

Indiana Monarch Conservation Plan

8/10/2018 FINAL DRAFT



It's more than just monarchs!

For simplicity and ease of reading, this plan is focused on monarch butterflies. However, the Technical Committee was unanimous in its assertion that the plan is intended to include by association all pollinators, and even other wildlife that share similar habitat

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EXECUTIVE SUMMARY

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In September of 2017, the Indiana Wildlife Federation convened a summit of state agencies, non-governmental organizations, landowners, businesses, educators and land managers to begin defining a major effort to address the needs of the declining Monarch Butterfly in Indiana and our region. The Indiana Monarch Conservation Summit generated the first round of ideas, strategies and goals that would eventually emerge as a cohesive plan for monarch and pollinator conservation in Indiana. Through collaboration and volunteerism, we hope to accomplish the recovery goals of this document and prevent the need for the monarch butterfly to be listed as a threatened species.

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SPONSORS



CONSERVATION.
EDUCATION.
ADVOCACY.

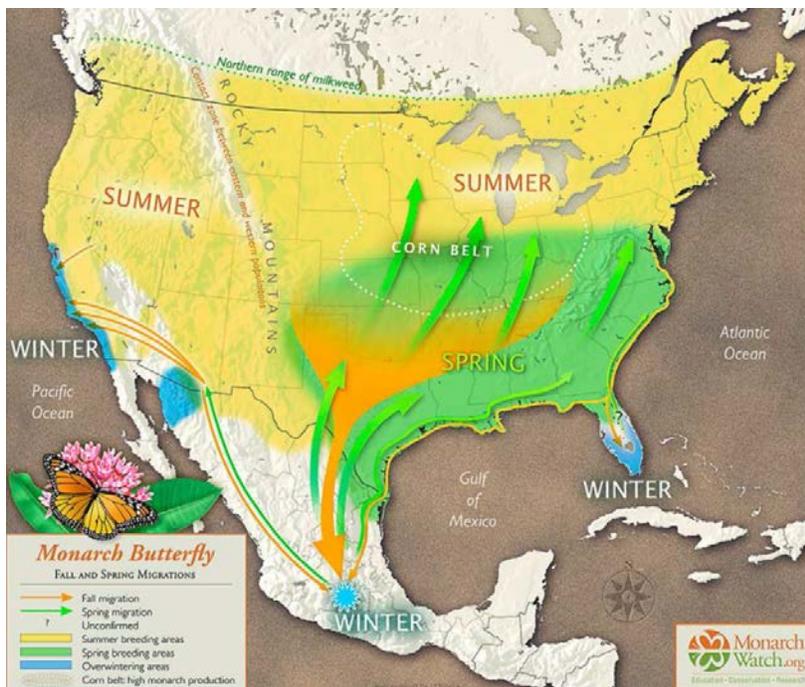
The following organizations generously contributed to sponsoring the 2017 Indiana Monarch Conservation Summit, the results of which provided the foundation for writing the formal **Indiana Statewide Monarch and Pollinator Conservation Plan**.



BACKGROUND

The monarch butterfly (*Danaus plexippus plexippus*) is an iconic butterfly species, known by children and adults alike for its striking orange and black wing patterns and magnificent long-distance annual migration phenomenon. Each fall, millions of monarch butterflies pass through Indiana as part of their spectacular journey to the high-elevation oyamel fir (*Abies religiosa*) forests in central Mexico where they overwinter (Figure 1). In the spring, monarchs start returning north to their breeding areas, a range that includes Indiana, where female monarchs will lay their eggs on emerging milkweed plants. The subsequent offspring or first brood will then colonize the remainder of the breeding range in eastern North America. In the fall, the adults produced from the last hatch will then return to the oyamel fir forests, and in the spring, the cycle will start again. (For more detailed information on the monarch butterfly, including species description, taxonomy, biology, and much more, reference the Mid-America Monarch Conservation Strategy (MAFWA 2018), available at http://www.mafwa.org/?page_id=2347.)

Figure 1. Monarch butterfly fall and spring migrations.



Source with permission for use: Monarch Watch.org (www.MonarchWatch.org)

The monarch in North America is experiencing significant population declines, both in the eastern population that overwinters in Mexico and in the western population that overwinters primarily along the Pacific coast in California. In 2014, the U.S. Fish and Wildlife Service (Service) was petitioned to list the North American subspecies of monarch as a threatened species under the federal Endangered Species Act (ESA). The Service found that sufficient data was presented to demonstrate that listing may be warranted. The Service has now begun a formal status

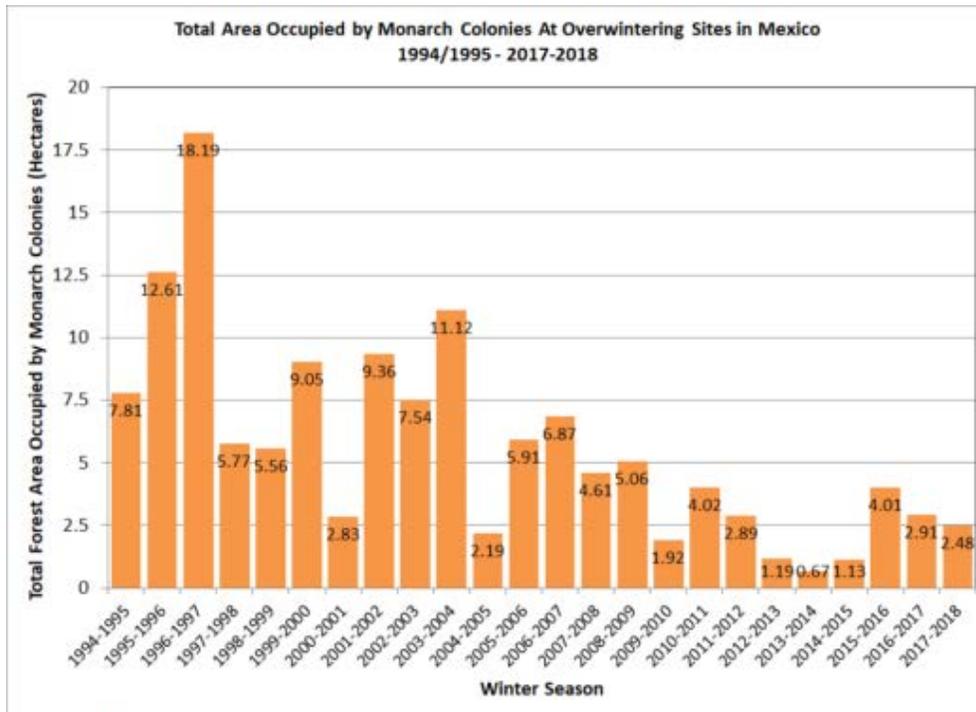
review of the monarch subspecies that will lead to a decision on whether listing is warranted by June of 2019. This has prompted governmental and nongovernmental groups and individuals to initiate immediate conservation actions to help monarchs. It has also led to the development of long-term plans, such as the Mid-America Monarch Conservation Strategy.

Indiana's involvement in the development of the Mid-America Monarch Conservation Strategy prompted the planning of an Indiana Monarch Conservation Summit, held in September 2017, to organize over 40 Hoosier conservation partners with an interest in monarch butterfly conservation and habitat restoration, and kickstart a collaborative effort to draft the Indiana Monarch Conservation Plan. This state-specific conservation plan will serve to guide monarch conservation in Indiana—specific to our landscape, conservation partners, and stakeholders. Through this plan, Indiana-specific goals, objectives, strategies and actions have been collaboratively agreed upon to maximize conservation of monarchs on the ground through habitat conservation, enhancement, and restoration amongst unique land use sectors. These sectors include Agricultural and Rural Lands, Public and Protected Lands, Utilities and Rights of Ways, and Urban and Municipal Lands. This plan also includes specific strategies to maximize the efficiency of Collaboration and Partnerships, Outreach and Education, and Monitoring and Research in regard to monarch conservation in Indiana. In addition to guiding monarch conservation efforts in Indiana, this plan also contributes to Indiana's section of the regional Mid-America Monarch Conservation Strategy, to help coordinate and facilitate a broad, landscape-scale approach intended to reverse the population decline and maintain a viable North American population of monarchs.

