Updated 12-2020

It's more than just monarchs!

For simplicity and ease of reading, this plan is focused on monarch butterflies (*Danaus plexippus plexippus*), hereafter referred to simply as monarchs. However, the Steering Committee was unanimous in its assertion that the plan is intended to include by association all pollinators, and wildlife that share similar habitat requirements.

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EXECUTIVE SUMMARY

In September of 2017, the Indiana Wildlife Federation convened a summit of state and federal 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.

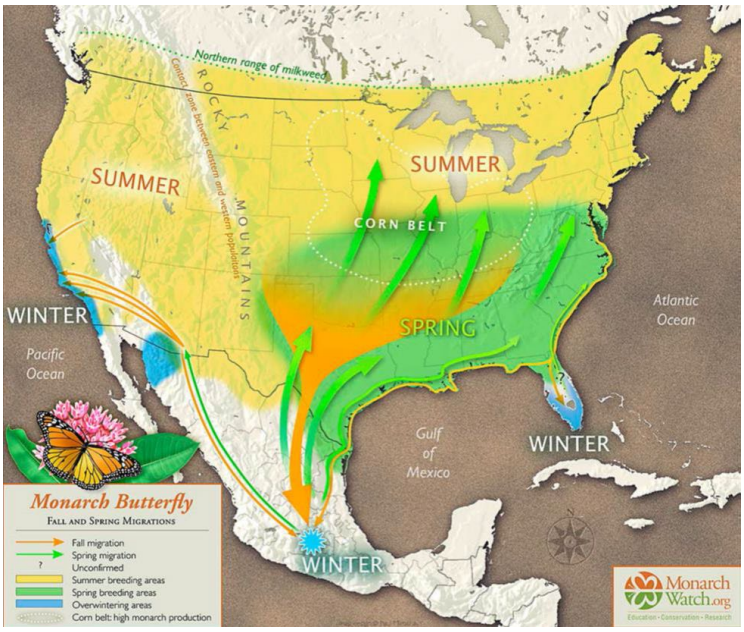
SPONSORS

The following organizations generously contributed to sponsoring the 2017 Indiana Monarch Conservation Summit, the results of which provided the foundation for writing this 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, including species description, taxonomy, biology, and much more, reference the Mid-America Monarch Conservation Strategy (Midwest Association of Fish and Wildlife Agencies 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

