

Conservation Strategy for the Eastern Monarch Butterfly (*Danaus plexippus*) in Iowa

Version 2

March 12, 2018

Cover Page

The Iowa Monarch Conservation Consortium members approved Version 1 of the Monarch Conservation Strategy and its implementation on February 1, 2017. Consortium members include: Iowa Department of Agriculture and Land Stewardship; Iowa Department of Natural Resources; Iowa State University; Alliant Energy; Bayer CropScience; Blank Park Zoo; Central College; DuPont Pioneer; Iowa Cattlemen's Association; Iowa Corn Growers Association; Iowa County Conservation System; Iowa Farm Bureau Federation; Iowa Natural Heritage Foundation; Iowa National Guard; Iowa Nature Conservancy; Iowa Pork Producers Association; Iowa Soybean Association; Iowa Turkey Federation; ITC Midwest; Luther College; Muscatine Island Research Farm Association, Fruitland, Iowa; Monsanto; Northeast Iowa Agricultural Experimental Association, Nashua IA; North Central Iowa Research Association, Kanawha IA; Northwest Iowa Experimental Association, Sutherland IA; Practical Farmers of Iowa; Soil and Water Conservation Society; Southeast Iowa Agricultural Research Association, Crawfordsville, Iowa; Syngenta; Western Iowa Experimental Farm Association, Castana Iowa; University of Northern Iowa Tallgrass Prairie Center; United States Department of Agriculture Agricultural Research Service, Corn Insects and Crop Genetics Research Unit; Wallace Foundation for Rural Research and Development, Lewis Iowa

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Foreward

This Iowa Monarch Conservation Strategy was made possible by the Iowa Monarch Conservation Consortium, associated organizations, and their staff by dedicating time and effort to planning, writing, and editing the document. Thank you to the Iowa Department of Agriculture and Land Stewardship; Iowa Department of Natural Resources; Iowa State University; Alliant Energy; BASF; Bayer CropScience; Blank Park Zoo; Bur Oak Land Trust; Central College; DuPont Pioneer; Iowa Association of Electric Cooperatives; Iowa Cattlemen's Association; Iowa Corn Growers Association; Iowa County Conservation System; Iowa Farm Bureau Federation; Iowa Natural Heritage Foundation; Iowa National Guard; Iowa Nature Conservancy; Iowa Pork Producers Association; Iowa Soybean Association; Iowa Renewable Fuels Association; Iowa Turkey Federation; Iowa Wildlife Federation; ITC Midwest; Luther College; Monsanto; Muscatine Island Research Farm Association, Fruitland, Iowa; Northeast Iowa Agricultural Experimental Association, Nashua IA; North Central Iowa Research Association, Kanawha IA; Northwest Iowa Experimental Association, Sutherland IA; Pheasants Forever; Polk County Conservation; Practical Farmers of Iowa; Soil and Water Conservation Society; Southeast Iowa Agricultural Research Association, Crawfordsville, Iowa; Syngenta; Western Iowa Experimental Farm Association, Castana Iowa; University of Northern Iowa Tallgrass Prairie Center; United States Department of Agriculture Agricultural Research Service, Corn Insects and Crop Genetics Research Unit; Wallace Foundation for Rural Research and Development, Lewis Iowa; Whiterock Conservancy; Iowa-based U.S. Department of Agriculture Farm Service Agency, U.S. Department of Agriculture Natural Resources Conservation Service and US Fish and Wildlife Service are *ex officio* partners.

Special thanks to Kelley Myers, former Conservation and Recreation Division Administrator with the Iowa Department of Natural Resources for her dedication to monarch conservation and support for developing the strategy.

1.0 Executive Summary

The Iowa Monarch Conservation Strategy identifies the information and resources needed to sustain and advance monarch butterfly conservation efforts in Iowa.

The eastern monarch butterfly (*Danaus plexippus*) population has experienced an 80% decline over the past two decades. Causes for the population decline include loss of milkweed habitat in the spring and summer breeding ranges of the United States, loss of overwintering habitat in Mexico, and extreme weather events.

Iowa is in the center of the monarch's summer breeding range, and roughly 40 percent of all monarch butterflies that overwinter in Mexico are estimated to come from Iowa and neighboring states in the Midwest. Since monarch caterpillars need milkweed to survive, one of the primary goals of conservation efforts is to establish milkweed as part of healthy natural ecosystems. Expanding monarch habitat in Iowa will play a major role in the recovery of the species.

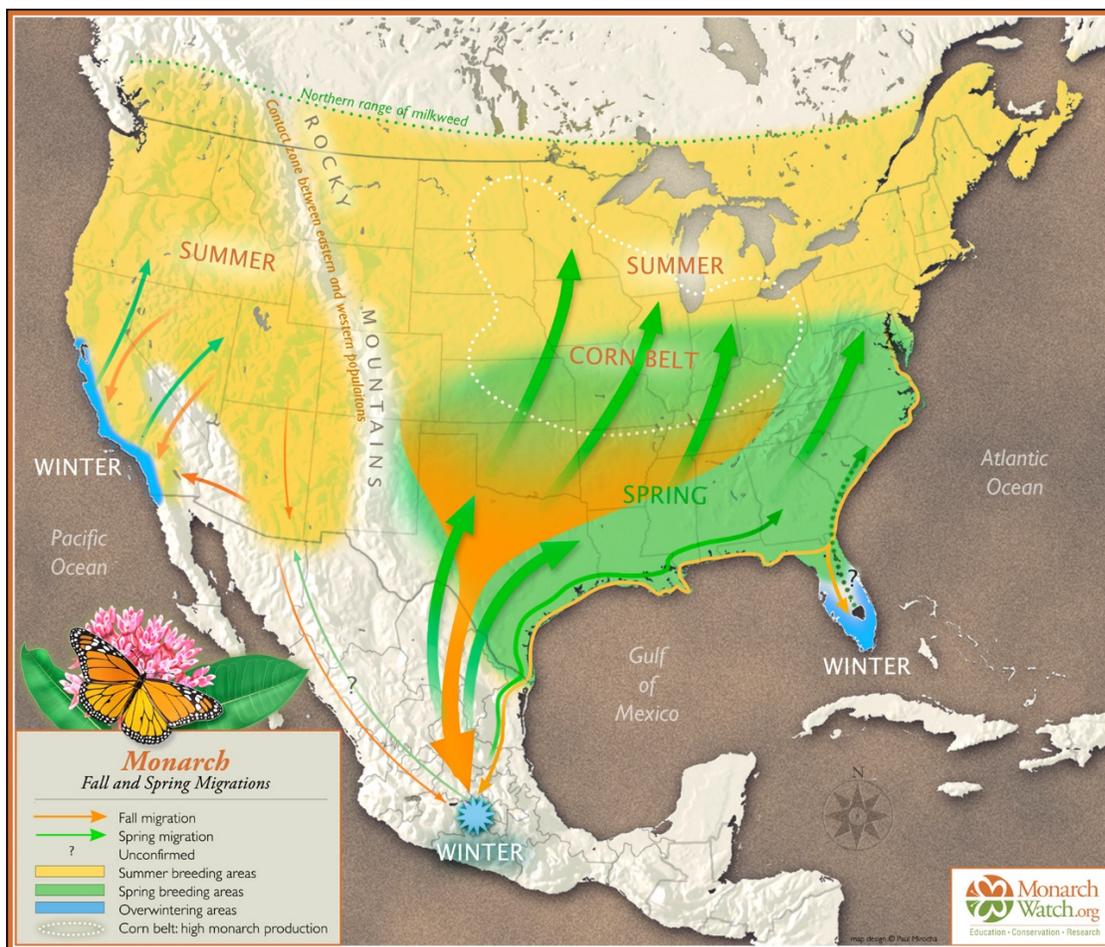
The strategy will guide the development, implementation and documentation of a voluntary, statewide conservation effort based on the best available science. The strategy includes information about the monarch butterfly, including a summary of its history, its population distribution, and its dependence on milkweed and other native plants; Iowa's current habitat availability and habitat goal; and the types of conservation measures needed to support recovery of the population. The strategy also provides a roadmap for supporting the conservation effort through administration, information management, monitoring, and research and outreach. As conservation efforts progress, mechanisms will be in place to distribute information so successes are replicated throughout Iowa and beyond.

The strategy also describes immediate conservation measures that can be undertaken. These include using resources in farm bill programs to establish monarch breeding habitat; volunteering to establish monarch habitat on farms in consortium-sponsored demonstration projects; using monarch-friendly weed management in ditches, roadsides and other rights-of-way; and establishing monarch waystations with native nectar plants and milkweeds in home and community gardens.

The Iowa Monarch Conservation Strategy will be a living document that incorporates new knowledge and accomplishments over time to provide the means to identify and quantify an active voluntary, conservation program, which in combination with regional and national efforts, results in the recovery of the species population.

2.0 Summary

This Iowa Monarch Conservation Strategy is a living document that describes purposeful, coordinated voluntary conservation measures based on the best available scientific information. Implementation of the Iowa strategy will contribute to the long-term conservation of the monarch butterfly (*Danaus plexippus*), while maintaining agricultural productivity. Version 1.0 of the strategy provides the foundation and framework for future versions that will have additional specificity as the scale of implementation increases. Updates will be made to the



Summary Figure 1. Monarch fall and spring migration routes. Figure used with permission courtesy of Monarch Watch.

strategy annually; however, necessary updates will be made as complementary federal and regional monarch conservation programs advance.

2.1 Monarch Life History

The eastern monarch butterfly is famous for its annual migrations across North America (Summary Figure 1). During the fall migration from the United States and southern Canada to

central Mexico, individual monarchs travel 3,000 mi (4,800 km).¹ The spring migration from Mexico back to the United States and southern Canada spans two generations. During the summer, two to three additional generations breed primarily in Iowa and the Upper Midwest of the United States.

Monarchs depend on milkweed plants (*Asclepias sp.*), flowering plants and forests for their survival across North America. Female monarchs lay their eggs on milkweed plants, and the caterpillars that hatch from the eggs feed exclusively on milkweed plants. Consequently, habitat that includes milkweed plants is necessary from the spring breeding range in Texas to the summer breeding range in the Midwestern United States and southern Canada. Adult monarchs need nectar from flowering plants during the spring and summer breeding seasons to support reproduction and during the fall to fuel their migration to Mexico. During the winter, adult monarchs congregate in the oyamel fir forests in the mountains of Michoacán, Mexico.

2.2 Eastern Monarch Population Status

The eastern monarch population has experienced an 80% decline over the past two decades and is well below a level that is needed to withstand extreme weather events (e.g., prolonged drought in the spring or summer breeding range or a severe winter storm in Mexico) and maintain the North American migration. Causes for the population decline include loss of overwintering habitat, extreme weather events, and loss of milkweed plants. With programs in place to protect the overwintering habitat, expanding the breeding habitat in rural landscapes in Iowa and the Midwestern United States will have a critical, positive impact on stabilizing and enhancing monarch butterfly populations. Based on current, best available scientific information from the United States, Canada and Mexico, increasing the fall eastern monarch population to 225 million butterflies by 2020 should be sufficient to maintain the continental migration, even in the face of extreme climatic events. It is currently estimated that to reach this population goal, approximately 7,000,000 ac (3,000,000 ha) of new monarch habitat, including milkweed and blooming plants, is needed in the United States. For the North Central States, a conservation goal of adding 1,300,000,000 to 1,600,000,000 new milkweed stems over the next 20 years has been proposed. The Midwest Association of Fish and Wildlife Agencies² released a [draft Mid-America Monarch Conservation Strategy](#) to attain 1,300,000,000 new stems in the monarch's northern breeding zone.

Due to the decline in monarch populations, the United States Fish and Wildlife Service (USFWS) was petitioned in 2014 to determine if the monarch should be listed as a threatened species under the Endangered Species Act (ESA). Under a consent decree, the USFWS committed to making a determination on the listing petition by June of 2019. Establishing and implementing a viable, voluntary Iowa monarch conservation program in 2018 can provide private landowners flexibility in implementing conservation practices and avoid significant regulatory and management burdens if the species is listed in 2019.

¹ Relevant facts are backed by scientific documentation, but the citations were removed from the summary for space and simplicity. Citations are included in the body of the strategy with a literature cited section following.

² http://www.mafwa.org/?page_id=2347

2.3 Monarch Conservation in Iowa: The Iowa Monarch Conservation Consortium

The strategy is an outcome of the efforts undertaken by the Iowa Monarch Conservation Consortium (www.iowamonarchs.info), which held its first meeting in February of 2015. The Consortium is a community-led organization comprised of 36 members and 5 partners whose mission is to enhance monarch butterfly reproduction and survival in Iowa through collaborative and coordinative efforts of farmers, private citizens, and their organizations.

The Iowa Department of Natural Resources (DNR), the Iowa Department of Agriculture and Land Stewardship (IDALS) and Iowa State University (ISU) College of Agriculture and Life Sciences (CALs) provide overall leadership and facilitation for the consortium. Through Iowa DNR, IDALS, ISU and ex officio members to the consortium from the United States Department of the Interior (DOI) and United States Department of Agriculture (USDA), the consortium and the development of the strategy is current with, and leveraging, developments in other state, regional and national monarch conservation efforts.

Shortly after the consortium's formation, a workgroup was established to provide background information to the members and partners on scientific, policy, and legal issues associated with development and implementation of conservation strategies addressing species being evaluated for federal protection in the United States. The membership for the workgroup and its products are provided in Appendix Q.

The workgroup met from the spring of 2015 through the summer of 2016 to review conservation efforts (i.e., plans, strategies, etc.) for other petitioned species, as well as candidate species and species listed under the ESA. These other efforts helped inform the approach for an Iowa-based monarch conservation strategy. The meetings included teleconferences with USDA Natural Resources Conservation Service (NRCS) staff responsible for implementing the Working Lands for Wildlife Program as well as staff and managers from the USFWS. In January of 2016, the consortium approved the workgroup's proposal that an Iowa Monarch Conservation Strategy be prepared, and in June of 2016, an associated work plan to develop Version 1 of the strategy was approved. Version 1 of the strategy was released publically in February of 2017.

2.4 The Goal of Conservation Strategy

The Iowa Monarch Conservation Strategy is a living document designed to guide the development, implementation and documentation of a voluntary conservation effort undertaken by members of the organizations in the Iowa Monarch Conservation Consortium. Version 1.0 of the Iowa Monarch Conservation Strategy was the first step in formulating and implementing a conservation effort. Version 2.0 of the strategy provides Iowa's monarch habitat goal and land cover/land-use specific habitat targets that were developed in light of related regional and national monarch conservation planning. Implementation of the conservation efforts described in the strategy will enhance monarch reproduction and survival in Iowa and will contribute to national efforts to preclude the need to list the species under the ESA.

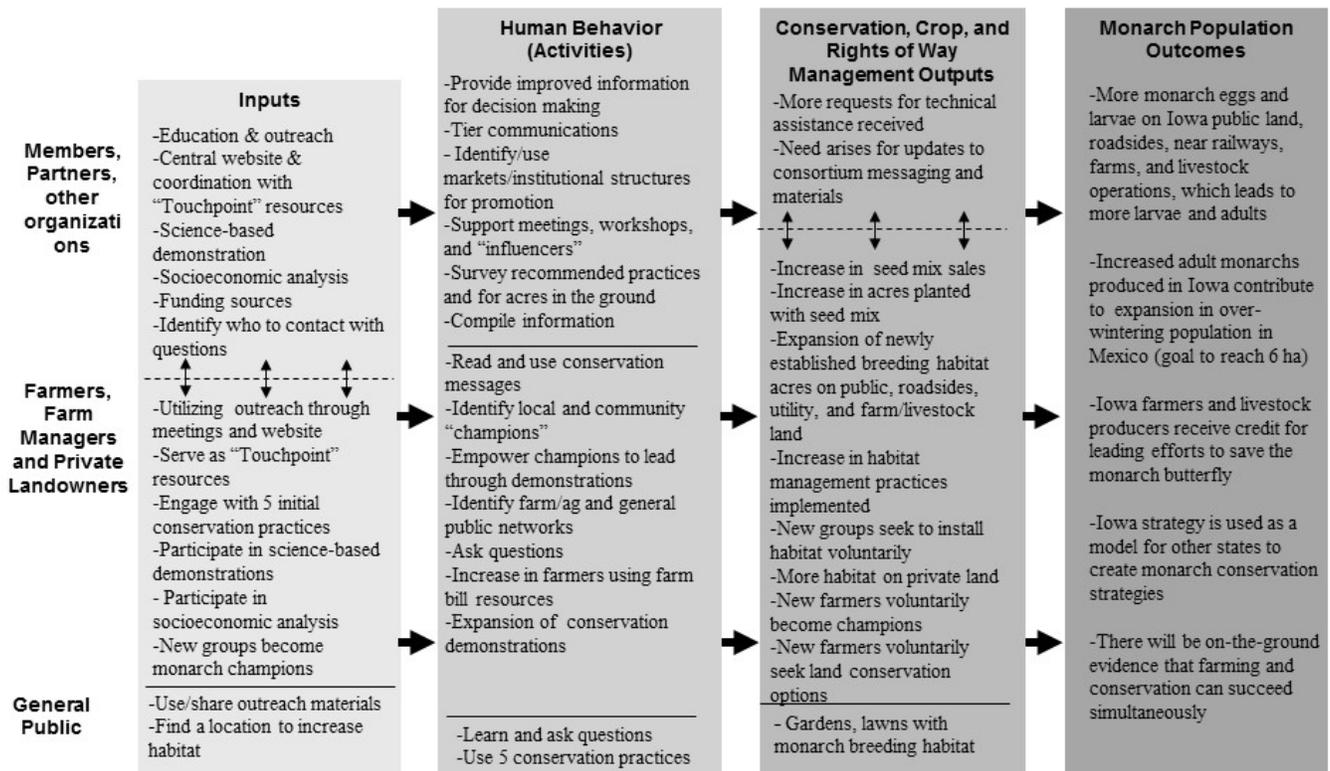
The Iowa Monarch Conservation Strategy provides a framework that supports identification, implementation and evaluation of conservation efforts in Iowa. All monarch-related conservation activities currently being implemented or planned within Iowa are purposeful and voluntary in

nature. There are no real or implied legal requirements for private landowners to participate in the strategy.

To the extent that Iowa’s voluntary conservation efforts, combined with other voluntary efforts in states across the spring and summer breeding range, are successful and there is no need for a listing under the ESA, future regulatory impacts to landowners can be avoided as well as any regulatory requirements that are placed on government agencies. If conservation efforts are not sufficient to avoid a USFWS determination to list the species as threatened in June of 2019, private landowners participating in the Iowa conservation strategy would likely receive assurances that additional conservation efforts would not be required by the USFWS under the ESA, if the ongoing voluntary conservation efforts are scientifically sound and can be reasonably expected to continue into the future. By implementing a voluntary, pre-listing conservation strategy, participants can have more flexibility integrating conservation practices within their ongoing operations and avoid more complicated and potentially inflexible conservation plans that could be required by the USFWS after a listing decision.

2.5 Strategy Highlights

The Iowa Monarch Conservation Strategy requires creation of an organizational infrastructure to manage and support the essential components of the effort. The strategy will be administered by an executive committee and a technical committee. The technical committee will be responsible for overseeing the planning and execution of the strategy in several areas including data management; monitoring; research; landowner recruitment; adaptive management; and information, education and outreach. The technical committee will also be responsible for developing yearly work plans and annual reports for review and approval by the executive



committee. Annual planning and progress reports will be based on the Iowa Monarch Conservation Strategy’s Logic Model (Summary Figure 2), which identifies inputs, outputs and outcomes over time. The logic model will be updated and refined in future versions of the strategy.

The technical committee will coordinate efforts with other national and regional monarch conservation efforts to minimize duplication of efforts and maximize collaboration and efficiency. Examples of these related federal, state and university-led efforts include, but are not limited to: the USFWS and its Monarch Advisory Committee and Species Status Assessment (SSA) team; the USFWS Monarch Conservation Science Partnership; Midwest Association of Fish and Wildlife Agencies’ (MAFWA) Monarch Working Group; USDA NRCS, USDA NRCS/USFWS Monarch Butterfly Partnership; a monarch conservation research project being implemented by ISU and other land grant universities across the monarch spring and summer breeding ranges; and the Keystone Monarch Collaborative.

The ultimate goal of these collaborative efforts is to increase the breeding habitat available to monarchs. The [Mid-America Monarch Conservation Strategy draft](#) describes how the North Central states in the monarch’s northern breeding ground will collectively establish 1.3 billion new milkweed stems over the next 20 years. Iowa’s strategy estimates 127,000,000 to 188,000,000 new stems will be established on 480,000 to 830,000 acres (190,000 to 340,000 ha) within Iowa to help meet the regional goal (Table S1).

Table S1: Estimated range of acres and milkweed stem targets for monarch habitat establishment in Iowa from 2015 to 2038 by land-use category.

| Acres | Range | | Stems* | Range | |
|---------------------|----------------|----------------|---------------------|--------------------|--------------------|
| Urban/Suburban | 39,774 | 198,870 | Urban/Suburban | 1,300,000 | 5,600,000 |
| Public† | 144,041 | 156,674 | Public† | 28,527,789 | 31,030,041 |
| Other† | 62,749 | 67,049 | Other† | 12,549,800 | 13,409,800 |
| Road Rights-of-Ways | 19,000 | 21,000 | Road 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 |

* New stems include stems derived from new seeding and subsequent propagation. Biologically reasonable stem densities of 10 to 50, 197 to 199, 200, 200 to 324, and 150 to 600 stems/acre were assumed for Urban/Suburban; Public Lands; Other; Road Rights-of-Ways and Agriculture, respectively.
 † These sectors include stems planted since 2015 through US Fish and Wildlife Service and other public programs.

The success of the Iowa Monarch Conservation Strategy ultimately depends on voluntary participation. Best management practices (BMPs) by sector--including agricultural lands; backyard gardeners; urban groups; schools and churches; and federal, state, and local agencies (nongovernmental conservation lands); recreational landowners; and rights of ways--will be elaborated in future versions of the strategy. Adaptive management strategies for these BMPs

will be employed as experience is gained and new information becomes available. While research in progress will refine conservation practices for different land use scenarios, five conservation actions (below) for monarchs are already available.

Five Ways to Help the Monarchs

Take advantage of farm bill programs to establish monarch breeding habitat. Increasing the number of milkweeds and nectar-producing plants is vitally important for monarch conservation. These efforts also benefit other pollinators and related wildlife conservation goals. More detail is available at local USDA Service Centers or at nrms.usda.gov.

Volunteer to establish monarch habitat on your farm as part of a demonstration project. The INHF and partners, through the Monarch Butterfly Flyway Project, is restoring or installing monarch habitat along two north-south migration corridors in Iowa. This project will partner to cost-share new pollinator seeding on public land or privately protected properties. Four additional grants already exist for EQIP-eligible lands, bioreactors, and land near hog confinements.

Follow federal pesticide labels and state regulations when applying pesticides labeled as toxic to bees to avoid unnecessary exposure to pollinators and monarchs. Adjust spray equipment to reduce drift by using low pressures, large droplets, and low boom heights. Avoid applications when wind speed is above 10 miles per hour or wind direction is toward monarch habitat. More detail is available at epa.gov/pollinator-protection.

Use monarch-friendly weed management recommendations for odd areas, roadsides and other rights-of-way (ROWs). Roadsides and ROWs offer opportunities for miles of monarch habitat (nectar and milkweed species). 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. More detail is available at tallgrassprairiecenter.org/irvm.

Establish a Monarch Waystation, a garden with both nectar plants and milkweeds, where monarchs can find nectar and reproduce. Monarchs lay eggs on milkweeds, the only food monarch caterpillars eat. Adults need flower nectar from spring through fall. More information is available at monarchwatch.org.

The Five Ways to Help the Monarchs were developed by the Iowa Monarch Conservation Consortium.

2.6 Conclusion

Ultimately, the Iowa Monarch Conservation Strategy will be a living document that uses current knowledge to provide a framework that both defines and quantifies active conservation efforts to the extent that there is no need for listing, impacts to landowners are avoided, and regulatory burden on agencies is removed.

3.0 Introduction

The monarch butterfly (*Danaus plexippus*) population has experienced troubling declines over the past two decades in North America (Jepsen et al. 2015; Brower et al. 2012b). While the 2018 adult population overwintering in Mexico was larger compared to the low 2013 and 2014 levels³, over the last two decades the population has declined by 80% (Pleasants and Oberhauser 2013). The 10 ac (4 ha) of occupied overwintering forest in 2015 was well below the target of 15 ac (6 ha) needed to support a resilient population and reduce the risk of quasi-extinction (loss of the North American migration) in the next 10 to 20 years (Semmens et al. 2016). The US Fish and Wildlife Service (USFWS) is evaluating listing the monarch as a threatened species under the Endangered Species Act (ESA) (USFWS 2014a, 2014b), indicating the urgency of a viable monarch conservation program as a potential listing will lead to significant regulatory and management burdens for farmers and livestock producers. The White House (USG 2015) established the goal of increasing the eastern monarch population to 225 million butterflies by 2020 with approximately 15 ac (6 ha) of overwintering grounds.

3.1 Background

The Iowa Monarch Conservation Strategy documents the management and activities of a conservation program that is being undertaken by members of the Iowa Monarch Conservation Consortium (see cover page). The strategy is an outcome of the efforts undertaken by the consortium (www.iowamonarchs.info), which held its first meeting in February of 2015. The consortium is a community-led organization comprised of 38 members⁴ and 6 partners⁵ whose mission is to enhance monarch butterfly reproduction and survival in Iowa through collaborative and coordinative efforts of farmers, private citizens, and their organizations. The Iowa Department of Natural Resources (DNR), the Iowa Department of Agriculture and Land Stewardship (IDALS), and Iowa State University (ISU), College of Agriculture and Life Sciences (CALS) provide overall leadership and facilitation for the consortium. Through Iowa DNR, IDALS, ISU and ex officio members to the consortium from the United States Department of the Interior (DOI) and United States Department of Agriculture (USDA), the consortium and the development of the strategy is current with, and leveraging, developments in other state, regional and national monarch conservation efforts.

³ <https://monarchjointventure.org/news-events/news/eastern-monarch-overwintering-population-numbers-announced>

⁴ **Members** of the Iowa Monarch Conservation Consortium have a presence in Iowa (e.g., members' business activities, conservation programs, research, outreach etc.) and a commitment to contribute in-kind resources or financial investment to meet the strategic goals of the consortium.

⁵ **Partners** of the Iowa Monarch Conservation Consortium have a presence regionally or nationally in monarch conservation, and/or in related habitat conservation efforts, and a commitment to meet the strategic goals of the consortium.

Shortly after the consortium’s formation, a workgroup was established to provide background information to the members and partners on scientific, policy, and legal issues associated with development and implementation of conservation strategies addressing species being evaluated for Federal protection in the United States. The membership for the workgroup and its products are provided in Appendix Q.

The workgroup met from the spring of 2015 through the summer of 2016 to review conservation efforts (i.e., plans, strategies, etc.) for other petitioned species, as well as candidate species and species listed under the ESA. These other efforts helped inform the approach for an Iowa-based monarch conservation strategy. The meetings included teleconferences with USDA Natural Resources Conservation Service (NRCS) staff responsible for implementing the [Working Lands for Wildlife Program](#) as well as staff and managers from the USFWS. In January of 2016, the consortium approved the workgroup’s proposal that an Iowa Monarch Conservation Strategy be prepared, and in June of 2016, an associated work plan to develop Version 1 of the strategy was approved. Version 1.0 of the Strategy was publically released in February of 2017.

Version 1.0 of the Iowa Monarch Conservation Strategy reflected the initial steps in formulating a state-based, voluntary approach for the conservation of the species. The strategy is a living document that will be updated on a periodic basis as national, regional and state habitat and species population goals are formulated. Updates to the strategy will take advantage of ongoing research to ensure the best available science is incorporated into conservation practices. Further development and implementation of the Iowa Monarch Conservation Strategy also requires creation of an organizational infrastructure and an associated articulation of the essential components of the conservation effort. Consequently, Version 1.0 of the strategy addressed governance of the effort and summarized currently available scientific information, including ongoing research in Iowa. Version 1.0 of the strategy also provided a perspective on “next steps” and documents components of the strategy that would be addressed in future versions.

Version 2.0 of the Strategy provides a presentation of Iowa’s monarch habitat goal and

Memorable Monarchs

Probably no other invertebrate species is both as well known and evokes the same nostalgic emotional response from Americans as monarch butterflies. Most children, at least in Midwestern states like Iowa, are introduced to the process of monarch metamorphosis at least once in their elementary school when a yellow, black and white monarch caterpillar is brought into their classroom. Fed a diet of milkweed until it forms a bright green chrysalis, which is watched daily with anxious anticipation, the chrysalis eventually splits open and a butterfly with tiny, rudimentary wings emerges. On that memorable day, the monarch pumps fluid from its abdomen into its wings until they are fully formed and hardened. The next day, the entire class convenes on the school playground, the jar is opened and the butterfly is released. The lesson is complete—the memories formed.

landcover/landuse category-specific habitat targets. Ultimately, the goal of the strategy is to provide a framework that both defines and quantifies active conservation efforts to the extent that there is no need for listing, impacts to landowners and regulatory burden on agencies are minimized, and regulatory burden on agencies is removed.

The strategy includes eight sections: (1) a summary; (2) an introduction, which describes the purpose, legal status and authority, species information, historic distribution and current status, and threats; (3) species population and habitat goals, which describes range-wide population and habitat goals, landscape design using modeling, and design of habitat patches; (4) species conservation in Iowa, which describes Iowa-specific population and habitat goals and targets, accomplishments, administration, data management, monitoring, landowner recruitment efforts, best habitat management practices, research, and information/education/outreach efforts; (5) adaptive management; (6) implementation schedule and budget; (7) literature cited; and (8) appendices, which with further development, will include bylaws, a memorandum of understanding, monarch habitat decision support tools, executive and technical committee member lists, a working group member list, habitat monitoring protocol, monarch monitoring protocol, and details relating to information, education, and outreach.

3.2 Legal Status and Authority

As a non-federally listed insect species, management of the monarch within the state of Iowa lies primarily with the state. Iowa law states that title and ownership of all wildlife found in Iowa, including non-game species such as the monarch, is in the state, subject to some non-applicable exceptions⁶. Currently there is no governmental protection for monarchs or monarch habitat on private property and no limitations on land use or other activities that might impact monarchs. All monarch-related conservation activities currently being implemented or planned within Iowa are purposeful and voluntary in nature as there are no legal requirements for landowners to participate in any such efforts.

Iowa law regulates the take and possession of wildlife based on a species' designated status (e.g., game, non-game, threatened or endangered). The monarch is classified as a non-protected, non-game species.⁷ 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 process⁸; however, it has not determined that such an effort is warranted at this time. In the event that the monarch is federally listed as threatened or endangered by the USFWS, its status under state law would change, as federally listed species are automatically afforded state protection based of their federal status.⁹ The monarch is currently classified as a Species of Greatest Conservation Need (SGCN) in the Iowa Wildlife Action Plan (IWAP) (Iowa DNR 2015); however, this classification does not provide any legal protection for the species.

Non-protected, non-game species, such as the monarch, receive no broad, direct protection under Iowa law. It is currently legal to take and/or possess monarchs within the state. Restrictions on

⁶ Iowa Code 481A.2

⁷ Iowa Code 481A.42. Note that insects are not included within "protected nongame."

⁸ Iowa Code 481B.3

⁹ Iowa Code 481B.5(2)

take are generally limited to those imposed by landowners. For example, a DNR–issued permit is required to take monarchs on any state lands under the jurisdiction of the DNR, a federal permit is required to take monarchs on national wildlife refuges, and many counties have ordinance provisions prohibiting take of non-game species on county-owned lands without permission or a permit. Monarchs and monarch habitat present on private lands are not subject to any government protections or restrictions.

The primary state agency charged with managing wildlife within Iowa is the Iowa DNR. The Iowa DNR is given the very broad duties of maintaining and preserving animal life and conserving the natural resources of the state using sound scientific principles in an effort to maintain biological balance.¹⁰ To this end, Iowa DNR is committed to actions that will enhance species conservation and prevent the need for federal jurisdiction under the ESA.

More specifically, it is directed to undertake the establishment, restoration, and enhancement of wildlife habitat, to promote wildlife diversity, and to provide technical assistance and financial incentives to private landowners to promote the management of wildlife and wildlife habitat.¹¹ Additionally, the Iowa DNR is given the directive to conduct research relating to population, distribution, habitat needs, limiting factors, and other biological and ecological data to determine management measures necessary to maintain sustainable wildlife populations.¹² As such, acting as the lead state agency in developing and implementing monarch conservation measures is solidly within the Iowa DNR’s legal authority and is consistent with its overall mission to protect and enhance Iowa’s natural resources.

3.2.1 ESA Background

The USFWS was petitioned in 2015 (USFWS 2014a, 2014b) to evaluate whether the monarch should be designated as a threatened species under the ESA. In July of 2016, a federal court provided a three-year extension to the USFWS before making a decision. The agency’s decision is now due in June of 2019. Extensive rules and regulations apply once a species is listed. The policy description summaries in the rest of this section based on the USFWS Endangered Species Laws & Policies and Regulations and Policies page (USFWS 2017).

Conservation agreements, conservation plans, management plans, and similar documents generally identify numerous conservation efforts (i.e., actions, activities, or programs) to benefit the species. In determining whether a formalized conservation effort contributes to forming a basis for not listing a species, or for listing a species as threatened rather than endangered, the USFWS must evaluate whether the conservation effort improves the status of the species under the ESA. Two factors are key in that evaluation: (1) for those efforts yet to be implemented, the certainty that the conservation effort will be implemented and (2) for those efforts that have not yet demonstrated effectiveness, the certainty that the conservation effort will be effective. Since the certainty of implementation and effectiveness of formalized conservation efforts may vary, the USFWS will evaluate each effort individually and use a set of criteria to direct the analysis

¹⁰ Iowa Code 461A.3

¹¹ Iowa Code 461.32

¹² Iowa Code 481B.3

using the Policy for the Evaluation of Conservation Efforts (PECE). These PECE criteria can be found in Appendix I.

If the USFWS ultimately lists the monarch, then non-federal landowners whose actions can harm the butterfly or its habitat will need an incidental take permit from the USFWS to proceed with an activity that would otherwise result in an unlawful “take” (i.e., harm) to the butterfly or its habitat. For example, a Habitat Conservation Plan (HCP) (see Appendix J), approved by the USFWS, is a prerequisite to receiving an incidental take permit. The HCPs can require implementation of conservation measures to address those activities that could result in harm to the species or its habitat. Non-federal landowners can also establish conservation plans before USFWS determines the status of a species (i.e., before USFWS determines a species is [a] warranted for listing, or [b] warranted but precluded for immediate listing – a candidate species; or [c] not warranted for listing). State and regional conservation plans or pre-listing conservation actions (PCAs; see Appendix J), developed and implemented before a listing decision, establish beneficial, voluntary conservation practices that, if implemented, are beneficial to a species under review. The implemented conservation efforts may not be as exacting or rigorous as those that would be required for USFWS to determine a listing is not warranted or for USFWS to issue an incidental take permit under a HCP, if the species was listed.

The USFWS–approved conservation plans developed and implemented after a warranted or candidate designation, but before a final listing decision, can have regulatory certainty/assurances (“no surprises”) for non-federal landowners; i.e., if the species is ultimately listed, the USFWS will not require additional land management requirements beyond those specified in an approved plan due to unforeseen circumstances in the future. These plans are called Candidate Conservation Action with Assurances (CCAAs; see Appendix J and Figure 1).

Terminology for Conservation Plans

| Developed PRIOR TO a Warranted or Candidate Designation | Developed AFTER Warranted or Candidate Designation, but before Final Listing Decision |
|---|--|
| <p>Examples:</p> <ul style="list-style-type: none"> • State Conservation/Management Plans • Regional or Range-wide Conservation/Management Plans <p>Should be built with the framework of a pre-listing conservation agreement and the PECE policy.</p> | <p>Examples:</p> <ul style="list-style-type: none"> • CCAAs- Candidate Conservation Agreements (primarily for federal lands) • CCAAs – Candidate Conservation Agreements with Assurances (for non-federal lands) <p>Can have regulatory certainty/assurances (‘no regulatory surprises’) for non-Federal landowners, if the agreement meets recovery goals and is approved by USFWS.</p> |

Figure 1. Terminology for Conservation Plans.

With approval of a CCAA, USFWS issues an Enhancement of Survival Permit (a type of incidental take permit) that documents regulatory assurances for participating non-federal landowners. The conservation practices in a CCAA are of sufficient rigor that if other landowners outside the CCAA adopted the same conservation practices the species would not require listing. The CCAAs (and the resultant permits) can be established by (issued to) individual landowners. “Programmatic” conservation plans (and resultant permit[s]) can be established for a group of participating landowners. Typically, a state agency facilitates the development of a programmatic agreement, its review by USFWS and its implementation.

In summary, upon approval of a HCP (for a listed species) or a CCAA (for a candidate species prior to a final listing decision) by the USFWS, the USFWS can then issue an incidental take permit(s) to those non-federal landowners that are participating in the conservation effort. To issue a permit, USFWS confirms the conservation measures in the plan will meet the standards under section 10(a)(1) of the ESA for a listed species, or in the case of a candidate species, confirms the conservation measures are sufficient to preclude the need for listing assuming other landowners in the species’ range adopted the same measures. If the USFWS ultimately decides not to list a candidate species, then the development and approval of a pre-listing plan should have no regulatory impact under the ESA on future land-management practices of non-federal landowners (assuming USFWS is unlikely to revisit a “no listing” decision in the foreseeable future or is not forced to reverse a “no listing” decision by the courts). Pre-listing conservation plans, with (e.g., CCAAs) or without (e.g., PCAs) regulatory assurances are science-based and founded on relationships between the nature and extent of habitat and expected responses of the species population. They include monitoring programs to assess outputs and performance outcomes, incorporate adaptive conservation management approaches and employ governance procedures to ensure implementation of conservation practices. However, as noted above, the rigor of a pre-listing effort that can provide regulatory assurances is more specific and exacting. Over time an implemented pre-listing plan that is beneficial to a species, but not of sufficient rigor to provide regulatory assurances, can be enhanced such that USFWS could issue an Enhancement of Survival Permit in the future, assuming the enhanced plan was approved as a CCAA by USFWS before a final listing decision.

A summary of the post- and pre-listing options are provided in the following sections with more detail in Appendix J.

3.2.1.1 Pre-Listing Conservation Options

Pre-listing plans are designed to address habitat conservation for a species prior to potential listing (i.e., candidate species being reviewed for potential listing or species determined to be warranted for listing but currently precluded from listing). Options include a Candidate Conservation Agreement (CCA), CCAA, or a Pre-Listing Conservation Action (PCA).

Pre-listing programs can be designed to preclude the need for listing. If the species is ultimately listed, future conservation management requirements for an incidental take permit may provide more options, as compared to a situation where no pre-listing conservation activities were undertaken. More detail on pre-listing conservation options can be found in Appendix J.