Why is the monarch in need of conservation?

The eastern migratory population of monarch butterflies (those found east of the Rocky Mountains) that overwinters in Mexico decreased by 84% between the winters of 1996–1997 and 2014–2015 (Semmens et al. 2016). The highest count was 18.12 occupied hectares of overwintering habitat in 1996-1997 and the lowest was 0.67 hectares in 2013-2014. The most recent estimate in 2017-2018 was 2.48 hectares (Figure 2).

Figure 2. Monarch Colonies in Mexico



Data from 1994-2003 were collected by personnel of the Monarch Butterfly Biosphere Reserve (MBBR) of the National Commission of Protected Natural Areas (CONANP) in Mexico. Data from 2004-2018 were collected by the WWF-Telcel Alliance, in coordination with the Directorate of the MBBR. 2000-01 population number as reported by Garcia-Serrano et. al (The Monarch Butterfly : Biology and Conservation, 2004)

Source: Journey North

The much smaller western monarch population (found west of the continental divide) that overwinters primarily in coastal California, has declined by a similar proportion. Through analyses that account for differences between sites and efforts over time, Pelton et al. (2016) estimated the population has declined 74% since the late 1990s, with an even higher estimate of population decline since the 1980's hypothesized by Schultz et al. (2017). Western monarchs are monitored primarily by counts in overwintering groves in late fall. The most recent count in 2017 was 193,000, even though a record number of 262 sites were monitored. The high was 1.24 million in 1997 at 101 monitored sites.

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

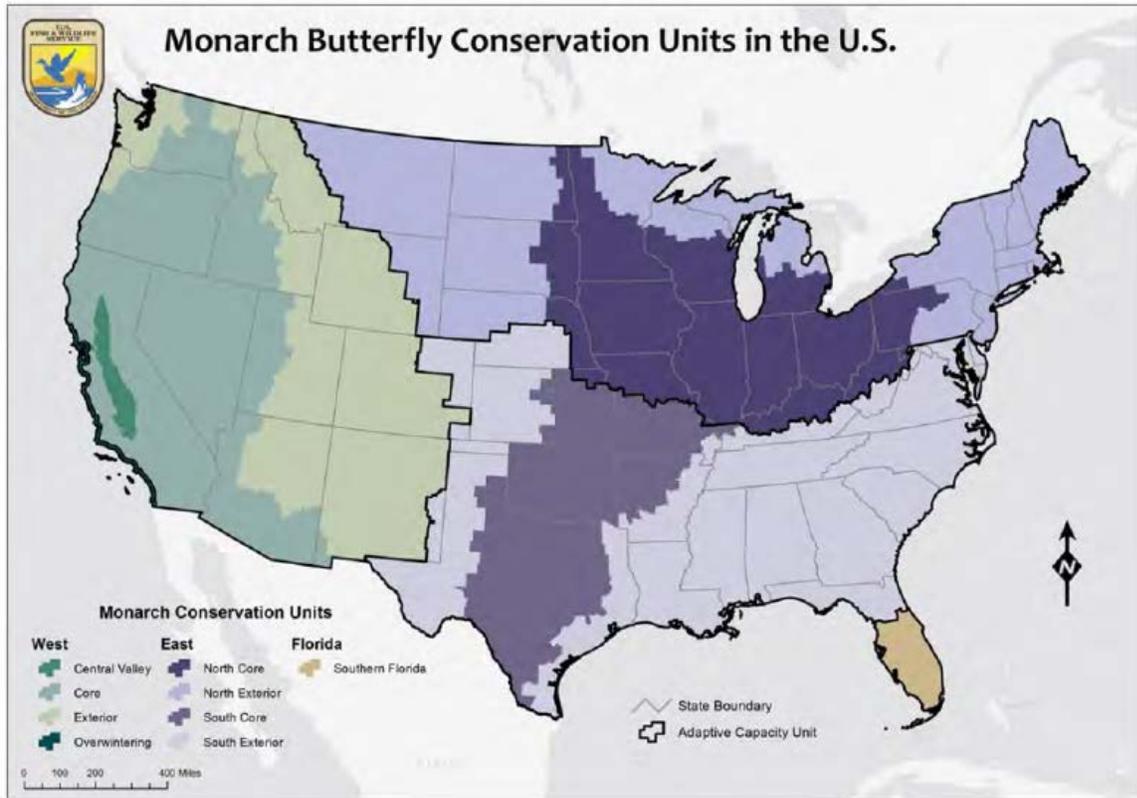
Much of the eastern monarch population's decline is hypothesized to be due to milkweed and nectar resource losses in the "corn belt" region of the central United States, as well as loss or degradation of nectar and milkweed resources in south-central states important to monarch migration and reproduction.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

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

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

The Service has proposed the areas most important or efficient for conserving monarchs in the continental United States in areas described as "monarch butterfly conservation units" (Figure 3). For eastern monarchs a North Core conservation unit and a South Core conservation unit have been proposed. These conservation units were drawn using county boundaries to facilitate analysis of county level land use data for conservation planning purposes and they approximate what are considered the primary production and migration areas for the eastern population, recognizing that monarch breeding and migration also occur in all other units identified on this map.

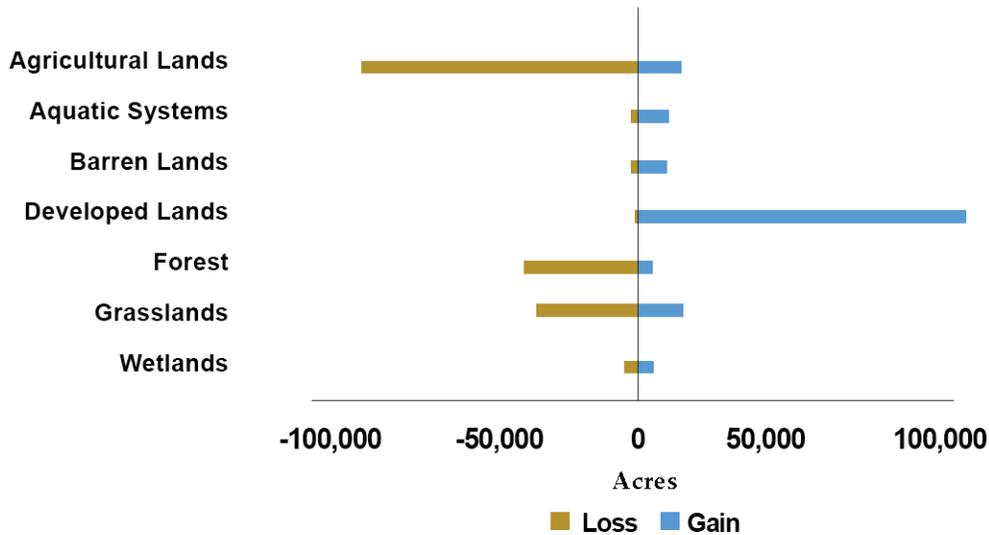
Figure 3. Approximate boundaries of areas important to monarch butterfly populations in the contiguous United States.



