plan implementation. The mission of the OMPC is "to educate, engage, and support Oklahomans in the creation, protection and

enhancement of suitable habitat (including milkweed, other host plants and nectar sources) for monarchs and pollinators throughout Oklahoma."

- In August 2017, the OMPC released the first draft of the Statewide Monarch Conservation Plan to attendees of the November 2016 Monarch Summit. The plan is scheduled to be formally launched in April 2017. Early actions are expected to focus on fundraising, the development of education and outreach materials and campaigns, as well as baseline habitat tracking, data management system development, and implementation of best management practices and trainings on available lands. Long-range activities will include a focus on more difficult and/or costly land management, culture, and policy change to support monarch friendly habitat and culture in the state for decades to come.

Specific Strategies for Reaching Monarch Habitat Goals

- The Oklahoma Department of Wildlife Conservation (ODWC) is the agency responsible for managing fish and wildlife in the state. As an insect species, the monarch butterfly is included within the state's definition of "wildlife". As such, ODWC has management and regulatory authority over the monarch butterfly. To be legally collected or captured, individuals must possess a valid Oklahoma Scientific Purposes License (Oklahoma Wildlife Statue, Title 29, 4-118).
- ODWC owns or manages approximately 1.3 million acres. Properties are managed with a focus on all wildlife species.

Private Working Lands:

Over 95% of the land in the state of Oklahoma is privately owned. Therefore, the maintenance/recovery of monarch butterfly habitat will depend on private landowners. Rural area landowners include farmers, ranchers, producers, any property owners outside of large urban or suburban areas and absentee owners that live away from their property and use it mostly for hunting and other recreational purposes.

Seventy-seven percent of Oklahoma's total surface area is farmland, which is split into various uses (USDA National Agricultural Statistics Service 2012). The most common farmland type is rangeland, which covers just over 50% of Oklahoma, followed by cropland (25%) and woodland (2%). Note that the millions of acres of forest lands in Oklahoma are not considered farmlands.

Rangelands without dense cover of eastern redcedar (*Juniperus virginiana*) or other invasive plants tend to have the open habitat structure that is ideal for many milkweed species as well as nectar plant species. That, combined with the vast acreage of rangelands in the state, make rangelands the most important land use type for monarchs in Oklahoma. The OMPC is working with the Oklahoma Farm Bureau, Oklahoma Cattlemen's Association, the Oklahoma Association of Conservation Districts (OACD), Pheasants and Quail Forever, The Nature Conservancy, Oaks and Prairie Joint Venture (OPJV), the Gulf Coast Prairie Landscape Conservation Cooperative, the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program, the USDA - Natural Resources Conservation Service, and other organizations to support partnerships with working rangelands. However, it is unclear at this time what percentage of Oklahoma rangelands provide suitable monarch habitat due to the difficulty to determining the quality of rangelands on a statewide level. Determining both the quantity and

quality of rangelands will be an essential action for achieving monarch conservation goals in the state.

Croplands in Oklahoma include a variety of crops and land uses. The dominant crops (in order of their acreage, from greatest to lowest) are winter wheat, sorghum, corn, soybeans, and cotton. Each of these crops is typically grown in large-scale monocultures, and herbicides are commonly applied to eliminate competition from weeds. As a result, the majority of croplands in the state today do not serve as active milkweed or nectar source habitat.

Other land uses in croplands include being idle, cover cropping, and enrollment in conservation programs such as the Conservation Reserve (CRP), Wetlands Reserve (WRP), or Conservation Reserve Enhancement (CREP) Programs. As of 2012, approximately 790,000 acres were enrolled in these programs in Oklahoma. It is possible that much of that acreage serves as monarch habitat, though there is concern that changes in commodity prices could lead to a decrease in enrollment in these programs.

Around the country and in Oklahoma, partnership with farmers will be crucial for restoring the base of monarch habitat needed to rebuild the migratory population, as well as supporting other pollinators. Finding the right financial incentives so that farmers, monarchs, and pollinators can thrive will be a crucial part of this equation. Establishing best practices for habitat conversion will also be critical - creating monarch habitat adjacent to insecticide-treated croplands can lead to a net decrease in monarch populations without proper management practices.

The following objective will be implemented on private working lands in the state:

- Maximize to the extent possible the utilization of agricultural lands and rangelands by monarchs and other pollinator species by encouraging the maintenance of existing monarch habitat and the creation of additional monarch habitat.

Rights-of-Way

Rights-of-Way (ROW) in Oklahoma offer opportunities for monarch habitat along various transportation corridors for roads and railways, as well as electrical and utility lines. With monarch-friendly management practices, these open land areas can provide a significant boost to statewide monarch and pollinator habitat.

The Oklahoma Department of Transportation (ODOT) maintains rights-of-way along highways that equate to several thousand acres of potential monarch butterfly and pollinator habitat. It is estimated that ODOT has approximately 142,000 “mowable acres”, which includes 12,000 acres that are statutorily maintained by municipalities. ODOT maintains a safety zone of intense vegetative management immediately adjacent to roadway pavement that varies from 15’ to 30’ (wider in medians, intersections, and interchanges). The safety zone comprises about half of the mowable acreage resulting in about 65,000 acres that might be available for both nectar source plants and milkweed along highway rights-of-way in Oklahoma.

Excluding areas where invasive species are a concern, approximately 15,000 acres may be available as habitat. Milkweed, especially green antelopehorn, already occurs within many roadsides, and thus it may not be necessary to plant milkweed to increase monarch habitat on roadsides, but instead mowing regimes could be modified. In addition to those 15,000 acres, there are thousands of acres of roadside with low density milkweed populations scattered within

dominant stands of invasive plants (bermuda grass (*Cynodon dactylon*), yellow bluestem (*Bothriochloa ischaemum*), etc.). These acres serve as poor monarch habitat at present, but their quality could be improved in the future through intensive invasive plant control.

In addition to ODOT lands, there are thousands of acres of public roadside rights-of-way along county roads in Oklahoma. These roads are managed by county commissioners. Just as with ODOT rights-of-way, county road rights-of-way can be managed to increase and maintain monarch habitat.

The Oklahoma Turnpike Authority, a separate agency from ODOT, also maintains 10 turnpikes in Oklahoma covering 606 miles. The width of ROWs on most of these routes is comparable to ODOT's free rural interstate system and contains similar vegetative conditions.

Power Lines and Electric Utility ROW are used for the construction and maintenance of above-ground electrical power transmission and distribution lines. These ROWs can vary in size from several hundred feet wide for large transmission lines to much less for local distribution lines. The ROW property is typically owned by a private landowner, but that landowner grants an easement to the utility company for the placement and operation of the line, usually with a payment by the utility. After construction, the utility company normally restricts uses and activities in the ROW that may interfere with the suitability of the land for planned or emergency access to the power line for maintenance work. Utilities maintain an access road along the ROW for maintenance vehicles and manage vegetation (mechanically or chemically) in the ROW so that it does not inhibit access or grow to a height that might interfere with the line itself. Given that tall trees and obstructions are undesirable in the ROW, there may be opportunities to manage the land within certain ROWs to be suitable as monarch/pollinator habitat. This would require the approval and cooperation of the landowner and the utility company.

Underground utilities such as water, sewer and natural gas have their lines beneath the ground surface, but their ROW procurement and use are otherwise similar to those for above-ground power lines. Easements for construction and maintenance access are similar. These ROWs could likewise be potential locations for suitable monarch/pollinator habitat, with the agreement and cooperation of the landowner and utility company. A similar potential for monarch/pollinator habitat exists with oil and gas pipeline areas in the state, although partnerships and details at this time are still lacking.

The following objectives will be implemented on Rights-of-Way:

- Maintain and increase (when and where feasible) available habitat for monarch butterflies and other pollinator species on both public and private ROW.

- Engage public and private ROW managers in discussions about ways that they can meet monarch habitat objectives using methods that are compatible with ROW management.

- Educate public and private utility managers to enhance awareness of monarch conservation issues and opportunities.

- Conduct research and monitoring of conservation efforts to preserve or enhance existing milkweed and nectar source plants within roadside and utility ROWs.

Public and Private Conservation Lands:

This section includes both public (state and federal) and private properties that are managed with a focus on conservation or biodiversity.

Public

- The Oklahoma Department of Wildlife Conservation (ODWC) manages over 1 million acres of land for the specific purpose of providing diverse habitat for game and nongame species alike. At present, several thousands of acres of high-quality habitat on ODWC lands is likely already suitable for monarch butterflies and other pollinator species. Wildlife Management Areas are routinely managed with prescribed fire, invasive plant species control, and selective thinning of trees (where deemed necessary) to encourage native herbaceous plants to flourish for high ecosystem productivity.
- The Oklahoma Tourism and Recreation Department (OTRD) maintains 33 parks across the state. While the agency's primary goal is recreation and not ecosystem management, many parks contain a diverse array of native habitats that can be sources for suitable nectar and host plants for monarch butterflies. As of 2017, OTRD staff began assessing the distribution of milkweeds at selected state park lands, including Lake Eufaula State Park (McIntosh Co.), Lake Murray State Park (Carter Co.), and Lake Texoma State Park (Marshall Co.). In addition, OTRD has begun to establish milkweed plugs in gardens on state park lands. The total acreage of these parks is approximately 74,646 acres.
- The U.S. Fish and Wildlife Service maintains 9 National Wildlife Refuges (NWRs) within the state of Oklahoma that cover over 140,000 acres. Refuges such as the Wichita Mountains NWR (Comanche Co.), Washita NWR (Custer Co.), and Sequoyah NWR (Sequoyah Co.) likely have the greatest potential to provide a significant amount of monarch butterfly habitat.
- The U.S. Forest Service (USFS) owns and manages over 175,000 acres of land within the state of Oklahoma, including one national forest and two national grasslands. These include the Ouachita National Forest in southeast Oklahoma (McCurtain, LeFlore counties), the Black Kettle National Grassland in western Oklahoma (Roger Mills Co.) and the Rita Blanca National Grassland in northwestern Oklahoma (Cimarron Co.). All three of these properties have the potential to provide a large amount of monarch butterfly habitat, especially the two national grasslands.
- The U.S. Department of Defense (DOD) owns several Army bases and military installations throughout the state, including Fort Sill (Comanche Co.); Tinker Air Force Base (Oklahoma Co.), Altus Air Force Base (Jackson Co.), Vance Air Force Base (Garfield Co.), and McAlester Army Ammunition Plant (Pittsburg Co.). DOD lands are often managed in such a way that many wildlife species can benefit, including monarch butterflies. The total land area owned and managed by these installations is approximately 181,000 acres (U.S. Department of the Interior 1994).

Private

- The Nature Conservancy owns multiple preserves throughout the state, most of which provide or have the potential to provide milkweed and nectar plants. Some of these have large swaths of native prairie, including the Tallgrass Prairie Preserve (Osage Co.), the

Four Canyon Preserve (Ellis Co.), the Oka' Yanahli Preserve (Johnston Co.), and the Pontotoc Ridge Preserve (Pontotoc and Johnston counties). The total acreage for these four preserves is a little over 50,000 acres.

- Conservation easements are agreements between private landowners and accredited land trusts in which the landowner conveys to the land trust some of the property rights for that land, either through sale or donation of those rights. The existence of a conservation easement places that property into a protected status as a conservation land for the period of the easement. The landowner retains ownership of the property, but mutually-agreed-upon restrictions (on subdivision, development, mining, logging, herbicide use, or other practices) may be placed on the use of the property to preserve conservation values there. The easement can be for a stated period of time or held in perpetuity. The provisions are attached to the land for the period of the easement, regardless of any change of ownership, and are enforceable in a court of law. Land Legacy currently holds about 20,000 acres in conservation easements and The Nature Conservancy currently holds about 10,000 acres in permanent easements. Other entities may also own conservation easements in Oklahoma.

The following objectives will be implemented on Public and Private Conservation Lands:

- Engage both public and private entities that own and manage protected grasslands and rangelands to both maintain and increase (when and where feasible) available habitat for monarch butterflies.
- Develop Best (Land) Management Practices for monarch/pollinator habitat.

Communications and Outreach Strategy

Throughout this strategy, content will focus on educating the public about the state of monarchs, collaborative habitat restoration efforts, and actions groups and individuals can take to support vibrant monarch habitat (protection, restoration, invasive management, etc.).
The following goals and objectives will be implemented through the OMPC's communications and outreach strategy:

- Goal 1 - Establish a clearinghouse for information about monarch butterflies and pollinator conservation in Oklahoma.
    - Objective A: Launch the "Okies for Monarchs" Campaign. The campaign includes all the public outreach components associated with meeting the goals of the OMPC, including the website, social media, press releases, etc.
        - Strategy 1. Design, develop and rollout an official Okies for Monarchs website.
        - Strategy 2. Incorporate social media into the Okies for Monarchs Campaign to promote the website, encourage participation in strategies, and raise awareness of importance of pollinators.
        - Strategy 3. Develop a communications campaign with specific messaging goals for each of the target audiences.
- Goal 2 - Initiate action for monarchs across the state of Oklahoma.

- Objective A: Educate and empower citizens in how they can participate in monarch conservation.

    - Strategy 1. Develop online pledge for citizens to take on website stating they will help the monarchs.
    - Strategy 2. Develop online garden registration tool for website.
    - Strategy 3. Provide resources on website for how to build a garden.
    - Strategy 4: Provide information on website for where citizens can visit a garden.
    - Strategy 5: Develop specific tools and tips that allow individuals to take actions.
    - Strategy 6: Promote participation in national efforts and citizen science opportunities to improve understanding of monarch population.

- Objective B: Engage OMPC partners' audiences, members, fans, followers, friends, partners, etc.

    - Strategy 1: Provide pre-made content to OMPC partners.
    - Strategy 2: Provide relevant content to the varied partner audiences.

- Objective C: Engage and involve youth-focused groups/organizations.

    - Strategy 1. Encourage schools to participate in pollinator initiatives by establishing school habitats and incorporating monarch curriculum into the classroom.
    - Strategy 2. Target youth-focused groups such as 4-H, FFA, Boys & Girls Clubs, scouts, church groups to engage them with current initiatives/programs that engage youth in habitat projects.

<u>Statement Regarding Likelihood of Implementation</u>

Members of the Oklahoma Monarch and Pollinator Collaborative are committed to the long-term success of the Statewide Monarch Conservation Plan. It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding circumstances and political environments may change. However, Oklahoma's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration and monitoring held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, we have devised strategies that will help each sector and partner to contribute meaningfully to our conservation targets, and we believe that both long-term and short-term objectives are feasible and attainable.

SOUTH DAKOTA

Monarch Habitat Goals

The State of South Dakota's goal is to add 67.6 million milkweed stems and appropriate nectar sources. This is considered a placeholder pending more specific discussions with potential cooperators during the development of the state monarch plan. At this time, we are unable to propose a timeline for reaching the state's stem goal.

Current Monarch Conservation Activities

South Dakota Game, Fish and Parks has incorporated pollinator plantings into land management activities on state game production areas and state parks and recreation areas. Private lands in South Dakota have the typical assortment of pollinator activities facilitated by the availability of Farm Bill funding, Pheasants Forever sponsorship, and other miscellaneous grant opportunities by private entities. In addition, Governor Dennis Daugaard has directed the South Dakota Department of Transportation to incorporate pollinator plantings along federal highways, where feasible.

To avoid duplication of effort, a detailed compilation of such activities will be developed after the U.S. Fish and Wildlife Service's (USFWS) Monarch Conservation Database is available for data entry, projected for June 2018. In the interim, it is likely that a less formal listing of activities will be solicited from partners during the development of the state monarch plan to supplement information gathered at the South Dakota Monarch Summit.

Specific Strategies for Reaching Monarch Habitat Goals

- South Dakota Game, Fish and Parks (SDGFP) has authority for wildlife, including invertebrates such as the monarch butterfly (SD Codified Law 34A-8-1). That management authority makes SDGFP the logical lead in the state plan development, but other entities will be critical to increasing the likelihood that the planning effort is successful.
- Engagement of sector groups began at the South Dakota Monarch Summit, held in October 2017. Fifty-seven individuals participated in one or both days of the summit, which resulted in a list and description of many current pollinator practices, ideas for imagining success, sector-derived suggestions for increasing pollinator accomplishments in the state and suggestions for successful implementation of the state's future plan for native pollinators. Individual participants also shared their specific interest in future participation and made suggestions for additional groups that should be included in this effort.
- We are in the process of finalizing a state plan coordinating committee, targeting representatives of key partner sectors, such as urban interests, education, agriculture, transportation and rights-of-way, conservation lands, and USFWS and other federal agencies. We expect members of the coordinating committee to facilitate communication and participation with interest groups/industries they represent.
- We can provide a more detailed list of strategies following the development of the state monarch plan, which is underway and expected to conclude during the summer of 2018.