3.2.1.2 Post-Listing Conservation Options

Post-listing conservation options are more stringent and difficult (and inconvenient) to achieve. Options include a Habitat Conservation Plan (HCP), Safe Harbor Agreements for Private Landowners, and Conservation Banks. More detail on post-listing conservation options can be found in Appendix J.

3.2.2 Iowa Monarch Conservation Strategy Conservation Option

The Iowa Monarch Conservation Consortium met in January of 2016, and given that existing and new monarch habitat will be located on private lands, a programmatic pre-listing conservation effort was selected by the consortium as the most flexible, effective and efficient approach for moving forward. The consortium requested that Version 1 of an Iowa Monarch Conservation Strategy be created during 2016. The first version of the strategy was publically released in February of 2017.

The consortium is optimistic that if the implemented conservation strategy in Iowa and other states in the species range are successful, the USFWS may not be required to list the species. If the species is listed, the consortium also agreed that the conservation strategy will be prepared with sufficient rigor, over time, such that it could be converted to a CCAA and thereby provide those private landowners voluntarily participating in the conservation plan regulatory assurances. Finally, the consortium concluded that a programmatic CCAA is preferred as compared to individual landowners developing their unique plans with USFWS. Under this scenario, Iowa DNR may be the facilitating state agency to implement the programmatic conservation plan; however, consistent with the operating principles of the consortium, IDALS, ISU and consortium members will work collaboratively to facilitate an efficient and effective effort.

Development of the Iowa Monarch Conservation Strategy was based on the conservation strategy established for the New England cottontail (Fuller et. al. 2012), which is an example of successful, voluntary pre-listing conservation plan (<https://www.fws.gov/northeast/newenglandcottontail/>).

Version 1.0 of the Iowa strategy was intended to provide an overall structure and guidance to the wide variety of monarch conservation activities being planned or already underway in Iowa. Version 2.0 of the strategy provides Iowa's habitat goal and land cover/land-use category-specific habitat targets. Future versions will add elements that will form the basis of a CCAA, if needed.

3.3 Species Information

3.3.1 Distribution of Monarchs

Three distinct populations of monarchs exist in North America and are defined by their breeding distributions. The eastern population, with its stronghold in the Midwestern Corn Belt, breeds from the western border of the Northern Tallgrass Prairie Ecoregion to the Atlantic coast, and as far north as southern Canada and winters in Mexico (Brower and Calvert 1985). A small monarch population in peninsular Florida resides there year round. Some eastern population monarchs may migrate to Florida and simply remain there, as may their descendants.

The eastern monarch population is famous for its annual southward fall migration from the United States and Canada to central Mexico. During the fall migration, an individual monarch travels roughly 3,000 mi (4,800 km). The spring migration north spans several generations. The western population of monarchs typically migrates to sites in coastal California but has been found in overwintering Mexican sites as well. No genetic differences between monarch populations apparently exist (but see Zahn et al. 2014, which suggests Florida population may be somewhat different genetically); reproductive isolation has not created subspecies (Brower and Boyce 1991; Lyons et al. 2012).

Iowa may be the most essential state in the Midwest for the eastern population of monarchs during the breeding season. Thus, the remainder of the Iowa Monarch Conservation Strategy will focus on the eastern population of monarchs, the most likely factors suppressing their numbers, and the conservation actions, especially in Iowa, that are most likely to rehabilitate the species.

3.3.2 The Annual Cycle of the Eastern Monarch Population

In early September, individuals belonging to the eastern population of monarchs begin a migration of several thousand miles (Figure 2) to their wintering grounds in a small, mountainous area of Michoacán, Mexico, roughly 40 mi (65 km) west of Mexico City (Urquhart and Urquhart 1976, 1978). In an arc of oyamel fir (*Abies religiosa*) forests about 70 mi (110 km) long from north to south, the monarchs establish at least 12 wintering colonies on the south slopes of mountains, at the heads of drainages above 10,000 to 10,500 ft (3,000 to 3,200 m) elevation. By forming dense clusters on trees and shrubs, they help moderate their microclimate, ensuring that it is neither too warm nor too cold, which would adversely affect survival. Nevertheless, major mortality events of greater than 70% do periodically occur, usually associated with cold, wet weather, as in 1981, 2002 and 2004 (Calvert et al. 1983; Brower et al. 2004, 2005). In the spring of 2016, a major winter sleet storm hit the wintering areas causing up to 50% mortality in some colonies, although some monarchs had already started migrating north (World Wildlife Fund 2017). Climate change scenarios that predict more frequent extreme weather events could mean that monarch populations will exhibit even more annual variability, which could raise the likelihood of extinction (Semmens et al. 2016).

In late February, a northward spring migration begins (Figure 2); the first phase culminating with the over-wintering generation laying eggs in mid-March on milkweed plants in eastern and central Texas and Oklahoma (Malcolm et al. 1993). These eggs hatch into 1st generation caterpillars, which pupate and emerge as adults in late April or early May. Caterpillars go through five instars, each associated with rapid growth when the exoskeleton is shed. First generation adults continue to migrate into the mid-latitude states (38°N to 49°N latitude) where 2nd, 3rd, and 4th generations are produced. It is likely that, given late summer temperatures, most 3rd and 4th generation butterflies are produced north of 40°N latitude, which includes Iowa (Nail et al. 2015). The average life span of 1st, 2nd, and 3rd generations is 6 to 12 weeks with only 2 to 6 weeks after emerging as adults. However, 3rd or 4th or 5th generation monarchs that emerge when day length is short and nighttime temperatures are cool may remain sexually immature and migrate southward (Barker and Herman 1976; Herman 1981, 1985). The average life span of 1st, 2nd, and 3rd generations is 6 to 12 weeks with only 2 to 6 weeks after emerging as adults. However, 3rd or 4th or 5th generation monarchs that emerge when day length is short and

nighttime temperatures are cool may remain sexually immature and migrate southward (Barker and Herman 1976; Herman 1981, 1985). The 4th or 5th generation is physiologically

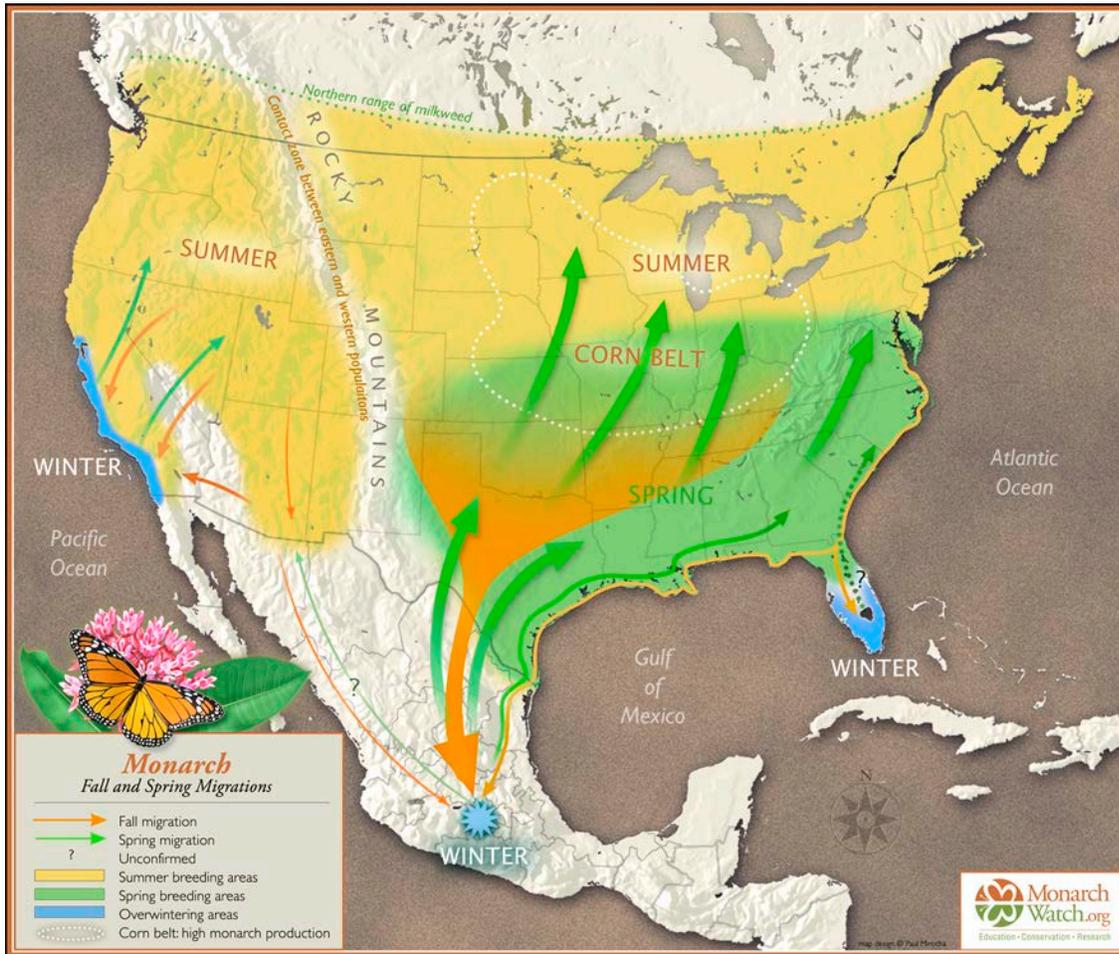


Figure 2. Monarch fall and spring migration routes. Figure used with permission courtesy of Monarch Watch.

unique, surviving 180 to 240 days from August to the following March when the annual cycle begins again. Some 4th generation monarchs may produce a 5th generation in the south. Fifth generation individuals do not appear to be common and the importance of 5th generation monarchs to the overwintering populations is unknown.

3.3.3 The Importance of Milkweed

There are approximately 100 known species of milkweed (*Asclepias* spp.) in the United States, and 17 species are native to Iowa (Eilers and Roosa 1994; Appendix K). Milkweed is named for its milky sap, which consists of a latex containing alkaloids and several other complex compounds including cardenolides (Malcolm et al. 1989, 1995). Milkweed species are normally found in grassland, damp soils or wetlands, but a few species occur in deciduous forest or in deserts (Woodson 1954; Kaul et al. 1991). Of the five species common in Iowa, common milkweed is by far the best known and most abundant, but other species, particularly swamp milkweed and whorled milkweed, may be preferred by monarchs (Pocius et al. in press).

Monarchs are milkweed obligates because females will only lay eggs on milkweed, and larvae will only feed on milkweed. By eating milkweed, caterpillars accumulate toxins from the plant called cardiac glycosides, which are sequestered in the exoskeleton of the caterpillar and the wings of the adult, causing vertebrate predators to vomit or have a mild heart arrhythmia that promotes learned avoidance (Brower 1984).

Gravid (mated) female monarchs use visual and chemical cues to locate milkweeds (Garlick 2007). Females are estimated to lay 300 eggs before dying. Monarch eggs and early larval instars suffer mortality rates of 90% or higher (De Anda and Oberhauser 2015; Oberhauser et al. 2015 and references cited therein).

3.3.4 Flowering Plants

Since adult monarchs depend on nectar as a source of energy for flight and egg production, it is critical that flowering plants be abundant whenever monarchs are present during the annual cycle. In Iowa, this means roughly May 15 through mid-October. Monarch adults are generalists, and virtually any flowering plants that produce nectar are suitable food for adults. Little is known about potential preference for species of flowering plants, including native prairie forbs and ornamental flowering plants in gardens. If the goal is to create a garden for monarchs and other butterflies during the breeding or migration seasons, the species selected for the garden are generally less important than the time of year they flower. However, if the goal is to create a larger block of habitat for monarchs and other pollinators, for example, on the acres of a farm that are least profitable for farming, then native prairie forbs will be more beneficial and require less maintenance over the long term but more maintenance short term.

Availability of flowering plants during migration is particularly important because migrating adults must not only consume enough calories from nectar to fuel the long flight south to Mexico but must also accumulate enough additional calories to build fat reserves to sustain them through the winter (Brower et al. 2015). See Appendix L for detail on bloom times of selected flowering plants.

3.4 Status of Eastern Monarch Populations

3.4.1 Historic Overview

In pre-settlement European times, optimal spring and summer breeding habitat for monarchs was likely prairies, grasslands, savannas, and wetlands in the Midwest and eastern plains. Midwestern pre-settlement landscapes were characterized by “a rich pre-colonial milkweed flora [that] was widely distributed,” with 29 species of *Asclepias*, most of them grassland species (Woodson 1954; Hartman 1986) native to the late summer breeding range of the monarch (Malcolm et al. 1989, 1993; Wassenaar and Hobson 1998; Brower 2012a).

Pre-settlement vegetation in Iowa was dominated by prairie and prairie wetlands in the north and prairie/oak savanna in the south, with gallery-type forests along the streams and rivers, including larger patches along the Mississippi River and in northeast Iowa. Early descriptions of monarchs on the prairies and/or in Iowa are given in Brower (1995):

During September 1867 in southwestern Iowa, Allen (in Scudder & Allen 1869: 331) described monarchs gathered in several groves of trees bordering the prairie “in such vast

numbers, on the lee sides of trees, and particularly on the lower branches, as almost to hide the foliage, and give to the trees their own peculiar color.”

The accumulation of anecdotal notes of monarch swarms from the prairies across the Great Lake states to New England, supplemented by frequent newspaper and signal officer reports of swarms passing over Iowa, Kansas, Missouri, and Texas, finally convinced Riley (1878) that the monarch indeed performs a birdlike fall migration.

Riley (1880) described monarchs flourishing on “the vast plains and prairies lying to the north between the Mississippi River and the Rocky Mountains” where “milk-weeds abound.” While this may have reflected his living in the Midwest as the Missouri State Entomologist, it also is possible that the eastern prairies were where most monarch breeding did naturally occur. Perhaps significantly, Doubleday and Westwood (1846 to 1852) stated that, “*Danais Archippus* [the monarch] is abundant even in the largest towns of the Middle and Northern states.” Shannon’s (1916) description of monarchs migrating through Minnesota, Iowa, Kansas, Oklahoma and eastern Texas is certainly consistent with the early observations. Contrasting these numbers with the smaller migrations through Illinois and the states to the east, he stated that the “wide highways of the Great Plains and West Central States offer the most frequent reports of remarkable butterfly spectacles, gatherings of almost unbelievable magnitude ... move forward in congregations ... miles in width ... forming veritable crimson clouds.”

With the loss of prairie and its replacement by croplands, monarchs likely increasingly used common milkweed found in agricultural habitats (within fields and field margins) pastures, and disturbed areas such as roadsides, field edges, and railroad corridors in an attempt to replace lost natural habitat (Pleasants 2015). According to Brower (1995):

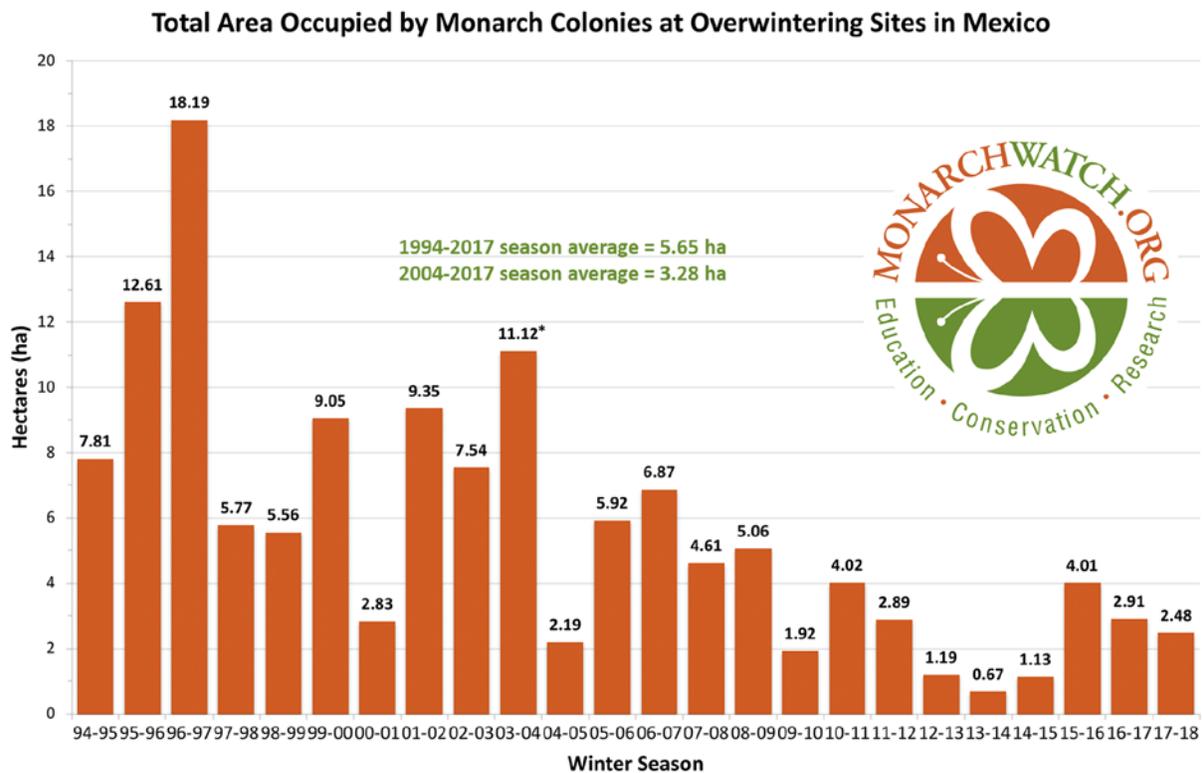
I propose that Riley’s emphasis on the prairie states as the original center of summer breeding was not biased and that monarchs actually expanded their area of intensive breeding from the midwestern to the eastern states during the latter part of the 19th century. This would have been caused by plowing and deforestation greatly altering milkweed distributions and abundances in both the prairie and the northern forest ecosystems (Marks 1983).

Since 1999, monarch breeding habitat in Iowa corn and soybean fields has declined with changes in farming practices (Pleasants and Oberhauser 2012). Most monarch breeding habitat in Iowa is assumed to be in native and restored prairie and savanna, wetlands (including shallow depressional wetlands and riparian areas), pastures and hayfields, roadsides and transmission line corridors, pollinator gardens, and some sites managed under specified USDA Farm Bill Programs; e.g., eligible land in the Conservation Reserve Program (CRP) or the Environmental Quality Innovation Program (EQIP).

3.4.2 Current Status

During the last 21 years, records of the size of eastern monarch wintering colonies have been collected in the very limited number of colonies in the oyamel fir forests in the mountains of Michoacán, Mexico. Although colony size may change slightly based on weather, colony size is thought to be a reasonable index to population size. From 1994 to 2018, the total average size of

wintering colonies was 14.0 ac (5.65 ha), and from 2004 to 2018, it was only 8.11 ac (3.28 ha) (Figure 3). The eastern population achieved its highest population index in 1996 to 1997 and its lowest index in 2013 to 2014. The difference is greater than 96% of the size of the wintering population. Given the stochastic nature of wintering monarch populations, probably due to natural environmental variability, estimates of a precise population trend is difficult; however, an approximate population decline over the last 20 years of 80% appears reasonable (Xerces Society 2016). Inamine et al. (2016) estimated the average annual decline to be greater than 9% per year, and Semmens et al. (2016) predicted an 16% to 62% probability that this population will go extinct over the next 20 years, although uncertainty was large because of the dynamic nature of monarch populations.



Data for 1994-2003 collected by personnel of the Monarch Butterfly Biosphere Reserve (MBBR) of the National Commission of Natural Protected Areas (CONANP) in Mexico. Data for 2004-2017 collected by World Wildlife Fund Mexico in coordination with the Directorate of the MBBR.

* Represents colony sizes measured in November of 2003 before the colonies consolidated. Measures obtained in January 2004 indicated the population was much smaller, possibly 8-9 hectares. CT

Figure 3. Annual abundance indices for the eastern monarch population at overwintering sites in Mexico from 1994 until 2018. Figure used with permission courtesy of Monarch Watch. (2018).

Using a moving three to five year mean and standard deviation of the population, it is apparent that monarch populations are highly stochastic (Flockhart et al. 2015). The chief concern for monarchs is that during periods when the monarch’s annual population is small, as is currently the case, uncontrollable environmental factors like weather could cause extinction, e.g., a catastrophic event like a severe winter storm in the area of the wintering colonies or a summer with prolonged, widespread unfavorable weather for breeding or survival. For example, the period of 2012 to 2015 had the three lowest wintering indices on record, which were likely due

to three consecutive years of poor spring reproduction because of drought in the United States (2012 to 2014). In March of 2016, an ice storm and colder than normal temperatures in Mexico likely played significant roles in a 27% decline in the 2016 to 2017 total occupied area of the overwintering population as compared to the 2015 to 2016 occupied area (World Wildlife Fund 2017). The key to the monarch's survival as a species is to increase the average annual population to the point that weather poses less risk of species extinction (Flockhart et al. 2013).

3.5 Potential Threats

Monarch populations are undeniably in a precipitous decline. It is virtually certain that there are multiple factors contributing to this decline. The only question is which of these factors poses the greatest threat to the future existence of monarchs. If they are all significant limiting factors, then monarchs are facing a "perfect storm" of circumstances driving them toward extinction. Since an increasing population trend can only be achieved by increasing recruitment, increasing survival, or both, it is prudent to acknowledge the factors that are believed to be contributing to decreased recruitment and/or survival, and then attempt to alleviate the factors that exist in this local region, rather than debating which threat is the most acute.

3.5.1 Deforestation of Overwintering Habitat

Despite the designation of the mountains around monarch wintering colonies as a legally protected 138,000 ac (56,000 ha) Butterfly Biosphere Reserve and a UNESCO World Heritage Site, degradation of the oyamel fir forests within the Butterfly Biosphere Reserve continues albeit apparently at a reduced rate. Tree cutting by residents within the reserve to provide domestic fuel for cooking and heating homes and to clear land for farming was thought to be the primary threat to wintering colonies in recent years; however, the attempted commercial harvest of 25 ac (10 ha) of forest in 2015 near several colony sites suggests the deforestation threat is more organized than previously believed (Brower et al. 2016). Illegal logging and a recent outbreak of bark beetles continue to erode the integrity of the oyamel fir forests in which the monarchs overwinter. Many lines of research have demonstrated the importance of maintaining the integrity of the forest canopy for successful overwintering by monarchs (Ramirez et al. 2015 and references cited therein; Calvert and Brower 1981; Anderson and Brower 1996). Forest fragmentation, especially coupled with climate change, may lead to more frequent catastrophic mortality events on the wintering grounds, further imperiling the species.

3.5.2 Loss of Forage Sources

Recently, a few researchers have used widespread citizen science databases of monarch abundance to evaluate alternative hypotheses of where in the annual cycle population bottlenecks may be occurring (Davis 2012; Badgett and Davis 2015). Inamine et al. (2016) used North American Butterfly Association data to hypothesize that declining population trends in the south central United States during fall migration were more closely linked to population declines in wintering colonies than were population changes in summer breeding areas. They suggest that a low survival rate during fall migration is the primary factor causing monarch population decline. They did not speculate on a reason for decreased survival. However, one potential reason for low fall migration survival rates is the loss of fall-flowering nectar-producing plants that are critical for migration refueling and building fat reserves to sustain monarchs through the winter. Taylor et al. (2016) were highly critical of analyses used by Davis (2012), Badgett and Davis (2015) and

Inamine et al (2016). Taylor et al. (2016) cited the more stringent analyses and editorial review conducted to test the loss of breeding habitat analysis. Other critics of the fall migration limitation hypothesis point out productivity in agricultural land was not assessed (Pleasants et al. 2016) and that the density of sampling sites in the Midwest (the core of monarch breeding range) was much lower than along the east coast, Great Lakes and south central United States, and this, along with a tendency of volunteer observers to select sites where monarchs are abundant and avoid less attractive habitat where declines are likely occurring first, irreparably biased the data (W. Thogmartin, USGS, pers. Comm.).

3.5.3 Loss of Breeding Habitat

Loss of habitat in the summer breeding grounds is the most widely proposed factor contributing to the decline in monarch numbers. In all, approximately 147,000,000 ac (60,000,000 ha) of monarch habitat have been lost since 1992—an area four times the size of the state of Illinois (Monarch Watch 2016). Wright and Wimberly (2013) reported that Iowa lost 376,000 ac (152,000 ha) of grassland (a surrogate for monarch habitat) statewide from 2006 to 2011 due to record high crop prices, based on USDA National Agricultural Statistics Cropland Data imagery. Southwest Iowa had the largest single expanse of recently converted grassland of anywhere in Iowa, Nebraska, Minnesota or the Dakotas. The conversion of 7,000,000 ac (2,833,000 ha) of CRP land in the Corn Belt to crops, adds to the total habitat loss. Another 1,276,500 ac (517,000 ha) of CRP in Iowa are scheduled to expire by 2025; however, it is reasonable to assume that many if not all of these acres will be re-enrolled based on past experience.

A trend associated with this habitat loss has been the ascension of common milkweed, *A. syriaca*, as the most abundant and, therefore, most widely used milkweed by monarchs (Brower et al. 2012a; Pleasants and Oberhauser 2012). This loss of milkweed diversity and the heavy reliance on a single milkweed species by breeding monarchs is an artifact of land-use history and the decline of native habitats with more diverse milkweed flora.

The loss of monarch habitat in cropland (i.e., common milkweed) due to the adoption of glyphosate-tolerant corn and soybeans in the last 10 years amounts to at least 75 million ac (30,350,000 ha) (Fernandez-Cornejo et al. 2014). From 1999 onward, milkweed reduction in agricultural fields has coincided with the application of glyphosate herbicides in locations where it has been studied (e.g., corn and soybean fields in Iowa where milkweed abundance had decreased 58%; Pleasants and Oberhauser 2012). In effect, agricultural fields where glyphosate herbicides are being applied no longer serve as monarch breeding habitat because of a lack of milkweed (Pleasants and Oberhauser 2012) (Figure 4).

There are many uncertainties related to land conversion and use of genetically engineered crops and the resulting effects on monarch reproduction. While documentation exists of ongoing grassland conversion to cropland in Iowa, reliable estimates of milkweed density and flowering plant density within cropland (prior to use of glyphosate tolerant corn and soybean) are lacking. Current assumptions, now that glyphosate-tolerant corn and soybean are used, are that density of milkweed in cropland approaches zero. Estimates of milkweed and flowering plant densities in conservation grasslands, grass hayland and pasture vary widely, contribute to uncertainties in

assessments of the relative impacts of grassland conversion and the use of genetically engineered crops and glyphosate on monarch reproduction.

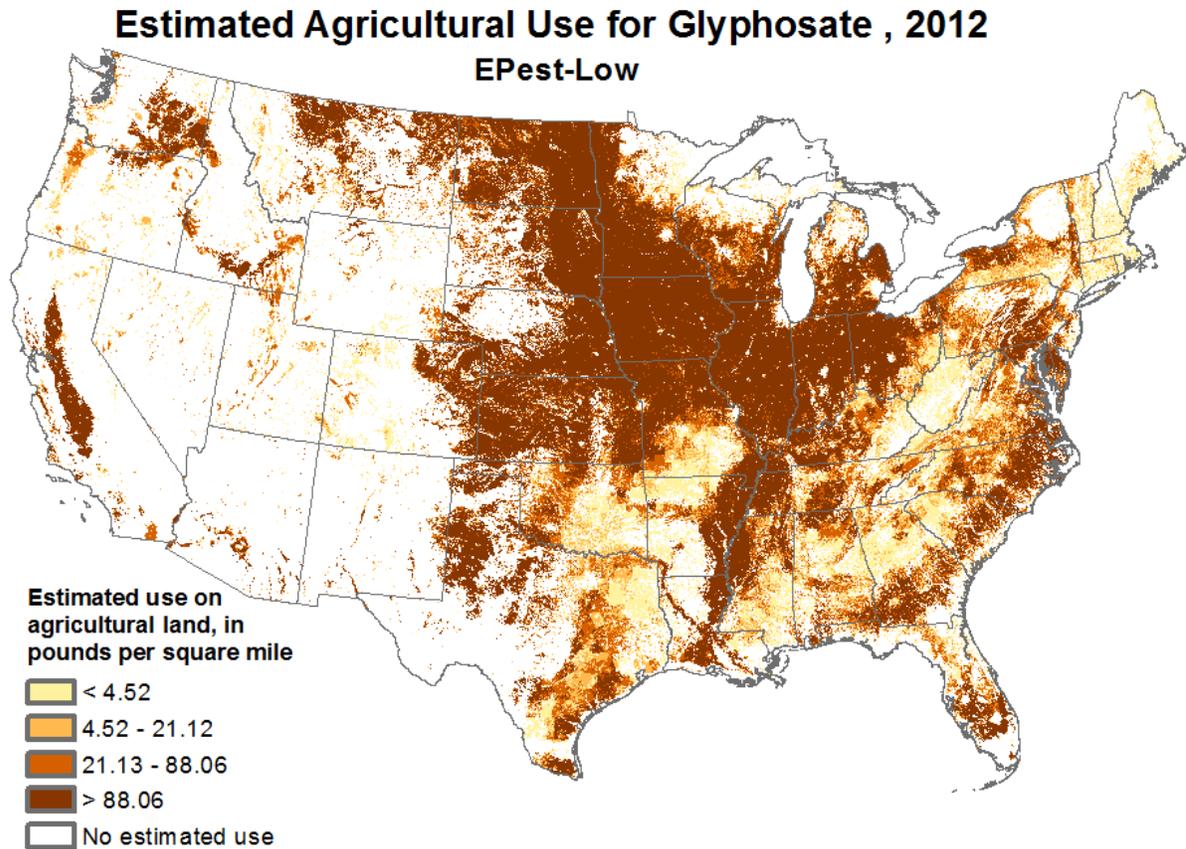


Figure 4. United States map showing glyphosate use on agricultural lands in 2012. Additional maps can be found on the USGS website.

Contrary to the milkweed limitation hypothesis is the observation that egg densities on milkweed plants may also be decreasing. Several alternative explanations could account for this observation: milkweed availability is not limiting populations; there are now too few monarchs to utilize the available milkweed, perhaps because other limiting factors associated with low populations have now taken over; or the configuration of remnant milkweed stands in a highly fragmented Midwestern landscape is not conducive to monarchs finding the remaining milkweed.

Declining recruitment due to habitat loss is not the only concern in breeding areas. Exposure to widespread insecticides may be increasing larval and adult mortality. Bt corn is a genetically engineered cultivar that includes a gene from the DNA of a naturally occurring soil bacterium, *Bacillus thuringiensis* (hence Bt). The inserted gene causes the corn to produce a systemic protein that kills the larval form of the European corn borer moth (*Ostrinia nubilalis*). The results of a series of studies summarized in Sears et al. (2001) indicate that Bt corn pollen from existing varieties of corn would have negligible to no impact on monarchs in habitats near corn.

Monarch larvae in existing and newly established milkweed patches near crop fields could also be exposed to insecticides due to spray drift during the cropping season. Insecticides for managing corn and soybean insect pests include organophosphate, pyrethroid, neonicotinoid, and anthranilic diamide insecticides (Hodgson and VanNostrand 2016; University of Tennessee Extension 2016; Dupont 2010). While there do not appear to be published studies designed to systematically monitor insecticide levels on milkweeds following treatment, spray drift models used by the US Environmental Protection Agency (USEPA), such as AgDRIFT and AGDISP¹³, indicate that exposure to monarch larvae through this route of exposure cannot be precluded.

Monarch larvae could also be exposed to insecticides through ingestion of milkweed. Corn and soybean are typically planted with neonicotinoid-treated seed (Douglas and Tooker 2015), including 70% of soybean acres in Iowa (Hodgson et al. 2012). Chlorantraniliprole is also entering the market as a corn seed treatment option (Corn and Soybean Digest 2015).

Imidacloprid, clothianidin, and thiamethoxam have moved into Iowa streams, presumably due to subsurface flow (Hladik et al. 2014), which raises concerns that plants downslope of the cropped field could absorb neonicotinoids systemically. Several studies (Krupke et al. 2012; Long and Krupke 2016; Botías et al. 2015, 2016; David et al. 2016) showed that a variety of non-crop plants in the margins of fields previously sowed with neonicotinoid-treated seeds can have detectable levels of imidacloprid, clothianidin, and thiamethoxam in their pollen and nectar, although the frequency of detection is highly variable. In some cases, it is not clear if detections were a result of dust drift at planting and/or systemic uptake from subsurface water flow.

Two studies provide preliminary evidence of the systemic uptake of neonicotinoids in milkweed near crop fields. Paola and Kaplan (2015) did not find clothianidin in the leaves of common milkweed plants located 0 to 160 ft (0 to 50 m) from two corn fields in Indiana, but approximately 15% of the plants at a distance of 160 to 300 ft (50 to 90 m) from the fields had detectable levels (minimum detection level for the HPLC-MS/MS method not provided). While the concentration range of clothianidin in plants with detectable levels was not provided, the maximum concentration of clothianidin present in one plant was 14 ng/g. Using an ELISA method, Pecenka and Lundgren (2015) reported detectable levels of clothianidin in approximately 65% and 35% of common milkweed plant leaves sampled in June and July, respectively, within 4.9 ft (1.5 m) of corn fields in Brookings County, South Dakota. Mean concentrations ranged from 0.4 (June) to 0.69 ng/g (July), with a mean of 1.14 ng/g in plants with detectable levels.

In non-crop plants, insecticide concentrations are typically below levels that would cause acute lethality for non-target insect species; however, toxicity data are limited for estimating species-specific risk, especially for non-target lepidopteran species (Botías et al. 2016; Pisa et al. 2014) including monarchs. Two studies provide limited information on the toxicity of two neonicotinoids to the monarch. Pecenka and Lundgren (2015) reported an LC₅₀ of 15.63 ppb to neonates exposed to swamp milkweed (*Asclepias incarnate*) leaf discs topically treated with an aqueous solution of clothianidin. Effects on developmental time, body length, and head capsule width were observed in some instars, with significant effects at 1 or 5 ppb; however, no

¹³ <https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/models-pesticide-risk-assessment#atmospheric>

significant sublethal effects were observed at the 10 and 25 ppb exposure levels. The inconsistent sublethal responses observed in this study may be a function of the exposure method (leaf dipping) that resulted in variable larval dosimetry. Krischik et al. (2015) assessed the toxicity of imidacloprid to monarch larvae that fed on tropical milkweed (*Asclepias curassavica*) plants grown in nurseries and greenhouses. Potting soil was treated with 300 mg ai/pot and 600 mg ai/pot. A residue analysis (HPLC-MS/MS) of the flowers from these plants showed 6.03 and 10.4 ppm of imidacloprid, respectively. Foliage concentrations of imidacloprid were not reported. Nonoates were placed on these plants, and mortality was assessed. By day 14, nearly all larvae feeding on both the 300 mg/pot and 600 mg/pot milkweeds were dead (larvae feeding on control plants had approximately 35% mortality). No significant mortality was observed in adult monarchs foraging on flowers of the treated plants. These limited observations underscore how the current lack of information concerning insecticide toxicity (e.g., mortality, growth suppression, or developmental delays) to larval monarchs impedes developing robust risk assessments for insecticide exposure.

3.5.4 Potential Impacts of Increased Milkweed Density on Larval Survival

Attempting to increase monarch populations by enhancing a tiny fraction of their original habitat area, such as public land that comprises about 1.5% of the area of Iowa, may lead to proposals to establish artificially high densities of milkweed on these lands. This could result in higher than normal densities of monarch eggs, larvae and pupae, and, in turn, attract elevated populations of monarch predators and parasites. Elevated predator or parasite populations could create habitat patches that produce fewer larvae (De Anda and Oberhauser 2015 and references cited therein) such that the patch recruitment rate may result in a population growth rate (λ) that is less than 1.0. While it is generally accepted that Iowa must have many more milkweed plants for monarch recovery, how many plants and their distribution at local, landscape and state-wide scales are still being considered.

3.5.4.1 Predators

Ants, mites, lacewing larvae, spiders, (Oberhauser et al. (2015) and beetle larva (Koch et al. 2003) can sometimes be predators of monarch eggs. By providing numerous potential milkweed oviposition opportunities, a low density of eggs on each plant should increase egg survival (Prysby 2004 and references cited therein).

Many genera of ants feed on monarch larvae, especially when they are young. Large wasps from the *Vespidae* family often depend on caterpillars for food. Paper Wasps (*Polistes spp.*) are notorious for locating and capturing monarch larvae on milkweed plants to feed their young. Several species of flies from the *Tachinidae* family parasitize larger monarch larvae with two or three eggs. The emerging fly maggots feed as internal parasites and do not kill the monarch larvae. After pupating, the maggots exit the monarch pupa on a silk thread, and they pupate nearby on the ground. Small species of leaf-rolling spiders can be a pest. They sew the edges of a milkweed leaf together with silk to make a nest. They usually come out at night and feed on young monarch larvae. Larger monarch larvae have few spider predators. The assassin bug of the family *Reduviidae* is known to feed on monarch larvae (Prysby 2004 and references cited therein).

Most problems in the pupa stage originate from parasitoids and pathogens the larvae acquire. Occasionally, wasps from the family *Braconidae* parasitize the pupae. Tiny wasps from the family *Chalcididae* may successfully penetrate the pupa leaving a small hole. The pupa begins to turn dark and dies.

Although it is uncommon, some birds will consume monarch larvae and adults opportunistically (Brower and Calvert 1985, Calvert et al. 1979). These species may be better able to tolerate high levels of the toxins from milkweed that larvae consume. The most common birds that feed on monarchs are some kingbirds (*Tyrannus* spp.), rufous-sided towhee (*Pipilo erythrophthalmus*), and starlings (*Sturnus vulgaris*).

Baculoviruses are pathogens that attack insects and other arthropods. Many butterfly species, especially monarchs, are infected by the virus *nucleopolyhedroviruse*, commonly called NPV. The virus is a tiny particle that enters through spiracles (air passages) or is eaten by larvae. The cells of the larvae produce more virus particles until the caterpillar “melts” into a black liquid, and releases more virus particles into the immediate environment to infect other butterfly larvae. One larva may produce billions of virus particles (Monarch Predators and Pathogens 2016).

3.5.4.2 Parasites

Neogregarin (*Ophryocystis elektroscirrha*) is a protozoan commonly called OE (McLaughlin and Myers). When a larva eats the spores of the protozoan, the parasite remains in an intermediate state until after pupation and then rapidly infects the tissue that becomes the scales that cover the adult body (Altizer and Oberhauser 1999). The adult carries the protozoa spores externally and transfers them to the surface of its eggs and plants (Altizer and Oberhauser 1999).

Monarchs that are heavily infected often die before they mate. The parasites may be fairly benign in the eastern population because most infected individuals would die in migration (Altizer et al. 2004).