This map was created by the U.S. Fish and Wildlife Service to help focus conservation efforts, and it provides a spatial framework for planning and data management. Different monarch populations or different portions of a population's range may have different conservation needs or may contribute differently to a population's status. (Source: U.S. Fish and Wildlife Service).

Indiana, along with other Midwestern states, comprises a particularly important portion of the range of the eastern population of monarch butterflies, supplying much of the breeding and migrating habitat that produces the migratory generation of the eastern monarch population that overwinters in Mexico (Flockhart et al. 2013). According to Indiana's State Wildlife Action Plan (SWAP), between 2001-2011, Indiana experienced a significant loss of grassland habitat and agricultural lands, two land types capable of providing beneficial monarch habitat (Figure 4) (Indiana Department of Natural Resources 2015).

Figure 4. Losses and Gains in Land Cover from NLCD in Indiana between 2001 and 2011.



Note on Figure 4: To help visualize and document the ebb and flow of habitat changes across the landscape, Indiana’s 2016 SWAP used NLCD raster data to analyze changes in the Indiana landscape between 2001 & 2011. Figure 4 above shows the losses and gains (in acres) of the seven major habitat types in Indiana. For example, between 2001 and 2011, 93,462 acres of agricultural habitat was converted to some other habitat type. During that same time frame, 15,217 acres of other habitats were converted to agricultural habitat. This resulted in a net loss of 78,245 acres of agricultural habitat in Indiana from 2001-2011.

This Plan focuses on conserving the eastern migratory population of monarch butterflies, which utilize both breeding and nectaring habitat in Indiana. The development and implementation of this Plan is a truly collaborative process, involving dozens of partners from around the state who have served on the Steering Committee (Appendix A), planned and attended the Summit (Appendix B) and served on work groups to develop and integrate various sections of this plan (Appendix C).

Definition of monarch habitat as used in this Plan

While the habitat needs of monarch butterflies will vary across the species’ range and throughout the year, this document uses a general definition that includes both larval and adult food sources necessary to support the monarch life cycle in Indiana. The plan defines monarch habitat as diverse, forb-rich grasslands, mixed woodland-grasslands, or cultivated areas that provide native, regionally-appropriate and non-insecticide tainted milkweed plants (predominately *Asclepias* with some other related genera) and blooming nectar resources throughout their breeding and migration range. In other words, an area is monarch habitat if it

provides usable host plants for monarch larvae (milkweed) during the breeding season as well as nectar food sources for adult monarchs whenever the species may be present. This definition assumes that, when needed, best practices will be used to avoid or minimize pesticide or other potential mortality impacts within established or enhanced habitat areas. While “monarch habitat” has certain requirements (such as the presence of a milkweed species), once established, this habitat will mutually benefit a vast number of pollinator and wildlife species. Habitat can also be established and managed to benefit specific wildlife or pollinator species while also meeting “monarch habitat” requirements and contributing to monarch conservation.

MISSION, VISION, AND GOALS

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

Mission Statement

Engage Hoosiers to increase and sustain habitat for monarch butterflies through citizen involvement, and to seek ways for partners, communities, and agencies to coordinate similar efforts.

Vision Statement

Hoosiers appreciate the importance and value of monarch butterflies, and work to conserve healthy habitats that support robust populations of monarchs statewide.

Target Audiences

This Plan is not necessarily intended for the “general public,” but it is directed to anyone working to conserve/protect monarchs in Indiana.

Goals

The Goals of the Indiana Monarch Plan are broken down into five large categories:

1. Habitat Conservation, Enhancement, and Restoration
2. Collaboration and Partnerships
3. Outreach and Education
4. Monitoring and Research
5. Capacity, Governance, and Funding

I. HABITAT CONSERVATION, ENHANCEMENT, and RESTORATION

Across the United States, Monarchs have lost significant amounts of habitat mostly due to land use changes, development, and agricultural land management. Grassland habitat most commonly associated with the monarch butterfly makes up approximately 15% of Indiana's land cover, according to the Indiana State Wildlife Action Plan (SWAP). However, much of this grassland is not in a condition that is suitable as monarch habitat. Due to statutory limitations, the Indiana SWAP does not identify the monarch butterfly or any insects as species of greatest conservation need (SGN); however, it has identified the loss of grassland habitat as the single greatest risk for habitat loss in Indiana. In order to reverse the trend of grassland habitat loss and the degradation of the quality of habitats most beneficial to the monarch, Indiana intends to identify and protect existing high quality monarch habitat, identify and protect lands that currently provide suitable monarch habitat and enhance them to provide increased habitat quality and restore and establish new habitat in priority areas that no longer provide any notable benefits to monarch butterflies due to habitat conversion or degradation over time.

The goal of the Mid-America Monarch Conservation Strategy for the North Core region (of which Indiana is included) is to work with partners to support an average of 6 hectares of overwintering eastern monarch population through an additional 1.3 billion stems of milkweed in the North Core monarch conservation unit by 2038, with a baseline year of 2014 for counting additional conservation efforts (Mid-America Monarch Conservation Strategy-P.42)

To achieve this goal, modeling and allocation tools were developed to estimate the potential contributions of milkweed stems of each of the 17 states in the North Core to reach the ultimate goal of an increase of 1.3 billion milkweed stems. The "Allocation Tool" method used a land cover-based spreadsheet tool to estimate potential milkweed stem increases, whereas the "Proportional Land Area" method simply assigns a percentage of the 1.6 billion total to each state based on the percentage of the North Core geography that it represents.

Based on estimates of these two tools, Indiana would ideally work towards adding between 121,555,412 and 132,800,000 milkweed stems by 2038 (Mid-America Monarch Conservation Strategy, p.44).

While the ultimate intent of this plan is to maximize Indiana's potential in recovering monarch butterfly habitat and populations, it is currently unknown whether these milkweed estimates are attainable or realistic goals in Indiana. There is a large gap in knowledge of current milkweed distribution and cumulative monarch habitat restoration efforts, accomplishments and capabilities across the state. One of the short-term outcomes we hope to achieve through this plan is to organize all partners and individuals involved in monarch conservation and obtain the most comprehensive estimate possible of monarch habitat work being accomplished in all the various sectors throughout Indiana. After the comprehensive habitat accomplishment efforts have been captured for one full year, the Steering Committee will reconvene to re-

evaluate, and if necessary, revise an appropriate long-term monarch habitat and milkweed stem goal for Indiana. The Indiana Monarch Conservation Plan is a working document. In order to maximize the efficiency and success of this plan and the efforts underway in Indiana, goal commitments and all other stated objectives and strategies will be continually evaluated and adapted over time, based on monitoring and evaluation of implementation, monarch population response, and new science.

Indiana's conservation partners will work to coordinate and mobilize public and private stakeholders to increase and sustain monarch and pollinator habitat through establishment, restoration, and management through technical outreach and education. Threats and current limitations to monarch habitat improvement as well as collaborative strategies and solutions to overcome these will be identified and coordinated amongst Indiana's conservation partners through the Indiana Monarch Conservation Plan.

This section is categorized according to four sectors identified at the Summit:

1. Private Agricultural and Rural Land
2. Public and Protected Land
3. Transportation and utilities Rights of Way
4. Urban/Municipal Land

1. Private Agricultural and Rural Land Sector (Brienne Lowe)

Goal: To conserve, enhance and restore habitat in agricultural and rural landscapes that contribute to the national effort to maintain viable populations of Monarch butterflies.

Definitions:

Agricultural Land- Cropland, hay land, pasture and other land on which agricultural products, forest-related products, or livestock are produced.