Statement Regarding Likelihood of Implementation

Assuming funding for pollinator projects on private lands, particularly targeting monarch habitat needs, continues to be available through the Farm Bill and other sources, we believe activities proposed in the upcoming state monarch plan are likely to be implemented. Delivery of the specific statewide milkweed stem goal is less certain at this point. Pollinator practices are already a high priority within state government, particularly for the South Dakota Departments of Transportation and Game, Fish and Parks. The South Dakota Department of Agriculture places a high priority on the needs of managed pollinators and completed a plan for these resources: https://sdda.sd.gov/ag-services/beekeeping-apiary-resources/pdf/Pollinator.Plan.July2017.pdf

Maps:

Emphasis for monarch conservation activities will be in "eastriver" South Dakota, the regional term for counties east of the Missouri River (shaded area on map below). All relevant activities throughout the state will be considered for inclusion in the USFWS Monarch Conservation Database.

TEXAS

Monarch Habitat Goals

The State of Texas has not yet determined a monarch habitat conservation/ restoration goal. However, a state summit was convened at the beginning of November 2017 which culminated in broad support among the approximately 50 participating organizations for the creation of a Texas Monarch Consortium. The consortium will consist of relevant entities from multiple sectors working together to create a Texas Monarch Conservation Strategy. The strategy will include voluntary, self-identified targets and strategies for implementing those targets through 2035. Restoration efforts will focus on conservation and restoration of native, forb-rich plant communities that provide appropriate nectar sources although efforts that result in establishment of native milkweed species will also be tracked. A central goal is for efforts to be tracked so that they may be efficiently and accurately entered into the USFWS' monarch conservation database. Efforts will be measured primarily as acres of land conserved/ improved although additional metrics (i.e. number of citizens reached with outreach efforts, numbers of milkweed stems planted) will also be tracked. Participation from many partners, representing several land use sectors will be necessary for effective conservation in the state.

Current Monarch Conservation Activities

Texas Parks and Wildlife Department has been working on monarch-specific conservation activities since 2015. Our monarch conservation efforts include a variety of activities that include habitat restoration efforts on wildlife management areas, wildlife habitat management on state parks, education and outreach at state parks, education and outreach through popular written articles, radio and television, and social media, provision of technical guidance for private landowners implementing wildlife management activities on private lands, funding for wildlife habitat restoration and enhancement through competitive grants, and collaboration with a diversity of partners on the development and implementation of monarch conservation activities. Dozens of additional agencies, organizations, individuals, and institutions are currently involved in monarch conservation efforts. A primary objective of the Texas monarch consortium is to provide a framework through which these partners can identify conservation goals while collating information on current activities. Because the Texas Monarch Consortium is not yet active, we are currently unable to report on the full scope of current monarch conservation activities in the state, although we believe that this deficiency will be addressed by the final version of the MAFWA Mid-America Monarch Conservation Strategy. Monarch conservation activities are organized into the four broad categories listed below. Activities listed below are for Texas Parks and Wildlife only.

- Habitat Conservation
    - 38 acres reseeded with native forbs on wildlife management areas.
    - 70.5 acres treated with herbicide to restore native grassland/ prairie vegetation
    - 711 acres burned at wildlife management areas to control woody encroachment and restore native grasslands
    - 770 acres of brush mechanically cleared to restore native grassland/ prairie at wildlife management areas.
    - 800 square feet of pollinator demonstration gardens created at wildlife management areas.

- Monarch/ native pollinator gardens and wildscapes maintained at 12 state parks.
- Texas Parks and Wildlife Biologists coordinate with private landowners and wildlife management associations to development wildlife management plans for agricultural tax valuation and managed lands deer permitting. Plans may include a diversity of activities that benefit monarchs, including brush clearing, range reseeding, invasive species control, etc. Texas Parks and Wildlife is currently collating information on the number of acres enrolled with wildlife management plans, summarized by county and qualifying practice. These data should be ready to include in USFWS' monarch conservation database before August.

- Education and Outreach
  - Two state-wide pollinator bioblitz events held using social media and volunteer-led, on-site outreach activities.
  - A guide to Texas milkweed species was created and published online (https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/texas_nature_trackers/monarch/).
  - A citizen-science iNaturalist project was created to capture statewide observations of natural and cultivated milkweed plants.
  - Management recommendations for monarchs and native insect pollinators was created and published online as a resource for private landowners seeking agricultural tax appraisal valuation based on wildlife management (https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/texas_nature_trackers/monarch/).
  - Monarch, butterfly, and native pollinator interpretive presentations and nature walks given at 15 state parks.
- Research and Monitoring
  - $400K in state funding was approved in support of a $900K competitive state wildlife grant in Texas and Oklahama investigating land management practices (i.e. disking, burning, reseeding) on native grassland plant and pollinator communities.
  - A citizen-science iNaturalist project was created to capture statewide observations of natural and cultivated milkweed plants.
  - Monarch waystations and/or monarch larval monitoring projects at 5 state parks
- Partnerships and Collaboration
  - Texas Parks and Wildlife Department is represented on the Texa Comptroller of Public Accounts Monarch Science Working Group
  - For more information on Texas' developing statewide monarch conservation plan, contact Benjamin Hutchins (ben.hutchins@tpwd.texas.gov, 512-389-4975)

Specific Strategies for Reaching Monarch Habitat Goals

- Within the state of Texas, monarch butterflies are not a regulated or protected species. Consequently, monarch conservation activities occur on a voluntary basis. However, monarch conservation has been identified as a priority by several state agencies, institutions, non-government organizations, and civic groups. In general, monarch conservation also enjoys broad public support. Consequently, monarch conservation in Texas is characterized by a large network of active partners. The South-Central Monarch Symposium (May 31 – Jun. 1, 2017) and Texas Monarch Summit (Nov. 1 – 2, 2017) were organized, in part, to build capacity among diverse stakeholders engaged in monarch conservation and to increase implementation of monarch conservation activities.

- Aside from the statewide monarch conservation strategy that will be developed by the Texas Monarch Consortium, a number of regional, municipal, and corporate monarch strategies have also been created in the state. Because these strategies were developed independently, with self-identified goals, we feel that they have a high likelihood of success. A major focus of the Texas Monarch Consortium will be to provide an overarching framework for the various state monarch strategies. In general, we feel that conservation targets are more likely to be met when those targets, along with the strategies to achieve them are self-identified. However, we also believe that a formalized process for joining the Texas Monarch Consortium and an active role in creation of a state monarch strategy will increase buy-in and participation in monarch conservation activities. To date, monarch efforts in the state have not been implemented with a sector-specific approach. Texas Parks and Wildlife is a member of the MAFWA Southern Core Habitat Technical Working Group which is currently developing a monarch habitat model to identify gaps and potential deficiencies in monarch habitat availability. We anticipate that information produced from this model can be used by participants within the Texas Monarch Consortium to self-identify monarch conservation targets. A major focus of the Texas Monarch Consortium is creation of a strategy to ensure that partner monarch conservation activities are entered into the USFWS monarch conservation database.

<u>Statement Regarding Likelihood of Implementation</u>

The Policy for the Evaluation of Conservation Efforts requires that formalized species conservation plans include some assurances that planned conservation actions will actually be implemented. This will not be easy to provide given the multitude of partners engaged in monarch conservation as well as a general lack of regulatory authority over an un-listed insect species. It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding circumstances and political environments may change. However, Texas's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners, backed by public support. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, we have devised strategies that will help each sector and partner to contribute meaningfully to our acreage goals, and we believe

that both long-term and short-term objectives are feasible and attainable. Texas Parks and Wildlife Department and its partners have encouraged adoption of voluntary conservation program that consider the important role of private land stewardship in wildlife conservation in Texas. The use of such programs can often achieve necessary goals for species, while avoiding regulatory burdens of listing.

WISCONSIN

* This section is a compilation of information developed at the **2017 Wisconsin Monarch Conservation Summit** and in the 2016 **Wisconsin Pollinator Protection Plan**. All information is draft and will be finalized by the Wisconsin Monarch Collaborative during the development of the Wisconsin Monarch Conservation Strategy in 2018.

Monarch Habitat Goals

The goal of the Wisconsin Monarch Collaborative (hereafter "the Collaborative") is, by the year 2038, to add XXXXXX milkweed stems embedded in a matrix of diverse nectar sources throughout the state, with priority on the 54 counties in the North Core Monarch Butterfly Conservation Unit. This goal is expected to be finalized by the Collaborative in 2018 during the development of the Wisconsin Monarch Conservation Strategy. Voluntary participation from many partners, representing several land use sectors will be essential to reach this goal. The purpose of the Collaborative is to provide coordination and technical resources for willing public and private landowners to voluntarily add or enhance monarch habitat, share success stories, and track progress as Wisconsinites help in the national effort to proactively recover monarchs.

2023	2028	2033	Total by 2038
XXX stems	XXX stems	XXX stems	XXX stems

Table 1. Timeline. The **draft** goals and timeline of the Wisconsin Monarch Collaborative is, by the year 2038, to add XXXXXX milkweed stems embedded in a matrix of diverse nectar sources throughout the state, with priority on the 54 counties in the North Core Monarch Butterfly Conservation Unit. This goal is expected to be finalized by the Collaborative in 2018 during the development of the Wisconsin Monarch Conservation Strategy.

Current Monarch Conservation Activities

Wisconsin has been working on monarch-specific conservation activities since 2015. The following section highlights key statewide monarch conservation efforts to date from information gathered at the 2017 Wisconsin Monarch Conservation Summit.

Coordination, Collaboration, and Outreach

- In May of 2017, 60 individuals from agencies, NGOs, and businesses participated in the **Wisconsin Monarch Conservation Summit**. WDNR staff collaborated with representatives from the Department of Transportation, Department of Agriculture, Trade and Consumer Protection (DATCP), Pheasants Forever, Wisconsin Wildlife Federation, Sand County Foundation, and the Natural Resources Foundation of Wisconsin to plan and host the event with full financial support from a U.S. Fish and Wildlife (USFWS) grant awarded to the National Wildlife Federation. The summit had participation from agriculture, protected lands, outreach/education, research, utilities, transportation, and urban sectors. Summit participants laid the foundation for a statewide strategy for sustainably achieving the habitat enhancement goals being established by the Mid-America Monarch Conservation Strategy. At the end of the summit, participants created a collaborative governance design, the **Wisconsin Monarch Collaborative**, to continue the work needed to create the statewide strategy in 2018 and beyond.
- The Natural Resources Foundation of Wisconsin, Sand County Foundation, University of Wisconsin – Madison Arboretum, U.S. Forest Service Eastern Region, Wild Ones, and WDNR are Wisconsin-based official members of the **Monarch Joint Venture**

- Ten Wisconsin cities have signed the **Monarch Mayor's Pledge**
- The Wisconsin State Senate introduced SB-565 designating the monarch butterfly as the state butterfly and *Monarda fistulosa* as the state wildflower.
- WDNR partnered with the Midwest Association of Fish and Wildlife Agencies (MAFWA) and the National Wildlife Federation on two grant proposals to fund a state Monarch summit and the production of this strategy, providing cash and in-kind match, as well as staffing executive and technical committees.
- Monarch butterfly was added to the 2015-2025 **Wisconsin Wildlife Action Plan** as a Species of Information Need to prioritize data collected on this species in the state.
- DATCP lead the development of the **Wisconsin Pollinator Protection Plan** with input from WDNR and a diverse group of partners and stakeholder. The plan includes best management practices for monarchs in addition to other wild and managed pollinators.

Habitat Enhancement and Management

- Up to 50,000 acres in WI can be enrolled in the CRP Pollinator and Monarchs SAFE project.
- National Fish and Wildlife Foundation Monarch Fund supported projects in WI
  - Enhancing Monarch Butterfly Habitat along the Mississippi River Corridor (WDNR and NRF): >700 public acres
  - Enhancing Monarch Habitat through Technical Assistance (Pheasants Forever)
  - Wisconsin Driftless Area Monarch Butterfly Initiative (USFWS): 250 public acres
  - Coordinating Monarch Habitat Restoration in Agricultural and Grassland Landscapes (Driftless Area Land Conservancy): 1,650 public and private acres
  - St. Croix Valley Monarch Habitat Partnership (Friends of Crex): 939 public and private acres
  - Building Capacity for Monarch Recovery Among Electrical Utilities (Sand Valley Foundation): 400 sites
- Competitive State Wildlife Grant supported projects in WI
  - Initiatives to conserve key pollinator and other SGCN habitat in the Driftless Area of Wisconsin and Minnesota (WDNR and MN DNR): 300 public acres and 250 private acres
  - Pollinator conservation through enhancement of Michigan's and Wisconsin's grassland, prairie, and savanna habitat (WDNR and MI DNR): 250 public acres

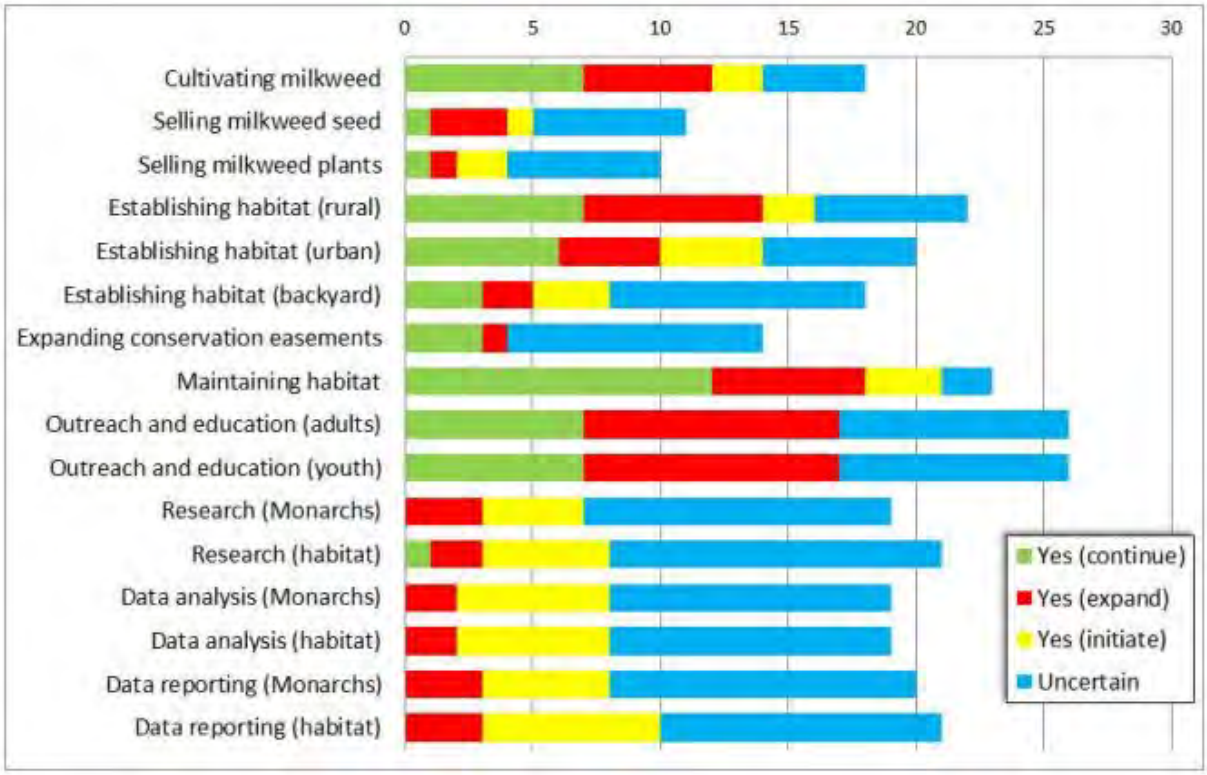


Figure 1. *Monarch conservation activities that attendees of the Wisconsin Monarch Conservation Summit intend to initiate, continue, or expand in 2017-2019.*

At the Wisconsin Monarch Conservation Summit in May of 2017, representatives from many organizations shared what activities their organizations had accomplished or are currently accomplishing. Some specific activities that were mentioned by the organizations include:

Aldo Leopold Foundation

- Stewardship of 3,000 acres of land with management utilizing fire and planting for nectar and milkweed, as well as timber harvest to restore 200 acres of savanna

Alliant Energy

- Monarch plantings at general headquarters
- Native plantings at several operations facilities
- Pollinator education for employees
- Remnant prairie restoration

Applied Ecological Services

- Use high spectral imagery to identify milkweed
- Grow/sell native milkweed and nectar seeds and plants
- Co-develop high performing/available/buildable seed plans
- Construct oversight for monarch and pollinator program plantings

American Transmission Company

- Exploring ways to utilize pollinator enhanced seed mixes where appropriate

Botanical Club of Wisconsin

- Promotes the study of Wisconsin's native flora, and supports efforts to increase native vegetation and native pollinators

Butterfly Gardens of Wisconsin

- Promote butterfly gardens and importance of pollinators via demo gardens and speaking
- Supports University of Wisconsin-Stevens Point with monarch research, raising, and tagging

Wisconsin Central Ltd.