4.0 Species Population and Habitat Goals

4.1 Range-wide and Iowa Summary of Population and Habitat Goals

In 2015 the United States Government set a goal of increasing the population of overwintering adult monarchs to 225 million by 2020 (USG 2015). Current estimates of new monarch summer breeding habitat needed to reach this goal are expressed as the number of new milkweed stems that need to be established in the North Central states over the next 20 years. These estimates range from 1.3 to 1.6 billion new stems (see Thogmartin et al., 2017 and references cited therein). The Midwest Association of Fish and Wildlife Agencies (MAFWA), which is coordinating development of a Mid-America Monarch Conservation Strategy, has set a goal of 1.3 billion new stems for the northern breeding core area of the monarch (deep purple area illustrated in Figure 5) (MAFWA 2017). Iowa falls entirely within the northern breeding core. Within the context of this multi-state conservation strategy, on November 28, 2017, the Iowa Monarch Conservation Consortium agreed Iowa should strive to establish 160,000,000 new milkweed stems over the next 20 years, which represents 12.3% of the North Central states’ overall goal of 1.3 billion new stems within the northern breeding core.

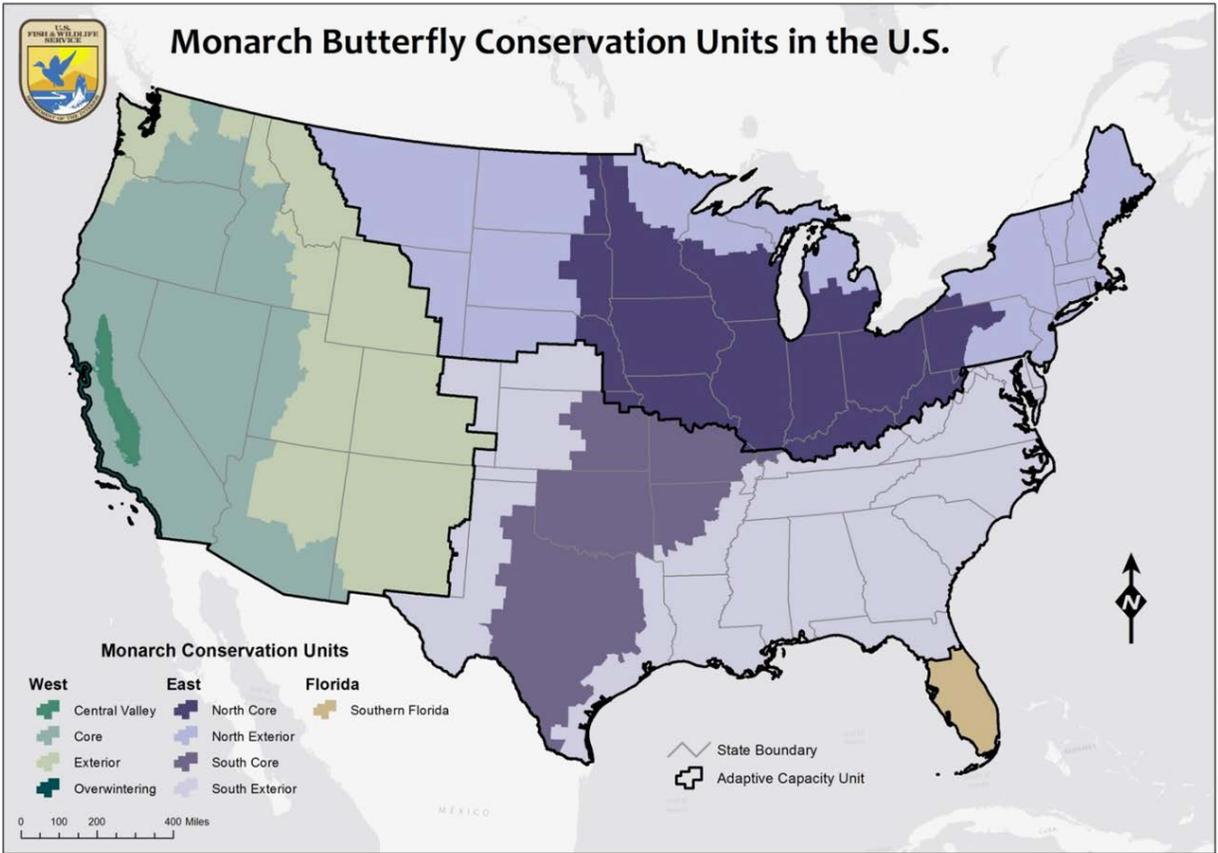


Figure 5: Map of monarch distribution. Dark purple area indicates the northern breeding core.

During the summer and fall of 2017, a consortium workgroup, with *ex officio* support from USFWS and USDA staff, developed habitat targets for the following land cover/land-use categories in Iowa:

- Urban/suburban
- Road rights-of-ways (secondary roads)
- State, county and federal land (Public Lands)
- USFWS Partners for Fish and Wildlife and USDA Natural Resources Conservation Service Program Lands (Other)
- Agriculture

The consortium met on January 19, 2018, and reached consensus on land cover category-specific targets to reach the Iowa goal of 160,000,000 new milkweed stems (see Table 1; category-specific analyses are provided in Appendix M). The combined, category-specific targets are estimated to establish between approximately 127 to 188 million new stems on approximately 480,000 to 830,000 acres (190,000 to 340,000 ha) by 2038. While targets are presented as milkweed stems and monarch habitat acres, it is assumed establishment of new habitat includes co-establishment of native warm season grasses and forbs, which provide monarch adults with nectar sources from spring through the fall migration, in addition to milkweeds for oviposition and larval development.

Table 1. Estimated range of new acres and milkweed stem targets for monarch habitat establishment in Iowa from 2015 to 2038 by land-use category.

| 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 |
| Road Rights-of-Ways | 19,000 | 21,000 | Road 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 |

* *New stems include stems derived from new seeding and subsequent propagation. Biologically reasonable stem densities of 10 to 50, 197 to 199, 200, 200 to 324, and 150 to 600 stems/acre were assumed for Urban/Suburban; Public Lands; Other; Road Rights-of-Ways and Agriculture, respectively. See Appendix M for a summary of category-specific analyses.*

† *These sectors include stems planted since 2015 through US Fish and Wildlife Service and other public programs. Details of stems planted from 2015 through 2017 appear in the summary of category-specific analyses in Appendix M.*

Assumptions underlying these targets include:

- Organizations, businesses, and landowners have access to technical information (e.g., best management practices) and technical support service providers (e.g., support for habitat site selection, site preparation, planting and maintenance)

- Sufficient public/private funding is available to defray costs for establishing and maintaining monarch habitat
- Sufficient seed is available for planting
- New and existing monarch habitat is properly established and maintained

Additional, unique inputs and assumptions were employed in formulating targets for each of the specific land cover categories. These included, but were not limited to, estimates of land cover acres available for habitat establishment, landowner habitat-adoption rates and biologically reasonable milkweed stem densities. These category-specific assumptions are discussed in Appendix M.

The combined habitat-category targets bound the Iowa’s goal of 160,000,000 new stems. It is anticipated that additional habitat targets will be established for land-use categories not addressed to date; e.g., Iowa Department of Transportation (IDOT) highway rights-of-ways, commercial property including utility power stations and transmission lines. Addition of these categories will be included in future versions of the Iowa Monarch Conservation Strategy. To the extent the combined, category-specific targets exceed Iowa’s goal of 160,000,000 new stems, this “reserve capacity” will ensure there is sufficient habitat to account for intermittent decreases in habitat establishment rates or unanticipated increases in monarch habitat loss. The “reserve capacity” also addresses uncertainties in the current analysis. For example, ongoing research and demonstration studies may indicate milkweed-seeding success or milkweed propagation rates were overestimated. To the extent habitat-establishment success or contributions of new habitat from other land-use categories are significantly greater than currently assumed, the consortium reserves the right to reduce the current estimated targets in a manner that maintains an appropriate “reserve capacity.” In the same manner, if current assumptions are found to over predict habitat establishment rates to the extent that it is unlikely Iowa can reach a goal of 160,000,000 new stems over the next 20 years, the consortium will consider revising category targets and/or increasing landowner recruitment efforts.

4.2 Designing a Landscape to Conserve the Eastern Monarch Butterfly in Iowa

Research is ongoing to inform landscape design approaches. Please refer to section 5.6 Research for more detail. Future versions will elaborate on this issue as research progresses.

4.3 Designing Habitat Patches for the Eastern Monarch Butterfly in Iowa

Research is ongoing to inform habitat design approaches. Please refer to section 5.6 Research for more detail. Future versions will elaborate on this issue as research progresses.

5.0 Species Conservation in Iowa

5.1 Administration

Administration and management of the planning and implementation of the strategy will be overseen by an Executive Committee, with specific activities and tasks undertaken by supporting committees and workgroups (see Appendix N). Clear processes for effective administration of the Executive Committee and Technical Committee are necessary to ensure that (1) the strategy

can be adapted to reflect substantive new information; (2) procedures and timelines for accomplishment reporting are established and documented; (3) the efforts of the various working groups concentrating on different tasks are coordinated; and (4) member organization leadership is kept aware of the overall effort and understands any needs so that resources can be allocated to important tasks.

It is possible that USDA could serve as the facilitator of a programmatic conservation plan as has been done for several other candidate and listed species. These conservation plans involved USDA NRCS and USFWS developing a section 7 conference opinion, which can be converted into a final biological opinion if a candidate species is listed. This conversion provides regulatory assurances by ensuring that plan participants receive incidental take coverage upon or soon after a listing (see [NRCS Working Lands for Wildlife website](#) to see species that USFWS has determined not to list because of NRCS-facilitated conservation plans – e.g., sage grouse and New England cottontail). It is important to note that in the USFWS approval of these agreements, USFWS recommended the non-federal landowners that are not eligible to receive support for species conservation with farm bill funds create a CCAA to have assurance of no regulatory surprises in the future. Thus it may be possible for USDA and USFWS to partner with private landowners in establishing the scientific and regulatory analyses that could then be used to create a related programmatic CCAA that could be facilitated by the state to address needs of private, non-agricultural landowners or for those producers or agricultural landowners that do not enroll in farm bill programs.

5.1.1 Executive Committee

The Executive Committee is comprised of senior decision-makers from each organization that is contributing to the strategy. The primary roles and responsibilities of the Executive Committee will include setting and approving strategic and tactical goals and objectives; evaluating proposals from the Technical Committee on work plans; formation of workgroups; approving annual progress reports; ensuring financial, in-kind and technical support for implementing the strategy; and maintaining coordination with national and regional organizations addressing monarch conservation. The Executive Committee will meet at least once a year but not more than quarterly.

5.1.2 Technical Committee

A Technical Committee, consisting of senior representatives from across all the supporting organizations, will be established. Upon formation of the technical committee, several workgroups will be formed to address issues concerning research; monitoring; landowner recruitment; data management; and information, outreach and communication. Upon concurrence of the Executive Committee, these workgroups will support the Technical Committee. Managers and staff from USDA (NRCS and Farm Service Agency [FSA]) and USFWS will serve as *ex officio* members of the Executive and Technical Committees. The Technical Committee will be responsible for overseeing the technical planning and execution of the strategy in areas including data management; monitoring; research; landowner recruitment; adaptive management; and information, education and outreach. The Technical Committee will also be responsible for developing yearly work plans and annual reports, which will be based on

a logic model to be developed by the Technical Committee, for approval by the Executive Committee.

Future versions of the strategy will formalize the by-laws for the Executive and Technical Committees.

As noted in the Introduction, the Iowa Monarch Conservation Strategy will not proceed in isolation of activities underway at the regional and national levels. Strong coordination and collaboration with these other efforts will help ensure efficiency and effectiveness at the state and national levels. Listed below is a summary of regional and national programs in which Iowa organizations are active participants. These organizations are advancing research that will support the Iowa Monarch Conservation Strategy as well as addressing policy and implementation issues at the national and regional levels, whose resolution will facilitate efficiency in Iowa's efforts.

5.1.3 Coordination with Regional and National Monarch Conservation Efforts

5.1.3.1 Department of Natural Resources Monarch Conservation Activities

5.1.3.1.1 *National Coordination*

The conservation and recreation division administrator of the Iowa DNR's Conservation and Recreation Division has liaised with USFWS Agency regional directors as well as State Fish and Game Agency directors from across the county to ensure that monarch conservation plans are as comprehensive as possible and that the plans meet as many of the challenges as possible for better PECE review. Most states are engaging on this issue in the hopes of preventing the need to list this species.

The administrator has also been invited by the USFWS to serve on their Monarch Advisory Committee on behalf of all states. The USFWS has been engaging with states to ensure that a state perspective is considered throughout their analysis.

Karen Kinkead (Ph.D.), Iowa DNR's Wildlife Diversity Program Coordinator, is a member of the USFWS monarch Species Status Assessment (SSA) team as well as the Monarch Conservation Science Partnership, which is developing a national monitoring plan.

5.1.3.1.2 *Regional Coordination*

The conservation and recreation division administrator is a member of the Midwest Association of Fish and Wildlife Agencies' (MAFWA) Monarch Working Group. This group is a representative group of 13 Fish and Wildlife Agencies across the Midwest. On the monarch conservation effort, MAFWA is taking a lead role in coordination and is working with states beyond the Midwest; MAFWA has received two National Fish and Wildlife Foundation (NFWF) grants.

The first grant, awarded in 2015, supports the development of state planning materials and a coordination meeting of the central states, which was held in Texas on January 18 to 20, 2017.

The second grant, awarded in 2016, facilitates the development of state plans by hiring a coordinator and technical advisor to work with states, and for the development of a mid-continent monarch conservation strategy, which is envisioned to roll up state monarch

conservation plans. Iowa's Monarch Conservation Strategy is incorporated in the Mid-America Monarch Conservation Strategy draft, which was released on March 12, 2018¹⁴. The states have agreed the regional plan should be evaluated by USFWS using the PECE requirements (found in Appendix I).

5.1.3.2 USDA NRCS

Monarch EQIP funds were allocated and efforts were made to establish approved monarch conservation practices (USDA NRCS 2015). The NRCS is working in the 10, core-states region, which includes Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Ohio, Oklahoma, Texas, and Wisconsin.

The Section 7 Monarch Conference report¹⁵ prepared by NRCS and FSA was finalized in December of 2016. The NRCS/USFWS Monarch Butterfly Partnership convened in early 2016 for the purpose of developing an agreement that would protect and conserve the species and ensure regulatory certainty (i.e., ESA predictability) for private landowners. The ESA predictability is the hallmark of NRCS' Working Lands for Wildlife initiative, which has successfully pre-empted federal listing of the sage grouse, New England cottontail and other imperiled species. The partnership identified 42 NRCS conservation practices useful for monarch conservation. These practices would be conditioned to ensure reliable protection and conservation benefits to the monarchs. Under an approved conservation plan, landowners would receive a 30-year promise that good deeds would not jeopardize their operations; thus, providing valuable regulatory certainty for agricultural operations. The NRCS Monarch Butterfly Habitat Development Project Screening Criteria Worksheet¹⁶ is designed to help prioritize acres for establishing monarch habitat.

5.1.3.3 USDA FSA

There is not currently a Section 7 Conference Report between USFWS and FSA for monarch conservation using CRP conservation practices; however, discussions between the two agencies was anticipated to start by the spring of 2017 (K. McPeck, personal communication 2/1/2017).

5.1.3.4 NC1205- Monarch Conservation

This NC1205¹⁷ project is coordinating regional efforts and communication and collaboration among investigators representing several disciplines and numerous land grant institutions. Coordination is ensuring that efforts build on existing knowledge and eliminate duplication of effort. The projected research will advance existing methods, models and knowledge to: (1) establish cost-effective methods to establish and maintain habitat patches that includes

¹⁴ <http://www.mafwa.org>

¹⁵ <https://www.fws.gov/savethemonarch/pdfs/MonarchConferenceReport2016.pdf>

¹⁶ https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwiW46yaiVzRAhUC2IMKHTfeDIsQFggkMAI&url=https%3A%2F%2Fwww.blogs.nrcs.usda.gov%2Fwps%2FPA_NRC_SConsumption%2Fdownload%3Fcid%3Dnrcseprd944808%26ext%3Dpdf&usg=AFQjCNFR3h6fd2hM2rgnF-ITylYCNzylug&sig2=FmPkop_nM_nDtPn1zNeP5w&bvm=bv.146094739,d.amc

¹⁷ <https://www.nimss.org/projects/18360>

milkweed, nectar sources, and companion plants that are geographically appropriate and offer season-long benefits for a variety of arthropod species; (2) determine optimal breeding habitat patch characteristics and landscape spatial arrangements to maintain and promote population; develop a model-based decision support system to guide conservation recommendations, understand monarch butterfly behavior and impacts of agricultural productive practices on monarch habitat; (3) establish broad, consistent survey and sampling protocols that can be applied region-wide to evaluate breeding habitat quality, monarch utilization of breeding habitat, and life stage assessment consistent for region-wide baseline; and (4) determine the socio-economic constraints and opportunity for private landowners, particularly farm landowners and managers, for engaging in conservation practices for maintaining breeding habitat patches at both the individual and community levels. Ultimately, this project will support the development and implementation of state and potentially regional monarch conservation strategies across the spring and summer eastern monarch breeding zones. This approach may also provide a model for other conservation challenges that span large geographic areas and multiple disciplines. Dr. Sue Blodgett, Chair Departments of Entomology and Natural Resource Ecology and Management, ISU, chairs this project and several ISU faculty members are active participants.

5.1.3.5 Monarch Conservation Science Partnership

This USGS- and USFWS–led Monarch Conservation Science Partnership¹⁸ is engaged in research to address information gaps associated with the ecology and conservation of monarch butterflies. Among these efforts include analyses of extinction risk, continental-scale full-annual-cycle demography, threats assessments, overwinter density estimation, milkweed target estimation, and storylines for conservation recovery as well as monitoring strategies. The partnership examines numerous issues related to monarch conservation, including approaches to predict changes in adult monarch populations at the national level, based on alternative habitat establishment scenarios, and the development of monarch and milkweed survey designs and protocols to support national, regional, and state monitoring programs. The collaboration includes Karen Kinkead (Ph.D.) from Iowa DNR and ISU researchers, including Steve Bradbury (Ph.D.), Tyler Grant (Ph.D.), and John Pleasants (Ph.D.).

5.1.3.6 Keystone Monarch Collaborative

Following recent declines in monarch butterfly populations, the Keystone Policy Center brought together a diverse group of committed stakeholders, including scientists, conservationists, farmers, and the private sector, to facilitate collaborative solutions that strengthens monarch populations and habitat. The Keystone Monarch Collaborative's¹⁹ initial meeting, held in spring of 2015, led to ongoing efforts to develop collaborative strategies to promote and implement actions that will support monarchs in agricultural landscapes. Iowa DNR and ISU are members of the steering committee, and Steven Bradbury (Ph.D.) is serving on the collaborative's steering committee. The Keystone effort is addressing national issues, such as habitat seed availability, best management practices (BMPs) for establishing and maintaining habitat and addressing federal monarch conservation policy questions with USFWS, USDA and USEPA. Many of the

¹⁸ <http://www.umesc.usgs.gov/management/dss/monarch.html>

¹⁹ <https://www.keystone.org/our-work/agriculture/monarch-collaborative/>

national organizations engaged on the Keystone Collaborative are also represented with their Iowa-based organizations on the Iowa Monarch Conservation Consortium. This coordination between national and state-based organizations will enhance efficiency in resolving conservation implementation issues that are related to federal policies and programs.

5.1.3.7 Iowa Monarch Conservation Consortium

The Iowa Monarch Conservation Consortium is a community-led organization whose mission is to enhance monarch butterfly reproduction and survival in Iowa through collaborative and coordinated efforts of farmers, private citizens and their organizations. The Iowa Monarch Conservation Consortium is composed of state-based organizations, including ISU, that agree on a common goal to enhance the monarch butterfly's reproduction across the state by supporting the propagation of breeding habitat through research, education and direct action. The consortium's research effort will establish a sound scientific foundation for Iowa's monarch butterfly conservation. The consortium's extension and outreach program will draw upon all the member organizations to ensure the broad delivery of practical, science-based information on monarch butterfly conservation practices for Iowa's landscapes. Habitat improvements in rural landscapes is targeting underutilized areas that do not conflict with agricultural production, are sufficient in scale to support improved monarch breeding success and that strive to complement other conservation programs.

5.1.3.8 Association of Fish and Wildlife Agencies

The Association of Fish and Wildlife Agencies (AFWA) represents North America's fish and wildlife agencies to advance sound, science-based management and conservation of fish and wildlife and their habitats in the public interest. The AFWA is engaged with monarch conservation on behalf of state fish and wildlife agencies. These efforts at AFWA are coordinated by Jonathan Mawdsley (Ph.D.), who is the Fish and Wildlife Science Coordinator at the Association of Fish and Wildlife Agencies.

5.1.3.9 Midwest Association of Fish and Wildlife Agencies

The MAFWA is an organization of 13 state and 3 provincial Midwest fish and wildlife agencies (Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, Manitoba, Ontario and Saskatchewan, www.mafwa.org). The MAFWA advocates state's rights in fish and wildlife issues, promotes efficiencies in government by exchanging research and management information and promotes multi-state, range-wide initiatives to keep species from being listed under the ESA.

With support from the National Wildlife Federation, Pheasants Forever and AFWA, MAFWA instigated regional monarch butterfly conservation planning efforts in 2015. The MAFWA held a monarch butterfly conservation workshop in October of 2015. The workshop, attended by over 70 participants representing state fish and wildlife agencies, state agriculture departments, universities and research institutions, and various federal agencies, served as a launch point for region-wide monarch conservation planning efforts.

5.1.4 Measuring Progress

Progress stemming from the strategy will be determined using the Iowa Monarch Conservation Strategy Logic Model (Figure 6), which tracks inputs, outputs and outcomes over time.

Additional modifications and fine tuning of the logic model will be addressed in future versions of the strategy.

Inputs. Types of inputs include, but are not limited to, outreach efforts, website coordination, funding, and logistical implementation details. While members, partners, and other organizations will be initiating these efforts, the roles of all Iowans, such as farmers, farm managers, private landowners, public land managers, and urban dwellers will be to make use of meetings,

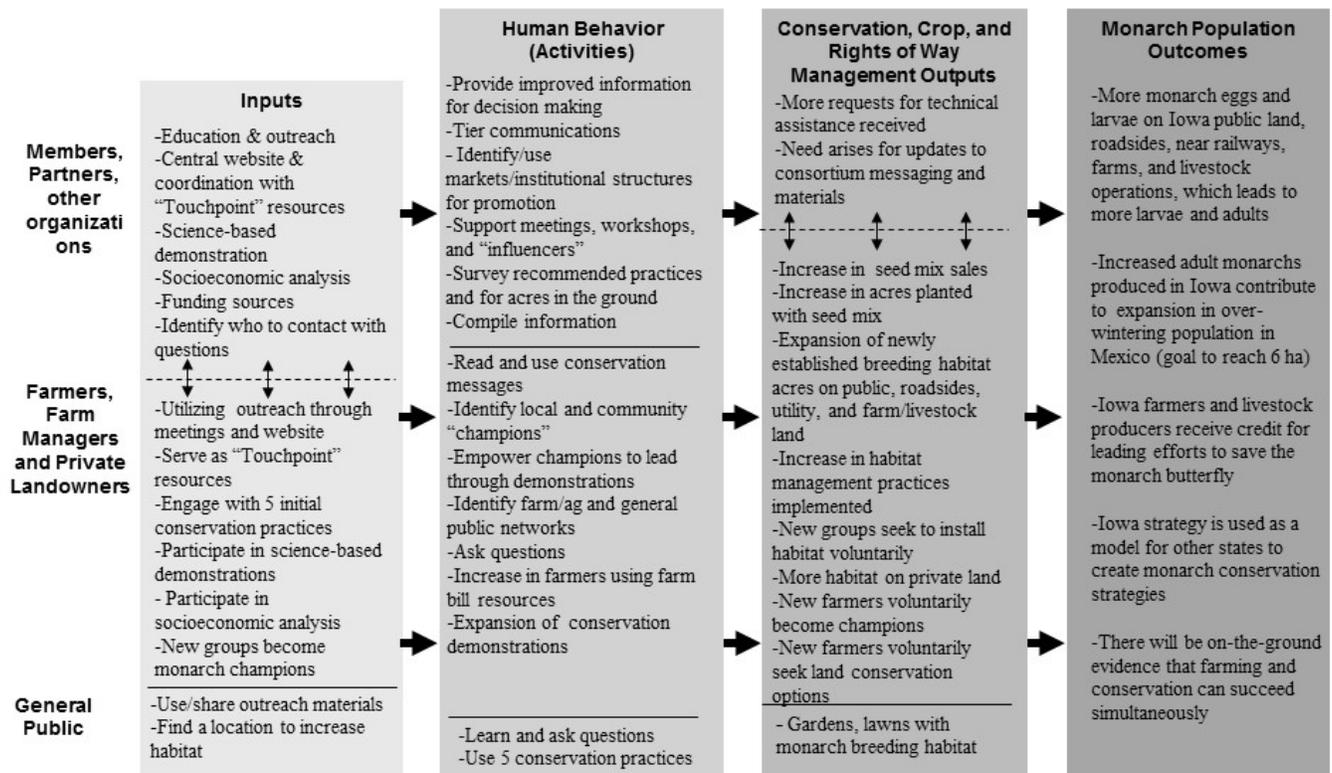


Figure 6. The Iowa Monarch Conservation Logic Model describes the flow between inputs and behavior to outputs and outcomes. It will be further refined in Version 2 of the strategy based on experiences gained and adaptive management.

communication efforts, participate in demonstration projects, join the effort to distribute information and resources, and to engage actively with the conservation practices endorsed by the Iowa Monarch Conservation Consortium (see Five Ways to Help the Monarchs text box below). The public will also have access to these resources to utilize and share.

5.1.4.1 Human Behaviors

Human behaviors will fundamentally influence the success of the strategy. Members, partners, and other organizations will provide information that will help farmers, farm managers, livestock producers, and other private landowners make decisions and will identify markets and options for promotion and execution of meetings and workshops. In the context of publicly owned land, state and agency behavior will also contribute to habitat implementation, while providing visibility of monarch efforts and learning opportunities for agricultural audiences and the public.

Surveys will also be distributed, and results will be compiled. Farmers, farm managers, and private landowners will be using conservation messages, making use of farm bill resources, and asking questions. It is essential for local champions to be identified and empowered to encourage peers to participate. The public will be encouraged to learn about conservation efforts, ask questions, and to make use of the five conservation practices (see Five Ways to Help the Monarchs text box below) on their properties or in local areas in their communities.

5.1.4.2 Outputs.

Conservation outputs demonstrate the successful impact of outreach effects. Members, partners, and other organizations will receive more questions and requests for technical assistance, and messaging and materials will need to be modified to fit changing communication needs. Farmers, farm managers, and private landowners will demonstrate active conservation adoption efforts through an increase in seed mix sales and acres planted with seed mix, and expansion of breeding habitat. Other indicators of program success will be additional farmers voluntarily becoming champions or establishing habitat as well as new groups seeking to support installation of habitat. For the public, outputs will include increased monarch breeding habitat in gardens and green spaces.

5.1.4.3 Outcomes

The increase in monarch population consistent with state and national goals will demonstrate the successful implementation of the strategy. This overall outcome will be documented by monitoring increases in monarch eggs, larvae, and adults on farms, livestock operations, Iowa public lands, roadsides, rights of ways (transportation and utility) and urban/suburban areas. Cumulatively, these gains will contribute to expansion in over-wintering monarch populations in Mexico (goal of 15 ac [6 ha] by 2020) and an increase in the population of adult monarchs to 225 million by 2020 (USG 2015). Finally, these outcomes will result in recognition of the work of Iowa farmers, farm managers, livestock producers, and landowners to lead efforts to save the monarch butterfly. These efforts will also serve as on-the-ground evidence that farming and conservation can succeed simultaneously.

The logic model provides a science-based perspective as to the nature of information that will be generated and interpreted to assess progress in meeting monarch conservation goals. Information needed includes, but is not limited to, evaluation of milkweed and nectar plant habitat placement to support monarch reproduction and survival. In version 2 of the strategy, specific sampling designs and metrics to evaluate habitat performance and monarch population responses will be elaborated in concert with surveillance monitoring (see 5.3 Monitoring). In addition, development of the strategy's data management plan will include maintaining information derived from the future monitoring program (5.2 Data Management). Linking changes in habitat

with changes in monarch population status is an area of active research and reflected in section 5.6 Research.

5.2 Data Management

The conservation of the monarch butterfly in Iowa will depend upon the collection and storage of a large amount of data, much of which must be shared amongst the many partners of the Iowa Monarch Conservation Consortium. In addition, information collected in Iowa will need to be aligned with and have the ability to be incorporated into regional and national conservation plans

Five Ways to Help the Monarchs

Take advantage of farm bill programs to establish monarch breeding habitat. Increasing the number of milkweeds and nectar-producing plants is vitally important for monarch conservation. These efforts also benefit other pollinators and related wildlife conservation goals. More detail is available at local USDA Service Centers or at nrqs.usda.gov.

Volunteer to establish monarch habitat on your farm as part of a demonstration project. The INHF and partners, through the Monarch Butterfly Flyway Project, is restoring or installing monarch habitat along two north-south migration corridors in Iowa. This project will partner to cost-share new pollinator seeding on public land or privately protected properties. Four additional grants already exist for EQIP-eligible lands, bioreactors, and land near hog confinements.

Follow federal pesticide labels and state regulations when applying pesticides labeled as toxic to bees to avoid unnecessary exposure to pollinators and monarchs. Adjust spray equipment to reduce drift by using low pressures, large droplets, and low boom heights. Avoid applications when wind speed is above 10 miles per hour or wind direction is toward monarch habitat. More detail is available at epa.gov/pollinator-protection.

Use monarch-friendly weed management recommendations for odd areas, roadsides and other rights-of-way (ROWs). Roadsides and ROWs offer opportunities for miles of monarch habitat (nectar and milkweed species). 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. More detail is available at tallgrassprairiecenter.org/irvm.

Establish a Monarch Waystation, a garden with both nectar plants and milkweeds, where monarchs can find nectar and reproduce. Monarchs lay eggs on milkweeds, the only food monarch caterpillars eat. Adults need flower nectar from spring through fall. More information is available at monarchwatch.org.

The Five Ways to Help the Monarchs were developed by the Iowa Monarch Conservation Consortium.

as appropriate. As such, the data required must be clearly identified, and rules and methods of dissemination among diverse partners will be established. Data in the following categories will be needed: habitat actions, outreach actions, administrative actions and habitat and monarch monitoring results. These data will be used to measure success and failure of the conservation strategy and serve as the basis for adapting the plan.

This system will need to ensure that it protects confidentiality of information, is statistically valid, and provides credible and accurate information.

5.2.1 Objective 1 – Assemble a Data Management Working Group to Develop a Strategy

This working group should include a data scientist as well as individuals representing ISU, a state government agency, a federal government agency, a non-governmental conservation organization, and a non-governmental agricultural organization. This team would be tasked with developing a data management strategy that addresses the following objectives and with overseeing the design of a system to store, organize, protect and disseminate shared information intended to demonstrate success (and failure) of this strategy. This committee would also identify the resources (e.g., time, funding, hardware and software) necessary to implement the data management strategy.

5.2.2 Objective 2 – Identify Data Needs

Member organizations of the consortium must identify key data needs to measure the effectiveness of the strategy's implementation. Monarch population trend data, amount and type of habitat established, amount and type of habitat improved, and the results of outreach efforts are all examples of the type of data that must be collected, stored and analyzed on a periodic basis. The exact data and format to be collected and how that data would fit into an adaptive management framework would be identified clearly and specifically. It is expected that species habitat and population goals must be established before this objective is met. Paramount to meeting this objective will be feedback from the monitoring; information, education and outreach; research; and administrative committees, as well as a full understanding of USFWS' PECE process and any related (i.e., regional and national) monarch conservation efforts.

5.2.3 Objective 3 – Acquire Required Data and Permissions

Because the data needs identified in Objective 2 may be sensitive or carry restrictions on how they may be shared, the committee would need to quickly identify such data for the purpose of developing agreements among data owners and users. Data sharing agreements should be explicit about who may have access, how the data may be used, and how it must be safeguarded.

5.2.4 Objective 4 – Establish Data Management Protocols

The Subcommittee would establish (or hire) a Database Custodian responsible for storing, protecting and disseminating all shared data. The appointed custodian would work with this committee to complete the following:

Determine appropriate hardware and software programs to store and process spatial and non-spatial data (both raw and processed), provide recommendations on how to acquire the same, and determine who will be responsible for the initial development of these tools;

Determine which sources of data would be allowed in the database (including submittal process, scale and format), and who may access the database (internal and external customers);

Ensure database is current and organized;

Ensure data would be protected from foreseeable vulnerabilities such as cyber-attack and loss (i.e., hackers and back-up, respectively);

Develop data summary and analysis methods, which will best inform periodic reviews of the overall strategy.

5.2.5 Objective 5 – Establish Data Sharing Protocols

The committee would establish a clear and specific data-sharing policy that will address the following:

Data requests from individuals and organizations external to the consortium and its established partnerships;

Data requests from members and partners of the consortium that are in addition to the established summaries and analyses;

Data dissemination and technical assistance to parties responsible for habitat establishment and land management including staff within conservation organizations as well as private landowners.

5.3 Monitoring

Monitoring serves two purposes – surveillance and effectiveness. Effectiveness monitoring is also known as research projects (how well does a species respond to a specific management action compared to another management action). Surveillance monitoring usually requires a larger sample size or a longer timeframe but can also be used to answer some specific questions (on occasion) and is most important for tracking a species' trend over time.

The Monarch Conservation Science Partnership (MCSP) is working on protocols for collecting data on milkweed and nectar resources, monarch egg and larval prevalence, and adult counts. As of February of 2017, the effort appears to be attempting to do both surveillance and effectiveness monitoring. Covering both can be difficult, and for purposes of this plan (tracking monarch trends over time), the following section will focus solely on surveillance monitoring. While some of the data collectors could be paid employees, given the national scope of the need, most data collected will be done so by citizen scientists. As part of the MCSP, the USGS is developing a Generalized Random Tessellation Strategy to assist with randomly selecting properties within each of the sectors (rights of way [transportation and utility], agricultural lands [crop, working grasslands which includes pastures, hayfields], and CRP), conservation and recreation lands [including all lands that are legally prevented from becoming crop land], and urban/suburban areas). There are still many details to be considered and worked out related to monitoring (see Appendix O for examples).

5.4 Landowner Recruitment

To effectively conserve the monarch butterfly, voluntary efforts to create and manage habitat on privately owned land will be essential due to the limited area of public land in Iowa. In order to engage with landowners on the topic, the consortium will work with conservation agencies to utilize outreach tools, propose conservation practices, address any conflicts between other conservation practices or crop or livestock production guidelines, encourage participation in science-based demonstrations and socioeconomic analyses, and develop a monarch champions program. There are many ways to recruit landowners, including formal activities by the consortium infrastructure in addition to partner organizations and institutions promoting and providing technical assistance to landowners who want to voluntarily opt in. Developing this network for outreach and assistance to landowners will lead to increased engagement and measurable outcomes regarding monarch populations. Currently there is a lack of capacity to (1) educate landowners on the economic benefits of establishing and maintaining habitat on their private lands and (2) assist landowners in establishing habitat on private lands, which includes completing the applicable enrollment and contracting procedures. These limiting factors will need to be addressed by the consortium to achieve landowner recruitment goals.

5.4.1 Estimated Need for Voluntary Conservation

Here, the need for purposeful and voluntary participation in land-management programs is discussed. Refer to Section 4.1 for range-wide and Iowa summary of monarch population and habitat goals. The “best parcels” for managing monarch habitat are still being determined through research, as discussed in Section 5.6.

Management opportunities on conservation and recreation lands may offset the anticipated need for voluntary management on private land. Roughly 600,000 ac (200,000 ha) of conservation and recreation land exists with many of those already available as “good” monarch habitat. While there are areas of public land that could be improved for monarchs, Iowa does not have enough public land to meet the need for monarch production, and not all is suitable for conversion to monarch habitat (e.g., timber). As discussed in Section 5.8.3.1, the Iowa DNR has multiple efforts ongoing related to monarch habitat establishment on public lands. This work is often in association with the INHF and the University of Northern Iowa’s Integrated Roadside Vegetation Management program.

Responses from Iowa farmers resulted in signed commitments to plant more than 175,000 ac (70,800 ha) of pollinator habitat through FSA’s continuous CP42CRP program (Curt Goettsch, USDA FSA, Personal Communication, December 14, 2016). This program helps farmers establish high-quality native wildflowers, legumes and shrubs that support pollinators. On CP-42, as with all CRP, mid-contract management is a requirement. In Iowa, CRP contracts participants have the following options: disking, disking and interseeding, burning, burning and interseeding, and interseeding only. Interseeding with milkweed is an approved option for mid-contract management seeding plans (Curt Goettsch, USDA FSA, Personal Communication, February 16, 2017).

There are at least 11 different programs available to Iowa farmers and landowners to help establish habitat (USDA – EQIP, Conservation Stewardship Program [CSP], Conservation

Innovation Grants [CIG], Wetland Reserve Program [WRP], Wetland Reserve Enhancement Program [WREP], CRP, Conservation Reserve Enhancement Program [CREP]; IDALS/Pathfinders Resource Conservation and Development (RC&D) – NFWF; Iowa Soybean Association; IPPA; INHF – NFWF). To evaluate the effectiveness and ability for these lands to meet habitat goals, monarch occupancy on such sites must be assessed, recognizing that because not all areas have sustainable habitat, habitat management in some locations will be needed. The need to educate landowners regarding habitat management on both public and private lands will be extremely important. A landowner management guide will be developed along with BMPs, as discussed in Section 5.5.

Evaluating and removing barriers to managing public and private land for the monarch butterfly is a real priority. Unless state and federal partners resolve factors limiting management on these lands (such as obtaining funding and getting management activities approved by agencies and accepted by the public), successfully carrying out this strategy may depend on additional voluntary participation of landowners. Also, local circumstances and reserve-design issues, such as connecting habitat patches, will clearly call for conservationists to enlist many private landowners in the conservation effort. Recruiting landowners is costly and time-consuming, but by utilizing targeted outreach through meetings, field days, and websites, this goal is achievable.

5.4.2 Objective 1: Convene Landowner Recruitment Team

The Iowa Monarch Conservation Consortium will establish a recruitment team to operate under the administrative framework. The team will coordinate efforts to make monarch conservation successful, such as developing outreach tools, increasing awareness of financial and educational opportunities, and creating a new Monarch Champions Program. Additionally, the team will adopt, revise, and share BMPs. The team, in consultation with the Technical Committee, should work with different agencies to approach owners of lands that are highly suited to habitat management benefiting monarchs in a consistent manner. To date, conservationists have made steady progress in signing up landowners willing to create pollinator habitat, but such efforts require considerable time and resources. The cost of time spent developing personal relationships with landowners, providing education and outreach materials monarchs, and negotiating habitat projects is considerable and can be a key limiting factor. The team could assist this effort with outreach materials and events to ensure a consistent message and a broader audience. Mailings, websites, telephone calls, and field days are potential tools for contacting and enlisting landowners.