Rural Land- Land not occupied by buildings or related facilities, outside of urban and suburban areas, that are not purposefully managed for food, forage or fiber. May include conservation lands that may be associated with nearby agricultural land.

Objective A: Conserve and manage existing Monarch habitat on agricultural and rural private lands, while restoring, creating or enhancing additional Monarch habitat annually by 2035.

Strategy 1: Quantify existing habitat area on agricultural and rural lands

Action/Tasks:

- 1) Define what constitutes Monarch habitat and quantify acreage. Where feasible, identify larval habitat versus nectaring/migrating habitat.
- 2) Adopt a consistent monitoring protocol to identify the success or limitations of establishment and enhancement of habitat areas. A consistent methodology to quantify habitat will be crucial to identifying program success.

- 3) Develop consistent reporting metrics so agencies and organizations can report their actions to the Monarch Conservation Plan Coordinator (e.g. acres, stems milkweed, participants, etc.)
- 4) Utilize existing data sources (e.g., Monarch Conservation Database) to compile summaries of monarch habitat previously developed by local, state and federal agencies and other conservation partners over the past 5 years
- 5) Use ArcGIS to identify gaps and potential corridors for connecting existing habitat and utilize available models to prioritize habitat work.

Strategy 2: Facilitate active management of existing monarch habitat.

Action/Tasks:

- 1) Develop and promote best management practices (BMP's) for the long-term maintenance of existing habitat (e.g. strategic mowing of roadsides, invasives control, disturbance practices in existing grassland settings to maintain vegetative diversity.)
- 2) Integrate multiple resource concerns into program implementation to maximize resource benefits on the same plot of land. Example: Using prescribed grazing, and fencing livestock out of a riparian area and seeding to riparian herbaceous cover to benefit monarchs for the purposes of supporting the monarch, Blanding's turtle and Great Lakes Watershed, while improving the water source and production capacity of the livestock operation.
- 3) Advertise/promote existing programs and funding sources for managing existing habitat, and technical support to do so.
- 4) Integrate monarch habitat benefits into existing workshops for landowners and partners to demonstrate the mechanics of managing habitats for Monarchs (e.g. frequency of management, identification of beneficial and harmful plants, the types of management practices that are practical in different land types and settings).

Strategy 3: Facilitate establishment of new habitat.

Action/Tasks:

- 1) Advertise/promote programs and funding sources for installing new habitats in priority areas. Utilize existing programs and initiatives (e.g. CORRIDORS, Working Lands for Wildlife, Game Bird Habitat Program, Partners for Fish and Wildlife) and identify potential new programs/funding sources
- 2) Focus on those areas most suited to establishment with long-term protection (10 or more years), including Conservation Reserve Program, Wetland Reserve Easements, Classified Wildlands Program, Land Trusts, and Partners for Fish and Wildlife.
- 3) Prioritize establishment of new habitat within previously identified gaps/corridors to maximize connectivity. Advise agricultural and rural landowners on ways to integrate monarch habitat within these lands
- 4) Develop ways to reach "non-traditional" landowners who may not be aware of USDA Farm Bill or other programs. Example- utilize Certified Crop Advisors and other ag-related commercial service providers as sources of outreach.

- 5) Coordinate efforts to increase the availability of native seed and plants for habitat plantings, emphasizing regionally appropriate sources.
- 6) Promote the use of native species in conservation plantings to benefit monarchs and other pollinators

Objective B: Promote the value and benefits of establishing monarch habitat, as well as technical and financial support available to implement habitat.

Strategy 1: Engage key partners in the role of establishing monarch habitat using methods compatible with agricultural production systems.

Actions/Tasks:

- 1) Compile a list of partner resources listing available resources and support by each key agency, to help partners direct customers to the appropriate resource. Identify sources of both governmental and non-governmental financial and technical support.
- 2) Create a “one stop shop” online to serve as a clearinghouse for information. Resource should be useable on mobile devices.
- 3) Organize field days for partners (e.g. Farm Service Agency, SWCDs, NGOs, etc.) to review monarch practices and habitat and promote future collaboration.

Strategy 2: Develop a consistent message that emphasizes how Monarch habitat can help address multiple natural resource concerns.

Actions/Tasks:

- 1) Develop a list of high profile species that also benefit from monarch habitat and practices (pollinators in general/listed pollinators, northern bobwhite, grassland songbirds, etc.) to expand support communities.
- 2) Develop a resource list for landowners similar to the list developed for professionals (may be the same, or may have a different look and feel based on audience). Increase the promotion of the financial and technical assistance currently available through all partners to ensure that funds are utilized each fiscal year to maximize habitat installation.
- 3) Promote Peer-to-Peer educational events highlighting farm success stories regarding the use of monarch BMPs, including benefits of soil health, buffer, and Integrated Pest Management practices.

Strategy 3: Build trust and collaboration among stakeholder groups, including agricultural sector, in the development, promotion and adoption of BMPs that support both agricultural production and monarch habitat.

Actions/Tasks:

- 1) Increase outreach and education to CCA’s and pesticide applicators through opportunities such as the Pesticide Applicators Review Program (PARP) and agricultural commodity group efforts.

- 2) Increase education on the fundamental structure and objective of the Working Lands for Wildlife Program, to encourage sustainable agricultural production, while maintaining or enhancing wildlife habitat in a win-win scenario.
- 3) Develop and promote ways to integrate monarch conservation into existing agricultural operations or land management plans. Promote the use of productivity/profitability tools to identify the production and profitability of each acre. Encourage wise use of resources, to maximize production on the most profitable acres, while finding alternative uses, such as permanent habitat, on those acres with low production capacity.

2. Public and Protected Land Sector (Cheryl Coon)

Goal: Set a realistic stems of milkweed goal for the State of Indiana.

Objective A: Determine a milkweed stems/acre metric by land-use type for Indiana.

Actions/Tasks:

- 1) Customize/Calibrate the existing “Land Use Allocation Tool” for IN with an ad hoc committee composed of members from different Sector and Support groups. Be sure to include members that can give the process and outcomes scientific rigor/credibility.
- 2) Determine what metric equates with ‘good’ or ‘existing’ habitat for each land-use type.
- 3) Look at land-use types over the State of Indiana and likelihood potential for increasing milkweed stems/acre to ‘good’ on those acres. Use they numbers, across land-use type, to produce a quantifiable goal for state.

Objective B: Quantify Current/Existing Monarch habitat acres and potential acres across Public and Protected Lands in Indiana.

Actions/Tasks:

- 1) Have individual site managers report acres for each of their sites: report existing/good habitat acres AND potential habitat acres. Have managers draw polygons on aerials for each that can be converted to acres in GIS.
- 2) Compile acres of existing and potential habitat by Ownership in GIS.
- 3) Determine how many more acres of potential habitat should be restored/enhanced to meet milkweed stems for the Public/Protected lands Sector.

Objective C: Prioritize potential acres across Public and Protected Lands in Indiana.

Actions/Tasks:

- 1) Provide a metric to help site managers prioritize the potential habitat areas they identify. With guided questions and rankings, this will give each potential site a “score”. Include comments or scoring section for documenting site challenges or barriers.

- 2) Have individual site managers score their individual potential areas, including documenting challenges/barriers.
- 3) Attach metric scores (and challenges/barriers comments) for potential habitat acres with the GIS polygons
- 4) Have Public/Protected lands Sector determine priorities at state level (based on State and Sector stem goals) to then look for funding opportunities for restoration/enhancement implementation for public/protected lands.

Objective D: Develop a monitoring/tracking protocol (with GIS capability) to track areas (in acres) with good milkweed stems/ac by land-use area.