- Plant/restore disturbed right-of-way following construction with native seed mixes, including pollinator plant species
- Developed and distributed monarch post cards with milkweed seed paper

Department of Agriculture, Trade and Consumer Protection

- In collaboration with the University of Wisconsin and a diverse group of partners and stakeholders, developed the Wisconsin Pollinator Protection Plan
- Implement the Conservation Reserve Enhancement Program
- Implement the Pollinator Protection Plan

U.S. Department of Defense—Fort McCoy

- Habitat creation and enhancement
- Monarch rearing and tagging at the Interpretive Center with small native prairie-garden

Friends of Lake Wingra

- Improve watershed management and habitat in Madison via native plants
- Implemented the Monarchs for Kids program, which provided monarch eggs, larvae and butterflies to elementary schools and summer program; worked with 118 classrooms in 2016

IPM Institute of North America

- Survey apple orchards for pollinators
- Work with agriculture retailers to ID revenue-environment opportunities
- Promote Integrated Pest Management in agriculture and urban areas
- Coordinate the Potato Sustainability Institute

Madison Audubon

- Perform nectar plant surveys, seed collection, butterfly tagging and habitat restoration in mainly Columbia county

Madison Naturalist Program, UW-Extension

- Outreach and education includes training 540 volunteers for natural resources education, citizen science, and stewardship

National Park Service

- Create guidelines for facilities management Best Management Practices, which includes limiting bluegrass and planting natives

Natural Resources Foundation of Wisconsin

- Communication about Monarchs in Wisconsin via field trips and outreach materials
- Fund conservation projects on public and private land
- Support citizen science monarch programs, as well as the Master Naturalist program

Pheasants Forever

- Implementation of the Wisconsin Native Seed Program, Adopt-a-Wildlife Area, Farm the Best-Conserve the Rest, and Youth 30 Ac Pollinator Plots
- Implementation of pilot projects for citizen agriculture

Sand County Foundation

- Added prairie filter strips on farms in Dane and Iowa counties
- Support railroad and right-of-way habitat creation and conservation
- Recruit Future Farmers of America/high school agriculture educators to participate in habitat establishment/monitoring on rural lands

Schlitz Audubon Nature Center

- Maintain a 40-acre monarch habitat with milkweed
- Lead activities for seed collection, education, tagging, monitoring, and citizen science

Syngenta

- Develop CRP and CREP pollinator-friendly seed mixes and riparian buffers
- Research and implementation related to field to market, sustainability metrics, ecosystem targets, heath grown (WPVGA), Integrated Pest Management, and precision agriculture to reduce drift

The Prairie Enthusiasts

- Maintain, protect, create, and restore remnants

U.S. Department of Agriculture (USDA)

- Development of cost share programs for Monarchs include Environmental Quality Incentive Program (EQIP) for Pollinator habitat, Regional Conservation Partnership Program (RCPP), Conservation Stewardship Program Enhancement, Wetlands Reserve Program for habitat
- Statewide technical assistance to landowners

USDA/Farm Service Agency/NRCS

- Conservation Reserve Program (CRP) Approved Monarch State Acres for Wildlife Enhancement
- Implementation of CRP Pollinator Habitat Program

USFS Chequamegon-Nicolet

- Pollinator research and activities for around 8 years
- Two Monarch Joint Venture sites—Catwillow and Octonto R.
- Log landings seeded for pollinators

U.S. Fish and Wildlife Service—Regional

- Targeted habitat restoration and enhancement projects

U.S. Fish and Wildlife Service—Statewide

- Conservation, protection, and restoration of grassland habitat

U.W. Entomology—Dane County

- Research focused on monarch phenology, the effect of clipping common milkweed stems on monarch oviposition, and variation in cardenolide levels among common milkweed stems (UW Biocore Prairie – Pleasant Valley Conservancy SNA)

U.W. Entomology—Regional

- Research consequences for crop pollination and wild bees

U.W. Extension—Lakes Program

- Work with municipalities and schools to promote rain gardens
- Provide support, resources and funding for native plantings for lakeshore property owners

U.W. Extension—Wisconsin Master Naturalist Program

- Train gardening volunteers

U.W. Madison Arboretum

- 80 acres of new restoration
- 1000 acres of habitat management
- Outreach and education for pollinator health, including monarch tagging, identification, and planting of milkweed

Wallendal Supply Inc.

- Create and maintain monarch habitat

Wisconsin Association for Environmental Education

- Education projects by member schools and organizations
- Restoration efforts at partner sites

WI Land & Water Conservation Association

- New monarch specific activities statewide

Wisconsin Department of the Interior

- Remnant prairie inventory and management

- Wetland mitigation sites restored and protected
- Native seed mixes

Wisconsin Energy Group (WE energies)
- Owns land and right-of-way, including wetlands and prairies which support monarchs.

Wisconsin Farm Bureau Federation
- Involvement with Sand County Foundation's initiative to promote monarch habitat as well as members of the stakeholder group that provide input for Wisconsin's first Pollinator Protection Plan

Woodlands Dunes Nature Center and Preserve
- Participate in several different pollinator programs, including the CRP, the Conservation Stewardship program, and the Environmental Quality Incentives program
- Currently restoring hundreds of acres of prairie pollinator habitat

Wisconsin Wildlife Federation
- Statewide outreach to municipalities and to sport clubs, conservation lands, and private landowners

Specific Strategies for Reaching Monarch Habitat Goals

The federal Endangered Species Act (ESA) is implemented by the USFWS. Through an agreement authorized by Section 6 of the federal ESA the WDNR assists in that implementation through participating in management of federally listed species like piping plover or Karner Blue butterfly and through providing regulatory support. For example, under the Section 6 agreement the WDNR is responsible for informing permit applicants about how their project may impact to federally listed species. The federal law protects animals, plants and critical habitat.

Wisconsin's endangered species law (ss. 29.604) is implemented by the WDNR in that any activity that the department conducts, funds or approves must avoid the taking of state listed species. Wisconsin's law protects animals and plants (on public land), but not their habitats. WDNR has regulatory authority over insects that are classified as threatened or endangered on the state list.

Monarchs are identified as a Species with Information Need in Wisconsin's Wildlife Action Plan (2015-2025), highlighting that they are a priority for data collection to evaluate their status as a potential Species of Greatest Conservation Need. Currently they are not on the state's threatened and endangered species list.

Sector Activities for Reaching Monarch Habitat Goals

Based on the newly developed guidelines for the U.S. Fish & Wildlife Service Monarch Conservation Database, the main threats that all sectors in Wisconsin will work to mitigate are:
- lack of habitat and nectar resources
- loss of habitat and nectar resources
- loss of habitat quality

Additionally, overarching strategies that all sectors will work to achieve are:

- Implement land protection to prevent loss of habitat and nectar resources
- Increase milkweed and blooming nectar plants
- Mitigate negative impacts of land use on habitat and nectar resources
- Implement habitat management plants to prevent loss of habitat and nectar resources

Sector Groups

A collaborative governance structure for Monarch conservation was created at the Wisconsin Monarch Conservation Summit. It consists of four Working Groups and two support groups. The sector working groups are:

- Agriculture
- Urban & green space
- Rights-of-Way
- Protected lands

The support groups are:

- Education/Outreach/Marketing
- Research/Monitoring

Each of the Working Groups have volunteer co-leads who plan and guide Working Group meetings, report activities to the Coordination Team (Working Group co-leads plus representatives from DNR, DOT, and DATCP), and are responsible for any final deliverables the Working Group may produce. The Working Groups are responsible for ensuring that their sector strategies are implemented and that progress toward goals is reported. The Working Groups began meeting in March of 2018 to formulate specific strategies and goals as well as realistic timelines and actions to achieve those goals.

In 2017, the attendees of the Wisconsin Monarch Conservation Summit suggested possible strategies for each sector. While these still need to be agreed upon and refined by each of the sector Working Groups, they are starting points for the development of a detailed statewide strategy. In 2016 the Wisconsin DATCP, along with several other stakeholders, developed the Wisconsin Pollinator Protection Plan. Since many of the priorities overlap with monarch-specific conservation strategies, some ideas from the plan have been incorporated in the draft sector strategies below.

General draft strategies for each of the Working Groups, based on suggestions from the Wisconsin Monarch Conservation Summit and the Wisconsin Pollinator Protection Plan, are as follows:

Agriculture

- Statewide implementation of Best Management Practices for Maximizing Pollinator Health & Pollination Services on Farms, developed by DATCP and partner organizations
- Increase the amount of Conservation Reserve Program (CRP) land in the northern core counties and increase the amount of pollinator habitat on current CRP land in those counties
- Develop pollinator-friendly standards for food products and engagement and buy-in from large companies to support new standards and certification processes

Urban & green space

- Statewide implementation of Best Management Practices for Improving Pollinator Habitat in Gardens & Lawns, developed by DATCP and partner organizations
- Increase the number of native lawns statewide
- Decrease insecticides on private lawns and public urban green spaces

Rights-of-Way

- Statewide implementation of Best Management Practices for Improving Pollinator Habitat in Prairies, Roadsides & Open Spaces, developed by DATCP and partner organizations
- Properly timed mowing in all rights-of-way areas, per the Wisconsin Department of Transportation mow timing guidelines for public safety and weed control
- Collaboration among landowners, natural resources experts, engineers and maintenance staff/volunteers resulting in successful statewide rights-of-way pollinator plantings

Protected Lands

- Statewide implementation of Best Management Practices for Improving Pollinator Habitat in Prairies, Roadsides & Open Spaces, developed by DATCP and partner organizations
- Utilization of The Xerces Society's seed mix calculator to match pollinator seed mix with local site conditions; utilize regional plant lists via the WDNR and Pollinator Partnership
- Create a "best management practices" toolkit for private landowners who are interested in monarch conservation

Education/Outreach/Marketing

- Identify key partnership gaps and seek to close those gaps; key partnership gaps identified are: corporate partners, golf courses, tribes, cranberry growers, bee keepers, county parks
- Create an Annual Monarch Festival in the state of Wisconsin with informational information about how to increase habitat for Monarchs for all sectors
- Increase marketing and educational materials with the Wisconsin Monarch Collaborative logo and agreed upon educational messages for monarch conservation

Research/Monitoring

- Develop a statewide strategy to collect monitoring data for the U.S. Fish & Wildlife Service Monarch Conservation Database
- Develop educational materials and training manual for organizations and private landowners to collect and share monitoring information
- Continue to incorporate pollinator and monarch-focused research into statewide implementation; identify key researchers at Wisconsin universities who can contribute to the statewide monarch strategies

Wisconsin outreach and education strategies include:

- A quarterly Wisconsin Monarch Collaborative newsletter to key stakeholders that provides information about Monarch conservation activities, highlights state "success

stories", and provides resources to improve statewide collaboration, monitoring, habitat expansion, and monarch conservation activities

- The creation of a Wisconsin Monarch Collaborative website that serves as a central repository for information regarding monarch conservation, linking visitors to other useful websites and sources of information
- Increased emails sent out to the Wisconsin Monarch and Pollinator Gov Delivery email lists
- Increased press about state monarch conservation activities, particularly relating to the creation of a statewide Monarch Conservation Plan

The Education/Outreach/Marketing working group will be working on specific strategies for increasing and improving these activities statewide moving forward.

Statement Regarding Likelihood of Implementation

It is not possible to completely ensure the certainty of carrying out this Strategy, as future funding circumstances and political environments may change. However, Wisconsin's monarch conservation planning and implementation efforts to date show the strong commitment to habitat restoration held by our many partners. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned. Nonetheless, we have devised strategies that will help each sector and partner to contribute meaningfully to our stem goals, and we believe that both long-term and short-term objectives are feasible and attainable.

Maps

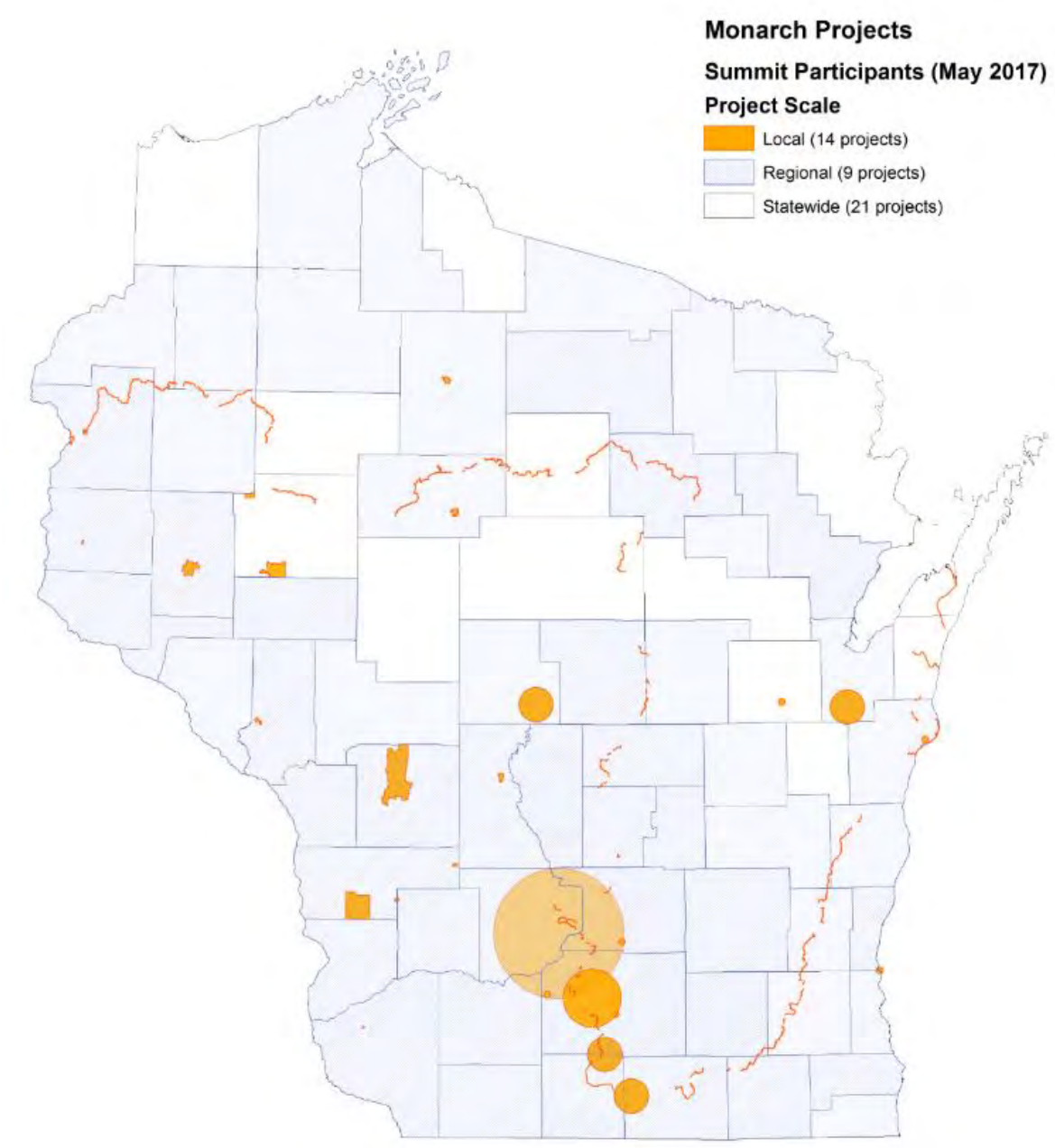


Figure 2. *Map of Wisconsin showing the location of current monarch conservation projects in Wisconsin. The information was collected from participants of the Wisconsin Monarch Conservation Summit in May of 2017.*