5.4.3 Objective 2: Develop and Deliver Incentives

Conservationists must develop and deliver incentives to attract private landowners to participate in the conservation effort. Incentives may include regulatory assurances, such as CCAAs, which let private landowners continue to use their land and gain income from it while voluntarily creating habitat for monarchs. Other incentive examples include the NFWF grant opportunity IDALS (in association with Pathfinders RC&D) offered landowners through targeted conservation programs (refer to section 5.8) CCAAs provide legal guarantees that no additional regulatory burdens will be placed on cooperating landowners should the monarch butterfly formally be listed as threatened or endangered under the federal ESA.

5.4.4 Objective 3: Conduct Site Assessments

Conservation partners must assess properties owned by landowners interested in joining the monarch conservation effort to determine their suitability for management, identify landowners' objectives before management takes place, and develop effective management plans. This goal also encompasses encouraging landowners to participate in science-based demonstrations and socioeconomic analysis regarding the developed habitat.

5.4.5 Objective 4: Draft Applications, Preliminary Plans, and Cost Estimates

Conservation professionals must help in planning specific habitat work, estimating its cost, and drafting applications to programs that help landowners pay for creating and managing habitat on their lands.

5.4.6 Objective 5: Draft and Review Land Management Eligibility Criteria

To ensure that farm bill and other private land-management resources are directed to projects that maximize benefit to monarchs, conservationists should develop criteria for "best parcels" on private lands (ongoing research, discussed in Section 5.6). Program eligibility criteria may preempt the award of some funding; thereby, necessitating the need to find alternative funds through other programs. Recommendations on revision of rules directing eligibility should be collected and submitted through appropriate channels. This objective overlaps with the Technical Committee.

5.4.7 Objective 6: Manage Parcel Information and Landowner Status

Use decision-support tools and monarch data to identify key parcels, and track efforts to recruit landowners willing to manage those tracts (this objective overlaps with data management efforts). Additionally, develop a management guide (in association with BMPs) for landowners. Encourage landowners to participate in annual (periodic) site visits by agencies and consent of entry to land parcels for research purposes.

5.5 Best Management Practices for Habitat by Sector

In version 2, this section will provide a concise summary of current practices and references existing sources of support (e.g., USDA farm bill programs). Version 2 will include more detail, such as additional info about how BMPs will be established.

5.5.1 BMPs for Agricultural Lands

5.5.2 BMPs for Backyard Gardeners

5.5.3 BMPs for Urban Groups

5.5.4 BMPs for Schools and Churches

5.5.5 BMPs for Federal, State and County Agencies; NGO conservation lands

5.5.6 BMPs for Recreational Landowners

5.5.7 BMPs for Rights of Ways (e.g., road, rail, utilities)

5.6 Research

5.6.1 Active Research Projects: How to Plant Habitat

5.6.1.1 ISU: NRCS CIG-US “Enhancing Monarch Butterfly Conservation in Iowa”

To address monarch population declines, ISU has initiated a demonstration project to incorporate milkweed into existing grass-dominated landscapes on EQIP-eligible farms to support monarch butterfly recovery (\$760,897 awarded). Objectives for statewide demonstration and research include the following: (1) vegetation augmentation: partner with farmers to evaluate seed mixes and cost-effective methods for augmenting existing habitat, (2) vegetation replacement: partner with farmers to evaluate cost-effective methods for replacing existing grass-dominated habitat with milkweeds and companion plants, (3) evaluate additional milkweed species for plant growth, development, persistence, monarch oviposition preference and caterpillar performance, (4) disseminate project results through ISU Extension and Outreach field days and outreach.

5.6.1.2 ISU: NRCS CIG-IA “Integrating Nutrient Reduction and Monarch Conservation”

This project is the first to incorporate habitat enhancements specifically designed for monarch butterfly recovery and pollinators within the installation protocols for saturated buffers, a technology that plays a significant role in meeting Iowa’s nutrient reduction goals (\$75,000 awarded). Objectives of this study include the following: (1) demonstrate effective methods for establishing monarch and pollinator habitat in riparian zones associated with installation of saturated buffers. In doing this, ISU is partnering with EQIP producers and NRCS to evaluate the costs to establish and maintain enhanced habitat as part of saturated buffer installation. (2) disseminate project results through ISU Extension and Outreach field days and outreach.

5.6.1.3 ISU: Iowa Soybean Association Grant “Establishing Monarch Breeding Habitat as Bioreactor Groundcover”

This project provides support to ISU to develop approaches to enhance vegetative groundcover over new and existing bioreactors to provide habitat to support monarch butterfly breeding (\$86,154 awarded for 2016 to 2018). Objectives include the following: (1) development of cost-effective methods for establishing monarch habitat over bioreactors; (2) evaluation of establishment and persistence of milkweeds and companion plants and monarch utilization as “habitat-enhanced” bioreactor sites; and (3) extension of best practices through field days, videos, and publication of guidelines for monarch habitat establishment. The dual use of “habitat-enhanced” bioreactors benefit soybean farmers by supporting strategies for state-wide reductions in nutrient loads, increasing monarch reproduction and enhanced pollinator diversity throughout the state.

5.6.1.4 ISU: Iowa Pork Producers Association Grant “Establishing Monarch Butterfly Breeding Habitat on Iowa Swine Production Sites”

The dual use of “habitat-enhanced” swine production sites benefits swine producers by adding a key strategy for environmental improvement at Iowa’s swine production sites and significantly increasing monarch reproduction and enhancing pollinator diversity throughout the state

(\$125,841 awarded for 2016 to 2018). Objectives include the following: (1) to develop cost-effective, bio-secure methods for establishing monarch habitat at Iowa swine production sites; (2) evaluate establishment and persistence of milkweeds and companion plants and monarch utilization at “habitat-enhanced” swine production sites; and (3) extend best practices through video and publication of guidelines for monarch habitat establishment and management.

5.6.1.5 University of Northern Iowa: Tallgrass Prairie Center

Seed mixes designed to meet single-goal conservation objectives (e.g. pollinator forage) may not be sufficient to produce stands of native vegetation that persist long-term. This project’s objective is to compare measures of native vegetation quality and cost effectiveness in field experiments with and without establishment mowing for three different seed mixes that differ in grass-to-forb ratio and soil type customization (economy grass mix, diversity mix, and pollinator mix). After two years of vegetation establishment, the diversity mix had four times as many native stems, had greater native cover, and had equal amounts of native forbs as the pollinator mix. The diversity mix was also four times more cost-effective in producing native vegetation. Continuing work on this project will assess long-term vegetation measures to understand how well seed mixes and early establishment outcomes and can predict long-term ecological quality in native plantings. The University of Northern Iowa has a set of materials for best management practices for agricultural lands, including five technical guides, several videos, and more will be produced in the next year. In addition, the Integrated Roadside Vegetation Management office within the Tallgrass Prairie Center has materials for best management practices for rights of ways.

5.6.2 Active Research Projects: How Many Habitat Patches are Needed, What Arrangement is Best, and What Kind of Quality is Necessary?

5.6.2.1 ISU/Consortium Funded Research

This project’s overall goal is to contribute to scientific foundational studies of eastern monarch butterfly feeding and breeding behaviors in response to habitat characteristics and pesticide pressures within agroecosystems. The objectives are to (1) further the development of a spatially explicit model for monarch butterfly movement and egg-laying behavior, (2) understand monarch field movement and habitat utilization, (3) determine the sensitivity of monarch larvae to insecticide levels in corn and soybean agricultural regions, and (4) determine the effect of herbicides on common milkweed and the potential impact on monarch butterfly egg and larvae counts. Empirical data on monarch utilization of various habitat/patch characteristics (fragmentation and density) are being collected using radio telemetry in Iowa corn and soybean agricultural areas. Toxicity of pesticides are being determined to assess effects on larval survival and development in habitat patches. Collected data are contributing to the enhancement of a spatially explicit population model that is being used to evaluate monarch productivity based on varying milkweed/companion plant species combinations, patch sizes, and spatial arrangements. The spatially explicit model serves as a starting point for modeling monarch population responses at state and regional scales and will guide future conservation plans. Portions of this research effort are within a USDA-NIFA grant that was awarded on February 1, 2018.

5.6.2.2 University of Minnesota Monarch Lab

The University of Minnesota Monarch Lab is studying the effectiveness of prairie restoration efforts. Working with USFWS, NRCS, the Wisconsin DNR, and a private company, Prairie Restorations Inc., the lab identified 30 restored prairies in Minnesota and Wisconsin. For each site, information was acquired on the planting date, seed mix, and all management actions (burning, mowing, re-seeding). The field season spanned from May until September, and each site was visited four times in order to capture a full blooming season. Data was collected on milkweed density, monarch egg and larvae density, adult monarch sightings, and nectar plant frequency. Preliminary results indicate that most restored prairies have a peak bloom in the midsummer, but nectar plants are available to monarchs throughout the season. Additionally, it was observed that milkweed was often present even if not included in the seed mix. Common milkweed grew in 14 out of 14 sites where it was planted, but was also present in 11 more sites where it was not planted. Unfortunately, very few monarchs were observed in 2016; thus conclusions on the correlation between management practices and greater monarch densities are not yet available. Data from the study is being processed.

5.6.3 Active Research Projects: How can Monitoring Efforts be Coordinated?

5.6.3.1 Iowa DNR Multiple Species Inventory and Monitoring Program

The Iowa DNR partners with ISU to carry out the Multiple Species Inventory and Monitoring Program (MSIM). This program has been surveying properties (mostly public land, some private lands sites) since 2006. Over 300 properties have been surveyed by wildlife technicians recording observations of butterflies (as well as mammals, birds, reptiles and amphibians, dragonflies, etc.). These surveys provide information about how Iowa's monarch population trends compare to the annual surveys at the overwintering sites as well as how monarch occupancy relates to habitat condition on conservation lands.

5.6.4 Active Research Projects: How will Climate affect Monarch Population Viability?

5.6.4.1 ISU/Department of Defense

Ecologists now widely recognize that the timing of monarch life cycle events is shifting in response to directional (non-stationary) environmental change. However, it is not clear whether these shifts generally benefit or reduce population viability. This project will combine historical data and experimental manipulations to determine how environmental variation and shifting interactions affect population viability of at-risk species. The goals of this project are to investigate (1) the extent of recent changes in phenology, (2) the correspondence between new phenologies of interacting species, and (3) the importance of these changes for population viability. Work will focus on three at-risk butterfly species (Baltimore checkerspot [*Euphydryas phaeton*], Puget blue [*Plebejus icarioides blackmorei*] and monarch [*Danaus plexippus*]). All three species are not currently federally listed but are under consideration for listing at various levels. By integrating vital rates across the life cycle into demographic models, these efforts will contribute to understanding management of these species and to a general framework to

highlight conditions under which phenological changes have positive, negative, or negligible effects on population dynamics (award total is \$2,136,945 from 2017 to 2022).

5.6.5 Proposed Research: Evaluation of Existing Habitat

5.6.5.1 University of Minnesota Monarch Lab

A research project entitled, “Evaluating the Suitability of Roadway corridors for Use by Monarch Butterflies” is supported through the National Cooperative Highway Research Program and aims to deliver tools and methodology that will assist roadside managers in (1) selecting roadside habitat for restoration at broad and fine scales, (2) evaluating habitat quality and potential to produce monarchs and (3) selecting appropriate best management practices for habitat management and/or restoration. This is a two-year study conducted by the University of Minnesota and supervised by Karen Oberhauser (Ph.D.).

5.6.5.2 ISU: Evaluation of Monarch Roadside Habitat and Monarch Mortality

This research project was proposed by the ISU Center for Transportation Research and Education and submitted to the National Cooperative Highway Research Program. The proposed research effort was designed to investigate suitable use of road right-of-way corridors to enhance and sustain future monarch butterfly habitat, growth, and migration. The grant proposed to address the following three questions:

- What are the current habitat quality and milkweed density attributes of highway corridor right-of-way?
- What are the related “source” metrics for promoting monarchs within these corridors?
- What are the related “sink” metrics for highway-related mortality with monarchs utilizing these corridors?

Funding for this grant was not successful, but a smaller \$25,000 seed grant from NSF was awarded, which will allow the team to develop research methods related to this proposal.

5.7 Information, Education and Outreach

Since one of the major goals of this effort is to increase acres of milkweed habitat, the primary target audience will be rural landowners, including farmers. There will also be many secondary audiences, such as gardeners, urban groups, schools, churches and recreational landowners; federal, state, and county agencies; and private, county and state-managed rights of ways, such as railways, utilities, and roadsides. All messages will be positive and consistent. The first two messages that will be distributed are

- Iowa is taking a leadership role in monarch conservation by creating this strategy and promoting voluntary conservation efforts based on science
While everyone has a role to play, farmers are needed for the strategy to be succeed; farming and monarch conservation can occur simultaneously
- The Iowa Monarch Conservation Consortium is a community-led organization whose mission is to enhance monarch butterfly reproduction and survival in Iowa through collaborative and coordinated efforts of farmers, private citizens and their organizations

Additional messages will continue to be crafted for other audiences. Thus far, tools for sharing monarch information include the consortium website, Iowamonarchs.info, the 5 Ways to Help Monarchs half-page handout created by IDALS, a strategy summary document (full page), and a dedicated Facebook page and Twitter account. Partnering organizations will be empowered to use the tools readily available to them to distribute these resources. Consistent talking points will be made available to all organizations, including answers to the most commonly asked questions. Technical experts/organizations who can field questions about various topics will also be identified. In addition, channels for distributing the message will be determined, such as the Farm Progress Show, consortium member events, meetings, tradeshow, or sponsored media events. Measures of success using goals and metrics based on the logic model, including how often communications will be measured, will be explained in Version 2.

The communication plan will be closely coordinated with landowner recruitment efforts, and efforts to disseminate information will be tracked in the data management system. For example, outreach events, locations, dates and approximate participant numbers will be recorded, and contact information from individuals who contact the consortium will be stored for reference (signing up for notifications/email will be an additional option but not required). Potential issues include the challenge of staying in alignment across organizations with their communication efforts. Another challenge will be finding a way to coordinate communication content and timing with numerous organizations that are also promoting monarch conservation and to establish a consistent process that can be utilized repeatedly. Consistent dedication to the communication effort is perceived to require consistent funding.

5.8 Accomplishments Through 2016

Note: Appendix M provides a summary of habitat accomplishments through 2017.

5.8.1 Federal Monarch Conservation Progress

Nationally, many federal (USDA, NRCS, FSA, and DOI, USFWS) and state programs are actively supporting voluntary monarch conservation, and the majority of private grasslands and shallow wetlands in Iowa have been restored from cropland after being enrolled in term or perpetual easement programs administered by the USDA. These efforts include FSA CRP, including the State Acres for Wildlife Enhancement (SAFE), and CREP: Pollinator Habitat Planting CP-42, Honey Bee Initiative, NRCS EQIP, NRCS CSP, NRCS Agricultural Conservation Easement Program (ACEP--formerly the Wetland Reserve Program), comprised of the Agricultural Land Easement (ALE) and Wetland Reserve Easement (WRE) programs. In addition, public/private partnerships on federal land has allowed the USFWS Neil Smith Wildlife Refuge to receive funding through the People for Pollinators Program, which received \$220,770 for monarch habitat installation in 2017. All lands enrolled in the WRP, WRE and ALE as well as many CSP practices and some EQIP practices, as conservation lands, have the potential to benefit monarchs (Table 2). Note that pollinator/monarch plantings are not planted on all these acres.

At one time, 2,200,000 ac (890,000 ha) of Iowa were enrolled in the CRP; however, program changes and early failure to keep pace with cash rental rates at a time of high crop prices reduced

enrollment to 694,000 ac (281,000 ha) by 2014. However, continued interest in a more targeted CRP and cyclical, declining crop prices again has resulted in the current CRP enrollment figure of 1,688,975 ac (683,503 ha). The 2014 farm bill reduced the national cap on CRP from 38,500,000 to 24,000,000 ac (15,600,000 to 9,110,000 ha) effective in 2017 and 2018, and the total number of acres nationally is close to this cap 23,880,000 ac (9,664,000 ha) (Wiesemeyer and Bernard 2016). Continuous CRP conservation practices, such as CP42, Pollinator Enhancement, currently capped at 280,000 ac (110,000 ha) nationwide is very popular in Iowa, which has over 175,725 ac (71,113 ha) already enrolled or over 55% of the total national enrollment.

Iowa has thousands of acres of CRP set to expire from 2016 to 2020: 95,657 ac (38,711 ha) in 2016; 218,230 ac (88,314 ha) in 2017; 160,120 ac (64,798 ha) in 2018; 136,407 ac (55,201.9 ha) in 2019; 208,545 ac (84,395.2 ha) in 2020, and 91,918 ac (37,197.9 ha) in 2021, or a total area of approximately 911,000 ac (369,000 ha). However, it is reasonable to assume that many if not all of these acres will be re-enrolled based on past experience.

Table 2²⁰. Iowa USDA Conservation Program enrollments as of September, 2016. The total area added in 2016 was 1,992,725 ac (806,427 ha).

| Program | Area (ac) | Source |
|---|-------------------|--|
| CRP (General) | 715,154 ac | www.fsa.usda.gov/Assets/USDA-FSA-Public/usdfiles/Conservation/PDF/sep2016.pdf |
| CRP (Continuous) | 973,821 ac | www.fsa.usda.gov/Assets/USDA-FSA-Public/usdfiles/Conservation/PDF/sep2016.pdf |
| SAFE – Early Successional/Neotropical Birds | Goal = 1,200 ac | Iowa DNR |
| SAFE – Gaining Ground (Grassland Birds) | Goal = 167,150 ac | Iowa FSA |
| SAFE – Grand River (Grassland Birds in Ringgold County) | Goal = 2,200 ac | Iowa DNR |
| SAFE – Pheasant Recovery | Goal = 89,000 ac | Iowa FSA |
| SAFE – Early Successional Quail Habitat | Goal = 40,000 ac | Iowa FSA |
| CSP | 0 ac†‡ | USDA NRCS, Personal Communication with James Cronin, December 29, 2016 |
| WRP | 178 ac† | USDA NRCS, Personal Communication with James Cronin, December 29, 2016 |
| ACEP (ALE and WRE) | 3,842 ac# | www.nrcs.usda.gov/Internet/NRCS_RCA/reports/srpt_cp_acep.html |
| EQIP (new contracts) | 180 ac† | USDA NRCS, Personal Communication with James Cronin, December 29, 2016 |
| Total Potential Acres | 1,992,725 ac | |

† Reported acres target monarchs specifically (not pollinators in general) in 2016.

‡ Only one plant enhancement activity called PLT-15 targeted monarch/pollinators in FY16, whereas one enhancement will target monarchs in fiscal year 2017 with an additional three enhancements specifically targeting pollinators and beneficial insects

ACEP acres enrolled in 2014 and 2015 are included. There were no new WRE contracts in 2016 (James Cronin, USDA NRCS, Personal Communication, December 29, 2016).

²⁰ With the exception of the acres noted with †, areas reflect conservation efforts; the practices that include blooming native plants that provide forage for monarchs should provide some benefit to monarchs, and the practices that only include grasses will not provide any benefits for forage or egg laying.

5.8.1.1 USDA NRCS

Iowa monarch EQIP funds were allocated, and efforts were made to establish approved monarch conservation practices. Iowa requested an amount of \$150,000 (\$135,000 is obligated as of February 2017). Nationally, \$1.8 million was requested under EQIP, and currently, 93% of this is obligated. The NRCS state offices may request additional funding in fiscal year 2017. In addition to monarch project funds, NRCS state offices have wildlife subaccounts associated with their EQIP programs, whereby eligible landowners may also support monarch conservation. The NRCS wetland easement programs (WRP and WRE) as well as the CSP are also expected to receive targeted funding in fiscal year 2017.

5.8.1.2 USDA FSA

From mid-2015 through 2016, an additional 136,200 ac (55,120 ha) of habitat have been installed under pollinator contracts; most but not all have milkweed included in the mix. Iowa farmers have planted more than 175,725 ac (71,113 ha) of pollinator habitat through the FSA's continuous CP42 CRP over seven years (most was installed in from mid-2015 through 2016); this accounts for over 55% of the current national enrollment. A minimum of three species were included for pollinator nectar sources for late season migration.

5.8.1.3 USFWS

In addition, federal funds are being used to restore monarch habitat in Iowa with several projects. The USFWS Partners for Fish and Wildlife Program in Iowa provides cost share and technical assistance to landowners on a wide array of USFWS and USDA conservation programs. The partners program presently has an operations budget of roughly \$100,000 per year. The Iowa Partners for Fish and Wildlife Program is a participant in a NFWF-funded project known as the I-35 Corridor Project, which seeks to provide a series of monarch migration stepping stones from Duluth, Minnesota to Laredo, Texas. I-35 is often called the "Monarch Highway." Several million dollars have been committed to the project so far for up to 200,000 ac (80,000 ha) of federally funded habitat restoration and protection and for grants to private landowners. A NFWF grant award of \$500,082 was also given to USFWS to be used in 2017 to restore habitat in the Midwest.

The USFWS also administers the North American Wetlands Conservation Act (NAWCA) for wetland and adjacent upland restoration and protection. The NAWCA is authorized to receive up to \$50 million annually, with 50% block granted to Canada and Mexico. In 2016, \$33 million was appropriated. There are two grant cycles per year and two types of grants: Standard Grants for over \$75,000 and usually over \$1 million, and small grants for projects under \$75,000. The small grant application process is relatively simple and may provide an opportunity for county and community-scale conservation projects. In recent years, Iowa has received about \$2 million annually in NAWCA grants. The Iowa DNR sits on the NAWCA Council and makes recommendations for funding to the Congressional Migratory Bird Conservation Committee that has final approval authority.

5.8.2 US Army Corps of Engineers

The US Army Corps of Engineers has been working to restore wetland habitat throughout the State of Iowa through a wetland mitigation program. During the last five years, approximately

474.2 ac (191.8 ha) have been established. While the primary goal of the mitigation sites is to replace the function and value of wetlands lost as a result of the Corps' permitting process, the restored areas do provide space for milkweed to thrive, and milkweed has been observed within the sites even though they are not managed specifically to serve as monarch habitat.

The Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS) website shows the locations and sizes of mitigation banks in the United States and within Iowa:
https://ribits.usace.army.mil/ribits_apex/f?p=107:2.

5.8.3 Iowa Monarch Conservation Progress

5.8.3.1 Iowa DNR Monarch Conservation Activities

5.8.3.1.1 Iowa DNR: Conservation Delivery on Private Lands

The Iowa DNR's Private Lands Program has staff members located in USDA Service Centers. The Iowa DNR Private Lands staff members partner with Conservation Districts of Iowa, NRCS, FSA, IDALS, Pheasants Forever, the USFWS, and others to deliver conservation assistance (technical and financial) to private landowners in Iowa. Beginning in 2015, the DNR's Private Lands Program has engaged with the USFWS Partners for Fish and Wildlife Program to defray seed costs to landowners planting monarch-friendly habitat. The program is also part of the partnership implementing the NFWF grant led by the INHF.

5.8.3.1.2 Iowa DNR: Monarch Conservation on Land Owned or Managed by DNR

The Iowa DNR prairie reconstruction projects in Iowa have averaged about 1,950 ac (789 ha) per year since 2000. The Iowa DNR Prairie Resource Center (PRC) has been supplying the department with diverse local ecotype prairie seed since 2000 for use on Iowa DNR lands. The majority of the 21,500 ac (8,700 ha) of public grassland may be manipulated if necessary to increase forb density, however, significant additional resources would be needed to accomplish this on such a wide scale. Williams et al. 2007 demonstrated that overseeding followed by frequent first year mowing successfully augmented species-poor grasslands with high densities of native nectar plants.

For the past several years, the PRC has worked to increase the amount and the diversity of species of milkweed plants used in grassland restoration projects on public lands. Monarch Joint Venture small grants and PRC's partnership with University of Northern Iowa's Tallgrass Prairie Center have supported this effort. The director of the PRC also collaborates with ISU plant pathologists to improve milkweed production techniques.

The Iowa DNR Wildlife Bureau recently partnered with the Iowa Agriculture Water Alliance and IDALS on a \$10 million grant proposal to the NRCS Regional Conservation Partnership Program (RCPP). Of the \$10 million to be spent over four years, \$2 million were for ACEP ALE (grassland) and WRE easements. This portion of the RCPP grant is being administered by the DNR Wildlife Bureau and INHF.

In 2015, in response to staff questions about how to best help monarchs on properties they manage, the Iowa DNR developed habitat management guidance for managers of wildlife areas and state parks and forests.

5.8.3.1.3 Iowa DNR: Education and Outreach

The Iowa DNR staff participate in monarch conservation events, such as the Blank Park Zoo's Monarch Festival. The Iowa DNR is a member of the Plant.Grow.Fly. partnership. Staff conduct presentations to citizens on topics, such as gardening for pollinators and monarch tagging. The Iowa DNR and IDALS have used opportunities such as these and the Iowa State Fair to hand out handouts developed by the consortium depicting the Five Conservation Actions that citizens can begin now to help monarchs.

5.8.3.2 IDALS: National Fish and Wildlife Foundation Grant

The IDALS, in partnership with Pathfinders (RC&D), received a NFWF grant during the fall of 2015 for \$227,400 with the goal of establishing 3,311 ac (1,340 ha) of habitat in 4 Division programs. Most acres have been added through the Buffer Initiative incentive program on CP42. So far, IDALS has implemented 4,467 ac (1,807 ha), which is 1,156 ac (467.8 ha) more than the established goal. Funding for several field days during 2017 is also included in this grant. Some will be internal staff field days and two will be public field days with ISU Iowa Learning Farms.

5.8.3.3 Iowa's County Conservation System

Iowa's County Conservation System is supporting monarch conservation by restoring monarch habitat, hosting educational outreach events, and cooperating with Monarch Watch to create waystations and tag monarchs. This section only includes progress updates from a few of the counties; additional county updates are included in Appendix P, and future versions of the strategy will include information from additional counties as more detail becomes available.

5.8.3.3.1 Adair County

The Adair County Conservation Board planted 19 ac (7.7 ha) of Monarch Habitat in 2016 at the Hoskins Wildlife Area as part of an Iowa DNR/USFWS monarch project. In addition to the pollinator mix that was planted as part of the grant, the Conservation Board Staff hand harvested common milkweed, prairie blazing star and rattlesnake master seed and planted on the 19 ac. The Orient-Macksburg School Future Farmers of America classes grew common milkweed plants in their green house and gave the plants away in the community as part of the effort to help monarchs.

5.8.3.3.2 Cerro Gordo County

The Cerro Gordo County Conservation Board has supported monarch conservation with communication and outreach efforts as well as habitat restoration efforts:

- Created materials to support monarch programs, including a logo, flier and website (www.monarchmania.com)
- Registered 54 gardens registered through the website (surpassed goal of 50)
 - Received numerous photos submissions

- Included numerous blog posts
- Published two local newspaper articles with an introduction to the program (November 2015) and an announcement about the website launch (February 2016)
- Promoted monarch program via KIMT TV story (June of 2016)
- Planted pollinator habitat at local schools (provided plants, mulch, landscape fabric) to Hoover (270 ft² [25 m²]); Clear Creek (22,000 ft² frost seeding [2,044 m²]); 100 ft² (9 m²) garden; Jefferson (150 ft² [14 m²]); Roosevelt (200 ft² [20 m²]); and Harding (200 ft² [20 m²])
- Planted milkweed plants at local schools, including Mason City High School (1,500 plants) and West Fork Middle School (5,000 plants)
- Planted or distributed milkweed plants (distributed approximately 5,500 plants) to registered Monarch Mania gardeners, Fresh on Fridays at Central Gardens (Clear Lake), Clear Lake Farmer’s Market, Five school gardens, Lime Creek Nature Center planting (240 plants), YMCA planting, and to the general public.
- Distributed Monarch Mania signs and certificates for registered gardens
- Hosted eight programs for civic groups – 184 people
- Coordinated programs and education, including a presentation by Dr. Karen Oberhauser (May of 2016) (60 people), Facebook posts/Lime Creek Nature Center website, school monarch programming (September/October – 7 programs for 270 students), for seniors only – pollinators (October) (48 people), Monarch Mania pollinator garden program (November) (58 people), pollinator programs for all county elementary schools for National Wildlife Week – (37 programs for 2,270 students) and a Band Festival Float (3rd place)

5.8.3.3.3 *Decatur County*

In 2015, Decatur County Conservation worked with USFWS to plant approximately 10 ac (4 ha) of monarch butterfly habitat at Slip Bluff Park. In 2016, working with the Southern Iowa Oak Savanna Alliance (SIOSA) and Graceland University, a “Bringing Back the Monarchs” workshop was held with 20 participants. This workshop covered Monarch lifecycles, habitat needs and monitoring. Graceland students, Decatur County Conservation Board Staff and SIOSA will be regularly monitoring the pollinator plot at Slip Bluff to study Monarch use of the area through a Rural Energy for America Program (REAP) Conservation Education Program Grant received by SIOSA.

5.8.3.3.4 *Dickinson County*

Pollinator Habitat and Biodiversity Projects

Dickinson County Conservation completed the following reseeding and diversity projects, which should be beneficial to monarchs even though the habitat was not designed to meet monarch specific habitat requirements. The following projects were completed in 2016:

- 57 total ac (23 ha) reseeded to diverse prairie and savanna at Horseshoe Bend, Judd Wildlife Area, Kenue Park, Nature Center, EOB Bio-cell and County ROW
- 245 ac (99.1 ha) burned to promote habitat diversity at Horseshoe Bend, Judd Wildlife Area, Kenue Park, Little Sioux Savanna
- 1,000 native plant plugs planted into low-diversity areas @ Horseshoe Bend, Kenue Park, and EOB Bio-cell
- Over 100 lbs of native seed, including threatened species, collected for future integration into low-diversity areas

The following projects are planned for 2017:

- 45+ ac (18 ha) to be reseeded at Judd, Little Sioux Savanna, Hog Lot, Nature Center, Audubon Bird Sanctuary
- 15 ac (6.1 ha) of low diversity areas to be interseeded with collected seed at Horseshoe Bend
- 1,000 native plant plugs to be planted into low-diversity areas @ Horseshoe Bend
- 450+ ac (182 ha) to be burned to promote habitat diversity at Horseshoe Bend, Judd Wildlife Area, Little Foote Forest, Little Sioux Savanna, Jahn Wildlife Area, Nature Center, County ROW
- 20+ ac (8.1 ha) of invasive brush to be eliminated at Horseshoe Bend, Little Sioux Savanna, Judd Wildlife Area
- Collect over 100 lb (40 kg) of native seed for integration into low-diversity areas
- Establishment of a wetland on the western edge of Kenue Park

Dickinson County Conservation restoration work will continue into 2018 and beyond as work continues to promote biodiversity and critical pollinator habitat within county-owned land and county rights of ways. In addition to reseeding altered areas, interseeding low-diversity areas, controlling invasive species, and conducting prescribed fires, Dickinson County Conservation is in the early stages of oxbow and wetland restoration projects at Horseshoe Bend, Judd Wildlife Area and Kenue Park, and in the coming years may implement a patch-burn grazing system at the Judd Wildlife Area. Additionally, Dickinson County Conservation provides training in biodiversity-based land management for seasonal and part-time staff with the hope that they will take what they've learned and apply it later in their careers. Dickinson County Conservation also holds the annual Bee and Butterfly Festival which brings approximately 600 visitors to the local nature center where participants learn about bees and butterflies and get to tag monarchs. Dickinson County Conservation have guest speakers come and give presentations to the public about pollinators. They also have an indoor bee hive located in the nature center with education on the life cycle and members of the colony. Dickinson County Conservation have a butterfly garden that is maintained, and they are in the process of doing a nature center expansion by adding a room devoted just to pollinators (in the design phase for the building and look to begin fundraising and construction during the summer).

5.8.3.3.5 *Fayette County*

The Fayette County Conservation Board has partnered with Fayette County Pheasants Forever, USDA NRCS, Fayette County Soil and Water Conservation District, NFWF, Living Roadway Trust Fund, and private landowners to implement pollinator conservation projects. Fayette County Conservation and Fayette County Pheasants Forever have cooperated for over 20 years to establish native grasses and forbs throughout the county so adding pollinator habitat is simply an extension of work that is ongoing.

In 2015, the Fayette County Conservation Board was engaged in the planting of 307 ac (124 ha) of pollinator habitat on 28 separate landowner's properties. These plantings were established as part of CRP. In 2016, contract seeding CRP efforts continued. With news spreading that monarchs were in a huge decline, there was increased demand for pollinator habitat seeding. The Fayette County Conservation Board planted 903 ac (365 ac) of pollinator habitat on 48 separate landowner's properties, and so far for 2017, the Board has requests to seed 804 ac (325 ha) of pollinator habitat for 25 landowners

Fayette County Conservation, with its partners, also acquired a 94 ac (38 ha) property in 2016, which included a remnant prairie. The Fritz Prairie property included 46 ac (19 ha) that was planted with a pollinator seed mix and was enhanced with additional common and butterfly milkweed seed. The one mile of adjacent roadsides was seeded to pollinator habitat by Fayette County Roadside Management and were enhanced with additional common milkweed that was harvested from the Gilbertson Nature Center.

In 2016, the Fayette County Conservation Board also converted 20 ac (8 ha) of existing vegetation to pollinator habitat. A 12 ac (4.9 ha) field at the Gilbertson Complex, and an 8 ac (3 ha) field at the Houge Farm were seeded with an enhanced pollinator seed mix from Ion Exchange. Additional common milkweed was added to the seed mix at both sites.

5.8.3.3.6 *Mitchell County*

In 2016, the Mitchell County Conservation Board planted 716 ac (290 ha) of CRP/Native Habitat in Mitchell County, which included Iowa Pheasants Forever “Leopold Mixes” (butterfly milkweed, whorled milkweed, prairie milkweed, plus many forage species). In roadsides, 20 ac (8 ha) were planted with a custom mix that included butterfly milkweed and swamp milkweed as well as forage species. Common milkweed comes up readily in these areas and is not included in seed mix. The board held 38 programs on pollinators and monarchs, which reached 763 participants. Additional outreach included a live monarch display at the county fair, which was active for five days, and participation at four local parades, where small packets of pollinators seed mix containing butterfly milkweed, swam milkweed, and other forage species were given away during the parades. Throughout 2016, 186 monarchs were raised and released, of which 168 of the monarchs were tagged.

5.8.3.3.7 *Polk County*

In 2015, the Polk County Conservation Board completed a 0.85 ac (.34 ha) planting, which included seed provided by Monarch Joint Venture. In April, five species of milkweed plugs were added into the same area and an additional 0.25 ac (0.1 ha) was planted by students from Bondurant-Farrar School District.

In 2016, the Polk County Conservation Board pollinator conservation efforts spanned the entire year:

- In February the board planted 64.2 ac (26.0 ha) of Swan Lake parcel at CBG with Central Midwest Sedge Meadow mix.
- In April, 3.5 ac (1.4 ha) along new roadside leading to the Conservation Center was enhanced with diverse native forb mix.
- In May, 1.2 ac (0.5 ha) of the Van Oel property at CBG was enhanced with divers native forb mix.
- In June, 4.5 ac (1.8 ha) of the Hale parcel at CBG was planted with diverse native grass & forb mix.
- In August, a 0.2 ac (0.09 ha) planting was completed at the Bailey-Carpenter parcel with diverse native grass & forb mix.
- In December, 69.3 ac (28.0 ha) of Swan Lake parcel at CBG was planted with Central Midwest Sedge Meadow mix, and 79 ac (32 ha) was planted at Shaw parcel at CBG and included use of \$26,347 in NFWF pollinator grant dollars.

In addition, 10 monarch/pollinator gardens were planted across the Des Moines metro area. Each garden was 300 ft² (30 m²) and included 18 different natives (including rose/swamp and butterfly milkweed). The board planted a total of 200 plants in each garden. Outreach efforts also included 16 educational programs about pollinators, reaching 490 people.

In 2017, several additional projects are scheduled, which will use NFWF pollinator grant funding to supplement the seedlings.

5.8.3.3.8 *Ringgold County*

Ringgold County Conservation Board is very supportive of the Monarch Butterfly mission. The board planted 100+ ac (40 ha) to a pollinator mix by partnering with the USFWS and INHF. The board has also partnered with Blank Park Zoo and their Plant.Grow.Fly program and USFWS to plant educational landscapes around the new Dragoon Trace Nature Center. During the fall of 2016, the board filmed with National Geographic about the migration of the monarch butterfly. The Ringgold County Conservation Board has been participating in tagging butterflies through Monarch Watch for many years. Between 100 to 200 butterflies are tagged each year. About four years ago, a monarch waystation was planted at the Ringgold County Supportive Services, and last summer, the board partnered with ISU Extension and planted a small pollinator garden at Fife's Grove Park as part of their summer camp.

5.8.3.3.9 *Webster County*

The Webster County Conservation Board office has ordered 715 ac (289 ha) of pollinator mix for landowners over the past three years. Around half of these acres were either planted by conservation staff or else the landowner rented conservation board equipment to do the seeding. The other half was broadcast seeded by local farmer's cooperatives. The board participated in "Hands on Habitat" thru Pheasants Forever with the 3rd Grade from Feelhaver school, reaching 53 students. The board worked with students to plant a 2-ac (0.8-ha) pollinator plot at Kennedy Park. The board also partnered with the Brushy Creek Seed Harvest Unit of the Iowa DNR to host a butterfly tagging event.

5.8.3.4 Iowa Natural Heritage Foundation: 2015 and 2016 NFWF Grants
A 2015 NFWF grant was awarded (\$249,999) to provide habitat on public lands and permanently protected private lands within the I-35 Corridor and Loess Hills Corridor (31 counties). The grant funds are being used to acquire and distribute Iowa ecotype seed to county conservation boards, conservation easement landowners and the Iowa DNR. A second NFWF grant was awarded in 2016 (\$150,000) to further establish habitat in the same priority counties plus counties bordering the Mississippi River. The 2016 grant will also support the removal of eastern red cedar from remnant prairies along the Little Sioux River Valley. These two grant programs from NFWF will establish over 2,200 ac (890 ha) of new monarch and pollinator habitat on protected property and the restoration of 50 ac (50 ha) of prairie in the Little Sioux River. The project is being leveraged with an additional 7,000 ac (3,000 ha) of native habitat restoration by the project partners.

5.8.3.5 *Monarch Watch*

Monarch Watch has two active monarch conservation programs, the Monarch Waystation Program for encouraging habitat creation for monarchs to produce successive generations and sustain their migration and the Bring Back Monarchs program, which is similar but on a larger scale with a focus on habitat restoration. These programs allow milkweed plugs to be provided, and donations allow most plugs to be free for the cost of shipping. These plugs are grown from

seed and are distributed back to the same location as where the seed was collected, keeping the plants in their native regions. Over 200,000 plugs were provided in 2016 with 40,000 of them going to Iowa.