Actions/Tasks:

- 1) Try to find existing tracking database from one of partners that could be warehouse or example for State Monarch Data Collection and long-term tracking.
- 2) Quantify how to update information, how often to update and delegate overseer of data.

Objective E: Incorporate monarch conservation needs into existing land acquisition guidelines/plans.

Actions/Tasks:

- 1) Provide guidelines to Public/Protected Lands managers on how to identify high priority purchase areas.
- 2) Provide guidelines to Public/Protected Lands managers on best ways to manage, restore, enhance habitats to meet “good” habitat.
- 3) Develop ad hoc committee to explore funding opportunities for land purchase and/or restoration projects in identified high priority areas.

3. Transportation and utilities Rights of Way (Brian Kortum)

Goal: Incorporate Monarch conservation measures into ROW Integrated vegetation management strategies on electric and gas ROW and other Utility properties to maintain current habitat levels while increasing the amount of new habitat through 2035.

Objective A: Integrate monarch conservation management strategies and best management practices into construction and maintenance activities.

Actions/Tasks:

- 1) Provide guidance on how to restore and plant vegetation within a new easement using agreed upon seed mixes that would benefit the monarch butterfly and pollinators for different zones within the primary breeding and migratory monarch regions;
- 2) Seed mixes need to be regionally appropriate for the geography and site conditions, cost-effective, and viable during all seasons of the year (winter, spring, summer, etc.);

- 3) Any vegetation restoration activities need to achieve the performance criteria of 70% vegetative coverage as soon as possible to achieve erosion control and allow the utility to file a notice of termination.
- 4) Provide companies with a description of agreed-upon mowing practices that would meet MVCD standards and provide a benefit to monarchs (see Monarch Joint Venture Mowing Guidelines for an example);
- 5) Provide companies with a description of agreed-upon herbicide application practices that would meet MVCD standards and provide a benefit to monarchs;
- 6) Provide companies with guidance on how to monitor the site for vegetative coverage, presence of desired forbs, etc., and incidence of invasive or woody vegetation.

Objective B: Include monarch conservation measures into contract specifications for construction and maintenance activities.

Actions/Tasks:

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

Objective C: Develop a monarch conservation education and outreach program.

Actions/Tasks:

- 1) Provide annual education to ROW contractors, internal forestry personnel, including ROW land agents, and project managers/engineers;
- 2) Recommend a requirement for monarch and pollinator habitat education for contractors to be on bid list;
- 3) Allow ROW agents to provide information and options to landowners regarding potential to restore the ROW with monarch and pollinator-friendly vegetation;

Objective D: Partner with industry and conservation groups on monarch conservation rights-of-way.

Actions/Tasks:

- 1) Continue to foster information-sharing and supportive partnerships through the Rights-of-Way as Habitat Working Group;
- 2) Support research that will help make the business case for investing in monarch and pollinator habitat establishment and management in ROW environments;

- 3) Work to begin engaging contracting companies in monarch and pollinator habitat discussions since these are often the “boots on the ground” for vegetation work in ROWs;
- 4) Build networks or partnerships that will aid in tracking monarch habitat accomplishments and progress towards habitat goals on rights-of-way, including better data on milkweed baseline conditions and response. Include communication between U.S. Fish & Wildlife Service, current participants of the Rights-of-Way as Habitat Working Group, state agencies, and the Integrated Monarch Monitoring Program

4. *Urban/Municipal Lands Sector (Brad Feaster)*

Goal: To create, conserve, enhance and restore habitat in urban and municipal (U&M) lands to support populations of Monarch butterflies.

Objective A: Conserve and manage existing U&M Monarch habitats while increasing the amount of new habitat through 2038.

Strategy 1: Inventory existing U&M habitat conditions

Actions/Tasks:

- 1) Contact U&M partners for the acres and locations of Monarch habitat within their jurisdictions.
- 2) Use ArcGIS to identify gaps and potential corridors for connecting existing habitat.
- 3) Utilize existing partner reporting tools and create a reporting structure for which partners to report their respective efforts.

Strategy 2: Facilitate active management of existing U&M monarch habitat.

Actions/Tasks:

- 1) Advertise/promote existing programs and funding sources for managing existing U&M habitat.
- 2) Engage local civic organizations, HOAs, universities, NGOs through workshops to provide “how-to” technical support on establishing and managing plantings while also teaching the importance of these habitats to their community’s health and wellbeing with the purpose of enlisting them as volunteers or as potential funding sources for management activities.
- 3) Develop a program that recognizes municipalities that exhibit outstanding stewardship ie.... develop “weed” policies that are more monarch habitat friendly.
- 4) Develop a simple, effective reporting tool so partners can report their actions to the Monarch Conservation Plan Coordinator.
- 5) Link to existing citizen science programs to allow citizen partners to self-report/monitor efforts

Strategy 3: Facilitate establishment of new U&M habitat emphasizing previously identified gaps/corridors.

Actions/Tasks:

- 1) Advertise/promote programs and funding sources for installing new habitats in priority U&M areas.
- 2) Engage and educate area plan commissions, developers, urban planners, realtors, HOAs etc... on the benefits of Monarch habitats and how they can be incorporated into U&M settings
- 3) Work with municipalities on how they treat “blighted” properties. Maybe it’s cheaper to go in and establish some U&M habitat than it is to mow regularly?
- 4) Help partners recruit and engage volunteers.
- 5) Develop a reporting tool so partners can easily and effectively report establishment of new habitats.

Objective B: Create a clearinghouse of all the various urban outreach and education plans by 2020 so that partners can have readily available for their reference an inventory of all O&E programs available to them.

Strategy 1: Inventory Monarch programs.

Actions/Tasks:

- 1) Contact state/federal agencies on programs.
- 2) Contact NGOs on programs
- 3) Create a “one stop shop” to serve as a clearinghouse (I’m thinking we should tie into ISDA’s Story map web page).

Strategy 2: Develop a consistent message that talks about how Monarch habitats helps with clean water and healthy lifestyles especially in urban settings.

Actions/Tasks:

- 1) Promote the use of residential native plantings and their contribution to clean water and healthy lifestyle
- 2) Promote the use of native plantings on school grounds and other public buildings/spaces.

II. COLLABORATION AND PARTNERSHIPS

Collaboration and Partnerships

Monarch and pollinator conservation requires a collaborative approach that will succeed only if we actively develop, promote and maintain an active group of partners by providing them with the tools, resources and linkages to roll out this multi-faceted campaign. Existing and potential partners include but are not limited to federal and state agencies, city governments, non-

governmental organizations, community-based groups, corporations, businesses, educational institutions, and private citizens. A fundamental part of our effort will be a reliance on voluntary actions and volunteerism. Matching projects and actions to the varying levels of ability, willingness and desire will be a necessary component to our success.

Fulfilling our mission will also require a concerted effort to identify and implement effective methods and approaches that are science-based, effective, and practical. It is our intention to act in partnership with all interested parties on the conservation of monarchs and pollinators as a true coalition, providing information to the public about all aspects of monarchs and pollinators in Indiana, and creating opportunities for public engagement in decisions about the management of Indiana's pollinator resources. Moreover, substantial opportunities exist for everyone to contribute at some level; no effort is too small. However, a key to monarch conservation are those communities, groups, and individuals that control Indiana's diverse landscape. Only by working together with all stakeholders will we find practical options and solutions critical to our overall success.

GOAL I – To promote and cultivate collaboration and partnership across agencies, organizations, and stakeholder groups in support of our mission to increase and sustain habitat for monarch butterflies and pollinators.

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

Strategy 1. Arrange periodic meetings, demonstrations, workshops, and industry or partner events for information sharing, encouraging participation, planning, problem solving, and recognizing accomplishments. Use partner events and venues for promoting collaboration, needs, and accomplishments.