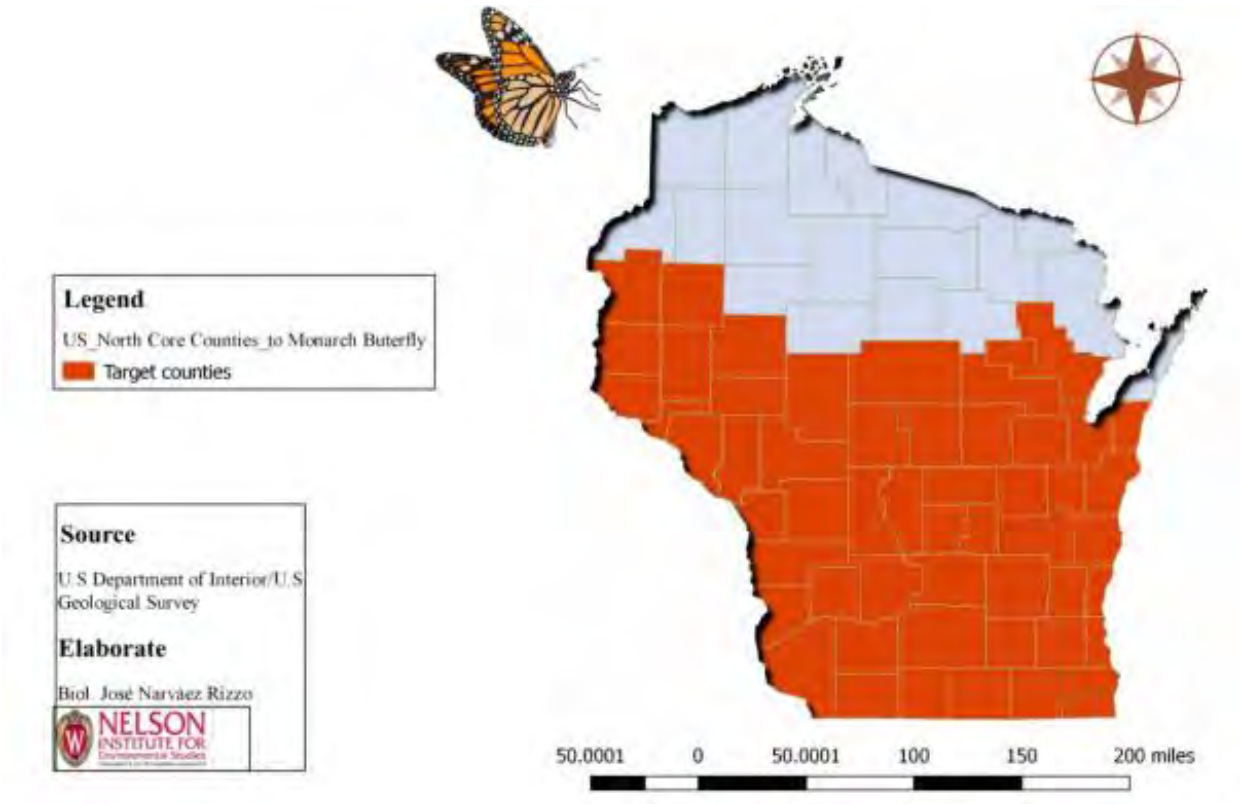


Figure 3. *Map of Wisconsin illustrating the scope of this recovery plan. The state is divided by counties and the targeted counties are highlighted in red.*

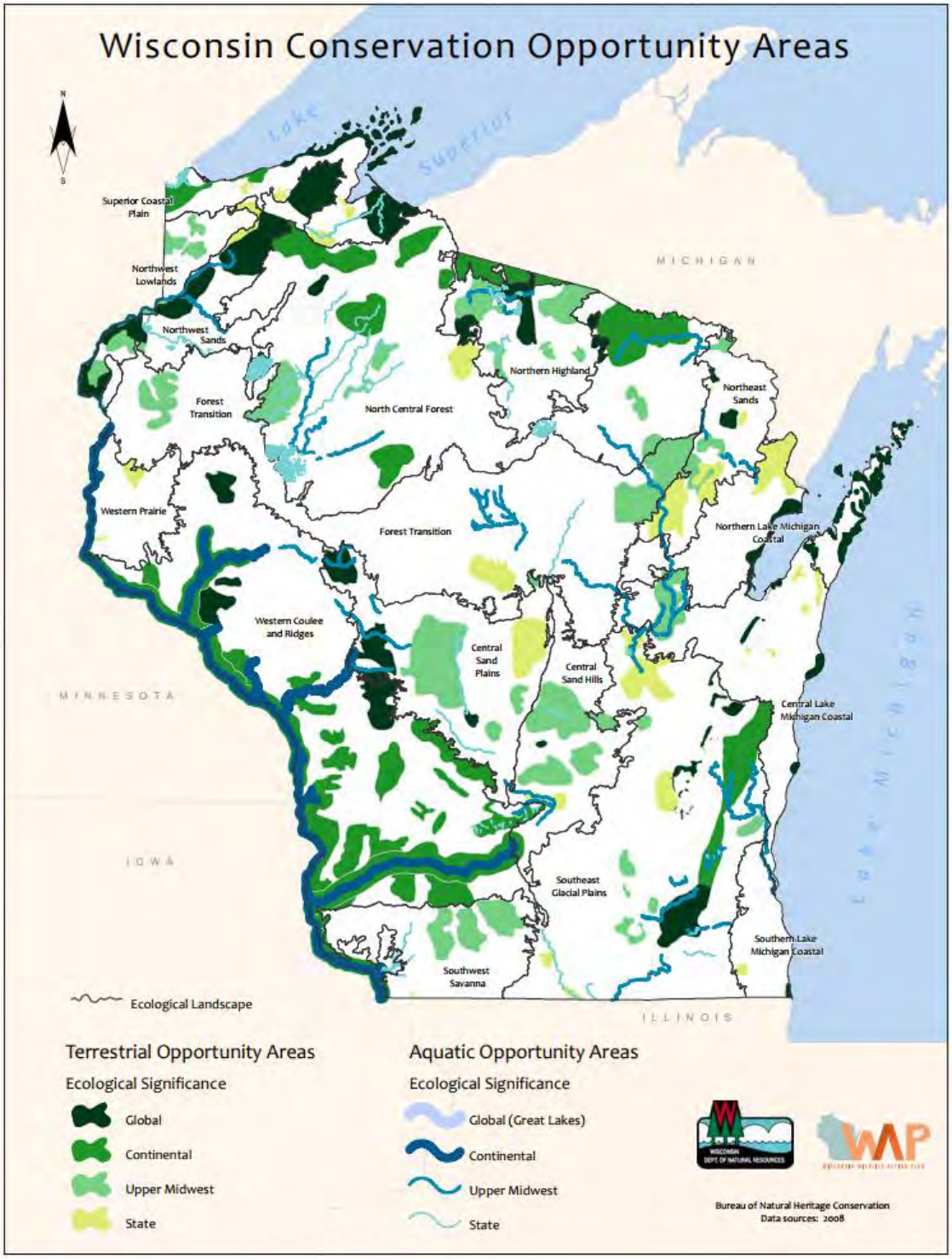


Figure 4. *The Wisconsin Wildlife Action Plan map of Conservation Opportunity Areas, places on the landscape that contain significant ecological features, natural communities, or Species of Greatest Conservation Need and their habitat. Monarch butterflies are currently considered a Species of Information Need in Wisconsin, meaning data collection for this species is a priority in order to evaluate and monitor the species' status in the state.*

NEAFWA STATES IN NORTH CORE

The Northeast Association of Fish and Wildlife Agencies is a participant in the Mid-America Strategy and has compiled its own regional strategy document to represent efforts and plans occurring in the Association's member states, with a particular focus on the northeast states in the North Core monarch conservation unit. The NEAFWA Monarch Conservation Strategy is copied here in full and will also be available through NEAFWA.

Northeast Association of Fish and Wildlife Agencies
Monarch Conservation Strategy

Draft
Northeast Fish and Wildlife Diversity Technical Committee

Compiled by:
Susan Olcott
WV DNR Diversity Unit

Introduction

The North American population of the Monarch Butterfly (*Danaus plexippus plexippus*) has been declining for at least 20 years (Pleasants and Oberhauser, 2012), to the point that it is currently undergoing a species status assessment to determine its status under the Endangered Species Act; a decision is due in June 2019. Conservation of this species is challenging because of its international migratory life history and broad distribution across the continent (Oberhauser et al, 2017; Thogmartin et al, 2017). State fish and game departments in the Northeast Association of Fish and Wildlife Agencies (NEAFWA) have recognized the need to conserve this iconic American species, to commit to engage in conservation actions to enhance its population and habitat, and to identify a range of landscape level conservation strategies.

The core breeding range of the eastern population of the monarch butterfly (dark purple in Figure 1) lies in a broad swath from the eastern Dakotas in the west, south through all Midwestern states and into much of Pennsylvania, West Virginia and far western New York.

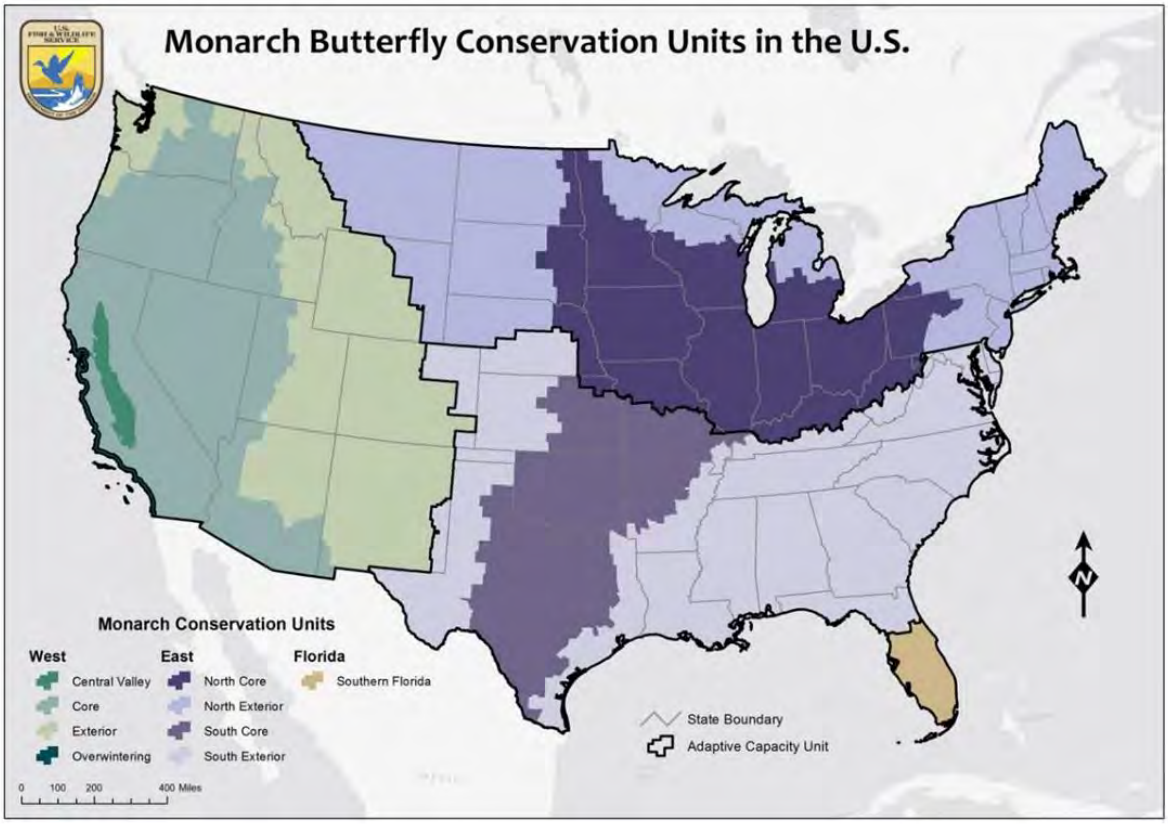


Figure 2. Monarch Butterfly Conservation Units in the continental United States. Courtesy of USFWS.

Although midwestern states have a primary responsibility for the vital northern breeding range of monarchs (Flockhardt, 2013), approximately nine percent lies in the NEAFWA states of Maryland, New York, Pennsylvania, and West Virginia (Karen Kinkead, personal communication, 3 October 2017). The North and South Exterior areas that encompass the remaining NEAFWA states are also significant to providing additional breeding capacity for the species. Because of

the importance of the North Core breeding area, this regional strategy document also includes conservation summaries for these four NEAFWA states (Appendix 1).

Monarchs have a complex life history. Three generations of adults hatch, grow, metamorphose, and breed in the continental United States and Canada; the fourth generation is migratory and winters in high elevation conifer forests in central Mexico. This fourth generation flies south in late August and September from as far north as Canada. A few of these fourth generation individuals may breed in the southern Texas if conditions are favorable, with fifth generation individuals continuing to Mexico. In February, environmental conditions in Mexico induce breeding and a return north to Texas and Oklahoma where females lay eggs on newly emerged milkweed plants. Successive generations spread north and east through the continent, seeking out milkweed and nectar resources.

Threats to the eastern monarch population centers around loss or degradation of breeding habitat (Pleasants and Oberhauser, 2012), loss of climatic stability in the Mexican over wintering sites due to climate change and resource extraction (Ramirez et al, 2015), and impacts from pesticides, disease, and parasites (Jepsen et al, 2015).

State	Srank	Authority	SGCN?	SWAP?
Connecticut	S5	no	yes	yes
Delaware	S5	yes	yes	yes
Dist. Of Columbia	S4B	no	yes	yes
Maine	S5	yes	yes	yes
Maryland	S5B	yes	yes	yes
Massachusetts	S5	no*	no	yes
New Hampshire	S5	yes	yes	yes
New Jersey	S5	yes	yes	yes
New York	S5	yes	no	yes
Pennsylvania	S2S4	no	yes	yes
Rhode Island	SNA	yes	yes	yes
Vermont	S5B	yes	yes	yes
Virginia	S4	yes	yes	yes
West Virginia	S2B	no	no*	yes

*Table 1. State agency designations pertaining to monarch butterflies. Srank = state rank reported to NatureServe; Authority is whether ot not the state has statutory authority over terrestrial invertebrates; SGCN is if monarchs were designated as SGCN in their 2015 SWAP revision, and SWAP is if monarchs were mentioned in their 2015 SWAP revision. *listed species only*

All the NEAFWA member states included the monarch butterfly and/or pollinators in their 2015 State Wildlife Action Plans, and most designated them as Species of Greatest Conservation Need (SGCN) (Table 1); West Virginia intends to designate it as such (*) when the opportunity allows.

Member states are accomplishing monarch conservation objectives through the following actions: habitat creation and enhancement, establishing partnerships with stakeholders and

other conservation organizations, promoting education and outreach material, and formulating government policies that favor monarch and pollinator conservation.

Habitat Creation and Enhancement

All states have identified the need for creating or enhancing early successional habitat to benefit wildlife. Most states specifically mention goals to benefit pollinators, with seed mixes composed of a variety of native species including milkweeds (*Asclepias* sp), the monarch's obligate larval host plant. All states have expressed a commitment to establish and maintain plantings that specifically benefit monarchs on state-managed lands, and with partners on private lands.

Habitat Opportunities

1) Create and maintain diverse early successional habitat to specifically benefit monarchs and pollinators.
    a. Leverage Pittman-Robinson, State Wildlife Grants, and other relevant funds to benefit a diverse array of early successional species, including monarchs and pollinators.
    b. Include *Asclepias* species in pollinator plantings at a level to benefit monarchs.
    c. Maintain the thousands of acres of early successional habitat already present on state-owned or managed lands with *Asclepias* species and nectar resources to benefit monarchs and pollinators.
    d. As resources allow, increase monarch habitat on state-owned or managed lands.

Partnerships

All fish and wildlife agencies have developed partnerships with other state agencies (e.g., Departments of Transportation, Forestry, Recreation, etc.), federal agencies (e.g., NRCS, USFWS, USFS, etc.), and non-profit organizations to leverage staff and budgets to create and maintain early successional habitat. These efforts often help to create a synergistic effect that may go beyond the initially envisioned project. For example, Virginia Department of Game and Inland Fisheries partnered with NRCS to hire five private lands biologists who conserved over 34,000 acres of early successional monarch and pollinator-friendly habitat on private land.

Partnership Opportunities

1) Partner with other state agencies to create and maintain monarch and pollinator habitat on state-owned or managed lands.
    a. Partner with state transportation agencies to manage roadsides, medians, and rest areas for monarchs and pollinators with revised mowing regimes and plantings of native pollinator species and milkweed.

    b. Partner with state agricultural agencies to promote pollinator-friendly practices on agricultural lands, including promoting nectar rich fallow areas, replacing low-production areas with pollinator habitat, and integrated pest management.
2) Partner with federal agencies to create, enhance, and maintain monarch and pollinator habitat.
    a. Create and maintain productive relationships with NRCS to promote Farm Bill practices that promote pollinator habitat creation, enhancement, and maintenance.
3) Partner with utilities to develop strategies to manage transmission rights-of-way for monarchs and pollinators.
4) Partner with non-profit organizations to leverage capacity to create, enhance, and maintain monarch and pollinator habitat.
    a. Provide technical assistance or funding to land trusts, farm land protection groups, watershed associations, and others.
5) Partner with municipalities to provide technical assistance and guidance with national monarch conservation efforts such as the "Mayors' Monarch Pledge."
6) Partner with industry to provide technical assistance and guidance with national monarch conservation efforts such as Wildlife Habitat Council.

Education and Outreach

All states have participated in designing and promoting outreach material to stakeholders on pollinators and often for monarchs specifically. Targeted outreach answers citizens' questions about monarchs and may also engage them. Engagement often leads to habitat creation, additional outreach to family and acquaintances, and a multiplication of the agency's initial effort.