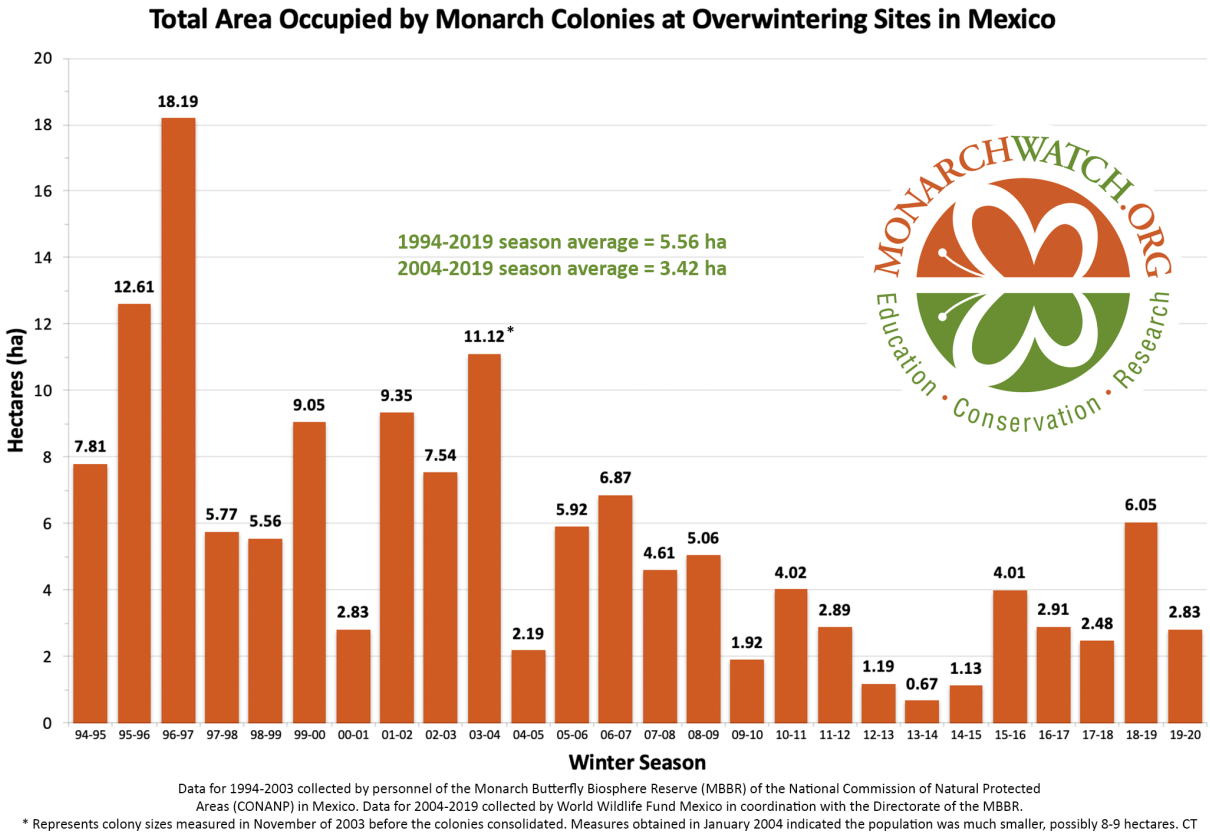
December 2020. This has prompted governmental and nongovernmental groups and individuals to initiate immediate conservation actions to help monarchs. It has also led to the development of long-term plans, such as the Mid-America Monarch Conservation Strategy.

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 estimates were 2.48 hectares in 2017-2018, 6.05 hectares in 2018-2019 and 2.83 hectares in 2019-2020 (Figure 2).

Figure 2. *Monarch Colonies in Mexico*



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 2004-2019 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

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 was scheduled to make a proposed decision on whether listing of the subspecies was warranted by June 2019. In May of 2019 the Service extended the deadline for the decision to December 15, 2020.

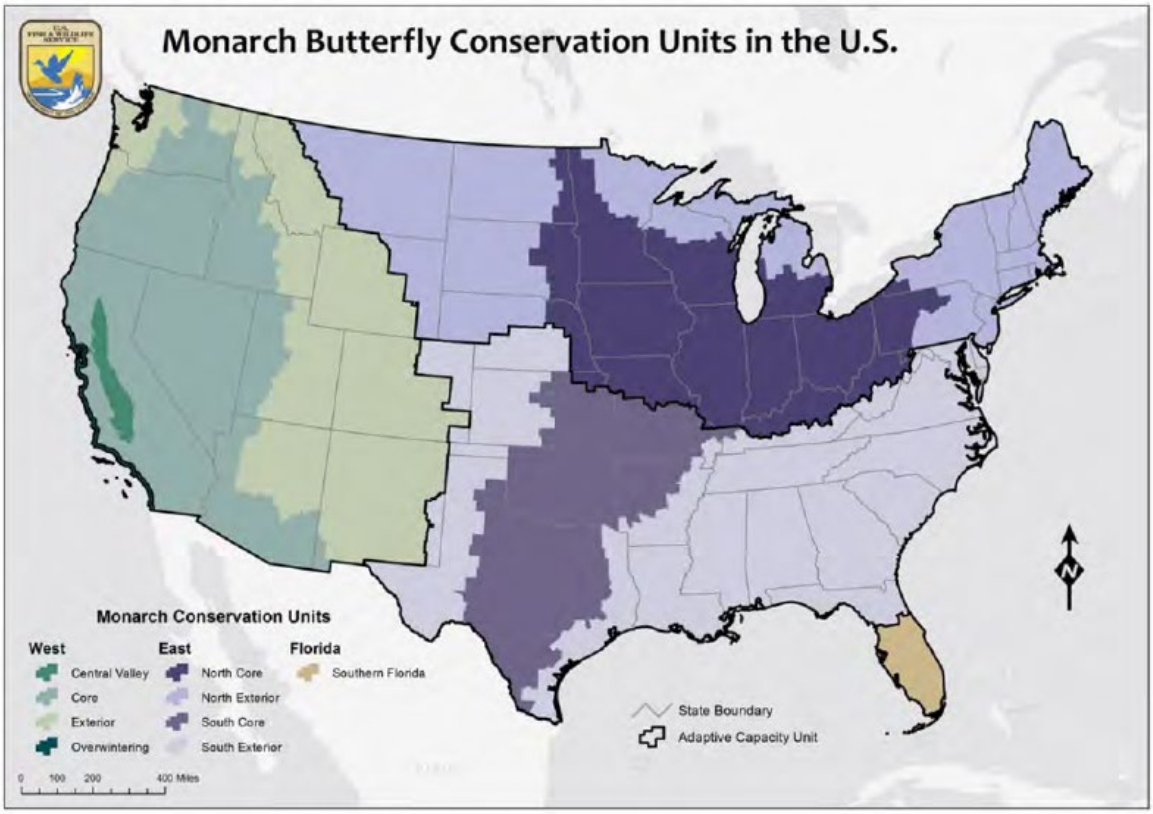
Much of the eastern monarch population's decline is hypothesized to be due to milkweed and nectar resource losses in the "corn belt" region of the central United States, as well as loss or degradation of nectar and milkweed resources in south-central states important to monarch migration and reproduction. 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 are 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.