Actions/Tasks:

- a. Identify and target major partner events for presence and/or delivery of the Indiana Monarch and Pollinator Conservation Plan.
- b. Identify existing efforts, resources, and potential partners in order to connect interests with opportunities.

Objective B: Secure commitments from leaders of collaborative partner organizations to direct resources (e.g., time, money, services) to monarch habitat efforts, and the adoption of monarch conservation recommendations as appropriate to their organization.

Strategy 2. Engage Collaborative partners in regular and timely discussions about individual and collective priorities and additional opportunities for collaboration. Formalize commitments as necessary.

Actions/Tasks:

- a. Convene an annual meeting of leaders of Collaborative organizations for the purpose of setting priorities, accomplishment reporting, and commitment of resources.
- b. Indiana Monarch Steering Committee will have representatives with defined communication channels to report on progress and share needs.

Objective C: Engage Indiana’s key education partners.

Strategy 3. Find or create opportunities for discussions with school educators, park naturalists, environmental educators to explore, develop and promote basic Monarch conservation education toolkits.

Actions/Tasks:

- a. Identify education partners.
- b. Create an environmental education work group.
- c. Take the lead in convening an educator-specific monarch and pollinators workshops for the purpose of information sharing and strategy development.
- d. Initiate collaboration in the development of statewide monarch conservation education outreach plan.

GOAL II – Develop a centralized location for partners to find information and updates to the ongoing work as well as easily access toolkits, find volunteer opportunities, download educational materials and locate conservation program information.

Objective A: Create process/structure to localize information for partners.

Strategy 1. Develop a website or listserv that centralizes environmental education toolkits and information.

Strategy 2. Identify opportunities for volunteer recruitment and engagement. Establish a communications link between the Indiana Monarch Conservation Steering Committee and existing and potential volunteers. Promote volunteerism within existing organizations.

Actions/Tasks:

- a. Identify local/regional organizations that might form independent volunteer teams/crews (e.g., business clubs, church groups, school districts and universities/colleges).
- b. Identify groups and organizations whose members may be receptive to individual volunteer action.
- c. Create and/or provide information and tools necessary for self-guided action.
- d. Coordinate with target groups to develop an understanding of their resources and needs in order to assist them with delivering monarch and pollinator conservation.

III. OUTREACH AND EDUCATION

Goal: To increase public knowledge of Monarch conservation in Indiana.

Objective A: Create a communication strategy for consistent messaging.

Strategy 1: Create a media package.

Actions/Tasks:

- 1) Create a media tips document
- 2) Write “canned” press releases for use at key events

Strategy 2: Develop a logo and marketing items.

Actions/Tasks:

- 1) Create a logo to be tied to all outreach, education, and communication components
- 2) Create a “sponsor package” for soliciting sponsor dollars when fundraising is necessary

Strategy 3: Create Monarch conservation communication tips.

Actions/Tasks:

- 1) Develop a quick fact sheet for Monarch conservation and the plan
- 2) Develop a quick communication tip tool for improving and providing consistency in communication.

Strategy 4: Spread knowledge of Monarch conservation needs and the Indiana Monarch Conservation Plan.

Actions/Tasks:

- 1) Incorporate website and social media into partner organizations’ online presence.
- 2) Keep website and social media active and current with regular posts and updates.
- 3) Advertise Indiana Monarch Conservation Plan to wide stakeholder group

Objective B: Create a central clearinghouse for the dissemination of Monarch conservation information.

Strategy 1: Create a website to serve as the information portal.

Actions/Tasks:

- 1) Determine who will host site.
- 2) Design website.
- 3) Collect existing Monarch content.
- 4) Create Monarch content where needed.
- 5) Launch website.

Strategy 2: Establish a social media presence for better advertisement of Monarch conservation.

Actions/Tasks:

- 1) Determine who will be social media coordinator.
- 2) Create accounts on pertinent platforms.
- 3) Connect with other conservation social media.
- 4) Advertise events, news releases, research, and outreach and education programs.

Objective C: Facilitate outreach and education programming.

Strategy 1: Identify existing outreach and education programs.

Actions/Tasks:

- 1) Catalog existing programs with partner organizations.
- 2) Catalog existing programs from external organizations.
- 4) Classify programs by content, geography, target audience, etc.
- 5) Compare content of programs to current best information.

Strategy 2: Identify gaps, geographically, topically, or otherwise, in outreach and education programming.

Actions/Tasks:

- 1) Using program catalog, find topical gaps.
- 2) Using program catalog, find geographic gaps.
- 3) Looks for trends in program type compared to organization type.
- 4) Identify gaps in target audience.

Strategy 3: Promote the expansion of outreach and education and its incorporation into existing programs.

Actions/Tasks:

- 1) Create outreach and education materials for topical gaps.
- 2) Identify outreach organization within geographical gaps.
- 3) Determine if any target audiences or age groups need additional programming.
- 4) Encourage agencies with existing programs to utilize website and social media platforms for best available information.

The Indiana Monarch Conservation Plan aims to further the knowledge and appreciation of the monarch butterfly and its North American migration phenomenon, as well as an understanding of the threats to the monarch and the need for conservation of the species by providing resources and information for establishment, restoration and management on monarch habitat. The plan will identify existing partners, programs and tools that can help enhance communication and sharing of science-based information on monarch conservation among diverse audiences, and coordinate efforts to develop effective education and outreach tools to increase awareness and appreciation for monarch butterfly conservation. Gaps in existing education and outreach tools and programs will be identified, and efforts will be made to

prioritize, develop and organize new efforts needed to further monarch butterfly conservation in Indiana. Education and outreach will target all Hoosiers including students, teachers, and citizens as well as the agriculture, industry, legislative, and conservation communities at large. Through monarch butterfly outreach and education efforts we hope to not only educate about a single species and its associated habitat, but also foster an overall increased appreciation for native plants, natural habitats and the associated benefits they provide not only to monarchs, but also to other insects and pollinators, wildlife species, and the overall quality of life for Indiana's citizens.

IV. MONITORING and RESEARCH

GOAL I – To ensure coordinated monarch butterfly conservation in Indiana is scientifically and biologically sound relative to monarch and pollinator conservation.

Objective A: Implement a shared, multi-jurisdictional monitoring strategy for measuring and capturing Indiana-specific accomplishment data and information.

Strategy 1. Engage partners and resident experts in discussions about methods for capturing accomplishment data; examine opportunities to participate in existing initiatives (e.g., USGS Monarch Conservation Science Partnership); consider required level of rigor and limitations of citizen science.

Actions/Tasks:

- a. Define general data needs and requirements (e.g., what do we need to measure and how do we gather data?).
- b. Determine methods for gathering citizen-collected data.
- c. Determine methods for counting residential and other small-scale plantings toward state habitat objective.
- d. Coordinate data collection.
- e. Collaborate regionally when developing/implementing data collection protocols.

Objective B: Identify Indiana-specific research needs and, when feasible, collaborate on regional or national research projects.

Strategy 1. Engage leading science experts to discuss the status of monarch science and research, and consider jointly identifying priority research needs and collaboration as needed.

Actions/Tasks:

- a. Convene a monarch and pollinator science workshop/roundtable discussion.
- b. Collaborate regionally when discussing priority research needs.

Objective C: Annually collect and report statewide habitat accomplishment information from partners as measured against the annual and the 20-year objective.

Strategy 1. Create an easy and efficient method for partners to collect and self-report accomplishments in a timely manner.

Actions/Tasks:

- a. Assemble relevant habitat accomplishments from partners and stakeholders.
- b. Report and publicize habitat accomplishments to the general public and regional and national level monarch groups.