Outreach Opportunities

1) Develop and promote educational materials for citizens.
    a. Develop or partner with others to provide online resources for monarch stakeholders – landowners, agricultural producers, educators, and municipalities.
    b. Partner with non-profit organizations at events at state parks or preserves – such as Monarch Tagging with Monarch Watch.
    c. Develop best management practices for monarch habitat, enhancement, and maintenance including seed mixes and sources for materials.
    d. Develop best management practices and resources regarding use of pesticides and impacts to monarchs and other pollinators for nurseries, landscapers, homeowners, etc.
    e. Highlight monarch conservation at public events such as state fairs, youth conservation camps, or state park summer programs.
2) Promote monarch habitat and conservation at state-owned or managed lands with signage, demonstration areas, and management.

3) Promote or sponsor training for citizen scientists for monitoring monarchs and pollinators.
4) Partner with non-profit educational organization to develop public school curricula on monarchs and conservation.

Policy

Several states have enacted agency regulations or legislative policies that benefits pollinators and monarchs. Although contingent on agency capacity and other jurisdictional-level priorities, policy and legislative efforts can greatly benefit conservation. All states expressed their desire and commitment to continue or increase monarch and pollinator conservation efforts, in the context of other state-level priorities.

Policy Opportunities

1) Establish or reach out to existing state groups to evaluate monarch and pollinator populations and health, and to recommend possible policy or management changes to improve them.
2) With state agriculture agencies, consider the impacts of agricultural practices, including commonly employed pesticides on agricultural lands, and develop best management practices that support the health and well-being of monarch populations.
3) With state agriculture agencies and other partners, identify policies and/or tools that provide insights into the use of pesticides by homeowners.
4) As opportunities exist, increase staffing and funding to promote monarch habitat creation and conservation, and outreach to citizens.

Summary

All NEAFWA member states are addressing monarch and pollinator conservation at different scales and through different avenues. There is commitment among all states to continue these efforts and to do more, as resources and priorities allow. Challenges include capacity, funding, political climate, and focusing the public and stakeholders to voluntarily commit to conservation. The initial steps have given satisfactory results. The two decades that follow should provide monarchs in the Northeast with a continuing and stable existence.

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Maryland Monarch Conservation Summary

Contact information for person providing this report:
Name: Jennifer Selfridge
E-mail: Jennifer.selfridge@maryland.gov
Phone: 410-827-8612 x102

Do you have explicit habitat-based goals already in place? If so, what are they?

No

Current Monarch Conservation Activities

Maryland worked on monarch-specific conservation activities in 2016 and on more general pollinator efforts from 2016-present. Our conservation efforts to date include:

- The passage of Maryland House Bill 132 "State Government – Pollinator Habitat Plans," by the Maryland General Assembly in 2016, required all State Agencies to develop Pollinator Habitat Plans. The Maryland Department of Natural Resources' *Pollinator Habitat Plan: A blueprint for the conservation of pollinators and pollinator habitat on the natural lands managed by the Maryland Department of Natural Resources for the benefit of Maryland's citizens*, is available at: http://dnr.maryland.gov/wildlife/Documents/PollinatorHabitatPlan_June2017.pdf. Additionally, the Maryland Department of Agriculture (MDA), the Maryland Environmental Service (MES), and the Maryland State Highway Administration (SHA) have all developed pollinator habitat plans as the result of the passage of this bill.
- In 2016, Maryland was awarded a one-year Region 5 Northeast State Grant through the Monarch Conservation Fund to expand ongoing efforts in the state to increase available habitat for Monarch butterflies in Maryland, creating patches of milkweed habitat (monarch breeding areas) and patches of general pollinator habitat (monarch foraging areas) on state-owned lands in the coastal migration corridor, both on the Coastal Plain and in the mountainous regions of the state. Some follow-up work continues on State Park lands.
- Environmental Concern Inc., a 501(c)3 public not for profit Corporation promoting public understanding and stewardship of wetlands through outreach and education, native species horticulture, and the restoration, construction and enhancement of wetlands, initiated the Mid-Atlantic Monarch Initiative (MAMI) in 2016. Their mission is to foster collaboration and activate conservation initiatives through shared physical and educational resources to increase Monarch habitat in the Mid-Atlantic region of the United States. The contact is Jessica Lister, 410-745-9620, monarchs@wetland.org.

Specific Strategies for Reaching Monarch Conservation Goals

There are no monarch-specific conservation goals in place at this time. Strategies for overall pollinator conservation are outlined in the various State Agency plans as described above. Activities include but are not limited to:

- Establishing both small-scale and large scale pollinator meadows

- Managing utility right of way areas on State Lands for pollinators
- Facilitating the continued occurrence and health of diverse native habitats, including various wetland types, upland meadows, and forests of multiple age classes, all of which provide habitats for a variety of pollinator species
- Prohibiting the use of pesticides toxic to pollinators or any neonicotinoid pesticide in designated Pollinator Habitat Areas
- Expand public knowledge, understanding and appreciation for pollinators and their habitats
- Working with partners to provide pollinator habitat on private lands

Statement Regarding Likelihood of Implementation

All State Agencies are expected to implement their plans, but the degree to which this is done will vary by Agency. Each plan outlines general strategies for pollinator protection. Success will likely depend on available funding, time constraints, and possibly changes in the political environment. However, Maryland has demonstrated a strong commitment to pollinator habitat conservation with the passage of House Bill 132 and through the work of many of its partners, and we believe that both long-term and short-term objectives are feasible and attainable.

New York Monarch Conservation Summary

New York was unable to provide a monarch conservation summary, but has completed a Pollinator Conservation Plan for managed pollinators, and a 2015 species status assessment for the monarch for consideration for listing under New York State endangered species statute. An excerpt pertaining to New York conservation efforts is quoted below.

"NYS has "inadvertently" supported Monarch conservation by maintaining grasslands on private and public land-primarily for grassland birds. Milkweeds are pioneer species and without regular disturbance would not occur in high abundance.

On private lands, at least 4,157 acres are being maintained as grassland through DEC's Landowner Incentive Program (LIP)/ State Wildlife Grants (SWG) and another 1,500 acres being maintained as such through State Acres for Wildlife Enhancement under the Conservation Reserve Program (SAFE-CRP), total; 5,657 acres. Since grasslands enrolled in these programs cannot be mowed until August 15, and in practicality are not mowed until mid-September, they provide habitat for milkweed, which thereby provides feeding and nesting opportunities for Monarchs as well. Monarchs are seen moving through the fields in August and September.

On New York State land (primarily Wildlife Management Areas), about 11,065 acres of grassland are also under a delayed and rotational mowing schedule using Pitman-Robinson (PR) funding for birds and mammals, but also benefitting bees and butterflies. This equals a total of about 17,000 acres of grassland in NY, with about 1/3 of it being mowed per year. Goldenrod, milkweed, clover and a diverse array of asters proliferate under this management scheme (Marcelo delPuerto, NYSDEC, pers. comm.).

While a large portion of the threats affecting monarch populations occur outside of the state, region, and even country, one action that northeastern states and states all along the butterflies' migratory pathway could take is the creation of Monarch Waystations (monarch habitats) in home gardens, at schools, businesses, parks, zoos, nature centers, along roadsides, and on other unused plots of land. Adjustments to the aforementioned programs (LIP, SWG, PR-funded management of state grasslands) such as including known nectar sources in seed mixes for adults in addition to promoting milkweed growth would be a huge contribution to this effort. To offset the loss of milkweeds and nectar sources it is necessary to create, conserve, and protect milkweed/monarch habitats. Without a major effort to restore milkweeds to as many locations as possible, the monarch population is certain to decline to extremely low levels."

Pennsylvania Monarch Conservation Summary

Contact information for person providing this report:
Name: Betsy Leppo, PA Natural Heritage Program
E-mail: bleppo@paconserve.org
Phone: 717-292-0275

Do you have explicit habitat-based goals already in place? If so, what are they?
PA: I do not know of habitat based goals set programmatically at the state level, but there are a variety of local and regional efforts that may include specific habitat goals.

Current Monarch Conservation Activities
PA: Pennsylvania has individuals and organizations working on monarch-specific conservation activities, but I'm not aware of an organizing group at the state level. Below is a partial list of monarch conservation efforts in Pennsylvania, and there are certainly others.

- Monarch counts as part of the migratory bird counts at Waggoners Gap in Carlisle since about 2004, and at Hawk Watch in Schuylkill County since 1990.
- The status of the Monarch in Pennsylvania was reviewed for the recently updated State Wildlife Action Plan. The full invertebrate report is included in Appendix 1.1 E, of the plan at http://www.fishandboat.com/Resource/Documents/SWAP-CHAPTER-1-apx11-12.pdf, starting on page 76. The monarch is mentioned specifically in the following pages
    - Taxa groups evaluated, page 90
    - Conservation Actions for pollinators, page 119
    - Monitoring, Page 122
- The Monarch is mentioned in the recently released Pennsylvania Pollinator Protection Plan available online at:

http://ento.psu.edu/pollinators/research/the-pennsylvania-pollinator-protection-plan-p4
Specific goals for the monarch are not provided in the plan, but a variety of best management practices are provided to protect and improve the health of a variety of native and managed pollinator populations.

- The MonarchWatch citizen science program and tagging project has active individuals and groups in Pennsylvania. The Master Gardeners groups in several counties have been organizing efforts, planting gardens, etc., and there has also been some interest and involvement from land conservancies.
- I contacted researchers associated with the Center for Pollinator Research at Penn State University http://ento.psu.edu/pollinators regarding this questionnaire. The Center was involved in the coordination and development of the Pennsylvania Pollinator Protection Plan. They were not involved in any current monarch projects, but suggested several contacts that we may wish to include in future conservation and planning efforts for the monarch. They also directed us to the following website: https://www.monarchredcarpet.org/#extinction.

Planning summits or collaborative groups that have occurred:

PA: Over the past two years, zoologists from several state heritage and natural resource programs in the mid-Atlantic (Maryland, West Virginia, Pennsylvania, New Jersey, Delaware, and Washington DC) have worked on a collaborative Regional Conservation Needs (RCN) project focused on wetland butterflies. This RCN grant is wrapping up at the end of December 2017, but we hope to continue to work with these partners on invertebrate conservation projects.

Estimate of how many milkweed stems or acres have been added/restored for monarchs:
PA: I don't have documentation of these numbers, though various individuals and groups likely keep track for their purposes. MonarchWatch should have figures on Pennsylvania participation in the free milkweed seedling project. The Pennsylvania Game Commission and the Pennsylvania Department of Conservation and Natural Resources have been working towards creating better pollinator habitat on their lands where they are maintaining permanent herbaceous openings or restoring newly disturbed sites such as on gas pipeline right of ways. I am not aware of numbers that quantify target or achieved goals in terms of number of planted stems or acres planted or managed for pollinators.

Contact information for your state's monarch conservation initiative for anyone who may be interested in getting involved or getting more information.

Betsy Leppo Invertebrate Zoologist PA Natural Heritage Program Western PA Conservancy Phone: 717.292.0275 Email: bleppo@paconserve.org	Diana Day Conservation Coordinator PA Fish & Boat Commission 1601 Elmerton Avenue Harrisburg, PA 17110 Phone: 717.346.8137 Email: diday@pa.gov	Catherine Haffner Wildlife Diversity Conservation Planning Coordinator Pennsylvania Game Commission Bureau of Wildlife Management Wildlife Diversity Division 2001 Elmerton Avenue Harrisburg, PA 17110 Office: 570.275.3934 Cell: 717.433.1464 Email: chaffner@pa.gov

Specific Strategies for Reaching Monarch Conservation Goals
Statement that describes what regulatory authority your state wildlife agency / DNR holds over monarchs and/or their habitats. In all likelihood, the state wildlife agency will not necessarily have the authority to implement everything in your plan. However, please describe what authorities your agency does have and what partnerships are being leveraged to implement conservation activities where you do not have authority.

PA: Terrestrial invertebrates, including monarch butterflies, are not afforded legal protection by a state agency in Pennsylvania. Some orphan taxa get attention by virtue of their economic importance. The PA Department of Agriculture is tasked with surveys and management of economically significant species including pests and beneficial species (e.g. honey bees). The Department of Agriculture may be able to expand attention to native pollinators and supported

their inclusion in the recent PA Pollinator Protection Plan. The Pennsylvania Department of Conservation and Natural Resources (DCNR) has taken initiative on certain terrestrial invertebrates such as pollinating insects. They have funded several invertebrate research projects and have incorporated a group of rare butterflies and moths into environmental review. DCNR has in-house expertise in the Bureau of Forestry's Forest Pest Management Division (FPM), and there is an existing relationship between FPM and the Department of Agriculture's Entomology section, particularly for pest management issues. There may be occasional conflicts of interest between control programs for forest pest species and impacts on non-target species of concern; however they already have a system in place for resolving these conflicts through the environmental review process. Voluntary partnerships such as the Pennsylvania Biological Survey and the Pennsylvania Pollinator Partnership bring together representatives from state and local governmental agencies, universities, conservancies, and citizens, to advance work related to invertebrate conservation.

Describe how you are engaging with major sectors to work towards goals and what strategies each sector plans to pursue.

PA: Pennsylvania does not have a unifying monarch conservation strategy or a coherent way of tracking the various efforts that are taking place in the state that benefit monarchs and other pollinators. Information and resources for best management practices are addressed in the State Wildlife Action Plan and the Pennsylvania Pollinator Protection Plan. Many aspects of the work listed below is being conducted on private, public, and protected lands by partners who helped develop these plans, along with other efforts.

Next, describe your state's outreach and education strategies and plans (bullet points or paragraphs)

PA: Recommendations for outreach and education around pollinator management are included in the Pennsylvania State Wildlife Action Plan and the Pennsylvania Pollinator Protection Plan. Outreach and education is being conducted by many entities, but we don't have centralized tracking system for these efforts. There is a desire to improve communication between partners and facilitate education and outreach efforts. The PA Biological Survey and partners in the PA Pollinator Protection Plan will continue to work towards achieving conservation and education strategies outlined in these plans.

Statement Regarding Likelihood of Implementation

The Policy for the Evaluation of Conservation Efforts requires that formalized species conservation plans include some assurances that planned conservation actions will actually be implemented. This will not be easy to provide given the multitude of partners engaged in monarch conservation as well as a general lack of regulatory authority over an un-listed insect species. However, your state should try to emphasize the strong participation and commitment from partner organizations to the extent possible.

PA: I think this NEAFWA effort to summarize what is being done for monarchs on a regional basis will be beneficial for people interested in monarch conservation in Pennsylvania. I have

seen the map that shows western Pennsylvania as part of the northern core habitat, so we appear to have a regional responsibility. But I haven't found a key contact in the state who has digested the information that is available and tried to figure out what conservation actions would be most practical and effective in Pennsylvania. So perhaps this is a next step for us. The PA Biological Survey's Invertebrate Technical Committee and the PA Pollinator Protection Plan task force are two logical places where we can discuss this. These entities have established relationships with diverse partners in the state who came together to complete the invertebrate portion of the PA State Wildlife Action Plan, and the PA Pollinator Protection Plan. I recently made the following suggestions for incorporation into the recommendations section of the PA Pollinator Protection Plan (this section is still in development but should be released by early January 2018):

- Promote the Pennsylvania State Wildlife Action Plan which was updated in 2015. The conservation status of a group of pollinators and other invertebrates were evaluated for this plan. The invertebrate assessment report can be found in Appendices 1.1 and 1.2 (Pages 76-149), which is available online at: http://www.fishandboat.com/Resource/Documents/SWAP-CHAPTER-1-apx11-12.pdf . There are urgent conservation and management issues that need to be addressed to 'keep common species common', conserve species of global and regional importance, maintain PA-rare species, and reduce knowledge gaps to better assess the conservation status of species.
- Collaborate with the Pennsylvania Biological Survey to develop a white paper that discusses the status of 'orphan taxa' in Pennsylvania. Orphan taxa are species that have fallen through gaps in the state code and lack state agency oversight regarding their status and management. Orphan taxa include many pollinating insects such as native butterflies, moths, bees, wasps, beetles, flies, etc. This paper can investigate the many implications of having orphan taxa (e.g., fiscal, environmental and human health, etc.) and suggest strategies to advance research, conservation, and management of this large and diverse group of overlooked species.
- Utilize the P4 partnership to help coordinate and facilitate participation of scientists, policy makers, concerned citizens, etc. in the development and implementation of future research, conservation and planning efforts, much in the same way the P4 itself was created. For example, the Northeast Fish and Wildlife Diversity Technical Committee is developing a monarch conservation strategy on behalf of the Northeast Association of Fish and Wildlife Agencies (to be completed by February 23, 2018). They are seeking assistance from stakeholders in each state in the Northeast to share existing information on monarch conservation efforts, and to help develop strategies to address gaps in those efforts as needed. The P4 partnership includes individuals who have the information, expertise, and connections needed to inform future local and regional efforts to support pollinators.