5.8.3.6 Blank Park Zoo

5.8.3.6.1 *BPZ: Plant.Grow.Fly.*

Blank Park Zoo's (BPZ) Plant.Grow.Fly. program works to increase habitat for pollinators like the iconic monarch butterfly. Now, with over 50 local, regional and national partners, Plant.Grow.Fly. has become a hub for pollinator conservation in Iowa. This project provides information about cultivation of high-quality habitat for novice and expert gardeners alike. Once gardens are planted, they can be registered with the program. Nearly 800 gardens have been registered, from single pots on porches to entire prairie restorations. These gardens span the Midwest and nation, creating corridors and waystations to help pollinators find the resources they need.

Plant.Grow.Fly. at BPZ is leading a coalition of partners to plant a pollinator garden at the Iowa State Capitol in Des Moines. Partners include: Edible Outdoors, Iowa Department of Natural Resources, Polk County Conservation, Iowa Department of Agriculture and Land Stewardship, Des Moines Park and Recreation, Polk Soil and Water Conservation District, Cherry Glen Learning Farms, Prairie Resource Center, Neal Smith National Wildlife Refuge and Prairie Landscapes of Iowa. This garden will be a diverse, native bed and will serve as a model for thousands who visit the Capitol each year on how they too can provide habitat in urban areas.

5.8.3.6.2 *BPZ: Monarch Festival*

Plant.Grow.Fly. hosts an annual Monarch Festival at BPZ. Held in September, during the peak of the monarch's southern migration, this festival is focused on educating the public about the miraculous journey of the monarch butterfly. The festival includes: crafts and activities, puppet shows, free milkweed seeds and monarch tagging. The event is in partnership with the Latino Heritage Festival, celebrating the Iowa – Mexico connection through the flight path of this butterfly. Mariachi music and traditional Mexican dance are highlights of the day. Children are encouraged to dress up as their favorite insect and march in the Bug Parade, a symbolic journey from the prairie to the mountains of Mexico.

5.8.3.7 Sand County Foundation

The Sand County Foundation, Inc. received a NFWF grant award of \$268,768 to build capacity within the energy industry to establish high-quality monarch habitat on lands dedicated to energy infrastructure and rights-of-way. This project will incorporate cost-effective habitat restoration strategies into energy industry standards of operation and restore habitat at 400 sites.

5.8.3.8 Resource Conservation and Development for Northeast Iowa

Support for native seed supplies was granted to the Resource Conservation and Development for Northeast Iowa, which received \$916,758 in NFWF funding for 2016. Over 400 ac (162 ha) of seed banks will be established on public lands surrounding roadways in nine Iowa counties. Seed produced on these lands will be used to establish or enhance monarch habitat on thousands of acres of public land in county parks and roadsides. Partners will also enhance Conservation

Reserve Program seed mixes with milkweed and nectar seed for plantings on 10,000 ac (4,000 ha) of agricultural lands.

6.0 Adaptive Management

An essential element to the strategy will be the use of adaptive management to make adjustments to the effort as conservation efforts progress. For example, landowner experiences and habitat/monarch trends will be monitored to inform modifications to on-going practices. Future versions of the strategy will include more details on adaptive management steps as conservation efforts are implemented and evaluated.

7.0 Budget Summary and Implementation Schedule

The following summary represents dollars contributed or awarded as grants to member organizations of the Iowa Monarch Conservation Consortium since its formation in 2015 through 2016. A future version of the strategy will provide an updated budget summary. In addition to financial support, many collaborators have also generously shared their time and resources in the form of in-kind contributions..

| | |
|---|-------------|
| USDA-NRCS Conservation Innovation Grant | \$760,897 |
| UDSA-NRCS-IA Conservation Innovation Grant | \$75,000 |
| Iowa Soybean Association | \$86,154 |
| Iowa Pork Producers Association | \$125,841 |
| ISU Foundation gifts (donations from Consortium Members) | \$230,000 |
| Strategic Environmental Development and Research Program | \$357,969 |
| National Science Foundation | \$25,000 |
| National Fish and Wildlife Foundation (NFWF) to Iowa Dept. of Agriculture and Land Stewardship | \$227,400 |
| NFWF to Iowa Natural Heritage Foundation | \$649,999 |
| NFWF to Iowa Natural Heritage Foundation | \$320,000 |
| NFWF to Sand County Foundation | \$268,768 |
| NFWF to Resource Conservation and Development for NE Iowa | \$916,758 |
| <hr/> | |
| TOTAL | \$4,043,786 |
| Additional grants submitted for funding | |
| National sponsors | \$1,250,051 |

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9.0 Appendices – To be completed in future versions of the strategy

9.1 Appendix A Executive Committee By-Laws
(Version 2; cross section of all organizations)

9.2 Appendix B Memorandum of Understanding:
(Version 2) Interagency cooperation and coordination; coordination with agriculture and conservation organizations and private landowners

9.3 Appendix C Monarch Habitat Decision Support Tools
(Version 2)

9.4 Appendix D Executive and Technical Committee Members
(Version 2)

9.5 Appendix E Working Group Members
(Version 2)

9.6 Appendix F Habitat Monitoring Protocol
(Version 2)

9.7 Appendix G Monarch Monitoring Protocol
(Version 2)

9.8 Appendix H Information, Education and Outreach
(Version 2)

PECE Process: Policy for the Evaluation of Conservation Efforts, Federal Register 68, pages 15114-15115).

PECE policy (FR68 pages 15114-15115)

Evaluation Criteria

Conservation agreements, conservation plans, management plans, and similar documents generally identify numerous conservation efforts (i.e., actions, activities, or programs) to benefit the species. In determining whether a formalized conservation effort contributes to forming a basis for not listing a species, or for listing a species as threatened rather than endangered, evaluation must be done to determine whether the conservation effort improves the status of the species under the act. Two factors are key in that evaluation: (1) for those efforts yet to be implemented, the certainty that the conservation effort will be implemented and (2) for those efforts that have not yet demonstrated effectiveness, the certainty that the conservation effort will be effective. Because the certainty of implementation and effectiveness of formalized conservation efforts may vary, each effort will be evaluated individually and will use the following criteria to direct analysis.

A. The certainty that the conservation effort will be implemented:

1. The conservation effort, the party(ies) to the agreement or plan that will implement the effort, and the staffing, funding level, funding source, and other resources necessary to implement the effort are identified.
2. The legal authority of the party(ies) to the agreement or plan to implement the formalized conservation effort, and the commitment to proceed with the conservation effort are described.
3. The legal procedural requirements (e.g. environmental review) necessary to implement the effort are described, and information is provided indicating that fulfillment of these requirements does not preclude commitment to the effort.
4. Authorizations (e.g., permits landowner permission) necessary to implement the conservation effort are identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the effort will obtain these authorizations.
5. The type and level of voluntary participation (e.g., number of landowners allowing entry to their land, or number of participants agreeing to change timber management practices and acreage involved) necessary to implement the conservation effort is identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain that level of voluntary participation (e.g., an explanation of how incentives to be provided will result in the necessary level of voluntary participation).
6. Regulatory mechanisms (e.g., laws, regulations, ordinances) necessary to implement the conservation effort are in place.
7. A high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding.
8. An implementation schedule (including incremental completion dates) for the conservation effort is provided.
9. The conservation agreement or plan that includes the conservation effort is approved by all parties to the agreement or plan.

B. The certainty that the conservation effort will be effective:

1. The nature and extent of threats being addressed by the conservation effort are described, and how the conservation effort reduces the threats is described.
2. Explicit incremental objectives for the conservation effort and dates for achieving them are stated.
3. The steps necessary to implement the conservation effort are identified in detail.
4. Quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified.
5. Provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.
6. Principles of adaptive management are incorporated.

These criteria should not be considered comprehensive evaluation criteria. The certainty of implementation and effectiveness of a formalized conservation effort may also depend on species-specific, habitat-specific, location-specific, and effort-specific factors. All appropriate factors will be considered while evaluating formalized conservation efforts. The specific circumstances will also determine the amount of information necessary to satisfy these criteria.

To consider that a formalized conservation effort(s) contributes to forming a basis for not listing a species or listing a species as threatened rather than endangered, it must be determined that the conservation effort is sufficiently certain to be implemented and effective so as to have contributed to the elimination or adequate reduction of one or more threats to the species identified through the section 4(a)(1) analysis. The elimination or adequate reduction of section 4(a)(1) threats may lead to a determination that the species does not meet the definition of threatened or endangered, or is threatened rather than endangered. An agreement or plan may contain numerous conservation efforts, not all of which are sufficiently certain to be implemented and effective. Those conservation efforts that are not sufficiently certain to be implemented and effective cannot contribute to a determination that listing is unnecessary or a determination to list as threatened rather than endangered. Regardless of the adoption of a conservation agreement or plan, however, if the best available scientific and commercial data indicate that the species meets the definition of “endangered species” or “threatened species” on the day of the listing decision, then appropriate rule-making activity will proceed under section 4 of the ESA.

9.10 Appendix J Pre-Listing Conservation Options

Pre-listing plans are designed to address habitat conservation for a species prior to potential listing (i.e., candidate species being reviewed for potential listing or species determined to be warranted for listing but currently precluded from listing).

Pre-listing programs can be designed to preclude the need for listing. If the species is ultimately listed, future conservation management requirements for an incidental take permit may provide more options, as compared to a situation where no pre-listing conservation activities were undertaken.

Candidate Conservation Agreement (CCA) - Similar in substance to a HCP, CCAs typically focus on federal landowners. Because federal landowners are part of the agreement, USFWS cannot provide assurances of no regulatory surprises in the future if the species is listed (USFWS can only provide assurances to non-federal landowners).

Candidate Conservation Agreement with Assurances (CCAA) - CCAAs only apply to non-federal landowners. The USFWS will issue an Enhancement of Survival Permit (a type of incidental take permit) upon approval of a CCAA. The conservation measures are designed to preclude the need for listing assuming other landowners in the species' range adopted the same measures. In CCAAs there are assurances of no regulatory surprises if the species is listed in the future.

Pre-Listing Conservation Action (PCA) – A PCA provides incentives for landowners to conserve candidate species that are not yet listed under the ESA. Landowners can earn credits, which can be redeemed later or sold to a third party later if the species becomes listed. PCAs can include federal and non-federal landowners; however, these actions must be administered through a state agency. The conservation measures must be beneficial to the candidate species, but they are not as exacting as those specified in a CCA or CCAA because a PCA alone may not be sufficient to ensure recovery of the species. Conservation measures in PCAs do not carry regulatory assurances. If the candidate species is listed, conservation achieved through measures undertaken in a PCA may serve as a mitigation or compensatory measure in a future HCP and resultant incidental take permit. More detail is available on the [USFWS site](https://www.fws.gov/endangered/improving_ESA/prelisting-conservation.html).²¹

Post-Listing Conservation Options

Habitat Conservation Plans (HCPs) – These plans are required as part of an application to the USFWS for an incidental take permit. Conservation measures are required to minimize and mitigate take to the maximum extent practicable; the taking should not appreciably reduce the likelihood of the survival or recovery of the species. Upon approval of a plan, state and private landowners are assured that if unforeseen circumstances arise, the USFWS will not require participants to comply with additional land-use restrictions for the duration of the permit, without prior consent.

²¹ https://www.fws.gov/endangered/improving_ESA/prelisting-conservation.html

Safe Harbor Agreements for Private Landowners – This program also results in the issuance of a permit but is more appropriate for a scenario where a landowner wishes to voluntarily implement habitat conservation that will support recovery of the species and may attract a listed species to the property. When approved by the USFWS, the landowner’s permit (an Enhancement of Survival Permit, a type of incidental take permit) protects them from unlawful take during the life of the permit and allows them to lawfully return the land to its original condition after the permit expires.

Conservation Banks – Land acquired and developed for the species of interest is permanently protected land that can be used as credit for adverse effects to a species for activities that may occur on other land. A conservation bank agreement precludes future development of the property and restricts certain land uses; establishes a long-term management plan; and provides funding for monitoring and long-term management of the bank through establishment of a non-wasting endowment. Conservation banks can apply to federal, state, county or private land; private land typically being permanently donated to a land trust or non-profit conservation organization or sold to a county, state or federal governmental agency. Some state and local governments offer tax benefits associated with this type of property encumbrance.

9.11 Appendix K

Iowa Milkweed Species. Reproduced from Lutz (2016) (Used with permission from IowaPlants.com, Milkweeds page).

Common Species of Milkweed



http://iowaplants.com/flora/family/Apocynaceae/asclepias/large_images/CommonMilkweed.html

[*Asclepias syriaca*](#) - Common milkweed. This is probably the most numerous milkweed in Iowa. It is tall—often chest high, broad-leaved, petiolate, and the pods (fruit) are distinctly papillose. While it is numerous, its distribution is not uniform and in some regions of Iowa it may be outnumbered by other species.



http://iowaplants.com/flora/family/Apocynaceae/asclepias/large_images/SandMilkweed.html

[*Asclepias amplexicaulis*](#) - Sand milkweed. Sandy soils are the preferred habitat for this milkweed. It is medium height—about knee high, although sometimes prostrate. Its broadleaves clasp the stem at their base and may overlap. The rounded inflorescence heads are more open than those of other local milkweeds



http://iowaplants.com/flora/family/Apocynaceae/asclepias/large_images/SwampMilkweed.html

[*Asclepias incarnata*](#) - Swamp milkweed. One of Iowa's two most colorful milkweeds, this one is tall and prefers swampy or marshy areas in full sun. Flowers appear light pink to a rose and white mix. Leaves are narrow and abundant along the stem.



[*Asclepias tuberosa*](#) - Butterfly milkweed. Probably Iowa's most colorful milkweed—its orange colored inflorescence is popular in Iowa's gardens. It is a medium sized native plant which is at home in sunny mesic prairies. Its leaves are narrow, the fruit is slender and stands upright on the plant.



http://iowaplants.com/flora/family/Apocynaceae/asclepias/large_images/WhorledMilkweed.html

[*Asclepias verticillata*](#) - Whorled milkweed. A medium sized milkweed, about knee high, with white flowers and slender grass-like leaves. The sessile leaves are often attached to the stem in whorls. It is often found along roadsides, in old pastures and along the edge of woodlands—usually in sandy soils.

Uncommon Species



http://iowaplants.com/flora/family/Apocynaceae/asclepias/large_images/PurpleMilkweed.html

[*Asclepias purpurascens*](#) - Purple milkweed. Only occasionally seen in Iowa.



http://iowaplants.com/flora/family/Apocynaceae/asclepias/large_images/PokeMilkweed.html

[*Asclepias exaltata*](#) - Poke milkweed. Only occasionally seen in Iowa, most frequently seen in eastern Iowa.

[*Asclepias engelmanniana*](#) - Engelmann's milkweed. At this writing it is listed as **ENDANGERED** in Iowa. However, a recent re-examination, at the Ada Hayden Herbarium of the few specimens so named, found them to be *A. stenophylla* and the examiners have concluded that *A. engelmanniana* does not exist in Iowa.

[*Asclepias stenophylla*](#) - Narrow-leaved milkweed. Only a few individuals have been seen in western Iowa, which is at the north-eastern edge of its current range. Mature plants are from 2 to 4 feet high with slender stems and leaves. Inflorescences are umbels of greenish-white flowers arising from leaf axils. They are found in sandy or rocky soils.

[*Asclepias lanuginosa*](#) - Woolly milkweed. Only occasionally seen and is **THREATENED** in Iowa.

[*Asclepias speciosa*](#) - Showy milkweed. Only occasionally seen and is **THREATENED** in Iowa.

[*Asclepias hirtella*](#) - Tall Green milkweed. Only occasionally seen in Iowa.

[*Asclepias meadii*](#) - Mead's milkweed. Only occasionally seen in Iowa.

[*Asclepias ovalifolia*](#) - Oval-leaf milkweed. Only occasionally seen in Iowa.



http://iowaplants.com/flora/family/Apocynaceae/asclepias/large_images/FourleafMilkweed.html

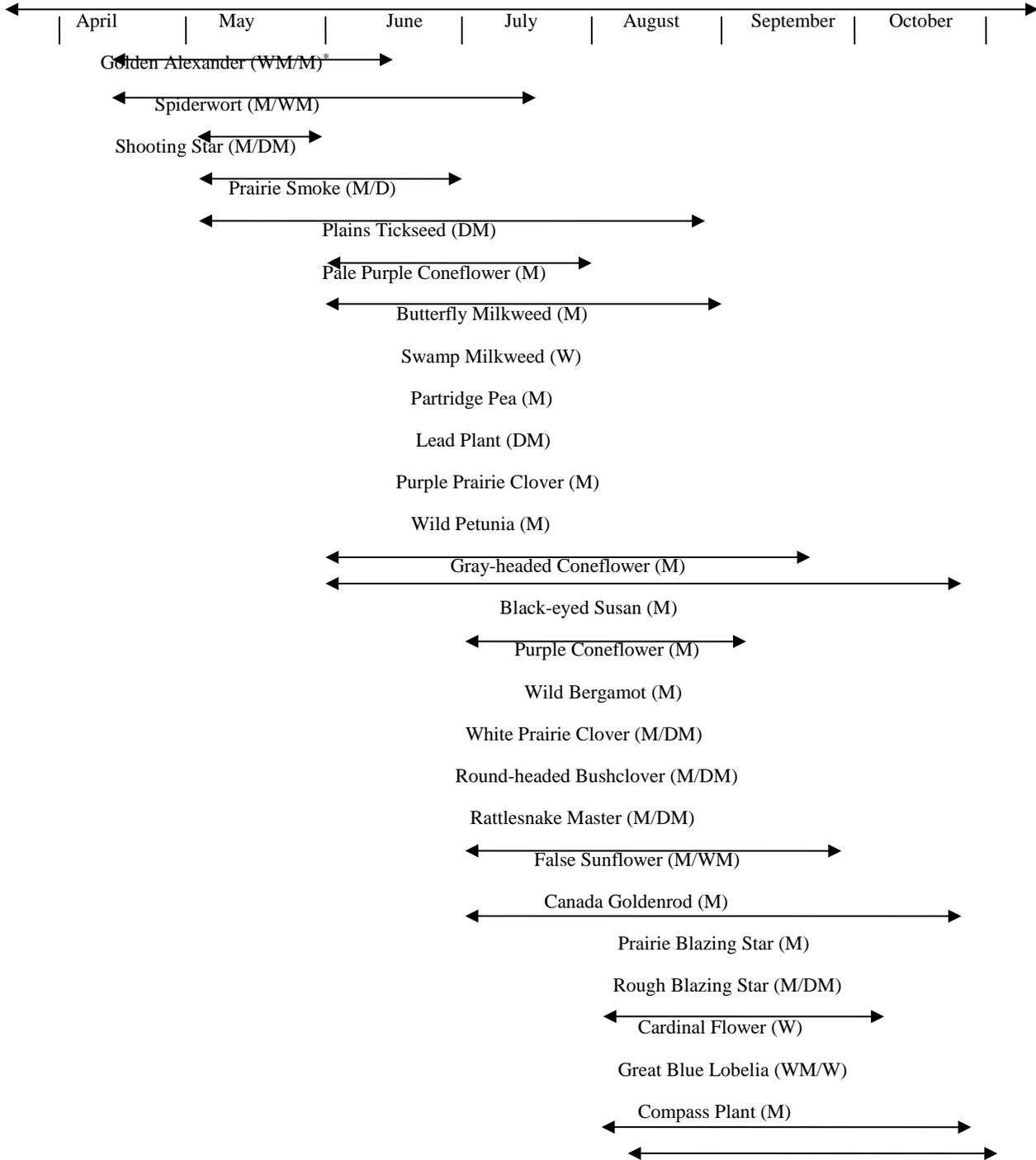
[*Asclepias quadrifolia*](#) - Fourleaf Milkweed. Only occasionally seen in Iowa.

[*Asclepias sullivantii*](#) - Sullivant's milkweed. Only occasionally seen in Iowa. Eilers and Roosa describe it as infrequent to rare throughout most of the state. It resembles *A. syriaca* (common milkweed), but is smaller and slimmer. It tends to hold its leaves at an upward angle, its leaves and stems are less hairy, and its pods have fewer papillae.

[*Asclepias viridiflora*](#) - Green milkweed. Only occasionally seen in Iowa.

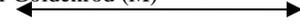
9.12 Appendix L
Common Native Prairie Forbs in Iowa

Common native prairie forbs in Iowa for monarch habitat enhancement (Iowa State University Extension 2008).



Bottle Gentian (M)

Stiff Goldenrod (M)



New England Aster (M)

*W=Wet

WM=Wet

M=Mesic

DM=Dry Mesic

9.13 Appendix M: Explanation of Sector Targets

In 2015 the United States Government set a goal of increasing the population of overwintering adult monarchs to 225 million by 2020 (USG 2015). Current estimates of new monarch habitat needed to reach this goal are expressed in terms of the number of new milkweed stems established in the North Central states over the next 20 years. These estimates range from 1.3 to 1.6 billion new stems (see Thogmartin et al., 2017 and references cited therein). The Midwest Association of Fish and Wildlife Agencies²², which is coordinating development of the Mid-America Monarch Conservation Strategy, has set a goal of 1.3 billion new stems for the northern breeding core area of the monarch. Iowa falls entirely within the area. Within the context of this multi-state strategy, the consortium met on January 19, 2018, and reached consensus on land cover category-specific objectives to reach the Iowa goal of 160,000,000 new milkweed stems over the next 20 years, which represents 12.3% of the North Central states' overall goal.

During the summer and fall of 2017, a consortium workgroup, with *ex officio* support from US Fish and Wildlife Service (USFWS) and United States Department of Agriculture (USDA) staff, developed habitat targets for the following land cover/land-use categories in Iowa:

- Urban/suburban
- Road rights-of-ways (secondary roads)
- State, county and federal (Public Lands)
- Other USFWS and USDA Natural Resource Conservation Service program lands (Other)
- Agriculture

The consortium met on January 19, 2018, and reached consensus on land cover category-specific objectives to reach the Iowa goal of 160,000,000 new milkweed stems (see Table A1). The combined, category-specific objectives are estimated to establish between 127,000,000 to 188,000,000 new stems on 480,000 to 830,000 acres (190,000 to 340,000 ha) by 2038. While objectives are presented as milkweed stems and monarch habitat acres, it is assumed establishment of new habitat includes co-establishment of native warm season grasses and forbs, which provide monarch adults with nectar sources from spring through the fall migration, in addition to milkweeds for oviposition and larval development.

²² <http://www.mafwa.org/>

Table A1: Estimated range of acres and milkweed stem targets for monarch habitat establishment in Iowa from 2015 to 2038 by land-use category.

| Acres | | Range | | Stems* | | Range | |
|---------------------|----------------|----------------|--|---------------------|--------------------|--------------------|--|
| Urban/Suburban | 39,774 | 198,870 | | Urban/Suburban | 1,300,000 | 5,600,000 | |
| Public† | 144,041 | 156,674 | | Public† | 28,527,789 | 31,030,041 | |
| Other† | 62,749 | 67,049 | | Other† | 12,549,800 | 13,409,800 | |
| Road Rights-of-Ways | 19,000 | 21,000 | | Road 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 | |

* New stems include stems derived from new seeding and subsequent propagation. Biologically reasonable stem densities of 10 to 50, 197 to 199, 200, 200 to 324, and 150 to 600 stems/acre were assumed for Urban/Suburban; Public Lands; Other; Road Rights-of-Ways and Agriculture, respectively.

† These sectors include stems planted since 2015 through US Fish and Wildlife Service and other public programs.

Assumptions to reach these targets include the following:

- 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

Additional, unique inputs and assumptions were employed in formulating objectives for each of the specific land cover categories. These included, but were not limited to, estimates of land cover acres available for habitat establishment, landowner habitat-adoption rates and biologically reasonable milkweed stem densities. These assumptions are discussed in sector-specific summaries.

The habitat target range bounds Iowa’s goal of 160,000,000 new stems. It is anticipated that additional habitat targets will be established for land-use classes not addressed to date; e.g., Iowa Department of Transportation (IDOT) highway rights-of-ways, commercial property, including utility power stations. Addition of these sectors will be included in future versions of the Iowa Monarch Conservation Strategy. To the extent the combined, sector-specific targets exceed Iowa’s goal of 160,000,000 new stems, this “reserve capacity” will cover intermittent decreases in habitat establishment rates or unanticipated increases in monarch habitat loss over the next 20 years, as well as uncertainties in assumptions and inputs to the current analysis. For example, ongoing research and demonstration studies may indicate milkweed-seeding success or milkweed propagation rates were over estimated. To the extent habitat-establishment success or contributions of new habitat from other land-use categories are significantly greater than currently assumed, the consortium reserves the right to reduce the current estimated targets in a manner that maintains an appropriate “reserve capacity.” In the same manner, if current assumptions are found to over predict habitat establishment rates to the extent that it is unlikely Iowa can reach a goal of 160,000,000 new stems over the next 20 years, the consortium will consider revising sector targets and/or increase landowner recruitment efforts.

Summary of Sector-Specific Habitat Targets

Urban/Suburban

To estimate additional habitat within cities, including habitat planted by parks and recreation departments, corporations and rights of ways, data from the Mayor’s Monarch Pledge (MMP) (<https://www.nwf.org/Garden-for-Wildlife/About/National-Initiatives/Mayors-Monarch-Pledge>) was used. On average MMP cities added 8 acres of habitat in 2016. Thus 8 acres per year was assumed to be the high average, half (4 acres per year) was used as a medium estimate, and a quarter (2 acres per year) was used for low.

To get an estimate of how residential areas may contribute habitat, data was used from the Plant Grow Fly (PGF) program, an outreach project that encourages citizens to plant and register pollinator habitat. These data provided an estimate of potential participation rates and average “patch” size in urban yards. These values were assumed to only represent a fraction of the participation because only a small fraction of people who put in habitat likely register it with the program. For the low goal it was assumed that 25% register, for medium it was assumed 10% register and for the high it was assumed 1% register. High = 2.5 acres, medium = 0.25 acres, and low = 0.1 acres. This was added to the estimate from the MMP data to establish the average acreage per city per year estimates (Table A2).

Assumptions

- Low, medium, and high stem densities reflect a range of effort across cities in Iowa.
- Preliminary data from Plant.Grow.Fly. (<https://www.blankparkzoo.com/conservation/plantgrowfly/>), the Mayor’s Monarch Pledge (<https://www.nwf.org/Garden-for-Wildlife/About/National-Initiatives/Mayors-Monarch-Pledge>), and a survey of 19 Parks and Recreation Departments[#] suggest habitat acres that can be established within 947 Iowa cities could range from:
 - 2.1 acres per city per year (low–3% of urban areas)
 - 4.25 acres (medium–6% of urban areas)
 - 10.5 acres (high–14% of urban areas)

A land cover analysis is in progress and will summarize the current acreage of land in several different urban land use subcategories (e.g., golf courses, cemetery, churches, schools). Preliminary results are consistent with the above estimates. In subsequent versions of the strategy, estimates of current acres and adoption rates will be refined as needed.

- Biologically reasonable stem densities in urban/suburban settings (Thogmartin et al., 2017) could be 10, 25, or 50 stems per acre; a mean of 28.3 stems per acre was used.

Table A2: Average City Habitat Area Annual Estimate.

| | Backyard Area* (acres per city per year) | Other Areas within Cities† (acres per city per year) | Total Area (acres per city per year) |
|---------------|---|---|---|
| Low | 0.1 | 2 | 2.1 |
| Medium | 0.25 | 4 | 4.25 |
| High | 2.5 | 8 | 10.5 |

* *Plant.Grow.Fly data were used, but were assumed to represent only a fraction of gardens planted. Low, medium, and high estimates represent this uncertainty.*

† *Mayor’s Monarch Pledge data were used to estimate how much area may be possible to add each year.*

Calculations

There are 947 cities in Iowa. The number of cities was multiplied by the number of acres to be added per year to estimate habitat added annually. This figure was multiplied by 20 to determine how much habitat could be added over 20 years.

To determine how many new stems could be established, the 20 year-acre estimates were multiplied by 28.3 stems/acre, resulting in a stem estimate range of 1,130,000 to 5,600,000 new stems to be added in the urban/suburban sector.

Table A3: Urban Area to Stem Conversion.

| | Total area (acres per year) | Total area in 20 years (acres) | Total new stems (acres per city per year)* |
|---------------|--|---|---|
| Low | 1,989 | 39,774 | 1,130,000 |
| Medium | 4,025 | 80,495 | 2,278,008 |
| High | 9,943.5 | 198,870 | 5,628,021 |

* *Biologically reasonable stem density used in conversion is 28.3 stems per acre*

Conclusions

The urban/suburban sector target is to add between 39,774 to 198,870 acres of habitat (represents 3% to 14% of total urban acres) and 1.13 to 5.6 million new stems (at an average of 28.33 milkweeds per acre).

#Survey of City Parks and Recreation Departments

There were 19 city parks and recreation responses to the survey, which was sent to over 100+ cities through the Iowa Parks and Recreation Association. In the last two years (2015 to 2016),

the Parks and Recreation Departments have added roughly 90 acres, and estimate that together, the 15 departments that responded to this question could add a total of 32 acres per year for the next 10 years (320 total acres). This results in an average of 2.29 acres per year per city.

State, County and Federal Lands (Public)

A survey was sent to Iowa Department of Natural Resources (DNR) and County Conservation Boards to determine how much monarch habitat has been restored or reconstructed in 2015, 2016, and 2017. This data was used to estimate how much habitat can be added annually for 20 years, and the 20-year estimate was added to the totals from 2015, 2016, and 2017 to provide a 23-year target. A similar approach was used for the USFWS data. The biologically reasonable stems per acre estimate used was a stem gain of 199 per acre for reconstructed habitat and 197 stems per acre for restored habitat (Thogmartin et al. 2017).

Assumptions

- DNR can continue to provide seed for 1,900 acres per year
- Existing acres that are disturbed each year 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 the current rate
- Special funding sources allowed to be used for nongame wildlife continue

Calculations

Estimates were partially based on a survey sent to Iowa DNR and County Conservation Boards, which is summarized below.

Table A4: Iowa DNR and County Conservation Board Survey Data Summary.

| | Iowa DNR Wildlife | Iowa DNR Parks | County Conservation Boards | Total Area (acres) | Total New Stems |
|----------------------------|----------------------|-------------------|----------------------------------|--------------------------|--------------------|
| 2015 Reconstructed* | 2,318 | 103 | 1,164 | 3,585 | 713,415 |
| 2016 Reconstructed* | 2,919 | 25 | 976 | 3,920 | 780,080 |
| 2017 Reconstructed* | 2,143 | 88 | 1,170 | 3,401 | 676,799 |
| Over Next 20 Years | 23,860 | 694 | 38,700 | 63,254 | 12,587,546 |
| 2015 Restored† | 1,574 | 124 | 868 | 2,566 | 505,502 |
| 2016 Restored† | 1,731 | 192 | 935 | 2,858 | 563,026 |
| 2017 Restored† | 2,244 | 469 | 1,047 | 3,760 | 740,720 |
| Over next 20 Years | 24,314 | 696 | 14,400 | 39,410 | 7,763,770 |
| Total | 61,103 | 2,391 | 59,260 | 122,754 | 24,330,858 |

*Reconstructed refers to newly planted milkweed habitat, representing a stem gain of 199 per acre (Thogmartin et al. 2017).

† Restored refers to grassland that has been burned, disked, de-treed (disturbed), representing a stem gain of 197 per acre (Thogmartin et al. 2017).

Doug Helmers with the USFWS queried other USFWS personnel to quantify monarch habitat planted since 2015, and this inquiry was used to predict future habitat reconstruction and restoration for the next 20 years. The acreage was converted to stems using biologically reasonable stems per acre estimates of 199 per acre for reconstructed habitat and 197 per acre for restored habitat (Thogmartin et al. 2017).

Table A5: USFWS Survey Data Summary.

| USFWS Managed Lands | Acres | New Stems |
|---------------------------|---------------|------------------|
| Since 2015 Reconstructed* | 335 | 66,665 |
| Over Next 20 Years | 4,700 | 935,300 |
| Since 2015 Restored† | 3,605 | 710,185 |
| Over Next 20 Years | 18,964 | 3,735,908 |
| Total | 27,604 | 5,448,058 |

* Reconstructed refers to newly planted milkweed habitat, representing a stem gain of 199 per acre (Thogmartin et al. 2017).

† Restored refers to grassland that has been burned, disked, de-treed (disturbed), representing a stem gain of 197 per acre (Thogmartin et al. 2017).

Table A6: Monarch Habitat Reconstructed or Restored on Public Lands During the Last Three Years.

| | Area (acres) | New Stems |
|----------------------------|---------------|------------------|
| 2015 to 2017 Reconstructed | 11,241 | 2,236,959 |
| 2015 to 2017 Restored | 12,789 | 2,519,433 |
| Total | 24,030 | 4,756,392 |

Given the assumptions and uncertainties associated with this estimate, the acres are likely to fall within a range of plus or minus 5% of 67,954 reconstructed acres and 58,374 restored acres over the next 20 years (Table A7).

Table A7: Potential Reconstructed or Restored Monarch Habitat on Public Lands over the Next 20 Years.

| | Area Range (acres) | | New Stems Range | |
|---|--------------------|---------|-----------------|------------|
| Reconstructed* next 20 years | 64,556 | 71,352 | 12,846,703 | 14,198,988 |
| Restored† next 20 years | 55,455 | 61,292 | 10,924,674 | 12,074,661 |
| Total | 120,011 | 132,644 | 23,771,397 | 26,273,649 |

* Using a stem gain of 199 per acre (Thogmartin et al. 2017).

† Using a stem gain of 197 per acre (Thogmartin et al. 2017).

Conclusions

Between 2015 and 2017, 11,241 acres of monarch habitat have been reconstructed, and 12,789 acres have been restored on public land. Using a stem gain of 199 per acre for reconstructed habitat and 197 per acre for restored habitat (Thogmartin et al. 2017), this new habitat results in 4,756,392 new stems (Table A6). In addition, there is potential for 120,011 to 132,644 new acres and 23,771,397 to 26,273,649 new stems on reconstructed and restored habitat during the next 20 years. Therefore, the target for the public sector is to increase monarch habitat by 144,041 to 156,674 acres and to add 28,527,789 to 31,030,041 new milkweed stems by 2038.

Other USFWS and NRCS Programs

This category includes habitat planted by the USFWS Partners for Fish and Wildlife Program and the Natural Resources Conservation Service (NRCS) Agricultural Conservation Easement Program (ACEP) Wetland Reserve Easement (WRE) (formerly the Wetlands Reserve Program), which both include acres that could be included in more than one of the other sectors. For example, the USFWS Partners for Fish and Wildlife Program could plant habitat that falls within urban areas or agricultural areas. Thus care must be taken to avoid duplication, but by keeping the numbers separate, errors will be easy to locate and correct if they occur. Data from both private lands programs was collected from USFWS Partners for Fish and Wildlife Program staff by Doug Helmers, and John Paulin, NRCS wetland restoration specialist, provided the data for the ACEP-WRE. Both the Partners for Fish and Wildlife Program and the NRCS program future projections use data from 2015, 2016 and 2017 to estimate how much habitat could be added annually for 20 years, and the 20-year estimate was added to the totals from previous years to provide a 23 year target. These estimates would be separate from the marginal land category in Agriculture, which is further explained in the Agriculture subsection.

Assumptions

- Federal funding for Iowa within both programs (USFWS Partners for Fish and Wildlife Program and USDA NRCS WRE Program) continue at or above current levels.
- USDA and USFWS staffing levels for these programs continue at or above the current level.

Calculations

Table A8: Private Lands Program Completed Habitat Stem Conversion.

| Reconstructed* | Area (acres) | New Stems‡ |
|----------------------------|-------------------------|-------------------|
| FY 15 reconstructed | 373 | |
| FY 16 reconstructed | 290 | |
| FY 17 reconstructed | 281 | |
| Total reconstructed | 944 | 188,800 |
| Restored† | | |
| FY 15 restored | 1,034 | |
| FY 16 restored | 1,345 | |
| FY 17 restored | 527 | |
| Total restored | 2,906 | 581,200 |

* Reconstructed refers to newly planted milkweed habitat

† Restored refers to grassland that has been burned, disked, de-treed (disturbed)

‡ A biologically reasonable estimate for milkweed stems is 200 new stems per acre (Thogmartin et al. 2017).

Future habitat construction was estimated based on conversations with private lands staff and is expected to be about 1,400 acres per year. Given the uncertainty associated with this estimate, a range of plus or minus 5% was applied so 1,330 to 1,470 acres will be planted per year.

Table A9: Partners for Fish and Wildlife Program Potential Habitat and Stems over the Next 20 Years.

| | Area Range (acres) after 20 years | | Stem Range after 20 years† | |
|--|--|--------|----------------------------|-----------|
| | 20 Years of Reconstruction and Restoration* | 26,600 | 29,400 | 5,320,000 |

* Future estimates are based on reconstructing or restoring 1,400 acres of habitat per year

† A biologically reasonable estimate for milkweed stems is 200 new stems per acre (Thogmartin et al. 2017).

Table A10: NRCS WRE Completed Habitat Stem Conversion.

| NRCS WRE | Area (acres) | New Stems* |
|---------------|---------------|------------------|
| FY 15 | 350 | |
| FY 16 | 765 | |
| FY 17 | 297 | |
| FY 18† | 1,627 | |
| Total | 3,039 | 607,800 |
| Future | 15,000 | 3,000,000 |
| Totals | 18,039 | 3,607,800 |

*A biologically reasonable estimate for milkweed stems is 200 stems per acre (Thogmartin et al. 2017).

†Projected based on 2018 funding

Based on the current farm bill, future WRE habitat construction was estimated to be about 750 acres per year for the next 20 years. Given the uncertainty associated with this estimate, a range of plus or minus 5% was applied. It is expected that 713 to 788 acres will be planted per year.

Table A11: Private Lands Program Potential WRE Habitat and Stems over the Next 20 Years.

| | Area Range (acres) after 20 years | | Stem Range after 20 years† | |
|-----------------------------|-----------------------------------|--------|----------------------------|-----------|
| 20 Years of new WRE* | 14,260 | 15,760 | 2,852,000 | 3,152,000 |

* WRE funding will be based on farm bill for beyond FY 18. A reasonable estimate is 750 acres per year for the next 20 years.

† A biologically reasonable estimate for milkweed stems is 200 new stems per acre (Thogmartin et al. 2017).

Conclusions

Together the USFWS Partners for Fish and Wildlife Program and the NRCS WRE target for increasing monarch habitat is 62,749 to 67,049 acres and 12,549,800 to 13,409,800 new milkweed stems from 2015 through 2038.

Roadsides

Each year since 1998, the Integrated Roadside Vegetation Management (IRVM) program has acquired native grass and wildflower seed through a Transportation Alternatives Program grant and distributed, on average, 1,000 acres worth of native grass, sedge, and forb seed for county roadside plantings. Currently, 45 Iowa counties participate in the IRVM program.