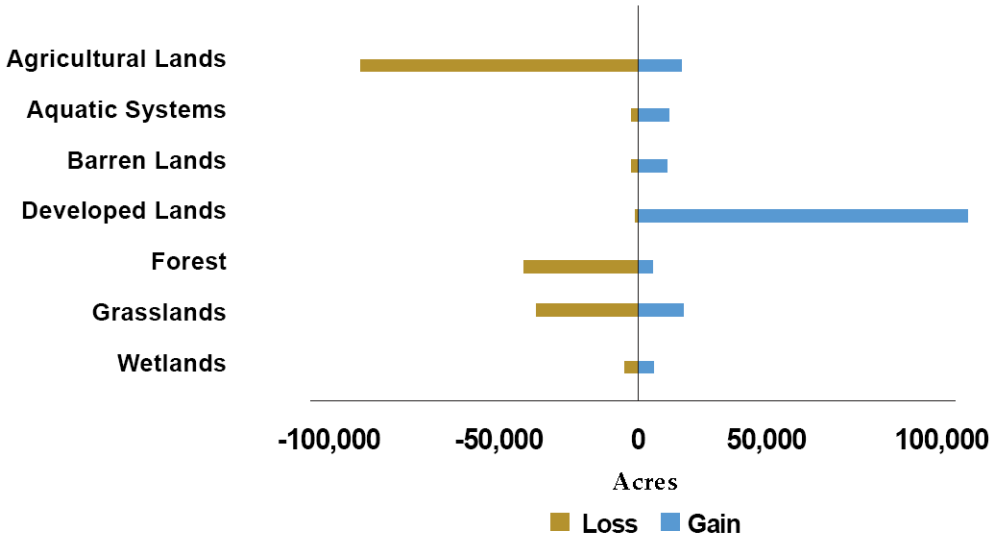
Figure 3. *Approximate boundaries of areas important to monarch butterfly populations in the contiguous United States.*



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

Sectors

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

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

I. HABITAT TRACKING, ECOLOGICAL MONITORING and SCIENTIFIC RESEARCH

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 extremely important in assessing monarch populations and future listing decisions. These habitat tracking and ecological 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 USFWS has currently developed the "Monarch Conservation Database" to track monarch habitat accomplishments among states and across individual conservation partners within each state. The Indiana Monarch Conservation Plan will facilitate 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 habitat tracking and ecological 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, within the Capacity, Governance, and Funding section.

The Indiana Monarch Conservation Plan will also foster the collaboration of continued scientific research on the monarch butterfly, its threats, and responses 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 efforts and will be continually updated to reflect any necessary changes in response to the best available science.