West Virginia Monarch Conservation Summary

Monarch Habitat Goals

West Virginia currently has no state goals for monarch conservation at this time. A Monarch Summit is planned for March 5-6, 2018 to start the process of developing goals and objectives from the numerous stakeholders in the state. Participation from many partners, representing several land use sectors will be necessary to form an effective strategy.

Current Monarch Conservation Activities

West Virginia Division of Natural Resources (WVDNR) has been working on monarch-specific conservation activities since 2017. Our monarch conservation efforts to date include:

- Creating and maintaining early successional habitat on WVDNR managed lands – we are increasingly targeting pollinator species and planting native nectaring species including milkweed.
- Maintaining communication with WV Department of Agriculture and Division of Forestry to coordinate control efforts of forest insect pest species to avoid non-target mortality.
- Hired a partner biologist with the NRCS to work as a pollinator specialist in fostering participation with Farm Bill programs, and to directly help WVDNR with pollinator conservation in the state.
- WV State Parks has instituted a mowing reduction program to create and enhance pollinator and early successional habitat on state parks from unneeded and unused lawn areas.
- In early March 2018, the Mountain State Monarch and Pollinator Partnership will host a WV Monarch Summit to bring together stakeholders to share monarch conservation efforts initiated or planned, and to develop goals and strategies to move monarch conservation forward in WV.
- A Senior Girl Scout, with WVDNR staff as advisors, is working on her Gold Award to spear-head an effort to establish the first Mayors' Monarch Pledge in WV.

Staff to contact for monarch conservation efforts in WV:

Susan Olcott
Regional Wildlife Diversity Biologist
WV Division or Natural Resources
PO Box 99, 1110 Railroad St
Farmington WV 26374
susan.p.olcott@wv.gov
(304)825-67897

Sarah Owen
Pollinator Specialist
NRCS
49 Mountain Park Dr
White Hall WV 26554
sarah.owen@wv.usda.gov
(304)368-6909

Specific Strategies for Reaching Monarch Habitat Goals

As defined in state code, WV does not have legal authority over terrestrial insects. The WVDNR Director, however, has clearly defined powers (§20-1-7) to conserve the natural resources of the state which he has interpreted to include any species in need of conservation. As such, SWG funds can be used as outlined in the implementation plan for conservation of monarchs

and other pollinators. PR funds can be used for early successional habitat creation, enhancement, and maintenance that will benefit a wide variety of wildlife species dependent upon early successional habitat. Pollinators and monarchs will respond favorably to these actions.

- WV is starting to develop relationship with other state and federal agencies to benefit monarchs. These are currently in early stages, but include the Department of Agriculture, Department of Highways, Department of Environmental Protection, NRCS, USFS, and USFWS.
- NRCS, with the WVDNR/NRCS partner biologist/pollinator specialist, is making extensive contacts with private landowners to encourage managing lands for pollinators and monarchs including planting or enhancing nectar resources and milkweed. Staff is also actively working with Xerces Society for Invertebrate Conservation and others to develop pollinator seed mixes that will be effective in the state, and to find sources for local seed.
- WVDNR is implementing the creation or enhancement of early successional habitat to benefit early successional wildlife, pollinators and habitat on wildlife management areas and state parks, and developing BMPs for maintaining these areas.
- Federal lands in WV, including the Monongahela National Forest, Jefferson National Forest, Canaan Valley National Wildlife Refuge, and Ohio River Islands National Wildlife Refuge, are developing and implementing plans to enhance pollinator habitat on their properties, including demonstration areas and wildlife opening maintenance.
- A variety of outreach and educational efforts occur in WV mostly by volunteers and NGOs. WVDNR does not have a comprehensive list of these efforts currently, but include monarch tagging by several individuals, public school curriculum activities, education provided by the Monarch Alliance and Potomac Valley Audubon in the Eastern Panhandle, garden clubs planting Monarch Waystations or pollinator gardens, education programs sponsored by the Good Zoo in Wheeling, and others.

<u>WV timeline/stem goal:</u>

WV currently does not have a timeline or stem goals for the state. At the upcoming WV Monarch Summit, we will explore possible timelines with stakeholders and partners. Because WV does not have extensive agriculture, and has little agricultural land in genetically modified crops, there is a reasonable possibility that milkweed may not be limiting in the state. Instead, our efforts may be focused on more effective maintenance and management of our existing milkweed, enhancing nectar resources, and promoting education and engagement of stakeholders and citizens.

<u>Statement Regarding Likelihood of Implementation</u>

The Policy for the Evaluation of Conservation Efforts (PECE) requires that formalized species conservation plans include some assurances that planned conservation actions will actually be implemented. This will not be easy to provide given the multitude of partners engaged in monarch conservation as well as a general lack of regulatory authority over an un-listed insect species. However, your state should try to emphasize the strong participation and commitment from partner organizations to the extent possible.

Because approximately half of WV's land area falls within the monarch's North Core breeding area, we recognize our responsibility in conservation of this species. The WVDNR, and increasingly the state's stakeholders and citizens, are realizing that they have a part to play and are stepping up to participate. We anticipate at least 100 stakeholders will be attending the WV Monarch Summit; few organizations or stakeholder groups that we've contacted have been uninterested in at least learning more about possible conservation plans and activities that they can participate in. However, uncertainty exists in any implementation strategy that may be developed from the Summit, as future funding circumstances and political environments may change. Future constraints may limit the ability of any partner, including federal, state, and local governments, to carry out the conservation actions that have been planned.

APPENDIX A – MID-AMERICA MONARCH CONSERVATION STRATEGY GOVERNANCE STRUCTURE AND PARTICIPANT LIST

PARTICIPATING AGENCIES IN THE MID-AMERICA STRATEGY PROJECT

Member states of the Midwest Association of Fish and Wildlife Agencies:

Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin

Additional states from other regional Associations of Fish and Wildlife Agencies:

Arkansas (SEAFWA), Maryland (NEAFWA), New York (NEAFWA), Oklahoma (WAFWA/SEAFWA), Pennsylvania (NEAFWA), Texas (WAFWA/SEAFWA), and West Virginia (NEAFWA/SEAFWA)

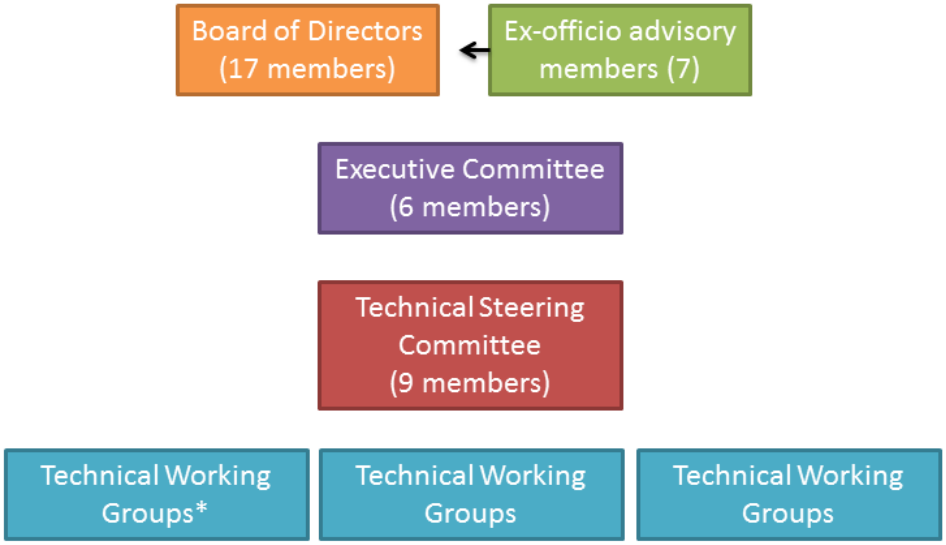
Federal Agencies:

U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Department of Agriculture (including Farm Services Agency and Natural Resources Conservation Service), U.S. Geological Survey

Non-Governmental Organizations:

Association of Fish & Wildlife Agencies, Environmental Defense Fund, Keystone Policy Group Monarch Collaborative, Monarch Joint Venture, National Fish and Wildlife Foundation, National Wildlife Federation, Pheasants/Quail Forever, Rights-of-Way as Habitat Working Group

MID-AMERICA MONARCH CONSERVATION STRATEGY GOVERNANCE STRUCTURE



Governance Structure: **Approved: June 2017**

Board of Directors will consist of executive level staff with public responsibility for species conservation, legal authority to undertake conservation actions, and with decision authority for their respective agency. It consists of state directors or designees from the 16 primary eastern monarch core breeding and migratory corridor area states, plus a NEAFWA representative. (i.e. 13 MAFWA member states; Texas, Oklahoma, Arkansas; and NEAFWA). It may also include up to seven ex-officio (non-voting) members representing key sector and/or agency partners at the discretion of the Board.

The Board oversees the decision-making elements of the Mid-America Monarch Conservation Strategy, including organization and guidance. It will have final approval authority for the strategy and will communicate with U.S. Fish and Wildlife Service regarding implementation strategy, including commitments for conservation actions. It will establish any needed standing committees.

The Board will charge the Technical Steering Committee with tasks such as developing and carrying out habitat and population plans and tracking accomplishments. The Board also plays an important role in obtaining and allocating funds and resources to accomplish conservation tasks. This structure will ensure decision-making roles regarding how and where funds are spent for the state agencies, accountability to legal requirements and outcomes, as well as coordination with other agency and organization conservation efforts.

The Board operates under established operating guidelines and shall meet at least annually. The guidelines will include the degree of delegated authority granted to the Executive Committee to make decisions related to plan development and implementation.

Executive Committee will meet monthly or as needed and will consist of a subset of six members of the Board, with consideration given for geographic distribution within the project area. It will make decisions related to plan development and implementation under authorities granted by the Board. It will also approve any needed Technical Work Groups.

Technical Steering Committee will consist of technical or science staff from state agencies and primary partners as identified in the grant and will develop a conservation strategy and prioritize and implement actions needed to conserve the eastern monarch butterfly under the direction of the Board. It will take a primary role in drafting and implementation of the conservation plan, as well as tracking accomplishments, leading evaluation, and making recommendations for adaptive changes to implementation.

Technical Work Groups will operate under the direction of the Board and the Technical Steering Committee and will carry out various tasks related to the technical aspects of the conservation strategy. Technical Work Groups are composed of experts in fields important to developing, implementing, and monitoring the Strategy. The Technical Steering Committee coordinates the Work Groups to ensure that they meet their individual charges in carrying out the overall Strategy.

***Current Technical Work Groups** include: North Core Habitat Allocation; South Core Habitat Allocation; Research, Monitoring, and Adaptive Management; Outreach and Education; Private Agricultural Lands; Protected Natural Lands; Rights-of-Way and Energy; Urban and Developed Lands; Policy

MEMBERS OF THE STRATEGY GOVERNANCE AND DEVELOPMENT TEAM

Board of Directors

State/Organization	Name
Members:	
Arkansas	Jeffrey Crow
Illinois	Wayne Rosenthal
Indiana	Mark Reiter
Iowa	Dale Garner
Kansas	Chris Berens
Kentucky	Greg Johnson
Michigan	Bill Moritz (Chair)
Minnesota	Jim Leach
Missouri	Sara Parker-Pauley
Nebraska	Jim Douglas
North Dakota	Terry Steinwand
Ohio	Mike Miller
Oklahoma	JD Strong
South Dakota	Tom Kirschenmann
Texas	TBD
West Virginia (NEAFWA)	Paul Johansen
Wisconsin	Erin Crane
***Ex-officio* Members:**	
U.S. Fish and Wildlife Service	Kelley Myers
USDA-NRCS	Lee Davis
Pheasants Forever	Richard Young
National Wildlife Federation	Naomi Edelson
Monarch Joint Venture	Wendy Caldwell
Keystone Monarch Collaborative	Aimee Hood

Executive Committee

State	Name
Iowa	Dale Garner
Michigan	Bill Moritz (Chair)
Missouri	Sara Parker-Pauley
Ohio	Mike Miller
Texas	TBD
West Virginia (NEAFWA)	Paul Johansen

Technical Steering Committee

State/Organization	Name
Iowa DNR	Karen Kinkead
Michigan DNR	Dan Kennedy
Nebraska Game and Parks	Kristal Stoner
Texas Parks and Wildlife	Ben Hutchins
West Virginia (NEAFWA)	Susan Olcott
AFWA	Jonathan Mawdsley
MAFWA	Claire Beck
National Wildlife Federation	Naomi Edelson
Pheasants/Quail Forever	Drew Larsen

Agriculture/Private Working Lands Technical Work Group

State/Organization	Name
Bee and Butterfly Habitat Fund	Pete Berthelsen
Environmental Defense Fund	David Wolfe
Illinois DNR	Bob Caveny
Iowa State University	Steve Bradbury
Kansas State University	Shelly Wiggam
Missouri DOC	Brent Vandeloecht
Monarch Joint Venture	Wendy Caldwell
NRCS	Lee Davis
NRCS	James Cronin
Ohio DNR	Jeff Burris
Pheasants Forever	Casey Bergthold
Pheasants Forever	Laura McIver
University of Northern Iowa	Laura Jackson
USFWS	Kelly Srigley Werner
USFWS	Dave Walker
USFWS	Doug Helmers
Xerces	Ray Moranz
Xerces	Sarah Foltz Jordan

Protected Natural Lands Technical Work Group

State/Organization	Name
BLM	Maria Ulloa Bustos
Forest Service	Sierra Patterson
Forest Service	Dennis Krusac
Illinois DNR	Ann Holtrop
Michigan DNR	Dan Kennedy
NRPA	Rich Dolesh
Pheasants Forever	Josh Divan

The Nature Conservancy	Jay Pruett
USFWS	AnnMarie Krmpotich

Rights-of-Way Technical Work Group

State/Organization	Name
American Electric Power	Tim Lohner
Associated Electric Cooperative	Rob LeForce
CN Railway	Kari Harris
Electric Power Research Institute	Jessica Fox
Illinois DNR	Kristi Dodson
Illinois DOT	Stephanie Dobbs
Indiana DNR	Kelsey Pearman
MAFWA	Claire Beck
Monarch Joint Venture	Alison Cariveau
NiSource	Brian Kortum
Pheasants Forever	Erin Holmes
Energy Resources Center - UIC	Iris Caldwell
Sand County Foundation	Neil Palmer
Texas DOT	Dennis Markwardt
Ohio DOT	Marci Lininger
Western Farmers Electric Coop	John McCreight
Xerces	Jennifer Hopwood

Urban and Developed Areas Technical Work Group

State/Organization	Name
City of St. Louis	Catherine Werner
Field Museum	Abigail Derby Lewis
Missourians for Monarchs	Bob Lee
Monarch Joint Venture	Cora Preston
NRPA	Rich Dolesh
National Wildlife Federation	Manja Holland
National Wildlife Federation	Patrick Fitzgerald
USFWS	Mara Koenig
West Virginia DNR	Susan Olcott

Outreach and Education Technical Work Group

State/Organization	Name
Iowa DNR	Karen Kinkead
Monarch Joint Venture	Wendy Caldwell
Monarch Joint Venture	Cora Preston
National Wildlife Federation	Mary Phillips

Nebraska Game and Parks	Kristal Stoner
Pheasants Forever	Drew Larson
UMN Monarch Lab	Katie-Lyn Bunney
University of Illinois	Michael Jeffords
USFWS	Mara Koenig

Research, Monitoring, and Adaptive Management Technical Work Group

State/Organization	Name
AFWA	Jonathan Mawdsley
Iowa DNR	Karen Kinkead
Monarch Joint Venture	Alison Cariveau
Nebraska Game and Parks	Kristal Stoner
Oklahoma State University	Kristen Baum
St. Louis Zoo	Ed Spevak
UMN Monarch Lab	Karen Oberhauser
USFWS	Ryan Drum
USFWS	Kelly Nail
USGS	Wayne Thogmartin
USGS	Steve Hilburger

Habitat Allocation and Goals (north core) Technical Work Group

State/Organization	Name
Illinois DNR	Ann Holtrop
Iowa DNR	Karen Kinkead
MAFWA	Claire Beck
Missouri DOC	Brent Vandeloecht
Nebraska Game and Parks	Kristal Stoner
Ohio DNR	Kate Parsons
University of Minnesota	Eric Lonsdorf
USFWS	Ryan Drum
Wisconsin DNR	Owen Boyle

Habitat Allocation and Goals (south core) Technical Work Group

State/Organization	Name
Arkansas GFC	Allison Fowler
Kansas Parks, Wildlife, and Tourism	Zac Eddy
Kansas State University	Shelly Wiggam
Missouri DOC	Brent Vandeloecht
Oklahoma DWC	Matt Fullerton
Oklahoma State University	Kristen Baum

OK Natural Heritage Inventory	Bruce Hoagland
Texas Parks and Wildlife	Ben Hutchins
University of Minnesota	Eric Lonsdorf
USFWS	Bill Bartush
USFWS	Katie Boyer
USFWS	Kelley Myers
Xerces Society/NRCS	Ray Moranz

Policy Team

State/Organization	Name
American Soybean Association	Wayne Fredericks
Illinois DNR	Mike Chandler
National Wildlife Federation	Naomi Edelson
National Wildlife Federation	Lekha Knuffman
Nebraska Game and Parks	Eric Zach
Nebraska Game and Parks	Kristal Stoner

APPENDIX B – IMPORTANT RESOURCES FOR MONARCH HABITAT BEST MANAGEMENT PRACTICES

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APPENDIX C – RANKING OF MONARCH RESEARCH QUESTIONS

Tables and ranking of research questions considered by the MAFWA Mid-America Monarch Conservation Strategy Technical Steering Committee and the Research, Monitoring, and Adaptive Management Technical Work Group. The survey was completed by 17 State Technical Representatives.