Estimates of highway habitat potential will be included in the next version of the strategy.

Assumptions

- The IRVM program will continue to obtain Transportation Alternatives Program grants, allowing it to continue providing counties seed sufficient to plant 950 to 1,050 acres per year.

Secondary Roads (County Administered); IRVM Program

Each year since 1998, the UNI IRVM program has coordinated a purchase of native grass and wildflower seed through a Transportation Alternatives Program grant administered by Iowa DOT and distributed an average of 1,000 acres worth of native grass, sedge, and forb seed to about half of Iowa counties for roadside plantings. To represent the variation that occurs from year to year, future estimates were made based on a range of 950 to 1,050 acres planted per year (1,000 acres plus and minus 5%). Assuming continuation of this rate of planting, 19,000 to 21,000 acres would be seeded in 20 years. There is little research on milkweed establishment in county roadsides, but a biologically reasonable stem density for county roadsides is 324 mature milkweeds per acre, based on a 1-year study conducted in central Iowa that used four times the milkweed seeding rate of a typical IRVM mix and different site preparation than a typical mix (personal communication Justin Meissen, UNI Tallgrass Prairie Center). However, given that many common milkweed species recruit to county roadsides on their own without seeding, this general estimate is being used. This results in an estimate of 6,156,000 to 6,804,000 new stems.

Table A12: Secondary County Roadside Area and Stem Estimates.

| | Area planted per year (acres) | Area during 20 Years | New Stems* |
|-------------|--|-----------------------------|-------------------|
| Low | 950 | 19,000 | 6,156,000 |
| High | 1,050 | 21,000 | 6,804,000 |

* A biologically reasonable estimate for milkweed stems in roadsides is 324 stems per acre (personal communication Justin Meissen, UNI Tallgrass Prairie Center).

Conclusions

Roadsides along county roads monarch habitat target is 19,000 to 21,000 acres, and this would result in 6,156,000 to 6,804,000 new stems in the next 20 years.

Agriculture

Habitat targets for land cover/land use were estimated for existing conservation reserve program (CRP) land, marginally productive corn and soybean fields, pasture, a variety of livestock production facilities, and rural homesteads. To estimate habitat targets for each of these land cover/land-use categories, a number of input assumptions were required, including estimates of the total number of acres available for each category; landowner adoption rates; composition of seed mix; planting success rate for establishing new stems; and the extent to which newly established stems would propagate over time. These input assumptions are summarized below.

Assumptions

Acres Available for Potential Habitat Establishment

Existing CRP: 1,143,000 acres. Existing CRP land available for augmentation to monarch habitat is based on the Cropland Data Layer 2014 and related analyses reported by Thogmartin et al. (2017). While some acres come out of CRP and additional acres enter CRP each year, it is assumed that the overall number of acres remain constant.

Marginal Corn and Soybean Crop Land: 448,000 acres. Estimated using the 2012 National Commodity Cropland Productivity Index (score <40 defined as marginal corn and soybean crop land), as reported by Thogmartin et al. (2017).

Pasture: 1,900,000 acres. Estimated based on USDA NASS (2012).

Dairy Feedlots: 1,810 acres. Based on USDA NASS (2012), there are 1,810 feedlots; assume 1 acre per feed lot potentially available for habitat establishment.

Beef Feedlots: 1,509 to 6,036 acres. Based on USDA NASS (2012), there are 6,036 feedlots; assume 25% (1,509 feedlots) are associated with a confinement building (Schulz 2014); assume 1 acre per feedlot potentially available for habitat establishment.

Poultry Farms: 4,333 acres. Based on USDA NASS (2012), there are 4,333 farms; assume 1 acre per farm potentially available for habitat establishment.

Pork Confinement Facilities: 13,000 to 19,500 acres. Iowa Pork Producers Association estimates 6,500 facilities and two to three habitat sites established per facility; assume 1 acre per site.

Rural Farmsteads: 200 acres. Based on NASS (2012), there are 88,000 rural farmsteads in Iowa; assume monarch gardens are 0.0023 acres (Monarch Watch 2017).

Landowner Adoption Rates

Existing CRP: 15% to 30% of existing CRP augmented at mid-contract or contract renewal

Marginal Corn and Soybean Crop Land: 5%

Pasture: 1%

Pork Facilities, Poultry Farms and Beef Feedlots: 1.5%

Rural Farmsteads: 10%

Regardless of land cover/land-use type, plantings are assumed to range between 0.5 and 5.0 acres, with a limited number of sites greater than 10 acres.

Monarch Habitat Seed Mix and Planting Success:
12,000 milkweed seeds per acre

The Iowa State University monarch seed mix (<https://store.extension.iastate.edu/Product/Monarch-Seed-Mix-High-Diversity>) includes an equivalent of 16,000 milkweed seeds per acre (12,000 common milkweed seeds and the remaining balance swamp and butterfly milkweed seeds). Pheasants Forever (J. Divan, personal communication) reports using a range of approximately 700 to over 52,000 milkweed seeds per acre with an average of 9,000 seeds per acre for 12 recent pollinator seed mixes. Excluding two monarch seed mixes with an average of 39,000 seeds per acre, the average Pheasants Forever pollinator CRP rate is 3,000 milkweed seeds per acre. Based on this data from Iowa State and Pheasants Forever, 12,000 seeds per acre was used as the milkweed seeding rate for new habitat calculations.

A range of 1.0 to 2.0% of planted seeds is assumed to produce new milkweed stems. For scenarios where seed is planted in bluegrass or pasture, it is assumed that 2.0% planted seeds will produce new stems.

Note: For rural farmsteads, 10 milkweed plugs were assumed to be planted per 0.023 acre plots (Monarch Watch 2017) with a 100% planting success rate.

Milkweed Stem Propagation

It is assumed that newly established stems will propagate at a rate of 5, 7.5 or 10% per year, assuming a habitat site is disturbed with mowing or burning once every five years.

Common milkweed propagates via adventitious root buds (Bhowmik, 1994; Bhowmik and Bandeen, 1976; Evetts et al., 1974; Evetts and Burnside, 1972). There is limited data available, however, to estimate propagation rates for common milkweed stems. Bhowmik and Bandeen (1976) provide data indicating a maximum value of 140% propagation from a single seedling over four years. Meissen et al. (2017) reported for common rhizomatous prairie species, propagation rates of 30% for Canada goldenrod to 2% for *Anemone* spp. Assuming monarch habitat patches are disturbed every five years by burning or mowing, it is unlikely propagation rates would exceed 30%, but is likely higher than 2%. Propagation rates of 5, 7.5 or 10% over five years result in predicted stems per acre in CRP between approximately 150 to 300, 225 to 450, or 300 to 600 stems per acre, respectively, assuming a 1 or 2% seed to new stem conversion rate and a seeding density of 12,000 milkweed seeds per acre. Thogmartin et al. (2017) assumed a biologically reasonable upper bound stem density for CRP to be between 200 and 225 stems per acre, based on best professional judgement.

In the calculations described below, it is assumed that all seeding in the agricultural sector occurs in the first 10 years, and stem propagation occurs in the remaining 10 years of the 20-year strategy. An estimate of stem propagation could be based on yearly estimates of acres inter-

seeded or planted over each of the next 20 years. However, given the uncertainties in forecasting the yearly amount of new habitat acres established over the next 20 years, an estimate of propagation was used for only the last 10 years of the strategy. Assuming no propagation until year 11 underestimates total stem propagation for those acres planted early in the first decade but overestimates stem propagation for those acres planted late in the first 10 years.

Funding and Support

It is assumed that federal funding to support establishment and maintenance of monarch habitat, especially funds appropriated to farm bill programs, are maintained at or above fiscal year 2017 levels.

Calculations

To estimate the number of new milkweed stems produced during the 20 years of the strategy, the following calculations were used:

Marginal Crop Land, Livestock Facilities, Feedlots and Pasture:

Number of New Stems = current acres X adoption rate X 12,000 milkweed seeds per acre X 0.01 or 0.02 new stems per seed X a compounded propagation rate of 5, 7.5 or 10% per year over 10 years.

Rural Farmsteads:

Number of New Stems = current number of farmsteads X adoption rate X 10 milkweed plugs X site 1.0 new stems per plug

Augmenting (inter-seeding) Existing CRP:

Given the high proportion of existing land cover/land-use currently in CRP, the workgroup assigned a goal of 40,000,000 new stems from inter-seeding existing CRP during the first 10 years of the strategy. Currently 512,000 acres are enrolled in CP-25 (Rare and Declining Habitat), CP-38 (States Acres for Wildlife) and CP-42 (Pollinator Habitat). Arguably, these existing CRP practices may be most readily augmented by inter-seeding with a monarch habitat seed mix. Assuming a seeding rate of 12,000 milkweed seeds per acre and 0.01 or 0.02 stems per seed, this equates to approximately 171,000 or 343,000 acres of existing CRP augmented through inter-seeding at mid-contract or contract renewal. The compounded propagation rate of 5, 7.5 or 10% per year over 10 years was applied to 40,000,000 stems.

Results

Based on the input assumptions and calculations summarized above, the range of acres associated with habitat establishment and the range of new milkweed stems from planting over the first 10 years of the strategy in the agriculture sector are provided in Table A13. The estimated total number of acres planted ranges from approximately 214,000 to 387,000 acres. Applying a 1 or 2% seed to stem conversion rate to 214,000 to 387,000 acres results in approximately 48,000,000 to 50,500,000 new stems.

Table A13: Agriculture Habitat Acres and Stem Estimates for Years 1 – 10.

| Ag Sector Land Cover | Area Low (acres) | Area High (acres) | New Stems (low) | New Stems (high) |
|-----------------------------|-------------------------|--------------------------|------------------------|-------------------------|
| Existing CRP | 171,000 | 343,000 | 40,000,000 | 40,000,000 |
| Marginal Lands | 22,400 | 22,400 | 2,688,000 | 5,376,000 |
| Pasture | 19,000 | 19,000 | 4,560,000 | 4,560,000 |
| Dairy Feedlots | 1,810 | 1,810 | 434,400 | 434,400 |
| Beef Feedlots | 22 | 90 | 5,280 | 21,600 |
| Poultry Farms | 65 | 65 | 15,600 | 15,600 |
| Pork Confinements | 250 | 250 | 60,000 | 60,000 |
| Rural Farmsteads | 200 | 200 | 88,000 | 88,000 |
| Total | 214,747 | 386,815 | 47,851,280 | 50,555,600 |

The range of stems produced after 20 years (see Table A14) takes into account propagation of stems established in the first 10 years (Table A13).

Table A14: Estimated Number of New Stems in Agricultural Land Cover After 20 Years

| Rate of Annual Propagation | Total New Stems Including Propagation |
|----------------------------|---------------------------------------|
| Low* | |
| 5% | 78,000,000 |
| 7.5% | 99,000,000 |
| 10% | 124,000,000 |
| High† | |
| 5% | 82,000,000 |
| 7.5% | 104,000,000 |
| 10% | 131,000,000 |

* Low estimate based on starting stem estimate of 47,851,280 stems.

† High estimate based on starting stem estimate of 50,555,600 stems.

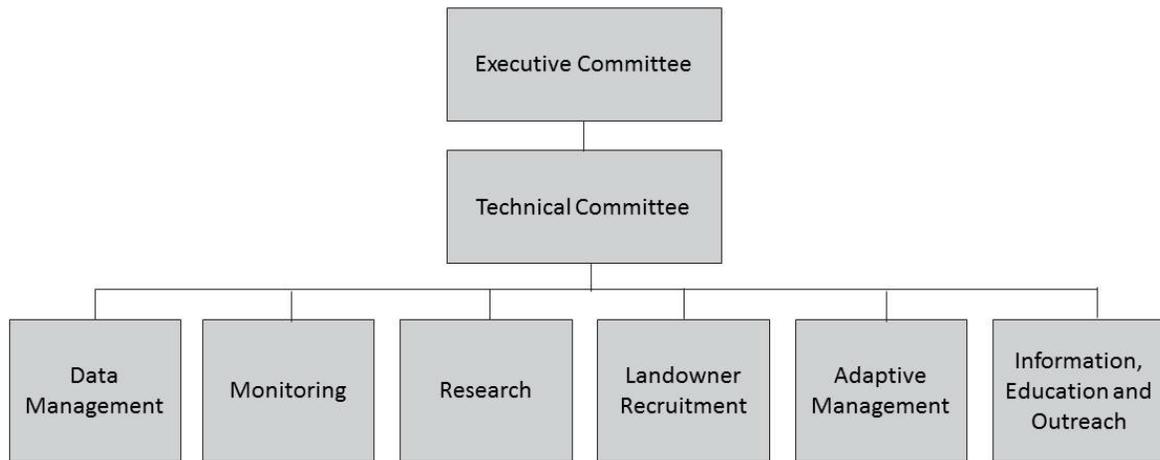
Conclusions

The estimated total number of acres planted results in a target of approximately 214,000 to 387,000 acres. Assuming a 5% to 10% yearly stem propagation rate compounded over 10 years results in a range of new stems over 20 years from 78,000,000 to 131,000,000.

Based on an analysis of native seed production in Iowa

(https://monarchjointventure.org/images/uploads/documents/MJV_Report_Milkweed_Market.pdf), if these levels of productions are maintained there should be sufficient native seed available to achieve cumulative targets over 3, 5, 7 and 10 years of approximately 114,000; 190,000; 270,000; and 386,000 planted acres, respectively.

9.14 Appendix N



9.15 Appendix O

Monitoring Details

The Integrated Monitoring Strategy proposed by the MCSP aims to engage multiple partners (citizen science, federal, state, NGO, etc.) in monitoring key monarch and habitat attributes using a broad-scale, spatially-balanced sampling scheme (GRTS, Generalized Random Tessellation Stratified draw). Protocols, site selection, site access, and data management procedures were pilot tested in 2016 at select (non-priority) locations in FWS Regions 2, 3 and 6 by seasonally hired (USFWS) biological technicians, academic contractors, or through Student Conservation Association internships. During pilot implementation, sites in Iowa, falling into protected grassland, unprotected grassland, right of way habitat and conservation reserve program strata were sampled in and around Neal Smith Wildlife Refuge. Iowa DNR field tested protocols in each of those strata and also 2 Urban sites in Ames. Protocols monitored attributes related to monarch habitat (e.g. milkweed density, blooming nectar plant relative abundance) and monarch use of habitat (per milkweed plant density of immature monarchs, adult counts measured with modified Pollard walks) and monarch survival (from immature to adult stage).

The Generalized Random Tessellation Strategy will be used to assist with randomly selecting properties within each of the sectors, which will result in a grid will being placed over a map of the United States. Each block within the grid will be given a random number. Sites will be chosen using that random number.

The State Volunteer Coordinator will be tasked with ensuring the land-use sector within the chosen block is, in fact, correct. The landowner will then be contacted to determine whether they would like to participate in the program. One positive of this approach is that any property can be included, so if someone wants to monitor their favorite park, that site can be included. The random number assignment gives every block a weighting factor, so blocks that are lower on the list can still be included, although the data collected from those hand-picked areas may be given a lower rank compared to randomly selected areas, unless the site happens to fall into both categories (a hand-picked site that was also randomly assigned to the priority survey list).

A Volunteer Coordinator will be appointed and will be responsible for recruiting volunteers, training volunteers, pairing volunteers with landowners, and being available to assist with questions throughout the year. Ideally each volunteer will collect and enter the data into a standardized database. Some electronic Apps exist which have the potential to be modified to send the data into a database without the volunteer having to enter it from a paper form. Reiman Gardens at ISU has such an App – but a database will need to be developed to accept the data. This App can be found at: <http://www.reimangardens.com/collections/insects/unified-butterfly-recorder-app/>

Although the data collection methods and data analyses decisions are still developed, it is most likely that the field methods will be similar to Butterfly Monitoring programs already in existence. The University of Minnesota Monarch Lab has long collected data on larval monarchs using protocols found here: <http://monarchlab.org/mlmp>. Similarly, the Iowa Butterfly Survey

Network has been collecting data on adult butterflies using protocols found:
<http://www.reimangardens.com/collections/insects/iowa-butterfly-survey-network/>.

The national effort has yet to determine what a database will look like, who will run it, who will have access to it, and who will be responsible for data analysis. As a state, the current goal is to be able to access raw data collected within state borders to conduct analyses.

Things the consortium may need to decide:

1. Does Iowa participate in the National Database or have a separate database and have an employee responsible for sending raw data to others when requested?
2. Could the consortium fund the Volunteer Coordinator position for several years? One past attempt at a National Fish and Wildlife Federation grant to fund this position was not selected. As Reiman Gardens at ISU already has a part time person working on the Iowa Butterfly Survey Network, it would make sense to expand this program to more properties for adults and to add the larval and plant monitoring component.
3. Who (or which organizations?) will have access to what part of the database? Look at <http://monarchlab.org/mlmp> and click on any of the red dots for one example of open access data.
4. Who (or which organizations?) will be responsible for analyzing the data? What would the product look like (a report? A website)?

9.16 Appendix P

Chickasaw County

Chickasaw County has been doing monarch education programs for a few years now, which includes seven school programs each year with about 150 students total. A butterfly garden was established at the Twin Ponds Nature Center, and the Chickasaw County Board helped the New Hampton High School put in a 1 ac (0.4 ha) plot about five years ago. In the future, Chickasaw County plans to plant about 60 ac (24 ha) with a pollinator mix, depending on access to the seed, with about 10 ac (4 ha) to be planted in spring of 2017.

Boone County

The Boone County Conservation Board has

- Planted approximately 23 ac (9.3 ha) of pollinator habitat plus 700 plugs
- Conducted public pollinator program in the City of Boone
- Conducted monarch and pollinator programs in the Boone County School System
- Planted a butterfly garden around one of the board's enclosed shelters, which included some of the 700 plugs as well as direct seeding

Clayton County

Every year, the Clayton County Conservation holds a Monarch Release Party on the first Friday in September, with an educational program, monarch tagging and release. In 2016, there were 31 participants, all of whom received an *Asclepias* mixture depending on what they had available for planting.

On top of that, the Osborne office serves as an official monarch waystation and also as a rearing facility--16 monarchs were successfully raised to adulthood, tagged (per Monarch Watch out of University of Kansas), and released.

Davis County

The Davis County Conservation Board is applying 6.5 ac (2.6 ha) of filter strips in a pollinator mixes along field borders and around some of the ponds on the area last spring and this fall. The board also has a group of master gardeners who participated in the Plant Grow Fly program with Blank Park Zoo in the education garden located in a local park.

Decatur County

In 2015, working with the Fish & Wildlife Service Decatur County Conservation Board planted approximately 10 ac (4 ha) of Monarch Butterfly habitat at Slip Bluff Park. In 2016, working with the Southern Iowa Oak Savanna Alliance (SIOSA) and Graceland University a "Bringing Back the Monarchs" workshop was held with 20 participants. This workshop covered Monarch lifecycles, habitat needs and monitoring. Graceland students, DCCB Staff and SIOSA will be

regularly monitoring the pollinator plot at Slip Bluff to study Monarch use of the area through a REAP CEP Grant received by SIOSA.

Floyd County

The Floyd County Conservation Board has planted about 20 ac (8 ha) of pollinator mix. A pollinator grant from Trees Forever was awarded to the board, which will help fund a public pollinator day in spring of 2017 where participants will plant trees and 200 milkweed plugs. Rockford, Rudd, Charles City, all have butterfly gardens in Floyd County. In addition, the board works with youth to practice monarch tagging and teach about the life cycle of the butterfly.

Hamilton County

The Hamilton County Conservation Board planted 15 ac (6.0 ha) of pollinator habitat (CP42 mix) at Bishop's Cons in 2015. The CP42 pollinator mix was also planted on 1 ac (0.4 ha) in the Coyote Bend food plot in 2016. The Hamilton County Conservation Board plans to plant an additional 12 ac (4.6 ha) of pollinator habitat Coyote Bend in 2017 with the Statewide Wet / Mesic Pollinator Mix.

Jackson County

The Jackson County Conservation Board held 19 programs with 344 participants in 2016 related to monarchs and pollinator habitat, and 178 monarch butterflies were tagged with students and the public for education/awareness. The nature center has a pollinator garden, and 42 monarchs were raised at there in September of 2016 for education/awareness. Plans are also underway for a 25 ac (10 ha) planting at a county park in 2017.

Jasper County

This year, the Jasper County Conservation Board hosted 17 monarch-specific programs, reaching 499 people. In addition, several field trip groups visited as monarchs were tagged and released with children this fall at Mariposa Recreation Area and Jacob Krumm Nature Preserve. Including the visiting children, more than 600 people participated in monarch programs. Two of the 17 programs were public events, with one at the Newton Library and one at the Newton Arboretum. Most of the school programs are for Kindergarteners or for classes that raise a butterfly and then naturalists join them to tag and release the monarch.

Designated monarch gardens have been planted at Mariposa Recreation Area and the Newton Public Library. Efforts are underway to plan something at Thomas Jefferson Elementary School in Newton and possibly at Berg Middle School in Newton for the future. I believe the Prairie City Library also worked with Neal Smith Wildlife Refuge this summer on a planting as well. Recently, the Jasper County Conservation Board received a grant from INHF to convert 19 ac (7.7 ha) of cool season pasture into a monarch/pollinator site, which will be completed in spring of 2017.

Jefferson County

Monarch conservation efforts are just getting started in Jefferson County, where the Jefferson County Conservation Board has entered into a partnership with the USFWS. So far, 3 ac (1.2 ha) have been planted with a pollinator mix, and three programs have been held with 180 participants.

Jones County

In 2015, the Jones County Conservation Board planted 10 ac (4 ha) of monarch habitat. In addition, swamp, common, and whorled milkweed seed were collected, cleaned, and distributed to schools, nursing homes, and individuals interested in planting monarch garden habitats. Four high school classes with 84 students and four assisted living and nursing homes with 64 residents assisted with collecting and cleaning milkweed seeds. The board participated in the annual monarch tagging program by providing presentations to members of the public, youth groups, and to students in schools; 17 programs were held and reached 303 contacts. Butterfly garden and pollinator habitat, including a variety of milkweed species, was added into the landscaping in front of the Central Park Nature Center. Additional outreach efforts have included multiple published articles in local papers and pollinator blurbs were shared on the county's Facebook page.

The Jones County Conservation Board continued monarch conservation efforts in 2016. The board participated in the Jones County Earth Day Fair with an exhibit on milkweed and monarchs. Milkweed seed was distributed, and the booth had 250 visitors. A monarch presentation was also held at the fair, reaching 32 visitors. The board received milkweed plus from a Monarch Watch Grant for a monarch habitat restoration project at Central Park. The plugs were planted over roughly 5 ac (2 ha) around the new west pond, near the south wetland, and in the Nature Center planting. The monarch tagging program was successful again by providing presentations to members of the public, youth groups, and to students in schools; 25 programs were held and reached 437 contacts. In addition, milkweed seeds were informally collected and spread in October and November on an additional 5 ac. Butterfly garden efforts (including advice and information on funding) were supported at the Anamosa Middle School, within the community of Anamosa and at Strawberry Hill Elementary. Again, multiple articles were published in local papers, and pollinator blurbs were shared on the county's Facebook page.

Wright County

The Wright County Conservation Board presents information about monarch migration and life cycles to around 150 1st through 3rd graders speaking annually. During each presentation, several monarchs are tagged and released with Monarch Watch tags. The board also organizes a camp in the late summer where participants attempt to catch and tag monarchs. The camp usually involves 30 kids/parents. In 2016, two conservation board projects were approved for the monarch butterfly flyway grant through the NFWF which will allow 15 ac (6 ha) of pollinator mix to be planted on two separate areas. In Wright County, there is already one butterfly garden located at Lake Cornelia, and there are plans to expand it in years to come. Clarion-Goldfield-Dows School worked with us four years ago to plant a forb-rich butterfly garden in front of the

middle school. The Belmont-Klemme School has a 14 ac (2 ha) outdoor classroom that has bountiful numbers of native flowers growing on it. Future efforts are being prepared to develop a few other crucial sites over the next few years utilizing pollinator-rich plantings for monarchs.

9.16 Appendix Q

Monarch ESA Workgroup

- Ed Anderson, ISA
- Pamela Bachman, Monsanto
- Steve Bradbury, ISU
- Aaron Brees, IDNR
- James Cronin, USDA/NRCS (*Ex officio*)
- Grover Depriest, USDA (*Ex officio*)
- Curt Goettsch, USDA/FSA (*Ex officio*)
- Matt Deppe, ICA
- Ben Gleason, ICGA
- Jim Gulliford, SWCS
- Theo Gunther, ISA
- Lisa Hein, INHF
- Doug Helmers, USFWS (*Ex officio*)
- Rex Johnson, IDNR
- Karen Kinkead, IDNR
- Susan Kozak, IDALS
- Joe McGovern, INHF
- Kraig McPeck, USFWS (*Ex officio*)
- Scott Moats, TNC- Iowa Chapter
- Jacque Pohl, ISU
- Katy Reeder, IDNR
- Rick Robinson, IFBF
- Eric Sachs, Monsanto
- Dana Schweitzer, ISU
- Stephanie Shepherd, IDNR
- John Whitaker, USDA/FSA (*Ex officio*)

Monarch Meetings Summary

January 2015 Iowa Monarch Conservation Consortium

- Discussion led to the creation of the Consortium and the thought starter document that follows:

Monarch Conservation and ESA Options: A Thought Starter

Assumptions

The Iowa Monarch Conservation Consortium research and extension efforts will result in farmers, ranchers and other non-Federal landowners establishing and maintaining monarch breeding habitat that supports butterfly reproduction.

The Iowa conservation effort will proceed whether or not the USFWS decides to list the species under the ESA.

The implemented conservation measures will at a minimum be beneficial to the species and depending on the nature and extent of the measures may be sufficient to preclude the need for listing. If listing is needed, landowners who participate in a USFWS approved pre-listing conservation agreement will be exempt from all ESA regulations specified in the agreement.

ESA Background

If the USFWS ultimately lists the monarch, then non-Federal landowners whose actions can harm the butterfly or its habitat will need an incidental take permit from the USFWS to proceed with an activity that would otherwise result in an unlawful ‘take’ (i.e., harm) to the butterfly or its habitat. A conservation plan, approved by USFWS, is a prerequisite to receiving an incidental take permit.

Non-Federal landowners can establish conservation plans either before or after a species is listed. Upon approval of a plan by the USFWS, the Service then issues an incidental take permit(s) to those non-Federal landowners that are participating in the conservation plan. The permit protects the landowners from the prohibition of harming a listed species or its habitat. To issue a permit USFWS confirms the conservation measures in the plan will meet the standards under section 10(a)(1) of the ESA, or in the case of candidate species, confirms the conservation measures are sufficient to preclude the need for listing assuming other landowners in the species’ range adopted the same measures.

If the USFWS does not list a candidate species, then the development and approval of a pre-listing plan should have no regulatory impact under the ESA on future land management practices of non-Federal landowners (assumes USFWS is unlikely to revisit a ‘no listing’ decision in the foreseeable future or is not forced to reverse a ‘no listing’ decision by the courts).

Conservation plans (and the resultant permits) can be established by (issued to) individual landowners. ‘Programmatic’ conservation plans (and resultant permit(s)) can be established for a group of participating landowners – typically a State agency, perhaps in association with USDA, facilitates the development of a programmatic plan, its review/approval by USFWS and its implementation.

Conservation plans developed and implemented before a listing decision (i.e., a plan developed for a candidate species or a species at-risk) can provide participating private landowners varying degrees of assured continuity of on-going land management activities. Conservation plans developed and implemented post-listing will likely require changes in land management practices for those landowners whose activities could result in harm to the species or its habitat.

Under certain conditions, conservation plans developed before or after a listing decision can have regulatory certainty/assurances (‘no surprises’) for non-Federal landowners; i.e., under certain circumstances USFWS will not require additional land management requirements beyond those specified in an approved plan due to unforeseen circumstances in the future. Approved plans have regulatory assurance for the future (‘no regulatory surprises’).

Conservation plans are science-based (e.g., relationships between improved habitat and species population must be established, rigorous monitoring programs to assess performance outcomes of the conservation plan, etc), include adaptive management approaches, and governance among participants. Plans can include options for developing a market for habitat credits ('cap and trade') with participating or non-participating landowners.

All types of post- or pre-listing conservation plans must be approved by USFWS.

Post-Listing Conservation Options

1. Habitat Conservation Plans (HCPs) – These plans are required as part of an application to the USFWS for an incidental take permit. Conservation measures are required to minimize and mitigate take to the maximum extent practicable. Upon approval of a plan, state and private landowners are assured that if unforeseen circumstances arise, the USFWS will not require participants to comply with additional land use restrictions for the duration of the permit, without prior consent.
2. Safe Harbor Agreements for Private Landowners – This program also results in the issuance of permit, but is more appropriate for a scenario where a landowner wishes to voluntarily implement habitat conservation that will support recovery of the species and may attract a listed species to their property. When approved by the USFWS, the landowners' permit (an Enhancement of Survival Permit, a type of incidental take permit) protects them from unlawful take during the life of the permit and allows them to lawfully return the land to its original condition after the permit expires.
3. Conservation Banks – Permanently protected land that can be used as credit for adverse effects to a species for activities that may occur on other land. For the monarch, probably not a likely option, at least for privately-owned land.

Pre-Listing Conservation Options

Pre-listing programs are designed to address habitat conservation for a species prior to potential listing (i.e., candidate species being reviewed for potential listing or species determined to be warranted for listing, but currently precluded from listing).

Pre-listing programs can be designed to preclude the need for listing. If USFWS subsequently determines listing required, future conservation management requirements for an incidental take permit may be more limited, as compared to a situation where no pre-listing conservation activities were undertaken.

1. Candidate Conservation Agreement (CCA) - Similar in substance to a HCP. Typically focuses on Federal landowners. Because Federal landowners are part of the agreement, USFWS cannot provide assurances of no regulatory surprises in the future if the species is listed (USFWS can only provide assurances to non-Federal landowners).
2. Candidate Conservation Agreement with Assurance (CCAA) - CCAAs only apply to non-Federal landowners. The USFWS will issue an Enhancement of Survival Permit (a type of incidental take permit) upon approval of a CCAA. The conservation measures are designed to

preclude the need for listing in the area covered by the agreement, and there are assurances of no regulatory surprises if the species is listed in the future.

3. Pre-Listing Conservation Action (PCA) - A proposed regulation by USFWS. Although not a final regulation, a pilot effort may be supported by the Service. PCAs can include Federal and non-Federal landowners. As proposed, these actions must be administered through a State agency. The conservation measures must be beneficial to the candidate species but they are not as exacting as those specified in a CCA or CCAA. Conservation measures in PCAs do not carry regulatory assurances. If the candidate species is listed, conservation achieved through measures undertaken in a PCA may serve as a mitigation or compensatory measure in a future HCP and resultant incidental take permit.

Given the nature of the monarch's habitat, a programmatic pre- or post- listing conservation effort would be most effective and efficient, as compared to individual landowners developing their unique plans with USFWS. Typically a state DNR or wildlife agency serves as the facilitating state entity that works with landowners and USFWS to develop and implement a programmatic conservation plan.

It is possible that USDA could serve as the facilitator of a programmatic conservation plan. The sage grouse pre-listing conservation plan involves USDA/NRCS holding a section 7 conference opinion, which can be converted into a final biological opinion if the sage grouse is listed. This conversion reduces the regulatory impacts of a listing by ensuring that plan participants receive incidental take coverage upon or soon after a listing. It is important to note that in the USFWS approval of this agreement, the Service recommended the non-Federal landowners subsequently create a CCAA to have assurance of no regulatory surprises if the grouse is listed in the future. Thus it may be possible to have USDA facilitate the initial 'heavy lifting' to establish a programmatic CCA and then using that 'template' create a related programmatic CCAA facilitated by the state.

April 1, 2015 Iowa Monarch Conservation Consortium

Agenda

1. Consortium Vision and Operating Principles
2. Consortium Members and Partners
3. Keystone Policy Center – Monarch Collaborative Project meeting scheduled for April 6 and 7
4. Webpage under construction - <http://monarch.ent.iastate.edu/>
5. Work group report - pre-listing conservation plan
6. Research update: a) Milkweed monitoring; b) Monarch monitoring – in conjunction with the IDNR-ISU; c) Multiple Species Inventory and Monitoring program; d) Demonstration plots for 2015
7. Other items

Outcomes and Action Items

Consortium Vision and Operating Principles: Consortium members are to send any comments/suggestions to the draft Vision and Operating Principles by April 3. ISU will finalize and distribute the final document the week of April 6th. Discussion topics: It was clarified that financial or in-kind contributions to the Consortium can include resources member organizations may receive from their constituents or other interested parties. Interested parties may also contribute resources to the Consortium but defer membership.

Consortium Members and Partners: The proposed definitions of consortium members and partners was approved. The definitions will be included in the final Consortium Vision and Operating Principles.

Upon finalization of the Vision and Operating Principles document, the following organizations that have contacted the consortium will be invited to join as members:

- University of Northern Iowa, Tallgrass Prairie Center
- Bayer CropScience
- Iowa Chapter of Pheasants Forever
- USDA – Agricultural Research Office
- USDA – Farm Service Agency
- US Fish and Wildlife Service, Rock Island Field Office

Upon finalization of the Vision and Operating Principles document, the following organizations that have contacted the consortium will be invited to join as partners:

- Monarch Watch
- Monarch Joint Venture

Keystone Policy Center – Monarch Collaborative Project meeting scheduled for April 6 and 7:

Eric Sachs summarized that the meeting will be an opportunity to convene diverse stakeholders to discuss and define the potential value, purpose, goals and structure of collaborative efforts to help implement solutions to challenges in accelerating efforts for monarch recovery.

Participation in the meeting will come from sectors including growers, the agricultural supply chain, university researchers, NGOs, and government agencies. ISU has accepted an invitation to attend and discuss the Consortium and its goals, consistent with the information shared and discussed at our February 13 meeting.

Webpage: ISU anticipates having a draft website ready for review in approximately two weeks, but any initial comments are appreciated (send to Sue Blodgett at sblodg@iastate.edu).

Members should be identifying their organization's web addresses for hot links to the Consortium website. We will be refining and updating the site during the year, so continue to watch for changes.

Pre-listing workgroup report: The workgroup (Anderson, Bradbury, Deppe, Gleason, Kinhead, Kozak, McGovern, Moats, Robinson, Reeder) met on March 20th to discuss and review background to different pre- and post-listing ESA programs. The workgroup agreed the focus

should be on pre-listing programs. The workgroup will meet again on April 3 and identify questions/topics for future discussions with NRCS and USFWS. An important aspect of this future discussion will be to gain better understanding of any potential regulatory risks to private landowners for establishing or modifying monarch habitat, with or without a pre-listing conservation plan, if the monarch is subsequently listed. It is anticipated within 6 weeks the workgroup will be prepared to provide options for the Consortium's consideration. Subsequent to the meeting Eric Sachs asked to join the workgroup.

Research update: Efforts to date and plans for the remainder of the year were summarized. This summer a multi-species milkweed survey across the state will be undertaken and the IDNR multi-species survey on public/conservation land will be modified to explicitly include monarch butterflies and associated habitat. Demonstration and research plots for establishing milkweed stands by using 'plugs' or direct seeding will be initiated this spring on ISU research farms.

Discussions then turned to what feedback should be provided to farmers or landowners that are requesting advice of establishing monarch habitat. At this time the optimum mixes of milkweeds, nectar plants and other species to serve monarchs in Iowa landscapes have not been determined. Once the Consortium's research has progressed and there is a better understanding of the regulatory environment, then more technical/research-based advice will be shared through the Consortium's extension/outreach component. However, several organizations have developed general seed mix recommendations for monarch and/or for other wildlife habitat.

Consortium members who are being contacted by their constituency for information on establishing milkweed habitat or are volunteering to establish habitat are suggested to share the following advice:

THE IOWA MONARCH CONSERVATION CONSORTIUM IS UNDERTAKING RESEARCH TO DETERMINE OPTIONS FOR ESTABLISHING AND MAINTAINING MONARCH BREEDING HABITAT BEST SUITED FOR DIFFERENT TYPES OF LANDUSE SCENARIOS IN THE STATE. THE RESULTS OF THIS RESEARCH WILL BE USED TO PROVIDE ADVICE TO FARMERS AND LANDOWNERS. IF YOU WISH TO START ESTABLISHING MONARCH HABITAT NOW, THE FOLLOWING ARE EXAMPLES OF SOME OF THE ORGANIZATIONS THAT PROVIDE INFORMATION ON ESTABLISHING MONARCH, POLLINATOR OR WILDLIFE BREEDING HABITAT.

- Iowa Pheasants Forever: Native Seed Program
- Iowa Prairie Network Iowa Prairie Network
- Monarch Joint Venture: Create Habitat for Monarchs
- Monarch Watch: Waystation Program, Milkweed Market
- Xerces Society: Milkweed Project, Monarch Butterflies

It was also requested that consortium members keep a record of contact information of people (and if possible their locations) to facilitate future follow-up.

Discussions then turned to the possibility of forming an 'implementation issues workgroup' that would work with farmers and other landowners from Consortium organizations to address

logistical, financial, and other related issues/questions that will be important factors in an individual's decision about establishing monarch habitat. Self-nominations to this new workgroup is requested by May 1st.

Other Items: Further discussion included a proposal to establish additional workgroups that could address issues such as research, extension/outreach and communications. It is recommended that the 'implementation issues workgroup' and the pre-listing workgroup are sufficient at this time. The potential creation of additional workgroups is suggested as a topic for discussion at the next consortium meeting [note sue suggested one workgroup to help manage outreach efforts; direct people who are planning to establish monarch habitat to appropriate sources, prioritize outreach materials and efforts. Such a workgroup could include USFWS – Kraig; someone from Pheasants Forever; NRCS James Cronin; IDNR, Bill Johnson, Katy Reeder, Jim Gulliford could be a good chair].

The next Consortium meeting is anticipated for early June as a face-to-face session, with teleconferencing for those who cannot attend in person.

Iowa Monarch Conservation Consortium Strategic Goals and Operating Principals Approved:

<http://monarch.ent.iastate.edu/files/file/4.1.2015-iowa-monarch-conservation-consortium-strategic-goals-and-operating-princ.pdf>

May 18, 2015—ESA Workgroup

Agenda

Discussion on Draft Questions for USFWS and USDA NRCS

Draft Questions for USFWS and USDA NRCS

USFWS

1. Assuming the monarch was listed, what types of activities could be considered to result in take and require an incidental take permit for a non-Federal landowner? For example, would use of glyphosate in a corn or soybean field be an issue? Would off-field pesticide exposure through drift or runoff be an issue? Removing milkweed from non-production land?
2. If the monarch were listed it seems 'take' will be a challenging issue given the species range that includes overlap with a diverse array of human activities (e.g., traffic on roads etc.). In the past, how has USFWS dealt with harm/take issues for routine activities of private landowners/citizens? Were they handled differently than activities undertaken by Federal landowners and/or activities funded by a Federal agency? Would these previous approaches be relevant in this case?
3. If private landowners begin to establish monarch breeding habitat and/or actively maintain or enhance existing breeding habitat prior to a USFWS listing decision and if the species is subsequently listed, will this habitat be considered part of the baseline? Will these landowners need to work with USFWS for incidental take permits if they need to modify the habitat? Would USFWS treat situations where the conservation efforts were based on a farmer's

use of NRCS support differently than situations where a farmer undertook the habitat conservation efforts independently? In situations where private landowners may have uncertainty as to the future regulatory environment (i.e., the outcome of a listing review), what can USFWS do to avoid the unintended consequence of a delay in establishing/maintaining breeding habitat, for example?