While increasing monarch butterfly habitat is paramount for the recovery of the species, particularly in Indiana, the tracking of habitat accomplishments and the associated ecological response of monarchs to conservation activities is incredibly important in assessing monarch populations and future listing decisions. These tracking and monitoring efforts are currently lacking in Indiana and across the nation. A significant challenge will be in determining realistic methods for quantifying effort and accomplishments that have enough scientific rigor to be credible. Designing protocol, methods of data collection, and database management will likely require the work and investment of multiple professional entities. The Indiana Monarch Conservation Plan will work with partners across the state, region and nation, to stay current on collaborative tracking and monitoring efforts in which Indiana should be participating. Partners will work to identify habitat tracking and ecological monitoring gaps in Indiana and pursue comprehensive and collaborative solutions. The Indiana Monarch Summit identified the coordination of these tracking and monitoring efforts as one of the top challenges to the implementation of a successful Indiana Monarch Conservation Plan. The hiring of a full-time monarch/pollinator coordinator for Indiana was identified as the best solution to this challenge and remains a top goal to the implementation of this plan.

The Indiana Monarch Conservation Plan will help foster the collaboration of continued research on the monarch butterfly, its threats, and its response to current and future conservation efforts, which will ultimately inform changes to best management practices for the species. An opportunity exists for the Indiana Monarch Conservation Plan to help bring together state and regional researchers to discuss Indiana's role in addressing applied scientific needs, and potentially engaging several public and private research facilities to those ends. The Indiana Monarch Conservation Plan will be a working document to guide conservation and will be continually updated to reflect any necessary changes in response to the best available science.

V. CAPACITY, GOVERNANCE and FUNDING

Conserving and increasing monarch butterfly populations and their associated habitat in Indiana will require an immense amount of collaboration and coordination that cannot be

achieved without some level of structure and collective oversight. While allowing partners to be flexible in their individual efforts and level of engagement with the Indiana Monarch Conservation Plan, formal participation and commitments will be necessary. Due to the nature of this conservation challenge, early efforts will rely heavily on active participation and communication to keep the strategy relevant and impactful. A governance structure, including a Plan coordinator, steering committee and associated sector and support work groups (identified in the Indiana Monarch Summit and detailed below) will be key to the recruitment of additional partners, as well as coordinating efforts and accomplishments. Moreover, a basic level of staffing support and funding will be essential to meeting the goals and objectives of the Plan, as the participating agencies, partners and volunteers all have inherent limitations. Funding for a Plan coordinator, future meetings, and collaborative projects identified through this Plan will be an ongoing need, and fundraising efforts will likely continue throughout the duration of the implementation of this effort.

Goal: To create an effective leadership structure that is reflective of this public/private collaboration and secure funding so as to adequately support the Plan and its leadership structure.

Objective A: Establish and formalize the governing Steering Committee to oversee the work of the Plan Coordinator and associated efforts.

Strategy 1: Develop and implement a Memorandum of Agreement (MOA) and supporting procedures for governing formal partner organization participation and the role and function of the Steering Committee.

Actions/Tasks:

- 1) Establish a process for selecting a rotating convener to host periodic meetings of the Steering Committee until a Coordinator is hired.
- 2) Develop and adopt rules and procedures for determining membership and decision-making.
- 3) Determine appropriate evaluation metrics for success of Plan goals and objectives.
- 4) Develop methods for including or removing collaborator organizations
- 5) Create or dissolve advisory working groups as needed.

Objective B: Secure necessary short-term funds (3 years) to support operational needs for the Coordinator.

Strategy 1: Develop a basic 3-year funding plan to support hiring a Coordinator

Actions/Tasks:

- 1) Identify and prioritize potential funding sources.
- 2) Establish methods to solicit and receive supporting donations.
- 3) Work with Steering Committee and partners to secure short-term (3 years) funding to hire a coordinator.

Objective C: Hire a full time Indiana Monarch Conservation Plan Coordinator.

Strategy 1: Identify the means and methods for hiring the Coordinator that can work across organizations and jurisdictions to lead, implement and facilitate achievement of the goals and objectives described in the Plan.

Actions/Tasks:

- 1) Determine and develop the necessary qualifications and job description acceptable to the Steering Committee
- 2) Determine salary and funding sources (short-term and long-term).
- 3) Determine potential employers who could hire and provide office space and related support for the position.
- 4) Develop and implement any necessary Memorandums of Agreement (MOAs) between partners to facilitate funding, hiring, supervision and support.
- 5) Develop a prioritized 12-month work plan.

Objective D: Secure necessary long-term funds (15 years) to support operational and programmatic needs.

Strategy 1: Develop a 15-year funding plan to support a Coordinator and programmatic needs

Actions/Tasks:

- 1) Identify and prioritize potential funding sources.
- 2) Work with Steering Committee and partners to secure long term (15 years) funding to keep a Coordinator and to support program needs.

CONCLUSION

Given the geographic importance of Indiana in the migration path of the monarch butterfly, our state is eager to implement the strategies of this plan. Intended to promote the conservation, enhancement and restoration of the monarch butterfly and other significant pollinators in Indiana; it is important to note that this is a living document that will be updated, adapted and modified as conditions and the status of the monarch butterfly change.

LITERATURE CITED

- Flockhart, D. T. T., L. I. Wassenaar, T. G. Martin, K. A. Hobson, M. B. Wunder, and D. R. Norris. 2013. Tracking multi-generational colonization of the breeding grounds by monarch butterflies in eastern North America. *Proceedings of the Royal Society B*. 280:20131087.
- Flockhart, D. T. T., J. B. Pichancourt, D. R. Norris, and T. G. Martin. 2015. Unraveling the annual cycle in a migratory animal: breeding-season habitat loss drives population declines of monarch butterflies. *Journal of Animal Ecology*. 84:155–165.
- Indiana Department of Natural Resources. 2015. Indiana Department of Natural Resources State Wildlife Action Plan. https://www.in.gov/dnr/fishwild/files/SWAP/fw-SWAP_2015.pdf.
- Midwest Association of Fish and Wildlife Agencies. 2018. Mid-America Monarch Conservation Strategy, 2018-2038, Version 1.0.
- Pelton, E., S. Jepsen, C. Schultz, C. Fallon, and S. H. Black. 2016. *State of the Monarch Butterfly Overwintering Sites in California*. Portland, OR: The Xerxes Society for Invertebrate Conservation. Available online at www.xerxes.org 34
- Pleasants, J. M., and K. S. Oberhauser. 2012. Milkweed loss in agricultural fields because of herbicide use: effect on the monarch butterfly population. *Insect Conservation and Diversity*. 6:135–144.
- Schultz, C. B., L. M. Brown, E. Pelton, and E. E. Crone. 2017. Citizen science monitoring demonstrates dramatic declines of monarch butterflies in western North America. *Biological Conservation*. 214:343-346.
- Semmens et al. (2016) Semmens BX, Semmens DJ, Thogmartin WE, Wiederholt R, López-Hoffman L, Diffendorfer JE, Pleasants J, Oberhauser K, and Taylor O. 2016. Quasi-extinction risk and population targets for the Eastern, migratory population of monarch butterflies (*Danaus plexippus*). *Scientific Reports*. 2016;6:23265. doi: 10.1038/srep23265.