Breeding Monarch research questions ranked by priority of State Agencies (respondents could select up to 5):

Question	Rank (votes)
For habitat establishment in intensively farmed landscapes within or near fields treated with pesticides, how does pesticide exposure impact monarch survival and recruitment?	1 (12)
What floral diversity, density and species are necessary to be considered monarch breeding habitat / is ideal for monarch breeding and does this change with scale?	2 (10)
How do small-scale habitats (less than 1 acre) contribute to monarch conservation relative to large scale habitats?	2 (10)
Need to validate / ground truth current assumptions regarding milkweed stem density by sector by state.	3 (7)
Is there a relationship between acres of breeding habitat restored/improved and the number of monarchs successfully overwintering in Mexico?	3 (7)
Is milkweed a limiting factor in the breeding zone for monarchs, and does this vary by sector?	4 (6)
Is the spatial configuration / juxtaposition of habitat in the breeding zone important in use by females?	4 (6)
Improve understanding of relative habitat quality at the patch and landscape scales.	5 (3)
Are floral resources / nectar a limiting factor in the breeding zone?	6 (2)
What other beneficial species are using monarch habitat at the landscape and patch levels?	6 (2)
How important are wetland edges in monarch/milkweed production?	6 (2)
How many milkweed stems are needed at the regional level?	6 (2)
Which nectar resources are preferred for adult monarch nectaring during breeding season?	7 (1)
Is there variability in monarch production by sector?	7 (1)
Is there variation of adult nectar preferences by sector?	8 (0)
Improve understanding of immature survival.	8 (0)

One respondent used the other category to emphasize that these research questions would be State Agency recommendations to Universities, not that Agencies would be answering the questions. Two other questions were added by a respondent:

1. How do we incentivize or encourage agricultural industry and sectors to increase or maintain milkweed plants on agricultural lands?
2. How do milkweed and monarchs respond to different management techniques. In other words, can we increase the number of milkweed and monarch productivity significantly via management (e.g. time of mowing or disking).

Migration Monarch research questions ranked by priority of State Agencies (respondents could select up to 3):

Question	Rank (votes)
Are there large gaps in floral/migration resources along the way? (how far can a monarch go before it has to stop and eat along migration/map out floral resources)	1 (9)
Is the quantity/diversity/spatial configuration of floral resources along the migration corridor a limiting factor?	2 (7)
Is there a relationship between acres of migratory habitat restored/improved (at a given intensity) and the number of monarchs successfully overwintering in Mexico?	3 (4)
Is there a relationship between acres of migratory habitat restored/improved (at a given intensity) and the number of spring monarchs successfully reproducing?	3 (4)
Are there hotspots (migration oases) along the migration corridor?	3 (4)
What are significant sources of mortality along the migratory corridor during migration?	3 (4)
What role does urban habitat play in migration?	3 (4)
How successful is the migration to Mexico each year? (A survey conducted in November to capture just the migration success and eliminate the variability of Mexico storms/mortality)	3 (4)
What role does wetlands and woodlands/savanna play during migration?	4 (2)
Is there a migration corridor?	5 (0)

One other question was added by a respondent:

1. How do milkweed and monarchs respond to different management techniques. In other words, can we increase the number of milkweed and monarch productivity significantly via management (e.g. time of mowing or disking).

Monarch habitat creation research questions ranked by priority of State Agencies (respondents could select up to 3):

Question	Rank (votes)
For the breeding zone – where should we apply management treatments to effect the greatest change in populations at the lowest possible total monetary and non-monetary costs to management agencies and societies?	1 (10)
Improve techniques for milkweed propagation and cost-effective habitat establishment.	2 (6)
What management treatments are available to overcome population limiting factors?	3 (5)
For migrating habitat – where should we apply these management treatments to effect the greatest change in populations at the lowest possible total monetary and non-monetary costs to management agencies and societies?	3 (5)
Assess the extent and impacts of milkweed diseases.	3 (5)
What are the best seeds mixtures for planting monarch habitat by state?	4 (4)
How much of a particular type of management will be necessary to reach our population objectives?	5 (2)
In creating milkweed dense habitat, how high can we push stem density per acre in each sector before Monarchs quit using them?	5 (2)

Five respondents added additional questions, including:

1. Validate assumptions about long-term stem densities and nectar. How much disturbance or other management will be necessary to maintain assumed habitat quality by sector?
2. What are the barriers and incentives to creation and long-term maintenance of habitat?
3. What determines the longevity of a pollinator plot, and what management practices should be applied to assure continued viability, particularly for milkweed within an area?
4. How do milkweed and monarchs respond to different management techniques. In other words, can we increase the number of milkweed and monarch productivity significantly via management (e.g. time of mowing or disking).
5. For some management questions, I wonder if there is enough information on the response and how the response may vary due to initial quality?

Overwintering Monarch research questions ranked by priority of State Agencies (respondents were told they could select up to 2, but some appear to have been successful in choosing 3):

Question	Rank (votes)
Determine areas of highest monarch overwintering contributions (repeat isotope analysis for breeding region contribution).	1 (13)
Where and what type of habitat in the United States are being used as overwintering sites for the eastern population?	2 (6)
How much are these overwintering sites contributing to the next generation?	3 (5)
Determine impacts of insect pests and tree diseases on overwintering habitat quality.	4 (3)
Improve understanding of fecundity of overwintering females.	5 (2)
What is the OE prevalence in the overwintering sites in the United States?	6 (0)

Four respondents added additional questions, including:

1. How do milkweed and monarchs respond to different management techniques. In other words, can we increase the number of milkweed and monarch productivity significantly via management (e.g. time of mowing or disking).
2. How many monarchs overwinter every year?
3. Isotopes – use new set of isotopes for analysis.
4. Validate assumptions about total population size (per hectare density and inter-annual variance in per-hectare density) in Mexico.

Monarch human dimension research questions ranked by priority of State Agencies (respondents could select up to 2):

Question	Rank (votes)
What are the barriers to creating and maintaining monarch habitat by sector?	1 (9)
What education and outreach efforts are the most effective/which lead to conservation action?	2 (8)
What incentive is necessary for row crop producers to create pollinator friendly habitat?	3 (4)
What drives participation of agricultural landowners in pollinator friendly practices?	4 (3)
What incentive is necessary for ROW managers to create monarch habitat?	4 (3)
What is needed to maintain citizen science volunteers in monarch conservation?	5 (1)
How aware is the general public of the monarch crisis?	6 (0)

Two respondents added additional questions, including:

1. How do milkweed and monarchs respond to different management techniques. In other words, can we increase the number of milkweed and monarch productivity significantly via management (e.g. time of mowing or disking).
2. What are the barriers to increasing the CRP Cap in the Farm Bill and how can optimal solutions be found that benefit wildlife, farmers, and ag business-interest groups?

Other Monarch research questions ranked by priority of State Agencies (respondents could select up to 3):

Question	Rank (votes)
Determine exposure level risks for different chemicals, habitat types or practices.	1 (10)
Conduct climate variability assessment to determine the consequences of climate, changing climate and extreme weather and climate events on monarchs and their habitat.	2 (5)
Genetic analysis to understand past/current population dynamics (isotope analysis repeated).	3 (4)
Assess effects of plant species – Vincetoxixum spp (Black swallow-wort (Cynanchum louisea) and pale swallow-wort (Cynanchum rossicum)) regarding abundance and attempted use by monarch (they lay eggs on it but caterpillars cannot eat it).	4 (1)
Assess effects of fire ant control on eastern Monarchs.	4 (1)
Determine natural enemy impact on population dynamics (predators and parasitoids).	4 (1)
Study prevalence, transmission, and identify of monarch pathogens and their interactions with OE, other natural enemies, host plant species, and host plant nutritional quality.	4 (1)
How prevalent is the OE parasite in wild populations? Is there regional differences?	4 (1)
How much mortality is caused by tachinid flies and other parasitoids?	4 (1)

Two respondents added additional questions, including:

1. How do milkweed and monarchs respond to different management techniques. In other words, can we increase the number of milkweed and monarch productivity significantly via management (e.g. time of mowing or disking).
2. What is the impact of breeding and/or captive rearing of monarchs on individual fitness?

APPENDIX D – URBAN CONSERVATION EXAMPLES IN THE MID-AMERICA REGION

National Efforts:

Mayor's Monarch Pledge

Cities, towns, counties, neighborhoods and homeowners associations all have practices that impact the monarch butterfly, native bees and other pollinators. Mayors and local leaders can take numerous actions to support the monarch. A review of commitments to date uncovers a variety of initiatives ranging from proclamations to innovative landscaping ordinances to environmental education programs. Each of these commitments is valuable, but all these and more are necessary if we hope to have a fundamental and lasting impact for the monarch butterfly.

Within the Mid-America Monarch Conservation Strategy area, 253 municipalities have signed the Mayor's Monarch pledge, with 173 committing to at least three actions to benefit monarchs, 78 committing to at least eight actions, and two cities—McAllen and San Antonio, Texas—committing to all 24 actions to benefit monarchs. Many of these communities have created networks to support and facilitate their monarch conservation work through their Mayor's Monarch Pledge efforts, and through other networks.

Million Pollinator Garden Challenge

The Million Pollinator Garden Challenge (MPGC) is a campaign to register a million public and private gardens and landscapes to support pollinators. The program encourages everyone to create pollinator habitat, and register their efforts with the challenge. The MPGC was started by the The National Pollinator Garden Network (NPGN). NPGN is a partnership between conservation organizations, gardening groups, volunteer civic associations and participating federal agencies to inspire people and organizations to create more pollinator habitats. The nine founding organizations launched NPGN in June 2015 with 26 inaugural partners and has grown to approximately 50 national network partners in less than two years.

Monarch Wings Across America

In partnership with the Monarch Joint Venture, the Pollinator Partnership has begun work to convert underused urban areas into monarch research stations as part of their Monarch Wings Across the United States. With their new program Transforming Urban Areas, degraded areas will be transformed into monarch research plots, resulting in monarch habitat restoration as well as ongoing training and research opportunities. The program will hire and train local student interns in planting and monitoring monarch habitats, thereby increasing capacity for monarch habitat planting in the area.

Fish and Wildlife Service Urban Refuge Partnerships

The U.S. Fish & Wildlife Service's vision for the National Wildlife Refuge System, entitled Conserving the Future: Wildlife Refuges and the Next Generation, proposes the Service to increase relevancy to urban citizens. This initiative will establish measures to help define and achieve standards of excellence for urban refuges, create a framework for creating new urban partnerships, and establish a refuge presence in ten demographically and geographically varied cities in the U.S. Chicago, Minneapolis, and Cincinnati host refuges that have active programs in

the north core conservation area; Alamo and Houston, Texas have active programs in refuges adjacent to the south core conservation area.

Regional Efforts

Urban Monarch Conservation Design

The U.S. Fish and Wildlife Service and the Field Museum in Chicago partnered to answer key questions about how best to conserve monarchs in urban areas located along the monarch's migration flyway. The effort looked at both the ecological and the social landscape, as they relate to monarch butterflies, in four large metropolitan areas including St. Paul- Minneapolis, Chicago, Kansas City and Austin. This information was compiled to create mapping tools and an Urban Monarch Conservation Guidebook. The Guidebook is intended to support the efforts of people like city planners and conservation practitioners who are interested in identifying the best places and best approaches to create pollinator-friendly habitat in urban areas. Your local partnership can look at your town and understand where there are opportunities for working with different land use types to convert portions of their land to multi-beneficial habitat. This tool helps marry local needs with creating wildlife habitat (www.fieldmuseum.org/monarchs)

State Initiatives

Minnesota

Minnesota Pollinator Friendly Cities: Pollinate Minnesota, Humming for Bees, the Pollinator Friendly Alliance and other non-profits and community groups in the state are working to promote pollinator friendly resolutions, which are pledges at the municipal level to increase flowering habitat for pollinators, reduce pesticide application and promote pollinator conservation. "In July 2014, Shorewood MN became [the first MN] city in to pass a Pollinator Friendly Resolution. Since then, 26 municipalities around Minnesota that have pledged to protect pollinators on the lands they own and manage- including Austin, Shorewood, Stillwater, Saint Louis Park, South Saint Paul, Andover (with a proclamation), Mendota Heights, Maplewood, Lake Elmo, and, [Minnesota's] three largest communities: Duluth, Minneapolis and Saint Paul. Ramsey and Washington County and two school districts have also passed resolutions" (http://www.pollinatemn.org/pollinator-friendly-twin-cities/).

The Minnesota Board of Water & Soil Resources Pollinator Initiative will provide leadership on the issue to more effectively support pollinator populations. The initiative will also help meet legislative requirements to provide pollinator habitat throughout the growing seasons for all prairie restorations on state land or funded with state dollars (Minn. Stat., Chap. 84.973). The goals of the project are:

- Increase awareness about declining pollinator populations;
- Support Local Government Unit partners in enhancing pollinator habitat;
- Focus outreach on how to incorporate pollinator habitat into all BWSR programs;
- Provide a 'pollinator toolbox' and 'featured projects' to guide pollinator projects.

This is a 2-year initiative that will build on the BWSR Pollinator Plan and other resources to integrate pollinator habitat across BWSR programs. The initiative is designed to support efforts by BWSR partners, though some technical resources will also be beneficial to the public. A wide

range of partners are involved in this effort, including: Minnesota Association of Soil & Water Conservation Districts, Minnesota Association of Watershed Districts, Minnesota DNR, Minnesota DOT, NRCS, Minnesota Department of Agriculture, University of Minnesota, cities, counties, and many other conservation partners (http://www.bwsr.state.mn.us/practices/pollinator/pollinator-initiative-summary.pdf).

Missouri

Missourians for Monarchs Habitat Highlights: Numerous monarch habitat areas have been and will continue to be installed throughout the State of Missouri through Missouri Master Naturalist Chapters, Master Gardener Chapters and Garden Clubs. Depending upon the location and the full public purpose of the garden habitats, each will range in size from ¼ acre to over 4 acres. Each habitat garden contains 2-3 species of milkweed plants and up to 25 different species of nectar plants. Some of the types of areas that have been enhanced include: municipal and county parks, elementary schools, college and corporate campuses, urban and residential greenspace, and highway interchanges. This large-scale program has numerous needs including funding for replacement plants and irrigation, monitoring of plantings, and education and engagement of communities.

Nebraska

Nebraska Statewide Arboretum has two active initiatives aimed at improving pollinator habitat: Greener Nebraska Towns and Community as Habitat, a cooperative initiative with the UNL Department of Entomology. Through those two initiatives they are hoping to help establish up to 100 total acres of pollinator friendly landscaping spread across 40–50 communities across the state. Project sites are at parks, schools, college campuses, fairgrounds and other public places. The arboretum has also written a proposal to the Monarch Butterfly Conservation Fund to support native plant collecting and growing for planting in communities to improve monarch and pollinator habitat.

Nebraska Wildlife Federation has been working to create (and identify existing) monarch and pollinator model gardens across Nebraska, to help educate Nebraskans about monarchs, pollinators, and their habitat. Several of these gardens are in development, primarily in the Lincoln area, and others are in the works.

Ohio

Ohio Pollinator Habitat Initiative (OPHI) was created to improve and create pollinator habitat in the state of Ohio, as well as raise awareness for all Ohioans regarding the importance of pollinators. Members of the initiative are the core professionals that provide education, outreach, and technical assistance to all that have an interest in pollinators and protecting our food supply. A part of their outreach is collecting milkweed from the public for propagation. This project started in 2015 as a 7-county pilot to collect approximately 200 lbs. of common milkweed seeds, totaling over 19 million seeds. Milkweed pods are collected starting September 1st through October 30th and the program is now statewide.

OPHI works with Ohio DOT to establish roadway conservation planning and monarch habitat within strategic rights-of-way areas. The program has grown exponentially with changes occurring to their standards spec book in regard to seed mixes and management tools, mowing

dates and now Ohio DOT is establishing informational kiosks and demonstration milkweed/pollinator habitat plots at major rest stops (travel information centers across the state).

Monarch Wings Across Ohio, part of the Pollinator Partnership Program has been working since 2010 throughout Northeast Ohio to raise awareness about pollinators.