4. In approving Candidate Conservation Agreements with Assurances (CCAAs), how does USFWS determine that the ‘science’ and implementation of the habitat conservation measures and monitoring of the species populations are sufficiently rigorous to meet the standard for approval (i.e., the measures are sufficient to preclude the need for listing assuming other landowners in the species range adopted the same measures)? How does USFWS monitor the progress of a CCAA, which may have a time frame of several decades? Have there been any legal challenges to approved CCAAs or CCAs?

5. Is the USFWS piloting Pre-listing Conservation Actions, even though the regulation has not been issued final? If so, is it possible a pilot effort with the monarch could be undertaken. Could a PCA be ‘upgraded’ to a CCAA for non-Federal landowners and/or a Section 7 conference prior to the final listing of a species?

USFWS and NRCS

1. We are aware of the Section 7 conference with USDA-NRCS for the sage grouse that created a pre-listing conservation plan. The plan can be converted to a final biological opinion if a listing decision occurs, which should reduce regulatory impacts by ensuring plan participants (Federal and non-Federal landowners) would receive incidental take coverage upon or soon after listing. In the USFWS approval of the Section 7 conference they recommended that non-Federal participants still create a CCAA to have assurance of no regulatory surprises if the grouse was listed in the future. Could USFWS and NRCS walk us through this example (or a different example if it would be more relevant for the monarch) and explain the basics of the effort. Also please discuss the rationale in the sage grouse case as to why the USFWS recommended that private landowners still proceed in establishing a CCAA – presumably a programmatic CCAA.

2. Would (are) the NRCS and USFWS considering a Section 7 conference pre-listing approach for the monarch in one or more of the states in the summer and spring breeding ranges?

NRCS

1. Prior to the listing decision on the monarch, NRCS is developing recommendations for establishing/enhancing monarch breeding habitat. Is it possible NRCS could cease providing assistance to a farmer if they declined to employ the monarch conservation practices? Could their priority status change if they declined to employ monarch conservation measures?

Meeting Notes

Opening Discussion

USFWS indicated the information provided in the workgroup’s working paper (Monarch Conservation and ESA Options: A Thought Starter) reasonably summarized background

information on the ESA and the nature and attributes of post- and pre-listing conservation options that are available to non-Federal landowners.

Before discussing the questions prepared by the workgroup, it was acknowledged that some of the questions could only be addressed generally or may have to be addressed as part of an on-going dialogue given specific aspects of monarch conservation are under study and/or some topics reflect broader policy issues that are under consideration within USFWS and/or NRCS.

It was noted; however, that getting questions ‘on the table’ and beginning the discussion was extremely useful in moving forward, even if some of the answers are uncertain at this time.

Discussion on Questions (please refer to the workgroup’s paper: DRAFT Questions/Topics for USFWS and NRCS)

Note: Federal agency responses to the workgroup’s questions, while consistent with USFWS and NRCS policies in general, do not reflect official positions of USFWS or NRCS concerning the monarch butterfly status review nor planned or on-going conservation activities as they may relate to the future listing decision.

USFWS Questions:

Question 1: It is possible that long-standing practices may be exempted from ‘take.’ For example, there are instances where 4(d) rules have been issued to exempt long-standing forestry management practices from ‘take’ for other species that were listed as threatened. While at this time it is not possible to make a definitive statement, it is possible that long-standing weed management practices in row crop agriculture could be viewed in a manner similar to the above forestry example. It was noted that removal of habitat from non-crop production land would likely be viewed differently than weed management within a production field.

Question 2. While it isn’t possible to provide ‘monarch-specific’ answers at this time, some general perspectives from past experiences are instructive. Generally, the approach to conservation/recovery of a species focuses first on protecting existing habitat and then on enhancing/establishing habitat in underutilized areas. A low priority is placed on general, long-standing activities. It was noted that under ESA Section 7(d) Federal agencies have to ensure their actions will not result in an irretrievable commitment, which could influence some USDA programs in theory, but probably not a likely scenario in this instance. As USFWS begins to review the ‘monarch science’ it will likely use the Species Status Assessment process to address issues reflected in question 2. This is a process that encourages public input and workgroup members noted the importance of providing ample time/opportunity to submit information to the Service during the SSA process for the monarch.

Question 3. The first series of sub-questions begin to ‘engage’ different aspects of pre-listing options under the ESA (i.e., CCAs, CCAAs, PCAs and/or Section 7 conference reports) and the extent to which regulatory certainty/assurances are provided for implemented conservation actions and potential take issues. USFWS indicated they would elevate the last sub-question in #3 that addresses the unintended consequence of a delay in establishing/maintaining monarch

breeding habitat because of uncertainty in how baseline/take will be addressed outside of an approved pre-listing program. It was agreed that clarification on this issue was very critical.

Question 4. Due to time constraints the ‘nuts and bolts’ of how a CCAA is developed, reviewed and approved by USFWS was not addressed. It is suggested this be a topic for the next workgroup meeting. In the meantime, USFWS will research the last sub-question concerning whether or not there are (or have been) any legal challenges to approved CCAAs or CCAs, and if so, the nature of the complaints and if they have been resolved.

Question 5. It was noted that USFWS Region 6 has been piloting the use of PCAs for other species (even though the regulation has not been finalized) and that a PCA-model could be a good approach in moving forward with the monarch.

USFWS and NRCS Questions

Question 1. NRCS walked through the Section 7 conference process for the sage grouse (please refer to the ‘Thought Starter’ paper for a brief summary of the general process). During the discussion it was stressed that for a rancher to have regulatory certainty/assurances they had to be participating in the sage grouse conservation program and undertake, as appropriate, the conservation practices specified in the Section 7 conference report. Ranchers that wish to participate in the sage grouse conservation program are required to work with NRCS conservation planners, develop a plan that meets landowner needs and follow the identified conservation measures specific for the species and implement the practices. It was also pointed out that the Section 7 conference report is not a ‘one and done.’ For example, additional conservation measures may be added or modified and performance of the conservation efforts need to be addressed. It was clarified that ranchers that are participating in the sage grouse conservation program (as described above) do not need to be covered under a CCAA to have regulatory assurances. The USFWS recommendation in the conference report to develop a CCAA was directed to those private landowners that were involved in non-agricultural land use.

Question 2. NRCS and USFWS acknowledged that a Section 7 conference approach would be logical for the monarch, but a decision has not been made at this time. The possibility of using this approach is under discussion within the USDA.

NRCS Question

Question 1. NRCS indicated that would not cease providing assistance to farmers that declined employing any future monarch conservation practices. It was acknowledged that NRCS priority ranking process could be influenced in the future if there were monarch conservation practices available.

Action Items

By COB May 26th, workgroup members to send to Steve any additional questions for USFWS and/or NRCS. Steve will consolidate the questions and send to USFWS and NRCS.

By COB May 26th, USFWS and NRCS to send to Steve, who will share with the workgroup, best estimates on a timeframe to receive feedback on the outstanding issues noted above.

After May 26th, Steve will work to schedule a follow-up meeting to address USFWS Question #4 and any additional questions submitted by workgroup members.

June 12, 2015—ESA Workgroup

Participants: Kraig McPeck (USFWS), Gallon Hall (NRCS), Susan Kozak (IDALS), Katy Reeder (IDNR), Aaron Brees (IDNR), Ed Anderson (ISA), Scott Moats (TNC), Rick Robinson (IFBF), Ben Gleason (IACorn), Steve Bradbury (ISU)

Agenda

- A. Summary of CCAAs and process (USFWS Question #4 from the question document).
 - B. Discussion of follow-up questions from the May 18th teleconference.
 - C. Status updates from USFWS and NRCS on outstanding topics from the May 18th meeting.
 - D. Summary and Next Steps
- A) Summary of CCAAs and process (USFWS Question #4 from the question document).

Kraig provided a general overview of the process (also see ‘thought starter paper’ for a summary). Monarch-specific description of a potential CCAA not possible at this time since critical science issues concerning monarch conservation are being studied and a summary of critical crop and livestock production practices that could interface with monarch conservation need to be identified. In general, as the ‘science’ of conservation for a specific species is resolved (e.g., key habitat needs- nature and extent, key aspects of life history during a year, etc.) and critical production practices that interface with a species life history/habitat are identified a framework can developed with the goal of species recovery (which is the standard for a CCAA) that also incorporates other land use needs. Changes/adjustments in land management will likely be needed to achieve species recovery, but with a goal of flexibility and practicality in terms of current and future management practices. Kraig indicated that each CCAA will be different in terms of details based on the species, existing land use and related spatial and temporal considerations. The key is for all the parties and USFWS to work together from the start so needs of the species and landowners are known and shared to create a framework that can evolve to a CCAA if the species becomes a candidate for listing.

B) Discussion of follow-up questions from the May 18th teleconference (see below).

1. Specifically, how will the agency analyze pre-listing efforts as they make a decision to list?

In making a listing decision the Service evaluates 5 factors, including the nature of habitat requirements and current/anticipated changes to extent/quality; overuse of a species; disease/predation pressure; regulatory mechanisms, and other man-made stressors. In the process of a species status review the Service will evaluate any on-going conservation activities. Depending on the extent and success of pre-listing efforts and confidence of continued implementation, the proposed or final listing decision could be not to list, or list as threatened instead of endangered, or determine the species is warranted for listing, but preclude finalizing the listing as conservation proceeds, or list, but perhaps with a less intensive/extensive need for additional conservation practices. If the pre-listing activity(ies) included approved CCAA(s),

then by definition the associated conservation efforts would have been approved as being sufficient to ensure recovery, assuming all landowners followed the same practices – hence a CCAA likely also reflects ‘the key ingredients’ that would be part of a listing decision and recovery plan.

2. Is there formal criteria to evaluate the efficacy of pre-listing efforts?

A CCAA reflects conservation measures sufficient to support recovery, as noted above. A Prelisting Conservation Action (PCA) reflects conservation measures that are beneficial to the species, but not necessarily sufficient to ensure recovery. The specific criteria will vary with the species and recovery needs, but CCAAs are science-based (e.g., relationships between improved habitat and population response established, critical land management practices have been documented, evaluated and adapted as needed to ensure recovery while providing landowner flexibility, rigorous monitoring program to document outcomes). Governance of the CCAA must also be documented.

3. Are there examples of these types of efforts leading to decisions not to list?

Galon provided examples of species that were not listed (Arctic Grayling, Bi-state sage grouse, Amargosa Toad), listed as threatened instead of endangered (Gunnison sage grouse, lesser prairie chicken), or delisted (Oregon Chub, Louisiana Black Bear) based on conservation programs. The sage grouse and New England cottontail decisions latter this year may demonstrate additional successful outcomes.

4. If there are, what facts were persuasive in their analysis?

In general, the results of these conservation measures met the recovery goals, or were anticipated to meet the recovery goals in the future, and there was confidence that the conservation programs would be maintained based on easements, resource commitments, etc. The details of the decisions are specific to the species, but would follow the principles outlined in previous questions.

5. Are there examples of pre-listing efforts for species that ultimately were included on the threatened/endangered species list?

There were no specific examples; however, as noted above some species were listed as threatened instead of endangered based on pre-listing conservation programs.

6. How are pre-listing activities utilized in the development of a recovery plan if a species moves to the threatened/endangered species list?

Please refer to question 1. In addition, Kraig pointed out that the listing decision and recovery plan process is now more integrated and engages public comment and input to help formulate conservation measures.

7. How are state agencies like the DNR involved with pre-listing options?

Galon pointed out that in many of the efforts NRCS has managed under the working lands program, there is significant state agency involvement with financial resources or in-kind

research/technical advice in developing conservation measures. As noted in previous workgroup discussions, programmatic CCAAs typical are implemented and managed through a state agency.

8. Does the DNR have the resources to implement these options?

Both IDNR and IDALS noted that monarch conservation is a priority issue in both organizations and related habitat management and/or monitoring efforts are underway/being adapted with IDNR. As with all parties involved in the consortium, IDNR and IDALS are in a learning phase. As the path forward gets refined, resource needs will become clear. Having said that, implementing a programmatic CCAA, for example, would require resources.

9. Do the different pre-listing options offer any means of Federal support to State agencies and/or flexibility in using existing Federal funds within related programs?

Galon and Kraig both pointed out while direct funding may not be available in a pre-listing phase, there can be opportunities for indirect support through technical assistance, sharing the development of conservation practices that are mutually beneficial to state and Federal programs etc. Galon pointed out that a section 7 conference report is a way NRCS can more directly alleviate part of the resource 'burn rate' for state agencies.

C) Status updates from USFWS and NRCS on outstanding topics from the May 18th meeting.

Kraig indicated he has raised to HQ the question on legal challenges to approved CCAAs and CCAs and the question about regulatory assurances viz baseline prior to the establishment of a CCAA. When he hears back he'll let us know.

Galon indicated that at this time NRCS was not planning on expanding their current portfolio of species under the working lands program to include a Section 7 conference for the monarch. However, that approach as a possibility for the future and has not been precluded. A potential decision to use this approach would reflect that USFWS, state agencies and private landowners along with NRCS had determined this to be an appropriate path forward and all were committed to invest resources in a collaborative effort.

D) Summary and Next Steps

Summary of key points. - Monarch conservation is a high priority in the USFWS and Federal government and there is a sense of urgency in moving forward. The species status review process under the ESA will likely not be moving at the same pace; i.e., it will lag behind conservation efforts. A listing decision is not going to happen for several years. Consequently, there is time to develop the science; explore effective, pragmatic conservation measures that meet recovery and ag production needs; and begin instituting conservation practices in a manner that can transition into a pre-listing agreement that provides regulatory assurances if the species becomes a candidate for listing. It was discussed that a sound conservation plan and its implementation (the strategic goal of the Iowa Consortium) could help to preclude the need to list and then obviate the ESA regulatory issues.

It was also agreed that all parties working together should start scoping out a framework to a conservation plan as the initial step forward. The effort would help provide more specific insights as to key steps needed for advancing monarch conservation and frame topics for a potential pre-listing action in the future. This initial effort would include summarizing the nature and status of scientific gaps that need to be addressed to support a conservation plan, identifying critical crop and livestock management practices that will interface with conservation practices, and formulating outreach approaches to gain additional input and feedback from farmers and private landowners.

Next Steps – Under the assumption that the Consortium will meet in August, the workgroup should anticipate providing a report out at that time. It was agreed that the workgroup would summarize key ESA background information and pre-listing options at the meeting. It was also agreed that the workgroup would emphasize that moving forward with conservation can be integrated, in an orderly fashion, with developing a pre-listing program with regulatory assurances if it is needed in the future. By developing and refining a conservation framework and beginning implementation, in coordination with USFWS and NRCS, as the monarch science and land management practice needs are refined, the Consortium members will be advancing measures that could preclude the need for listing. If in the future listing seems likely, the parties to the conservation plan would be well positioned to convert their efforts to a CCAA, for example, and thereby have regulatory assurances for conservation measures underway and planned.

It was agreed that the workgroup would strive to meet the week of July 20th for an all day, face-to-face meeting (with telecon back-up) to scope out key elements of a framework to share with the Consortium in August. A meeting venue between Des Moines/Ames and the Quad cities will be explored.

Please let Steve know of dates of days during the week of July 20th that have conflicts. A date will be selected that captures a reasonable cross section of the workgroup.

July 23, 2015—ESA Workgroup

Neal Smith Wildlife Refuge – Prairie Visitor and Learning Center

Meeting objectives

- a. Scope out elements of a monarch conservation framework, including initial definition of key monarch habitat/life history characteristics, and potential agricultural and non-agricultural land management practices that can/will likely interface with conservation efforts
- b. Outline governance elements of a conservation plan
- c. Identify next steps

Notes

Meeting Participants: Pam Bachman, Aaron Brees, Steve Bradbury, James Cronin, Matt Deppe, Doug Helmers, Ben Gleason, Susan Kozak; Joe McGovern, Kraig McPeek, Scott Moats, Tyler Grant, Theo Gunther, Katy Reeder, Rick Robinson.

Unable to participate: Ed Anderson, Grover DePriest, Jim Gulliford, Gallon Hall, Matthew Judy, Christine Rhoades, Eric Sachs

Meeting objectives

- a. Scope out elements of a monarch conservation framework, including initial definition of key monarch habitat/life history characteristics, and potential agricultural and non-agricultural land management practices that can/will likely interface with conservation efforts
- b. Outline governance elements of a conservation plan
- c. Identify next steps

Recap of previous workgroup discussions

A brief summary was provided of previous workgroup meetings that led to the decision to hold a one-day meeting to work through specific elements of a monarch conservation plan, taking into account the potential of a future listing decision (see previous workgroup meeting minutes as needed).

Overview of USFWS monarch conservation plan and ESA status review

Monarch conservation is a high priority in the USFWS and Federal government and there is a sense of urgency in moving forward. The species status review under the ESA will not be moving at the same pace as the conservation effort; i.e., the deliberations on the listing issue will likely lag behind the conservation efforts. A proposal to list, not list, or determine warranted for listing, but preclude action, is not going to happen for several years. Consequently, there is time to develop the conservation science; explore effective, pragmatic conservation measures that meet recovery and agricultural production needs; and begin instituting and documenting conservation practices and results. It was discussed that a sound conservation plan and its implementation (the strategic goal of the Iowa Consortium) could help to preclude the need to list and thus obviate any potential ESA regulatory issues in the future. If needed in the future, a well-crafted and implemented conservation plan could be converted in an orderly and timely manner into a pre-listing agreement that provides regulatory assurances, if the species becomes a candidate for listing. There is sufficient time to craft and implement a scientifically-sound and practical monarch conservation plan, which if successful could provide the USFWS the record to determine there is no need to list the monarch and, if necessary, to defend any legal challenge to such a determination.

Key aspects of monarch biology/habitat needs

Doug Helmers provided a powerpoint that outlined key aspects of monarch life history, its migration patterns and habitat needs, population trends over the last 20 years and remaining scientific issues concerning species conservation measures (see attached powerpoint). A USGS workgroup estimates that the size of the overwintering monarch population needs to increase from approximately 1 ha of forest cover to 6 ha (or 225 million monarchs) by 2020 to have a population sufficiently resilient to extreme climatic events in the spring or summer breeding ranges or in the overwintering habitat. At this time, assuming the overwintering habitat remains protected, improved reproduction in the spring and summer breeding ranges is the key factor for recovery. In turn, expanding the quantity and quality of monarch breeding habitat is needed to support increased reproduction. Additional milkweed are required for ovipositioning and larval development. Additional forage (nectar) plants are needed to support the adult monarchs during breeding and migrations. USGS is developing an initial population model and decision-support system that will provide a first approximation of the amount of additional breeding habitat required to reach the 2020 goal. The support system will provide habitat estimates at the county level for states in the monarch central flyway. The model may be released to the public latter this summer. Initial modeling results indicate that to reach the recovery goal, expanded habitat will be required in the spring and summer breeding ranges and will need to include public (e.g., Federal, State, county land; road rights of way, utility easements, etc.) and private land, with agricultural land area not in active production providing the most significant amount of land area available for habitat expansion. In terms of monitoring the status and trends of breeding habitat and larval populations, it was discussed that on-site sampling protocols are reasonably well-developed and research to develop probabilistic survey designs that could aggregate monitoring data with statistical confidence within and across states of the US is being initiated.

Key discussion points concerning the state of the science are as follows. Reducing uncertainties in understanding attributes of breeding habitat quality over time and the dimensions and spatial arrangements of habitat patches will influence estimates of needed breeding habitat acres. To support population modeling and associated conservation planning and monitoring efforts, it will be necessary to integrate GIS layers from multiple sources and maintain habitat data across public and private land uses; representatives from IDNR and IDALS discussed efforts within the State of Iowa and perhaps across Midwestern states that could facilitate addressing this issue. In addition to research on monarch biology and habitat, it was suggested that the ISU Iowa Farm and Rural Life Poll include a component to assess farmer perspectives on monarch conservation needs and willingness/concerns for implementing conservation practices.

It was discussed that while science-based refinements to conservation efforts will be needed to optimize 'return on investments' as the years proceed, given the current state of knowledge important progress can be made now to demonstrate habitat establishment and maintenance practices, create new habitat and build collaborative partnerships across public and private landowners. In this regard the group 'hypothesized' that initial emphasis on habitat expansion/maintenance efforts on public lands (including Federal, State, and county protected lands, roadsides, abandoned mine reclamation sites, etc.) could support the establishment of larger, more permanent habitat patches. Establishment of a larger number of smaller habitat patches, primarily associated with agricultural lands, would then follow. This phased approach would help demonstrate trust in the public-private collaboration to monarch conservation and provide additional time to refine habitat management practices for farmers and livestock producers as well as modeling efforts to support siting-recommendations for new patches on

agricultural land. Having said that, it was recommended that farmers and livestock producers be provided 3 to 5 practices they could implement immediately to support conservation and it was recommended that leading farmer/livestock producers within the Iowa associations be actively engaged in habitat conservation research/demonstration projects, and related outreach efforts, to support the ‘ramp-up’ of conservation efforts in the coming years.

Agricultural and non-agricultural land use/land management practices that may conflict with monarch conservation practices

The discussion of agricultural/livestock production practices that could interface with monarch conservation practices generally centered on the definition of monarch ‘habitat’ and the extent to which an ag/livestock practice was a long standing practice. While the nature of the discussion was caveated by USFWS participants as not being an expression of policy positions concerning the on-going monarch listing evaluation, the general direction of the discussion was characterized to be reasonably consistent with positions held by the Service in other species deliberations.

The control of weeds (including milkweeds) and insect pests within a crop field/pasture would likely not be considered ‘take’ if the monarch was listed because pest management could be considered a longstanding practice. In addition, a ‘volunteer’ milkweed stem outside a production field/pasture would likely not be considered monarch ‘habitat’, while an existing or deliberately established patch of milkweed plants (perhaps including any associated nectar plants) outside an active production/grazing area could be considered habitat. The latter scenario raised the question of whether or not there could be any ESA consequences associated with potential off-field herbicide or insecticide exposure to a habitat patch as well as potential consequences of removing a habitat patch in the future (e.g., converting CRP fields with monarch habitat(s) back into production fields; or establishing a building on an existing habitat patch). While the discussion did not provide additional examples of land practices that could interface monarch conservation efforts, these are likely illustrative of the fundamental policy questions and concerns.

The conversation then returned to the ‘regulatory’ significance of these agricultural practices, with reference to an unlisted species, a candidate species or a listed species. For a listed species the potential complexity and transactional costs associated with these example practices are the most extreme. Consistent with the Consortium’s goal of proactively advancing monarch conservation, and an earlier workgroup conclusion to address pre-listing options, the meeting’s discussion then focused on candidate or unlisted species scenarios. Please refer to previous workgroup documents for a general discussion on incidental take and habitat conservation plans for private landowners in the context of a listed species.

Currently, the monarch has no designation under the ESA and as a result there are no regulatory implications under the Act in terms of the above mentioned agricultural practices (but note, use instructions on pesticide labels that specify application requirements to reduce potential effects on off-site, non-target species need to be followed for FIFRA compliance regardless of the monarch’s listing status). If the monarch became a candidate species for listing, then an approved pre-listing conservation plan could provide regulatory assurances for on-going and future land management practices, consistent with the approved plan.

The possibility was discussed that farmers/livestock producers may defer establishing/maintaining monarch habitat to reduce uncertainty in losing future flexibility in land management options if the species becomes listed and/or they could wait to get engaged in a pre-listing conservation effort until a listing seems likely. The group discussed that this behavior (failure in implementing a monarch conservation practices or delaying implementation of practices until the ‘11th hour’) could then create the unintended consequence of providing USFWS minimal information and data to reasonably support a decision to not list the species and/or result in a hastily prepared and implemented pre-listing conservation plan that may be difficult for the USFWS to approve and defend if challenged.

While there are no guaranteed ‘risk-free’ recommendations that can be provided to farmers and livestock producers, the group agreed that the lowest risk scenario is to proactively develop and implement a sound Iowa monarch conservation plan, in coordination with USFWS and USDA, well in advance of the listing decision. This scenario, at worst, would provide the means to convert the plan to a programmatic candidate conservation agreement with assurances (for example) in an orderly and timely manner and realize regulatory assurance of flexibility in agricultural practices, consistent with monarch recovery, to the maximum extent possible. In the best case, the outcome of the conservation plan and its continued implementation could provide the USFWS the record to defend a no listing decision - and as a result there would be no loss in flexibility for farmers and livestock producers due to regulatory constraints under the ESA.

Discussion of governance elements for a conservation plan

Key elements identified:

Oversight of the development and implementation of a plan should involve a governing body that represents all the public and private organizations that are actively engaged and include on-going coordination and communication with USFWS and USDA to gain timely feedback, technical support and confirmation of conservation activities being undertaken through Federal programs and on Federal lands within Iowa.

Within the public and private sectors, each respective organization will need to establish or augment existing organizational infrastructure and processes to manage their responsibilities within the plan. There may be a need for organizations within the public and private sectors to form respective sub-groups/committees to coordinate/optimize efforts.

An initial set of components likely to be in a conservation plan were outlined and included the scientific framework to the conservation effort; description of adaptive conservation and land management practices and approaches and how they will be implemented and tracked; information/data management; monitoring to assess performance outcomes; and communication and outreach.

Overall meeting conclusion

It was agreed that the workgroup would propose to the full consortium a draft monarch conservation plan framework. Following adoption of the framework, it should be made

publically available, in part to facilitate discussions within USDA and USFWS. The framework would subsequently be expanded to a draft plan for review by the full consortium.

The proposed framework and subsequent plan would not be titled a ‘pre-listing conservation plan’: however, the text would be clear that the conservation plan was developed with the intention that its successful implementation will lead to recovery of monarch populations, which in turn would help preclude the need to list the monarch and thereby obviate any potential ESA regulatory issues. If the species becomes a candidate for listing in the future, the text would indicate the intention to convert the implemented conservation plan through an orderly and timely process into a pre-listing agreement with the USFWS that will establish regulatory assurances.

Next steps

Several immediate to longer term action items were identified, all of which related to realizing the overall goal described in the meeting conclusions.

1. Steve will ascertain the timeframe for the next consortium meeting to facilitate scheduling the workgroup’s milestones for developing and presenting a draft conservation framework.
2. Steve will contact the ISU Iowa Farm and Rural Life Poll about including monarch conservation questions; please provide Steve example questions as soon as possible.
3. Joe M. has contacted the executive director of the Iowa Association of County Conservation Boards to recommend they request to join the Iowa Consortium. This will help close the loop for a critical component of Iowa public lands.
4. IDNR and IDALS will confirm status of IDOT activities and ensure their future coordination within the conservation plan; IDNR and IDALS will also ascertain status of existing state GIS systems that may be available to the effort.
5. A subset of workgroup members will establish a proposed list of 3 to 5 conservation practices that farmers and livestock producers could implement now to support monarch conservation.
6. Each organization to begin ascertaining the extent to which they need to develop or modify existing organizational and data management infrastructure based on existing conservation programs.
7. USFWS and USDA to update their respective HQ offices on the status of the Iowa effort and to the extent possible ascertain if a Section 7 conference approach is possible in the near future. Short of confirming a Section 7 conference at the fall consortium meeting, confirming the level of USFWS and USDA technical assistance and other resources available to the consortium will be critical.
8. USFWS to report back current estimated dates for public release of the USGS population model, decision-support system and monitoring white paper.

9. Members of the ESA workgroup will work with USDA to ensure that options for milkweed/nectar plantings in new and existing CRP enrollments are being consistently documented, communicated and encouraged in Iowa, including the development of a consistent approach by FSA biologists to address any producer concerns raised about potential regulatory risks if a future ESA listing; i.e., FSA needs to clearly and consistently communicate the potential regulatory risks will be less with increased monarch conservation.

January 28, 2016 Iowa Monarch Conservation Consortium

Iowa Farm Bureau

Agenda

- Welcome and Introductions (Craig Hill and Wendy Wintersteen)
- Review Agenda (Wendy Wintersteen)
- Consortium Member Updates (All)
- Report Out and Recommendations from the ESA Workgroup
 - Overview of ESA Listing Process and Conservation Options
 - Proposal to Develop an Iowa Monarch Conservation Strategy
 - Proposed Near-term Conservation Practices
 - Consortium Discussion on Workgroup Recommendations
- Keystone Monarch Collective and Iowa Consortium (Sachs and DeLong)
- Consortium Next Steps
- Adjourn

Consortium Updates

- ISU Research Team
 - 1.5 million in competitive grants
 - Recruited grad students
 - Preparing to create research plots throughout Iowa
 - Grant fund research for monarch breeding habitat, nutrient management project, Iowa Pork Producers grant, and Iowa Soybean grant—attend tomorrow for more detail
- Kelly Meyer
 - Summary of Oct 2015 meeting with Fish and Wildlife agencies, Consortium members, Dept of Ag
 - What is the state's role
 - Avoid duplicating efforts
 - Resulted in a summary document given to Midwest
 - Need to ensure coordination and appropriate credit for voluntary conservation efforts
- INHF/TNC/US Fish and Wildlife received grant for I-35 corridor for new prairie plantings from NFWF; grant \$400,000
- Submit proposals for a new grant coming out

- Dept of Ag/Soil and Water 247,000 grant private lands
- NRCS perspective
 - Producers receive financial assistance for establishing pollinator habitat
- Kraig McPeck USFWS
 - Another conference in Davenport in June 26
 - 280 people last year
 - Chip Taylor with the Monarch watch will be keynote
 - Show Iowans what is going on
- Wendy
 - Ag and conservation groups coming together

Report Out and Recommendations from the ESA Workgroup

- Whether to list monarchs as endangered
- Workgroup to examine current status and endangered species policies
- Opportunity for diverse organizations to come together to launch conservation efforts
- Need to turn numbers around with habitat improvement while continuing with necessary agriculture
- ESA came up

Kraig McPeck Fish and Wildlife Service

- Updated group about endangered species act (ESA)
 - Outside entity has asked USFWS to consider monarch
 - 90 days from petition to determine if it is warranted
 - Can only use records in our possession
 - Made in Dec 2014 (positive finding)
 - Then 12 months to request info from partners
 - Notice of lawsuit—because process has taken more than 12 months
 - It is not unusual for it to take more than 12 months
 - Time frame for decision is difficult to estimate
 - Given the history, and time it takes for other species notice of intent—it will be a number of years before they will have the information to make a decision
 - Species status assessment framework
 - Litigation will affect timing, but the decision is not going to be immediate
- Species Status Assessment (SSA) Framework
- What info is available during process?
- 3 lenses
 - What is happening to monarch individuals?
 - What is happening to population
 - What is happening to species
 - Resiliency
 - Redundancy

- Representation
- PECE-policy is used for the evaluation of Conservation efforts
 - Must work together
 - Engage in a pre-listing environment to come up with a decision because it affects everyone
 - **How certain are we that it will happen?**
 - **How certain it will be effective?**
- Monarch currently has no protection under endangered species act-no status
 - 12-month determination—after decision, species becomes a candidate
 - Conservation plans can begin even before it is listed, such as state conservation/management plans
 - Once it is listed, there are more regulations in place
 - **make a plan that will allow easy transition to a document that is ready to serve as a post-listing document—threatened status
 - Use CCAs and CCAAs once it is listed, and allows those that volunteered to not be asked to make additional changes
 - Now is valuable—we have the most flexibility now—for research and land alteration
 - Fish and Wildlife has no authority until listed so they ask partners to take leadership roles
- These types of plans have affected listing decision in the past—there is a model to follow that demonstrates effectiveness
- Can leads to conservation success regardless of whether species is listed or not
- Being able to show the plan and the process is very important to be able to adjust plan if needed
- Don't get tied up in the what-ifs. There is no status, but there is a process going now. Now is the time to be talking. Early engagement is key.

Group proposed to pursue a “win win” situation—start conservation efforts now while there is less regulation; if listing is avoided, saves effort for USFWS for future regulation

- Discussed features for a conservation strategy
- Research efforts progress to fill in knowledge gaps
- Will need a database
- Will explore different sectors for habitat development
- Outreach efforts will be essential
- Build on success of other projects: New England cottontail
- Consider crossover and build on efforts of Nutrient Reduction Strategy

Reasons for Creating a Strategy

- Get organized.
- Pool resources.
- Meet goal of Consortium.

- Success will require a coordinated effort.
- Iowa will be a leader; national model for success
- Proactive rather than reactive

Cons

- Resources, time

Decision is to move forward with creation of an Iowa Monarch Conservation Strategy in 2016; next step is to develop a work plan for strategy creation

Proposed Near-term Conservation Practices

-people are asking questions, farmer, homeowners—what can I do?

- Five Conservation Actions
- Action 1—farm bill
 - 2008 Farm Bill supports pollinators
 - FSA—cropland focus
 - NRCS-some farm but other options too
- Example CRP: pollinator habitat. Not specific design for monarch, but will benefit them 41,000 acres enrolled currently; 30,000 enrolled for 2016. Landowners/producers are already taking notice
- Mid Contract Management MCM
- 1.6 million acres in Iowa for CRP—limited things to improve habitat
- MCM must be done once during contract; can also be voluntary. Example burn, disking, spraying, interseeding
 - Do this in a way that would support pollinator habitat
 - **Pollinator friendly interseeding mixes are available for cost share for all CRP practices
- NRCS available programs—EQIP, WRP, CSP, (easements as well)
- NRCS is developing monarch habitat (See slide)
- Action 2—for the whole general public; monarch waystation (Monarch watch),
 - get info out to be able to implement
 - Monarch joint venture
 - Plant.grow.fly—Blank Park Zoo
 - Million Pollinator Garden Challenge (national network; certification program)
- Action 3—roadsides and Rights-of-Way
 - Underutilized areas
 - Mow around/spray around milkweeds
- Action 4—use pesticides according to label
 - Monitor for off-site effects of pesticides
- Action 5—volunteer
 - Plot set up
 - Allow others to monitor their land

- Citizen Science Opportunities (MN)—larval monitoring and Monarch Watch (monarch tagging) (how we learned Iowa is such a critical location for conservation)
- Communities: garden, zoo, county nature centers,

These five actions are approved by Consortium for promotion to encourage monarch conservation efforts to begin now.

Keystone (Sachs) Monsanto

- Keystone Collaborative (national level organization) of similar interest
- Late 2014, several informal meetings and provide informal meeting facilitation between several organizations to find common ground
- ****Make progress together****
- Monarch Collaborative—use private land for monarch conservation
- More focused on agricultural lands—look for productive ag and monarch conservation at the same time
- Focus on creating awareness; engage farmers and landowners
- What landowners can do
 - Leave existing milkweed
 - Seek out information
 - Expand the effect-take action
 - Share success
- Went public on January 22 with Monarch Collaborative
- Objectives common between national Keystone Collaborative and the Monarch Consortium (this group is welcome to join)
- Tools for communicating—share resources...

Next Steps

Decision is to move forward with creation of an Iowa Monarch Conservation Strategy in 2016; next step is to develop a work plan for strategy creation

The five actions for monarchs are approved by Consortium for promotion to encourage monarch conservation efforts to begin now.

January 29, 2016 Monarch Consortium Research Update

Wallace Building, Room 2 North, Des Moines, IA

Development of Science-Based Information to Support Iowa Monarch Butterfly Conservation

AGENDA

- Welcome and Introductions – K. Myers, IDNR Administrator, Conservation and Recreation Division; S. Blodgett, ISU, Chair Entomology and Natural Resource Ecology and Management Departments
- Updates
 - I. Status of Iowa Monarchs and Their Habitat
 - Baseline data from the IDNR Species Inventory and Monitoring program. S. Dinsmore, ISU-NREM.
 - 2015 Milkweed Survey. R. Hartzler, ISU-AGRON
<http://monarch.ent.iastate.edu/files/file/1.29.2016-isu-hartzler-research-update.pdf>
 - Estimate of the number of milkweeds lost and remaining in the Midwest. J. Pleasants, ISU-EEOB
<http://monarch.ent.iastate.edu/files/file/1.29.2016-isu-pleasants-research-update-with-updated-data-from-2016.pdf>
 - II. Propagating Monarch Breeding Habitat
 - Habitat succession surveys. B. Wilsey, ISU-EEOB
<http://monarch.ent.iastate.edu/files/file/1.29.2016-isu-wilsey-research-update.pdf>
 - 2015 Demonstration and pilot sites. R. Hellmich, ARS, ISU-ENT
<http://monarch.ent.iastate.edu/files/file/1.29.2016-isu-hellmich-research-update.pdf>
 - Overview of NFWF grant: Monarch butterfly flyway. J. McGovern (?), INHF
 - What is IDNR doing for monarch habitat and how it's being accomplished. B. Johnson, IDNR, Prairie Resources Seed Unit
<http://monarch.ent.iastate.edu/files/file/1.29.2016-idnr-johnson-research-update.pdf>
 - Overview of NFWF grant: Habitat on marginal lands. S. Kozak, IDALS
 - Overview of NRCS, ISA and IPPA grants. S. Blodgett
 - III. Habitat Characteristics and Monarch Utilization
 - Milkweed species preference: larval growth and adult oviposition. V. Pocius, ISU-EEOB.
 - Milkweed patch size: Impact on monarch activity and behavior. T. Blader, ISU-ENT
<http://monarch.ent.iastate.edu/files/file/1.29.2016-isu-blader-research-update.pdf>
 - Modeling monarch egg production in spatially-explicit Iowa landscapes. T. Grant, ISU- NREM.
<http://monarch.ent.iastate.edu/files/file/1.29.2016-isu-grant-research-upate.pdf>
 - IV. Knowledge Gaps/Research Needs – Round Table Discussion
- 12:00 pm – Adjourn

March 14, 2016 ESA Workgroup Teleconference

Participants:

Kraig McPeck, Susan Kozak, Katy Reeder, James Cronin, Scott Moats, Rick Robinson, Ben Gleason, Doug Helmers, Christine Rhodes, Eric Sachs, Jim Gulliford, Karen Kinkead, Stephanie Shepherd, Rex Johnson, Steve Bradbury, Dana Schweitzer, Jacque Pohl

Agenda

- Introductions
- News and Updates
- Review Our Charge from the Consortium Meeting – Develop a Workplan for Review
- (Our charge at this point is to frame options for how to build the state monarch conservation plan, including resource estimates and time line options)
- Begin initial brain-storm discussion on key features for the first version of a State
- Monarch Conservation Plan and areas of expertise we should consider for developing the plan and timelines (see attached our annotated outline)
- Timing of a State Summit/Public Meeting on the Strategy
- Proposal for a one-day meeting to prepare a first draft of the work plan
- Next Steps

Meeting Notes

ESA Group

Kraig McPeck, Susan Kozak, Katy Reeder, James Cronin, Scott Moats, Rick Robinson, Ben Gleason, Doug Helmers, Christine Rhodes, Eric Sachs, Jim Gulliford, Karen Kinkead, Stephanie Shepherd, Rex Johnson, Steve Bradbury, Dana Schweitzer, Jacque Pohl

News and Updates

- USFWS provided an update on F&W monarch listing
 - Will form a group to do a species status assessment for monarchs
 - Three Rs are being reviewed for monarchs
 - Lawsuit filed last week—that F&W has not made finding within 12 month period—common for it to take longer than 12 months to allow time for a good decision to be made
 - F&W will say they don't have the staff to look at this
 - The best way to help F&W is to collect information for Iowa in a way that can be fed into the decision-making process

Review Our Charge from the Consortium Meeting – Develop a work plan for Review

- Logical next step is to put together a work plan to outline the strategy
- Estimate level of effort (people, other resources, skill sets, time)
- **Make sure people are on board with creating a work plan—Group agreed!**
- Strategy outline discussion

- Must document effort and development of sound practices for conservation
- Justify (with research) that when efforts are implemented that they will actually have the desired outcome
- **Work plan can have narrow scope originally that can then be expanded once successful**
- Connect with other groups doing similar conservation efforts—Xerces, NFWF, Pheasants Forever, etc
- In 3.0, Look at species and habitat roles
 - Hurdle to action plan: having estimates of milkweed density in different land covers—need baselines and monitoring methods
- 4.0 Species Conservation in Iowa
- 4.1 to 4.5
- Best management practices? Anything to discuss?
 - **key element: notion of shift portions of farmland that are not productive back into buffer strips for pollinators/monarchs. (bring this up in the future)**
 - Urban groups—municipalities? Park districts. Mayors will be interested...
 - include in all levels of government instead of only local, and county
- 4.6 Research and 4.7 outreach
 - using outline from New England Cottontail. Meant to be a starting point...
 - section will review ISU research and other topics
 - will be updated as research progresses “living document”
 - Who will be monitoring? Citizen science?
 - Will have details to work out
 - Extension/Outreach: work plan will include just the principals, not specifics
- 5.0 decision making and feedback:
 - Steve V1 and V2 may be short principals of how we will go about doing it. Begin by acknowledging that we need to know what sections will entail even if all info is not available yet. Recognize our system will have to be built to accommodate new information
 - Rick (IFB): signature page, IFB is resistant to signing the document
 - Steve: challenge is to create a document that will invite commitment from organizations across iowa
 - John, FSA, in Federal memorandum of understanding (MOU)—need time to assess before they sign a document—need ASAP

Timing of a State Summit/Public Meeting on the Strategy

- Bring people together that are working to benefit monarchs
 - When, who to help?