APPENDIX A. INDIANA MONARCH STEERING COMMITTEE

Emily Wood, Indiana Wildlife Federation	wood@indianawildlife.org
Aaron Stump, Indiana Wildlife Federation	stump@indianawildlife.org
Anthony Sipes, IN DNR	asipes@dnr.in.gov
Brad Feaster, IN DNR SWAP Coordinator	bfeaster@dnr.in.gov
Ben Miller, IN DNR Landscape Conservation & MAFWA	bmiller2@dnr.in.gov
Cheryl Coons, USDA Forest Service	ccoos@fs.fed.us
John Bacone, IN DNR Nature Preserves	jbacone@dnr.in.gov
Jeff Kiefer, U.S. Fish and Wildlife Service	jeffrey_kiefer@fws.gov
Jeff Belth, Author, <i>Butterflies of Indiana</i>	jeffreybelth@gmail.com
John Shuey, The Nature Conservancy	jshuey@tnc.org
Brianne Lowe, Natural Resources Conservation Service	brianne.lowe@in.usda.gov
Brian MacGowan, Purdue University	macgowan@purdue.edu
Sandy Belth, IU & Park Naturalist	belthbirds@gmail.com
Tom Swinford, IN DNR Nature Preserves	tswinford@dnr.in.gov
Brian Kortum, NiSource	bkortum@NiSource.com

APPENDIX B. ATTENDEES OF THE SEPTEMBER 2017 INDIANA MONARCH SUMMIT.

First Name	Last Name	Agency/Organization Name
John	Bacone	IDNR - Division of Nature Preserves
Stephen	Beard	Duke Energy
Sandy	Belth	Monroe County Parks and Recreation
Jeffrey	Belth	INPAWS
Brandon	Beltz	Pheasants Forever/Quail Forever
Jennifer	Boyle Warner	Indiana Association of Soil and Water Conservation Districts
Cliff	Chapman	Indiana Land Protection Alliance
Keith	Chasteen	US Army Corps of Engineers
Cheryl	Coon	USDA Forest Service
Mike	Dunn	The Nature Conservancy
Brad	Feaster	IDNR - State Wildlife Action Plan
John	Garner	Greencastle Sustainability Commission
Ralph	Grundel	United States Geological Survey
Ren	Hall	IDNR Division of Entomology & Plant Pathology
Scott	Haulton	IDNR Division of Forestry
Jill	Hoffmann	Empower Results
Erin	Holmes	Pheasants Forever/Quail Forever
Emily	Jacob	Quail forever
Ian	Kaplan	Purdue University
Julia	Kemnitz	U.S. Fish and Wildlife Service
Jeff	Kiefer	U.S. Fish and Wildlife Service
Jason	Kishton	USDA/Farm Service Agency
Brian	Kortum	NiSource
Matthew	Kraushar	Indiana Department of Transportation
Meg	Leader	Indiana State Department of Agriculture
Matt	Lord	IDNR Division of Forestry
Matt	Lord	IDNR Division of Forestry
Brianne	Lowe	Natural Resources Conservation Service
Brian	MacGowan	Purdue University
Natalie	Marinova	Eco Logic
Benjamin	Miller	IDNR Division of Fish and Wildlife
Ginger	Murphy	IDNR Division of State Parks
Ann	Niednagel	Environmental Education Association of Indiana
Mark	O'Brien	Cardno
Paola	Olaya Arenas	Purdue University
Ryan	Owen	Pheasants Forever/Quail Forever
Samuel	Pecoraro	U.S. Geological Survey

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Kathleen	Prough	IDNR Division of Entomology
Mark	Reiter	IDNR Division of Fish and Wildlife
Amy	Rhodes	Spence Restoration Nursery
Michele	Schilten	Indianapolis Zoo
Justin	Schneider	Indiana Farm Bureau
Jeremy	Sheets	Orbis Environmental Consulting
John	Shuey	The Nature Conservancy
Aaron	Stump	Indiana Wildlife Federation
Robert	Suseland	Pheasants Forever/Quail Forever
Thomas	Swinford	IDNR Division of Nature Preserves
Kris	Vance	USDA Natural Resources Conservation Service
Zachary	Voyles	Quail Forever
Cyndi	Wagner	IDEM Office of Water Quality
Robert	Waltz	Office of Indiana State Chemist
Emily	Wood	Indiana Wildlife Federation

APPENDIX C. MEMBERS OF SECTOR WORKING GROUPS

First Name	Last Name	Agency/Organization Name
Private Agricultural and Rural Lands Sector		
Brianne	Lowe	Natural Resources Conservation Service
Ben	Miller	IDNR, Division of Fish and Wildlife
Jeff	Kiefer	U.S. Fish and Wildlife Service
Justin	Schneider	Indiana Farm Bureau
Cyndi	Wagner	Indiana Department of Environmental Management
Ryan	Owen	Pheasants Forever/Quail Forever
Brian	Kruse	Natural Resources Conservation Service
Zach	Voyles	Pheasants Forever/Quail Forever
Beth	Clarizia	Natural Resources Conservation Service
Emily	Jacob	Pheasants Forever/Quail Forever
Josh	Griffin	Indiana DNR Division of Fish and Wildlife
Jason	Kishton	Farm Services Agency
Public and Protected Lands Sector		
Cheryl	Coon	USDA Forest Service
John	Shuey	The Nature Conservancy
Tom	Swinford	IDNR Division of Nature Preserves
Ben	Miller	IDNR, Division of Fish and Wildlife
Transportation and Utilities Rights of Way Sector		
Brian	Kortum	NiSource
Stephen	Beard	Duke Energy
Urban/Municipal Lands Sector		
Brad	Feaster	Indiana DNR Division of Fish and Wildlife
Ethan	Olson	Keep Indianapolis Beautiful
Tom	Swinford	Indiana DNR Division of Nature Preserves
Sandy	Belth	Monroe County Parks Department
Michele	Schilten	Indianapolis Zoo
Mike	Homoya	Indiana DNR Division of Nature Preserves
Jessica	Merkling	Indiana DNR Division of Fish and Wildlife
Julia	Kemnitz	U.S. Fish and Wildlife Service
David	Forsell	Keep Indianapolis Beautiful

APPENDIX D. ACRONYMS AND ABBREVIATIONS

AFWA – Association of Fish and Wildlife Agencies
IDEM – Indiana Department of Environmental Management
IDNR – Indiana Department of Natural Resources
ESA – Endangered Species Act
FFA – Future Farmers of America
FSA – Farm Services Agency
INDOT – Indiana Department of Transportation
MAFWA – Midwest Association of Fish and Wildlife Agencies
NFWF – National Fish & Wildlife Foundation
NGOs – Non-governmental organizations
NRCS – Natural Resource Conservation Service
NWF – National Wildlife Federation
IWF – Indiana Wildlife Federation
QF/PF – Quail Forever/Pheasants Forever
STEM – Educational grouping encompassing science, technology, engineering, and math
USDA – United States Department of Agriculture
USFS – U.S. Forest Service
USFWS or “Service” – U.S. Fish and Wildlife Service
USGS – United States Geological Survey

Terms and their definitions as used in this plan are as follows:

Goals – IN WHAT DIRECTION DO WE WANT TO GO? - Generalized directional statements for an intended purpose (e.g., to improve, increase, maintain, decrease, provide, etc.); Goals are usually 30,000-foot level and fairly broad. Usually not quantified or time-bound.

Objectives – WHAT WILL WE ACCOMPLISH? - Concise statements of what will be accomplished.

Strategies – HOW WILL WE ACCOMPLISH IT? - Statement(s) of an approach to achieve an objective(s).

Actions/Tasks – HOW WILL WE IMPLEMENT THE PLAN? – Specific things that must be done.

Evaluation – HOW WILL WE KNOW WHEN THE OBJECTIVES ARE ACHIEVED? – methods of assessing progress against the objectives. Should have specific metrics or measurements.