Municipal Urban Monarch Conservation Highlights on Public Lands

These efforts are examples of the outstanding monarch conservation efforts taking place in cities across the region. We did not capture an exhaustive list of all urban monarch conservation initiatives, instead highlighting examples that can be scaled up or replicated elsewhere, which demonstrate the habitat and conservation potential for urban communities. Efforts are alphabetical by state, then city or county.

Fayetteville, AR

Monarch Conservation Plan (https://drive.google.com/file/d/0BykrHDt5T1qGYmwxb2d5NC1zZWM/view)

The Fayetteville Monarch Project formed in January 2016. The group includes organizations and volunteers from the Fayetteville area including the Beaver Watershed Alliance, Botanical Gardens of the Ozarks, the City of Fayetteville and the Northwest Arkansas Land Trust. The group is committed to establishing demonstration garden habitats, working with plant sellers to increase the availability of native nectar plants, promoting gardening and landscaping best practices throughout the Fayetteville area and educating the public about the changes they can make to promote pollinator conservation. Their mission is to conserve and create monarch habitat in Northwest Arkansas.

Des Moines, IA

Blank Park Zoo's Plant.Grow.Fly. has registered over 1000 pollinator gardens since 2014. They span the state of Iowa, Midwest and Nation. They have over 50 local, regional and national partners working to encourage the planting of native plants through this program. www.plantgrowfly.com. They won the Iowa Gov. Environmental Excellence Award for habitat restoration and just planted a pollinator garden at the state capitol. Des Moines is looking for additional staff to help with resources for plantings and training for maintaining current plantings.

Oakland County, MI

Oakland County, Michigan is pursuing National Wildlife Federation Community Wildlife Habitat Certification with a strong focus on pollinators. Key partners of the effort include Oakland County, the Detroit Zoo, National Wildlife Federation, Dinosaur Hill Nature Preserve and other key habitat-oriented organizations. Community Wildlife Habitat Certification includes recruiting private residences, businesses, and schools to create pollinator-friendly habitats throughout the community. The group is also focused on education and outreach to raise awareness of pollinator decline and encourage people to act through a variety of mechanisms and events.

Minneapolis/St. Paul MN Metro Area

Minneapolis Monarch Festival: The Minneapolis Monarch Festival is a landmark event each fall for the urban Minneapolis community. This bilingual, very popular event is a collaboration between the Minneapolis Parks and Recreation, the Nokomis East Neighborhood Association, The US Forest Service, the University of Minnesota Monarch Lab, the Mexican Consulate and many other community organizations. The family-oriented event has monarch butterfly tagging, native plant vendors, art, food, dance, educational activities and information booths from many community organizations with a connection to pollinators. Centered around a neighborhood pollinator habitat installed more than a decade ago in a city park in the Nokomis East Neighborhood, this event has become a celebration of monarchs that brings together people from both Spanish-speaking and English-speaking communities. The monarch is a cultural ambassador from Minnesota to Mexico, as demonstrated by the popularity and diversity of this community event.

Metro Blooms, Blooming Alleys project: The Blooming Alleys program started in 2014 to achieve three goals: 1) to improve water quality by installing native habitat to act as rain gardens and keep pollution out of the Twin Cities lakes and rivers, 2) to create native habitat for pollinators and wildlife and contribute to the Blue Thumb partnership's Pledge to Plant challenge to plant 10,000 native plantings by 2020, 3) to create a welcoming community and pedestrian space in alleyways where neighbors want to spend time and get to know their community. The latter has been a large driver of success, bringing neighbors together to work on something to improve their neighborhood has resulted in very high adoption and maintenance rates, and beautiful gardens. Alleys are a pathway for people and pollinators, and where much of the storm water runoff in cities takes place- so it is an excellent opportunity to achieve multiple community benefits. Maintenance training and support is essential to overcome the challenge of low maintenance rates, which are common with similar programs.

Washington County Master Gardeners Milkweed and Monarchs (M&M) Team: This program serves as an example of Master Gardener programs across the state. The Washington County Master Gardeners M&M Team is a grassroots group of master gardeners who were interested in doing specific outreach around milkweed and monarchs. The group does outreach and education tables, presentations, and activities with kids. Their goal is to educate, teach and serve the community about the need for milkweed to support monarchs. As a gardening focused group, they put emphasis on the milkweed first. They have created a Master Gardener Garden at the County Fairgrounds with native plants for monarchs and pollinators, as well as vegetables. Many have created Monarch Waystations, and the group has created a native garden at a community library.

Mississippi National River and Recreation Area, National Park Service, Coldwater Creek Monarch Restoration and Citizen Science: MNRRA has established a volunteer monarch monitoring site through the Monarch Larva Monitoring Project on their monarch and pollinator habitat restoration sites at their Coldwater Creek site. They have done Monarch Biology 101 trainings, citizen science trainings, education booths at the Minnesota state fair, and National Public Lands Day habitat restoration events. They hope to bring the experience of the park to new people, leverage the river as a platform for human connections and that through engagement in monarch volunteer activities the public will get excited about monarchs and pollinators and implement management changes at their homes. Their habitat restoration goals are to restore the

landscape to a pre-European settlement environment and to be a great habitat resource for pollinators, birds, and other wildlife. Monarchs are a gateway to pollinators and a good point of entry for volunteers to engage with the habitat at the park. The National Park Service has dedicated staff time to this project and the Friends of Park organization helps to fundraise.

Columbia, MO: The most successful components of Columbia's pollinator habitat restoration efforts are (1) several acres of native prairie strips in publicly maintained right-of-way and (2) a 5-acre prairie restoration at Bonnie View Nature Sanctuary. Similar to many efforts, Columbia, MO is looking for funding for staff and materials necessary for habitat restoration, including invasive species control and habitat maintenance.

Kansas City, MO:
Bridging The Gap used its NFWF grant to plant 179 monarch gardens for the Kansas City for Monarchs program. Bridging The Gap is also planting 5 pollinator gardens at elementary schools in Fall 2017 through Keep America Beautiful and Lowe's. School children receive a 45-minute overview about pollinators and then help plant the garden. They are looking for funding to conduct more field studies and install demonstration sites.

St. Louis, MO: The most successful habitat components of Milkweeds for Monarchs: The St. Louis Butterfly Project [stlouis-mo.gov/monarchs] are:

(1) the citywide monarch garden program, resulting in 400+ monarch gardens at schools, homes and public spaces.
(2) the establishment of the 31 acre St. Louis Riverfront Butterfly Byway pollinator pathway along the Mississippi River. All gardens contain milkweed and nectar species from the STL Monarch Mix of recommended plants. St. Louis is looking for funding and/or capacity to provide ongoing research, outreach, stewardship and maintenance of urban habitat areas; plants to supplement, replace and motivate establishment of urban monarch habitat areas.

St. Louis, MO - St. Louis Audubon Society – Bring Conservation Home Program
(http://stlouisaudubon.org/blog/bring-conservation-home-program/)
In cooperation with other regional organizations and agencies, the St. Louis Audubon Society (SLAS) has been actively engaged in the preservation of existing natural habitats by helping to identify, establish, and manage critical habitats for native populations of birds through a program called Important Bird Areas (IBAs). Key IBA efforts in the St. Louis region have included the Great Rivers Confluence, Cuivre River State Park, the Urban Oases of Forest Park and Tower Grove Park, and the Lower Meramec. Partners in these projects have been diverse and ranged from the US Army Corps of Engineers to the City of St. Louis and the Missouri Department of Conservation. The greatest potential for habitat restoration in our cities and suburbs is on private lands—individual homeowners and businesses in the St. Louis Region. However, these spaces are often ignored and assumed to have little or no value as bird and wildlife habitat. Yet, if managed prudently, private lands collectively offer tremendous potential for urban wildlife habitat. The St. Louis Audubon Bring Conservation Home Program has been created to address this opportunity.

Bellevue, NE
Green Bellevue has focused on wildlife habitat and organic gardening as their two main initiatives in Bellevue public gardens. The three gardens have been designated as a Monarch Waystation, associated with the University of Kansas, and total approximately 6000 ft^2. Their challenges include resources for planting and maintenance and educating home owners regarding impacts of pesticides on pollinators.

Lincoln, NE
Pollinate Lincoln is a partnership including the University of Nebraska-Lincoln, Lincoln Parks and Recreation, Nebraska Extension and Finke Gardens and Nursery to pool resources to educate and engage Lincoln residents on best practices to protect pollinators in home landscapes. They plan on increasing their partners to reach a larger audience and to provide more resources such as research into garden practices.

Buffalo, NY - Silo City site
Lower Great Lakes Fish and Wildlife Conservation Office (USFWS)
For two years, biologists with the Lower Great Lakes Fish and Wildlife Conservation Office have been working with urban school children, girl scouts and volunteers from the Buffalo, NY area to restore habitat at a historic site called Silo City – home to our nation's longest standing grain elevators, located along the Buffalo River Area of Concern. The site had been invaded by nuisance plant species and was suffering from decades of environmental contamination and habitat degradation. Together with many partners, they planted a native garden and restored a steep slope along the riverfront after invasive Japanese knotweed was cleared away, and they created a pollinator garden in an upland area. Local students and girl scouts grew seedlings of milkweed, and then planted them in June with other native flowering plants. Project partners include Silo City and Rigidized Metals Corporation, People United for Sustainable Housing Buffalo, Landscape and Urban Design Department of the State University of New York at Buffalo, Great Lakes Experience Friends group, McKinley High School, Tapestry Charter School, Elmwood Village Charter School and Girls Scouts from Daisy Troop #31055 and Cadet Troop #31313. These projects not only restore habitat for migrating fish, birds and butterflies, they also are living outdoor classrooms for environment-based curriculums in schools, and serve as public demonstration models for restoring urban habitat for the thousands of Silo City visitors each year. Additional restoration plans include encouraging native grasslands, improving riverbank habitat, and creating natural drainage pools for collecting run-off from the area before entering the river – all of which will offer public education on how and why restoring habitat is good for people and nature.

New York, NY
Greenbelt Native Plant Center (https://www.nycgovparks.org/greening/greenbelt-native-plant-center/seed-collecting)
The Greenbelt Native Plant Center's Seed Collection and Banking Program reflects a mission to grow native plants for New York City projects using only local ecotypes. They collect and store seeds only from native plant populations in the NYC metropolitan region. Healthy populations are sought out as close to home as possible within the 25 counties that cover a 100-mile radius of NYC. This area represents nine counties in New York State including the five boroughs, 14 counties in New Jersey, and one county in Connecticut. It is their goal to share the facility with

other regional public agencies and non-government organizations (NGOs); they encourage these institutions to bank their seed collections with the Greenbelt Native Plant Center in planning for their future land management needs.

Staten Island, NY
Fresh Kills Park Project (http://freshkillspark.org/)
Government, organizations, and private individuals collaborated to reclaim what was once the world's largest landfill on Staten Island, NY. Envisioned as a multipurpose community resource, the park will provide resources for sports, education, the arts, and wildlife habitat. The 2200-acre site is being built in stages from the outside in with the first section opened in 2012, with additional sections opening in stages through the 2030s. Of the 2200 acres, 1740 is devoted to natural areas, including meadows, that will provide extensive reclaimed habitat for pollinators and monarch butterflies.

Cincinnati, OH
Cincinnati Nature Center launched Milkweed to Monarchs in 2014 to raise awareness of the decline of the species and to promote planting of milkweed in Southwest Ohio. With the help of the local media and concerned organizations including dozens of businesses, more than 160,000 milkweed seed packets have been distributed free of charge to encourage the planting of milkweed in yards and gardens. Krohn Conservatory Butterfly Show has a history of highlighting butterflies and the cultures from around the world. For the 22nd annual show in 2017, they focused on local conservation highlighting the monarch butterfly and how their visitors can have an impact the declining population.

Cleveland, OH
Cleveland Metroparks is enhancing exiting prairie habitat for monarchs by adding milkweed. They will continue to enhance and restore monarch habitat throughout its metro park system while increasing awareness through outreach programming. Cleveland Botanical Garden is educating and engaging their visitors about monarch butterflies and ways they can help, including creating Monarch Waystations.

Oregon, OH
The Ohio Department of Natural Resource's Maumee Bay State Park has a Monarch Butterfly Research Project underway. The main goal of the project is to increase the chances for the monarch's survival. A captive breeding program has also been started. Over 10,000 monarchs have been raised and released at Maumee Bay.

Toledo, OH
The National Wildlife Federation has partnered with a local group, Toledo Sacred Grounds, to support the installation of pollinator-friendly gardens/habitats at houses of worship. Toledo Sacred Grounds is a volunteer group consisting of representatives from the Multifaith Council, City of Toledo Division of Environmental Services, WildOnes, and the National Wildlife Federation. Sacred Grounds™ is designed to encourage faith communities to expand their environmental stewardship ministries by using native plants in their landscape and educating their congregations and communities about the ecological services that they provide. The group has a specific focus on communities experiencing frequent basement flooding, which can be

mitigated in part through rain garden installation, and lower socioeconomic status communities. The group is working collaboratively to seek funding to provide plants and gardening tools to houses of worship and community members who do not have the means to fund native plant garden projects. Sacred Grounds Toledo has facilitated and delivered a series of workshops for houses of worship and is partnering each of the houses of worship with mentors who can help with technical assistance - garden siting/design, plant selection, etc. The group envisions collaborating with participating houses of worship to provide additional workshops and resources (e.g., plant vouchers) for community members interested in creating native plant pollinator gardens at private residences or other community sites - this spreading native plant gardens throughout the greater Toledo area.

Corvallis, OR
Institute for Applied Ecology - Native Seed Network (http://nativeseednetwork.org/)
The Native Seed Network is a resource for people working to add native plants back into the landscape. Since 2002 we have been working with land managers, seed producers, and restoration professionals to share information about native seed and improve our knowledge about and access to native seed.
The Native Seed Network connects people and organizations involved with all aspects of native seed, from collection, development, production, and use in restoration. Our vision is for restoration and rehabilitation projects to be supported by an abundance of quality seed that is both appropriate for the site and affordable.

Sioux Falls, SD
The Outdoor Campus, a joint project between SD Game, Fish and Parks and City of Sioux Falls Parks and Recreation, started developing a butterfly garden in 1997. It has grown to cover 6000 ft^2 of primarily nectar and host plants for butterflies, especially monarchs, with an active monarch monitoring and tagging program and associated presentations on conservation. The prayer garden at Spirit of Joy Lutheran Church also hosts a large garden covering 1000 ft^2. Numerous other private gardens have also been established in Sioux Falls.

Madison, WI
Pollinator Protection Task Force (http://www.cityofmadison.com/sites/default/files/city-of-madison/mayor/documents/Pollinator%20Protection%20Task%20Force%20Report%20Final.pdf
In October 2014, the Madison Common Council adopted a resolution directing the Madison Food Policy Council to form and lead a Pollinator Protection Task Force. The task force was directed to convene, develop, and provide implementation direction to City departments for strategies to promote the health of honeybees and other pollinators. The Pollinator Protection Task Force (PPTF) drew the data and recommendations compiled in this report from several notable resources, including University of Wisconsin researchers, land use specialists, peer-reviewed scientific papers, articles from esteemed news sources, and government reports. The PPTF does not claim to be experts on pollination nor pollinators, but rather to represent the City divisions and departments most likely to be able to have a positive impact on pollinator populations. The stated goal of the PPTF is that this report leads to continued and increased efforts by the City and the public to protect and support all pollinator populations in the City of Madison and beyond.

Milwaukee, WI
Urban Ecology Center (http://urbanecologycenter.org/)
The Urban Ecology Center fosters ecological understanding as inspiration for change, neighborhood by neighborhood. The Environmental Community Centers:

- Provide outdoor science education for urban youth
- Protect and use public natural areas, making them safe, accessible and vibrant
- Preserve and enhance these natural areas and their surrounding waters
- Promote community by offering resources that support learning, volunteerism, stewardship, recreation and camaraderie
- Practice and model environmentally responsible behaviors

The Urban Ecology Center began with a community of concerned neighbors who wanted to take back their neighborhood park and make it safe again. Riverside Park, which had been neglected for years, had become crime ridden, full of litter and invasive plants. Neighbors came together and formulated an idea – could they replace crime and litter with learning? In 1991, they organized park clean-ups and started to use the park to teach neighborhood students about nature and science. In 2004, after years of operating out of a double-wide classroom trailer, the Center opened a new community and education center in Riverside Park. The award-winning facility has themed classrooms designed especially for the school programs. In addition, there is space dedicated to the community for potlucks, meetings, lectures and recreational activities.
Today, the Urban Ecology Center has two additional locations in Milwaukee: one in Washington Park to serve communities and schools on Milwaukee's west side and one in the Menomonee Valley on Milwaukee's south side. They are a vibrant and growing organization, serving 77,000+ people each year and protecting and restoring urban green spaces in Milwaukee.