April 21, 2016 Monarch Work Plan Drafting Session 1

Agenda

Create Monarch Work Plan outline

Participants

Katy Reeder, Matt Deppe, Theo Gunther, Ben Gleason, Scott Moats, Rick Robinson, Doug Helmers, Karen Kinkead, Stephanie Shepherd, Pamela Bachman, Steven Bradbury, Dana Schweitzer, Jacque Pohl

Agenda

Create Monarch Work Plan outline

Timeline

Mid-April: Work Plan Drafting Session

Mid-May: Proposed Work Plan to Consortium by mid-June

Mid-June: Consortium endorsement

Prior to harvest/after harvest: Initial rollout of first round of communications

Notes

Review work plan and goals

- goal is to create a plan that is easy to transition to a CCA if necessary
- Work plan will provide level of effort, timeline, and will explain what content will be included in V1
- Petition to F&W is pushing timeline forward.
 - Will need to be able to show there is evidence of voluntary conservation efforts and that these efforts will actually happen
- Summer/early fall have a completed document for F&W to point t
- Conserve species, flexible format, don't list → win/win/win

Other efforts

Needs to be a regional movement (not just Iowa) as well. Midwest down to Texas. Summit: ask for input sooner rather than later—for all of Iowa

-Have options: once version 1 is done, a public process can be formed around feedback on Version 1—changes from V2.

Consortium booth at Pollinator Conference-yes

Questionnaire for Nebraska a draft that could be modified

Governor's conference in Iowa in July 14-17 good visibility

Consider engaging and uniting county level efforts

Consider using website to extend reach: recognize different audiences, email blasts

Encourage all groups to add a monarch blurb on each website—link back and forth to www.iowamonarchs.info

Entomology Society presence...could consider exhibitor

Work Plan Outline Discussion

- Document management?
 - **CyBox—create folder**
- Signatures discussion: signatures don't commit to land on the ground—
 - Maybe should be an authorship page.
 - Will set up a **separate meeting with interested organizations** and lawyers if needed
- Executive Summary:
 - 2.0, 2.1, 2.2, 2.3 will all be needed in V1 (IDNR lead with support from ISU/~~IDA~~)
 - 2.4 and 2.5-V1 (IDNR lead with support from ISU/~~IDA~~)
 - 3.0-Iowa specific; will be in version 1
 - **what metrics qualify as habitat**
 - number of milkweed stems
 - data is limited... need a baseline. What are the data sources right now/
 - multiple species inventory and monitoring
 - Hartzler roadside surveys
 - monarch larval monitoring project
 - using national models to pare down to Iowa data
 - we do have national goals. Many assumptions of what is out there now
 - science and monitoring will be developed along the way... identify high quality
 - Tell what we do and don't know. Don't commit to acres. Committed to cooperation.
 - How much is being done- Need a way to track—add that in the plan
 - 4.0 add what is happening to conserve... and update with each revision
 - add status section... Accomplishments
 - 4.1 in version 1 essential; need cross section of organizations to be successful
 - 4.2 (later- list things we need to figure out)
 - 4.3 (later- list things we need to figure out)
 - Monitoring—different from protocols that the Monarch Partnership is working on; put placeholder protocols in

- Mostly citizen science: Neal Smith is one of the three experiments this year
- Measure goals: how to measure goals—feds, statistical designs—get as far as possible
 - Many acres will be on private land. Need to start discussion sooner rather than later about. Scope/options
 - Scale of acres implemented: “under construction.” Needs consistency but we don’t need GPS coordinates. Aggregated: state, county.
 - Survey seed suppliers—how much are they selling?
 - Registered Monarch Watch gardens, or Plant/Grow.Fly registrations
 - Track habitat implementation—then also track population recovery
- 4.4 Landowner... version 1
 - NRCS/FSA are tracking efforts through Farm Bill.
- 4.5 work in progress
- BMPs-- managing roadsides or Highlight 5 conservation efforts. Do outreach and communication. How everyone will help.
 - will tap into BMPs that others are creating
 - Keystone efforts can be utilized
- 4.6: Version 1; ISU lead
- 4.7: Outreach
 - Cross organization. Consider message, communication network, delivery venues. General goals, venues, Get a working group started.
 - Other organizations that are doing outreach currently. Bring them in...
 - Is there a **directory of different groups or potential offerings for a way for people to establish habitat. Help someone else? Directory.**
- 5.0: for the future
- 6.0 Budget. What we have done so far. Guesstimate when for V2. Careful of commitment/detail.
 - Follow outline of cottontail... Version 1—lets not get hung up on dollars.
 - Could document dollars in monarch initiative: money documented for Iowa. NFWF. NRCS grant. Document being written—many people helping.
- Appendices:
 - establish that we put together By-laws. Will have some work groups. We don’t know who they are. We have process. Executive Committee. Show we have the management infrastructure.

April 29, 2016 Monarch Work Plan Drafting Session 2

Participants:

Katy Reeder, James Cronin, Matt Deppe, Ben Gleason, Susan Kozak, Rick Robinson, Doug Helmers, Pamela Bachman, Stephanie Shepherd, Steven Bradbury, Dana Schweitzer, Jacque Pohl

Agenda

- Review Background and Strategy for Moving Forward
Review Current Work Plan Outline
- Discuss Outline – refine, revise, modify as needed
- Working Lunch
- Break into writing groups to create a 1st draft of selected sections of the Work Plan
- Share progress with the group
- Discuss next steps
- Discuss 5 Actions for Monarchs—Conservation Practices (see Attached Draft) – if time permits
- Final Ramp Up

Administration Recruitment draft

*Administration (VI) (Organization structure options; e.g., an executive committee; a technical committee; working group(s) for information and adaptive management; research and monitoring; land management; extension/outreach). Also lay out connection to Feds, other states. (This needs to be a clear framework, even if the committees slated for formation in the next version) *(Representative cross section of Consortium groups prepare this section)*

Additional administration discussion:

Necessary to ensure that the Strategy is successfully implemented, especially since the Consortium has already formed and will play a significant role.

How to invite/integrate additional groups? Sort of a disclaimer that non-Consortium groups are not necessarily excluded. “We’re always looking for more help, resources, etc.” Want people/groups who have something to offer to feel an opportunity to be included

Meant to be a statewide Strategy, not tied to any one particular sector, etc, etc.

Emphasize the living document aspect of the Strategy.

If/when other organizations join, helping to guide them towards buy-in

Is there any value in saying that this is a Monarch (Habitat) Enhancement strategy, rather than CONSERVATION strategy? Emphasis on growing/sustaining the population...

Exec Committee: group(s) assuming the most risk/commitment

- Is the Consortium, by definition, if you’re a member you HAVE signed on to the strategy? Or, a situation where some organizations that are/aren’t MEMBERS are still ex
- We envision that the administration
- Multiple options for the ways that participating organizations

- Use Exec committee to vet/confirm/recommend different options for thorny problems
- Exec to meet at least once a year, NOT more than quarterly
- John: will committees be empowered to immediately address problems? Or different process?
- V1 will work through how we might address these types of issues
 - If someone wants to form a workgroup, they need to ask the Exec committee first
 - Steve: also keep in mind the role of the ex-officio members, stay current on policy issues, etc.
- USDA, FWS won't be involved in decision making, but rather in general discussions

Technical committee

Implementation committee

Info/education/outreach

- e.g. the Exec committee sets the strategy for info/ed/outreach
- Put the SKILLS on the Info committee and have them bring ideas to the Exec committee
- Examples through CSIF, Clean Water Iowa,

v1 will say, “we know we need to do monitoring...” while v2 will actually tackle the HOW; ideas like getting Accomplishments to Exec committee, getting sign-off, then coordinating roll-out across Consortium members... Keep the message broad, insert quotes based on member reps.

Exec leadership would be responsible for bringing skeptics to middle ground

Generally, what will be addressed in the strategy?

- Who will be the representatives (or rep organizations) on the Exec committee?
- Higher level coordination (Keystone, other national/regional, commodities, land grants)

Identify who will need to complete work, what skills are needed to write? How many people?

- Govt: IDNR, IDALS,
- Education: ISU (Luther, Dordt, Central)
- NGO: commodities, FB, conservation
- Private sector/Agribusiness: seed, chem, utilities

Identify any issues that will need further discussion with the full group?

- Exec to meet 1-3 times per year?
- Are we expecting Core group to also start drafting by-laws? NO, NOT BEFORE JULY.
- Comfortable with Exec committee recommending the reps for 3 sub committees?
- Decide what it means to join the Consortium versus sign on to the Strategy
- Explore options for how to consolidate practices (soil, water, pollinators, etc, etc) BMPs...

How long will it take to write?

- Ben: probably two face-to-face meetings for drafting (one up front and one near the end)
- Electronic in the interim
 - Total estimated time... 6-8 weeks (so, May + June) to produce a near-final draft by late June
- Consortium likely scheduled for late June
 - Final review and comments due to Jacque by mid-August

Landowner recruitment

Shifting gears to Landowner Recruitment (added Helmers, Cronin)

- How do we get milkweed into pasture?
- If producer is going to implement pollinator habitat, is there a requirement or mechanism for producer to report back within (2 years??) or is it a spot-check for compliance? Planted vs. established??
- how do we establish a baseline or set a goal for the Consortium related to private lands?
- \$4mil (2 for EQIP, 2 for WRP) across 10 states... in Iowa, about \$150-200K for EQIP,
 - Document how many producers are turned away
 - Use this to illustrate pent-up demand
 - Then think about spray drift mgmt, roadside, other related practices even WITHOUT EQIP
- initial step could be... all contract funds are committed and now there's a waiting list, with success determined by HOW LONG the waiting list is...
- Two different paths... launch program on Day 1, money spent by Day 15... or funds get rolled out and there's money left on the table
- limited number of producers in the state (see Ag Census) so what is our goal to reach a certain percentage of those, and from those, a number who actually implement quantify against Ag Census data
- idea... postcards went out in the 10-state region to WRP participants, do a poll
- recruitment may look like recommending BMPs (protect existing milkweed on farm property) and folding that into the 5 Things to encourage participation with or without incentives, cost share, etc.

- the more we can get folks to document and really show voluntary practices on the ground... sustainable! Fed pool of funds will keep getting smaller, so getting voluntary buy-in on private lands.
- As Ben described, checking in with Farm Bill, related landowner recruitment, GETTING PRODUCERS TO MAKE SMALL, LOW- or NO-COST changes
- also getting in touch with IA DOT to figure out what's their demand for native seeds, etc.
- fact sheet for fence rows, field corners, different types of enterprises, etc etc.
- one of the challenges in pastures could be herbicides (e.g. thistles)

Information Management

The purpose of information management is to collect and disseminate data which will allow accomplishments of the Iowa Monarch Consortium to be shared locally and incorporated at larger scales (ex: regional/national plans). This section needs to articulate the specific types of data that will be needed to measure our movements towards accomplishing the goals of the strategy. The major categories in which key data to be collected needs to be identified are: Habitat Actions, Outreach Actions, Administrative Actions and Monarch monitoring results. Consider which data will be used and what kind of reports will be needed, including data analysis and data summary. The scale, format and tools for data collection also need to be identified with special attention being given to how the data will be coordinated and standardized within the state and across larger scales such as regionally and nationally. Finally this section should address and describe the logistics for managing the data collected in all categories.

The expected needed skills needed to write this section: Database Administrator IT professional, Consortium members representing ISU, state government, federal government, non-governmental conservation group and non-governmental agriculture group. Six months will be needed to full write this section of the plan. Issues identified include:

- How will we coordinate information needs and format across state lines at the regional and national level (coordinate with MAFWA)?
- Privacy/ Personally Identifiable Information scale of data collection may determine whether this is an issue or not?
- Is there a need for a clearing house and where would it be?
- Funding for a data clearing house creation/data manager.

1) Generally what will be addressed in the Strategy.

- Types of information to Track:
 - Habitat actions
 - Outreach Actions
 - Administrative Actions
 - Monarch Monitoring Results

- Describing the scale, format and tools for collection that could then be coordinated and standardized data across the range of the species (i.e. region, national). How will Iowa's data roll up seamlessly into larger scale conservation measurements?

- Logistics of Information Management: Who collects what, how and where is it stored.

- Each type of information may fit neatly in one pot (Monitoring/Survey Results) or may need to be pulled in from multiple sources (Habitat Actions).

2) Identify who will be needed to complete work – what skills are needed to write = core team. How many people?

- A Database Administrator type IT professional

- ISU Consortium Rep. (administrative accomplishments)

- Representative from Federal Gov, State Gov, NGO Conservation, NGO Agriculture

3) Identify any issues that will need further discussion with the full group.

- How will we coordinate information needs and format across state lines at the regional and national level? Coordinate with MAFWA?

- Privacy? Personally Identifiable Information. Scale of data collection may determine whether this is an issue or not?

- Is there a need for a clearing house and where would it be?

- Funding for a data clearing house creation/data manager.

4) How long will it take to write?

- 6 months

Information, Education and Outreach

The first version of the Monarch Conservation Strategy will develop the outreach communications plan, including the identification of tools that will be created (e.g., website and other communication products—see Keystone examples) to explain monarch conservation. The communication plan will identify audiences (which will be tightly connected to BMP section groups), objectives, messages, and potential channels for messaging (e.g. events like Farm Progress Show, Governor's meeting). The strategy will also identify communication goals and metrics (Logic Model) and will include decisions about how often communications will be measured. This chapter will identify the main talking points that must be available to all audiences, including answers to the most common questions while making sure the message is

consistent, as well as stakeholder talking points/training. This section should also identify the technical experts who can field questions about various topics.

Potential issues include the challenge of staying in alignment with other organizations and their communication efforts. Another challenge will be finding a way to cooperate with numerous organizations that are also promoting monarch conservation—maybe come up with a consistent process that can be utilized repeatedly. Consistent dedication to the communication effort is a perceived risk or concern and it would be best to have funding.

Need communication professionals from each Consortium organization, which should include a dedicated funding source for a communication professional (or request help pro bono [e.g., Strategic America] or with ISU students if needed). Will also need technical support to help identify talking points and provide answers to questions.

5-6 reps: NGO, government, agribusiness,

Timing: The communication strategy will be written by the end of the August and will include strategies for a mid-September launch of the first round of communications about the overall Monarch Conservation Strategy

June 10, 2016 ESA Subgroup

Participants: Katy Reeder, James Cronin, Ed Anderson, Karen Kinkead, Kraig McPeck, Rex Johnson, Joe McGovern, Susan Kozak, Rick Robinson, Curt Goettsch, Scott Moats, John Whitaker, Steve Bradbury

Agenda

- Discuss presentation of Monarch Conservation work plan proposal, who, which sections
- PowerPoint draft feedback
- Discuss presentation of proposed Five Actions for Monarchs: who, which sections
- Brainstorm primary speaking points

*June 17, 2016 Iowa Monarch Conservation Consortium
Teleconference*

- Introductions and Agenda Review
- Conservation Strategy Work Plan: Discussion, Approval and Next Steps
- Five Conservation Practices and Rollout: Discussion, Approval and Next Steps
- Requests for New Consortium Memberships
- New Business and Adjourn

PowerPoint presentation:

<http://monarch.ent.iastate.edu/files/file/6.17.2016-consortium-meeting-presentation.pdf>

Strategy work plan under review

<http://monarch.ent.iastate.edu/files/file/6.17.2016-monarch-conservation-work-plan-v7.pdf>

Five Actions text for review

<http://monarch.ent.iastate.edu/files/file/6.17.2016-five-actions-ag-for-approval.pdf>

- The Iowa Monarch Conservation Strategy Work Plan was approved and was given permission to move forward.
- Budget concerns were raised regarding the budget necessary to implement our plan. This is an appropriate concern and at this point, we do not have a clear understanding of the required resources to implement the plan or all of the potential sources of funding. Past conservation efforts for species of regional or national concern have received significant federal funding and at some point we believe the resources will be allocated to implement Monarch Butterfly conservation plans.
- Organizations were invited to provide names from their organizations to form teams for writing of the strategy chapters of administration; landowner recruitment; data management, and information education, and outreach.
- Five actions for monarchs text was approved.

July 29, 2016 ESA Subgroup

Participants: Karen Kinkead, Katy Reeder, Susan Kozak, Dana Schweitzer, Steve Bradbury, Jacque Pohl

Agenda

- Confirm Team Leads
- Discuss where we are and how things are progressing
- Confirm Strategy Next Steps, Consortium Meeting Date
- Confirm Timeline

Notes

- Will use PowerPoint similar to the one used in the past but will use them to explain progress instead of what will be developed
- Jacque will create a draft and share with speakers; once finished will share with entire ESA group
- Will share PowerPoint with Consortium members prior to meeting
- Jacque will send a poll to set up another meeting to touch base before Consortium meeting

September 6, 2016 Strategy Team Leads

Participants: Katy Reeder, Susan Kozak, Stephanie Shepherd, Steve Bradbury, Dana Schweitzer, Jacque Pohl

- Discuss Consortium presentation
- Review PowerPoint

Meeting notes

- Bold/italics in PowerPoint demonstrates what is Version 1 and what will be added for Version 2
- Send Jacquie slides by Friday—she will compile, share with entire ESA group, and get them to CALS for Consortium distribution
- Discuss timeline & timeline slide
- Identified who will share information on which slides

*September 14, 2016 Iowa Monarch Conservation Consortium
Teleconference*

Agenda

1. Welcome, Introduction of New Members and Partners, Roll Call – Wendy Wintersteen
2. Minor edits to our operating principles - Wintersteen
3. IDALS update on National Fish and Wildlife Foundation (NFWF) Grant– Susan Kozak, IDALS
4. Iowa Natural Heritage Foundation (INHF) update on current NFWF grant and objectives new NFWF grant – Joe McGovern, INHF
5. Midwest State Association’s activities on state conservation plans and coordination with U.S. Fish and Wildlife Service – Katy Reeder, Iowa DNR
6. Monarch EQIP funds allocated and efforts to establish approved monarch conservation practices – Grover DePriest and James Cronin, NRCS
7. Iowa Monarch Conservation Strategy – IDNR, IDALS, ISU representatives
8. Other items

PowerPoint with Strategy progress:

<http://monarch.ent.iastate.edu/files/file/9.14.2016-consortium-meeting-strategy-v1-update.pdf>

Five Actions for Monarchs Handout (mentioned during call)

<http://monarch.ent.iastate.edu/files/file/monarch-5-actions.pdf>

Notes in italics

1. Welcome, Introduction of New Members and Partners, Roll Call – Wendy Wintersteen

2. Minor edits to our operating principles (see attached) - Wintersteen

Addition of detail to the Consortium operating principals were approved: “As a functioning body, members agree to address issues regarding membership and operations by a simple majority vote of the assembled members at a meeting, during a teleconference or through email responses.”

3. IDALS update on National Fish and Wildlife Foundation (NFWF) Grant– Susan Kozak, IDALS

- *Received NFWF last fall for \$227,400 with goal of establishing 3,311 acres of habitat in 4 Division programs.*

- *Primary program is Buffer Initiative incentive on CP42.*
- *We are about 1/3 to 1/2 of the way there on all program acres and look confident to complete goal by spring of 2017.*
- *Several field days included in grant. Plan to organize them during 2017. A few are internal staff field days to educate each other and 2 will be public field days with Iowa Learning Farms.*
- *Due to looming CRP cap, we are anxiously watching the numbers roll in for obligated acres since we tied the majority of the grant to State incentive money on CP42.*

4. Iowa Natural Heritage Foundation (INHF) update on current NFWF grant and objectives new NFWF grant – Joe McGovern, INHF

*The original NFWF grant was provided for providing habitat for the I-35 corridor (31 counties). The new NFWF grant is also for providing habitat in the same counties, and INHF plans to focus on 16 counties along the **Mississippi River? Cedar River Valley?** This restoration will include about 400 acres of habitat.*

5. Midwest State Association’s activities on state conservation plans and coordination with U.S. Fish and Wildlife Service – Katy Reeder, Iowa DNR (for Kelley Myers)

Regional Coordination

The Midwest Association of Fish and Wildlife Agencies (MAFWA) is a representative group of 13 Fish and Wildlife Agencies across the Midwest. On the Monarch conservation effort, MAFWA is taking a leading role in coordination and is working with states beyond the Midwest. MAFWA has received two National Fish & Wildlife Foundation (NFWF) grants.

- *The first grant, from 2015, is for the development of state planning materials and a coordination meeting of the central states to be held in Texas next January. At this meeting, representatives from states in the Monarch’s central flyway will collaborate with each other as well as engage with relevant federal agencies (e.g., the Fish and Wildlife Service, Dept of Agriculture, US Geological Survey) and partners (Pheasants Forever and National Wildlife Federation). They will also engage representatives of the Keystone Collaborative and the Monarch Joint Venture to share information with their groups.*
- *The second grant, awarded in 2016, is for the development of mid-continental monarch conservation strategy (a roll up of state monarch conservation plans). Iowa's plan will be incorporated into this mid-continental strategy. MAFWA will be hiring a technical coordinator to develop the plan, and plan to announce the position shortly and hire in December. This 18-month position will be housed in a state fish and wildlife office within the MAFWA region or in Washington,*

DC. When MAFWA shares this position announcement, please help by sharing this announcement in your networks so that we attract the best candidate.

The goal is for this mid-Continental plan to be completed during the early months of 2018. The coordinator would continue to be available to conduct outreach on the mid-continental strategy, and to incorporate any additional modifications that may be required up and until it is considered by the US Fish and Wildlife Service's Policy for Evaluation of Conservation Efforts when Making Listing Decisions (PECE).

National Coordination

Kelley Myers is currently at a national meeting of Fish and Wildlife Agency directors, working with all 49 other state Fish & Wildlife agencies to ensure that their monarch conservation plans are as comprehensive as possible, and meet as many of the challenges possible for better PECE review. There are discussions about how to bring more financial resources for implementation. All states are engaging on this issue in the hopes of preventing the need to list this species.

The timing of the listing process for the monarch has become more clear. The listing decision must be finalized by June 2019. PECE Analysis is scheduled to occur early in the summer of 2018.

PECE is intended to provide a framework for evaluating, within a listing determination, conservation efforts that are still in the planning stage (not yet implemented) or have not yet demonstrated whether they are effective. This means that in addition to the Species Status Assessment (SSA; Kraig McPeck emailed call participants a fact sheet about the monarch butterfly SSA), which evaluates the ecological needs and threats to a species, the listing determination process also includes consideration of conservation efforts.

Kraig McPeck chimed in to relate to participants that, as he presented during the January 2016 meeting, PECE analysis evaluates formalized conservation efforts to determine the certainty that they will be implemented and the certainty that they will be effective in contributing to the elimination or adequate reduction of one or more threats to the species.

Katy pointed out that Iowa's Monarch Conservation Strategy as well as the mid-Continental strategy can be considered through PECE analysis, so it's helpful to have spring 2018 as a target for completion of these strategies.

The US Fish and Wildlife Service has been engaging with states to ensure that a state perspective is considered throughout their analysis. Kelley Myers has been invited by the USFWS to sit on their Monarch Advisory Committee on behalf of MAFWA. Dr. Karen Kinkead sits on the Science Team which examines emerging science and research needs, as well as the SSA team.

6. Monarch EQIP funds allocated and efforts to establish approved monarch conservation practices – Grover DePriest and James Cronin, NRCS

NRCS is very busy, working in the 10, core-states region.

EQIP

- *1.8 million was requested under EQIP*
- *93% of this is obligated*
- *Iowa requested a modest amount of \$150,000 (\$135,000 is obligated so far)*
- *NRCS State offices may request additional funding in FY17.*
- *In addition to Monarch Project funds, NRCS State offices have wildlife subaccounts associated with their EQIP programs, whereby eligible landowner may also support monarch conservation.*
- *NRCS wetland easement programs (WRP and WRE) as well as the Conservation Stewardship Program (CSP) are also expected to receive targeted funding in FY17.*

The NRCS-U.S. Fish and Wildlife Service Monarch Butterfly Partnership convened in early 2016 for the purpose of developing an agreement that would protect and conserve the species, and ensure regulatory certainty (i.e., ESA predictability) for private landowners. ESA predictability is the hallmark of NRCS' Working Lands for Wildlife initiative, which has successfully pre-empted Federal listing of the sage grouse, New England cottontail and other imperiled species.

- *The partnership identified 30 NRCS conservation practices useful for monarch conservation.*
- *These practices would be conditioned to ensure reliable protection and conservation benefits to the species*
- *Under an approved conservation plan, landowners would receive a 30-year promise that good deeds would not jeopardize their operation; thus, providing valuable regulatory certainty for agricultural operations.*
- *A final agreement is expected in November 2016*

7. FSA Update from John Whittaker (FSA)

- *Over the last 15 months, an additional 136,200 acres of habitat have been installed under pollinator contract; most but not all have milkweed included in the mix*
- *This brings the total installed acres to 150,000 acres over 7 years (most installed in the last 15 months)*
- *Minimum of 3 species were included for pollinator nectar sources for late season migration*

8. Chip Taylor (Monarch Watch)

Monarch Watch has two active monarch conservation programs.

- *Monarch Waystation Program for encouraging habitat creation for monarchs to produce successive generations and sustain their migration.*
- *Bring Back Monarchs is similar to the Waystation Program but on a larger scale with a focus on habitat restoration. Milkweed plugs are being provided, and donations allow most to be free for the cost of shipping. These plugs are grown from seed and are distributed back to the same area the seed was collected, keeping the plants in their native regions*
 - *200,000 plugs were provided this year with 40,000 of them going to Iowa*

9. Tallgrass Prairie Center (Laura Jackson)

- *The Center has 2 years of data on seed mixes comparing a pollinator mix and a custom designed (cheaper) mix*
 - *The custom mix shows promise and is much cheaper to purchase, but there are problems with weeds and poor establishment to work out*

10. Iowa Monarch Conservation Strategy – IDNR, IDALS, ISU representatives

Excellent progress has been made on version 1 of the Monarch Conservation Strategy. The provided PowerPoint provides an overview. Note that items in bold are being developed for version 1, and items in italics will still be in progress or updated in version 2. Leads have been determined for each section of the strategy, and are noted in parentheses. Text that is created by these leads will be reviewed by the entire ESA group (all interested organizations). Please email monarchs@iastate.edu if you would like someone from your organization to join the effort. Some components are too complicated for one organization to draft, and several cross-section committees are helping to construct these chapters. It was noted that we use the term “breeding habitat” but that this limits meaning—will go forward with “life cycle habitat.”

An updated timeline for completion of version 1 has the strategy being sent to the Consortium for review late in November for review. Perhaps comments can even be taken and incorporated before the December meeting.

November 19, 2016 ESA Subgroup

Agenda

Review the strategy completion timeline

Review elements that have not been changed since work plan was developed and strategize

Review elements that need a little revision

Review elements that are basically complete to ensure all are satisfied

Confirm timeline and next steps

December 16, 2016 ESA Subgroup

Agenda/Goals

- 1) Review Strategy edits (which ones are ok, which ones need more work, which ones need re-work) and discuss how and who to address Rick's suggestions;
- 2) Set a date for last revisions from IDALS/IDNR and
- 3) Agree on a goal date for distribution to Consortium members.

February 1, 2017 Consortium Meeting and Research Updates

Iowa Farm Bureau

Morning Agenda

- Welcome and Introductions
- Review Agenda
- Partner Update: Environmental Defense Fund
- State Agencies Mid-America Monarch Conservation Plan meeting
- NRCS – USFWS Partnership
- Finalize Iowa Monarch Conservation Strategy – Version 1
- Next Steps

Afternoon Agenda: Research/Outreach Updates

- Welcome
- Monarch Butterfly Tagging Results
- ISU Monarch Research Team
 - Monarch Habitat Establishment, Seth Appelgate, M.S.
 - Monarch Movement and Egg-laying Model, Tyler Grant, Ph.D.
 - Monarch Survival and Milkweed Use, Tori Pocius, graduate student
 - Milkweed Patch Qualities that Influence Monarch Butterfly Oviposition in Iowa Prairies and Roadsides, Teresa Blader, graduate student
 - Adapting Radio Telemetry Techniques to Track Monarch Butterflies, Kelsey Fisher, graduate student
 - Common Milkweed: Low-cost establishment and utilization of common milkweed in crop fields, Sydney Lizotte-Hall, graduate student
 - Milkweed Placement Studies: Insecticide toxicity to monarch larvae, Niranjana Krishnan, graduate student
- Consortium Members/Partners

- Collaborating within IDALS to Establish Monarch Habitat, Susan Kozak, IDALS
- Iowa DNR Multiple Species Inventory and Monitoring, Kevin Murphy, Iowa State University
- Monarch Habitat Exchange, David Wolfe, Env. Defense Fund

Morning meeting minutes

David Wolfe, Environmental Defense Fund

- New Consortium partner
- Nonprofit that focuses on coordinating collaborative efforts with stakeholders to address conservation challenges within four categories: oceans, climate, health, and ecosystems
- **The Habitat Exchange program is a marketplace that brings together generators of conservation with investors. It has been done already with the sage grouse and CA monarchs, and EDF is interested in opportunities in the Midwest**

Karen Kinkead, Iowa DNR

- State Fish and Game are working two NFWF grants
 - National Wildlife Federation to bring agencies together to discuss monarch conservation
 - Regional coordinator to create a regional plan
- MAFWA (Midwest Association of Fish and Wildlife Agencies) mid-January meeting in Texas—
 - Regional monarch conservation plan: goal is to generate cohesion for efforts across the states
 - Agreed to components of regional strategy--will have components that will be needed for Fish and Wildlife Service to meet PECE policy needs
- Other updates:
 - University of Minnesota
 - **Habitat Optimization Tool** allows analysis of potential habitat sources-- active farmland, ROWs, CRP—each kind is assigned a value for how much milkweed grows there. By changing land-use types, we can estimate potential for increasing milkweed acres in Iowa
 - Monarch Science Conservation Partnership (Iowa is involved)
 - USGS is looking at socioeconomic benefits of meeting water quality needs and monarch conservation at the same time
 - National Monitoring Strategy
 - Working to identify locations to monitor. Fits well with citizen science monitoring efforts that are already active
 - Field tested protocols in 2016. They are not quite ready, but will need volunteers in 2017 to try out the protocols
 - PECE analysis will begin in June of 2018—we need our Iowa strategy and regional strategy to be ready for USFWS to use in the species assessment

- **Anyone with contacts in other states doing monarch conservation—we need to connect efforts**

Kraig McPeck, USFWS

- The efforts to create the Iowa Monarch Conservation Plan will help USFWS satisfy the two requirements of the PECE (Policy for Evaluation of Conservation Efforts) policy:
 - Prove conservation efforts will happen (predictability)
 - Prove conservation efforts will be successful
- Conference report
 - NRCS Working Lands for Wildlife
 - How can we help encourage people to help monarchs?
 - Provide assurances that they won't be penalized later
 - NRCS conservation plan provide protections/assurances
 - Conference report is not the same as a conference opinion
 - **The Monarch Conference report is available here (scroll to the bottom):**
<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantsanimals/pollinate/?cid=nrcseprd402207>
 - **To satisfy Section 7 of Endangered Species Act, there has be a nexus through NRCS conservation planning—landowners must have a monarch conservation plan consistent with specifications in the Conference report — this allows the predictability to participating producers**
 - FSA was NOT part of the conference report, so only NRCS programs are eligible (e.g. still no CRP); USFWS-FSA discussions are starting to prepare a conference report that could cover monarch-specific CRP practices.
- The preparation and approval of Candidate Conservation Agreements with Assurances by USFWS is the process whereby private landowners not eligible for Section 7 Conference Report Farm Bill programs (or for landowners who are eligible for these Farm Bill programs but do use the programs) can have regulatory assurances

Conservation Strategy Discussion

- Overview of Strategy by Susan Kozak (IDALS)
- Suggestions received:
 - Introduction
 - Update it with recent PCA policy published last week
 - Plan should recognize need to ramp up pollinator seed supply gradually
 - Administration
 - Logic Model:
 - A number of orgs that provide technical assistance for providing habitat. ROW management output language could be a bit broader.
 - Metrics needed: number of acres
 - Make sure to capture all efforts (easy to miss if not enrolled in federal plan)

- Data Management
 - **Must track habitat quality/whether it remains after establishment**
- Landowner Recruitment
 - What about landowners and operators. Is that different from landowner?
 - Consider where conflicts between conservation programs may impede adoption
- Research
 - Use it to help set priorities for acres that should be restored first
 - Monarch Joint Venture to be added
- Accomplishments
 - Add summary of regional activities – draw upon recent Texas meeting (Kinhead)
 - Add detail about Monarch Joint Venture coordination with conservation will be added
 - Army corps of engineers sites will be added
 - **What is missing? Send a paragraph to Jacque at monarchs@iastate.edu by Wednesday, February 8.**
- Information, Education and Outreach
 - Create a 1-page summary document of the Strategy to make it easy to share
 - Make handouts sector-specific (federal highway, urban, etc)
 - Communication team must be prepared to field palmer concerns, educate how to avoid
 - AAI ag advisors could help provide info
- Timeline
 - **Communications rollout beginning in March so Communications Committee creation must begin now**
 - Convene Technical Committee Feb-March
 - March: convene Monitoring Committee; include discussions on use of landowner ‘apps’ that could assist with monitoring
 - April: Convene Landowner Recruitment and Data Committees
 - May: a workgroup will evaluate USFWS habitat goals: A subgroup should meet again in May/June to go over possible habitat goals once the federal goals are available
 - Summer: Convene Research Committee

Following establishment of national and regional habitat goals by the USFWS, options for meeting Iowa-based habitat goals will be developed for Version 2 of the Iowa Monarch Conservation Strategy.

Afternoon PowerPoint presentations:

- Monarch Butterfly Tagging Results
Note that the data on these slides represent preliminary analyses of a much larger data set. A more comprehensive analysis should be available by 2018.
<http://monarch.ent.iastate.edu/files/file/2.1.2017-chip-taylor-tagging-analysis-iowa.pdf>

- ISU Monarch Research Team
 - Monarch Habitat Establishment, Seth Appelgate, M.S.
<http://monarch.ent.iastate.edu/files/file/2.1.2017-isu-appelgate-research-updates.pdf>
 - Monarch Movement and Egg-laying Model, Tyler Grant, Ph.D.
<http://monarch.ent.iastate.edu/files/file/2.1.2017-isu-grant-research-updates.pdf>
 - Monarch Survival and Milkweed Use, Tori Pocius, graduate student
 - Milkweed Patch Qualities that Influence Monarch Butterfly Oviposition in Iowa Prairies and Roadsides, Teresa Blader, graduate student
<http://monarch.ent.iastate.edu/files/file/2.1.2017-blader-2017-research-update.pdf>
 - Adapting Radio Telemetry Techniques to Track Monarch Butterflies, Kelsey Fisher, graduate student
<http://monarch.ent.iastate.edu/files/file/2.1.2017-isu-fisher-research-update.pdf>
 - Common Milkweed: Low-cost establishment and utilization of common milkweed in crop fields, Sydney Lizotte-Hall, graduate student
http://monarch.ent.iastate.edu/files/file/2.1.2017-isu-lizotte-hall-research_update.pdf
 - Milkweed Placement Studies: Insecticide toxicity to monarch larvae, Niranjana Krishnan, graduate student
<http://monarch.ent.iastate.edu/files/file/2.1.2017-isu-krishnan-research-update.pdf>

- Consortium Members/Partners
 - Collaborating within IDALS to Establish Monarch Habitat, Susan Kozak, IDALS
<http://monarch.ent.iastate.edu/files/file/2.1.2017-idals-update-on-nfwf-grant-acres.pdf>

 - Iowa DNR Multiple Species Inventory and Monitoring, Kevin Murphy, Iowa State
<http://monarch.ent.iastate.edu/files/file/2.1.2017-msim-research-update.pdf>

 - Monarch Habitat Exchange, David Wolfe, Env. Defense Fund
<http://monarch.ent.iastate.edu/files/file/2.1.2017-wolfe-edf-intro-and-habitat-exchange.pdf>