GOAL I – Improve understanding, tracking and reporting on the state of monarch habitat by sector, in order to work toward setting and achieving Indiana's monarch habitat goals.

Objective A: Obtain the best possible statewide estimates for baseline monarch habitat by sector.

Strategy 1: Determine existing Monarch habitat by sector and land-use type for Indiana.

Actions/Tasks:

1. Determine what metric equates with 'existing' monarch habitat for each land-use type.
2. Utilize all existing tools for allocation of resources and conservation efforts for Indiana with an ad hoc committee composed of members from different Sector groups.
3. Utilize all available data, surveys and tools to obtain a best available baseline estimate of monarch habitat by sector and statewide. Where feasible, identify larval habitat versus nectaring/migrating habitat.
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. Customize/Calibrate the existing resource allocation tools to be Indiana-specific with an ad hoc committee composed of members from different Sector groups, emphasizing scientific rigor and credibility of the process and outcomes.
6. Design consistent methodology for quantifying habitat.
7. Extrapolate data obtained from each sector, and each individual conservation partner, land manager or landowner.

Strategy 2: Identify gaps in data collection of baseline habitat estimates as well as physical gaps in existing habitat on the landscape.

Action/Tasks:

1. Continually identify potential new Partners to participate in monarch conservation planning and tracking efforts.
2. Continually make efforts to identify and account for habitat previously unaccounted for in accomplished tracking databases such as the Monarch Conservation Database.
3. Use ArcGIS to identify habitat gaps and potential corridors to connect existing habitat and utilize available models to prioritize future conservation efforts.

Objective B: Effectively track and report all new monarch habitat accomplishments in a standardized, cohesive and collaborative method.

Strategy 1: Annually report all new monarch habitat accomplishments in Indiana to state and regional tracking databases, measured against the annual and 20-year habitat goals.

Actions/Tasks:

1. Develop consistent reporting metrics, mechanisms, and protocols so agencies and organizations can report their habitat accomplishments to the Monarch Conservation Plan Coordinator (e.g. acres, stems milkweed, participants, etc.) or directly to the Monarch Conservation Database.
2. Evaluate existing tracking databases (with GIS capability) that could be utilized for State monarch data collection and long-term tracking.
3. If needed, assign an ad hoc committee to create a database, determine processes and a schedule for updating information, and identify a potential database host.
4. Ensure that a shared Monitoring/Tracking database for Indiana also captures consistent metrics to feed into regional tracking databases (e.g. Monarch Conservation Database).
5. Train all participating partners on how to report monarch habitat accomplishments on a determined time schedule, to keep the database current and relevant.
6. Obtain and report total acres of monarch habitat, new acres of monarch habitat and potential acres for habitat improvement by each sector and each individual conservation partner or land manager.
7. When possible, obtain GIS maps of existing, new and potential monarch habitat for each individual conservation partner and land manager.
8. Compile acres of existing and potential habitat by sector type by utilizing tools such as GIS, existing data, aerial photographs, etc...
9. Report and publicize habitat accomplishments to the general public and regional and national level monarch groups.
10. Seek new partners and assist existing partners with following established protocol annually, for both state and regional habitat tracking.

Objective C: Utilize habitat metrics and available land use allocation tools to mutually agree upon a quantifiable habitat goal for Indiana and each land use sector.

Strategy 1: Complete a full year of statewide monarch habitat accomplishment tracking to better understand current state of conservation capabilities.

Action/Tasks:

1. Run reports by sector and partner to determine habitat accomplishments in 2021.
2. Utilizing surveys, identify individual partners and overall sector outlook in regard to potential opportunity to expand monarch habitat accomplishments in future years.
3. Use reporting metrics and survey data, paired with land use allocation goals from the Mid-America Monarch Conservation Strategy to develop multiple scenarios for Indiana's capabilities for potential monarch habitat goals to be achieved by 2038.
4. Hold individual sector meetings to analyze scenarios, metrics and survey data to collaboratively agree upon Indiana's statewide monarch conservation habitat/milkweed stem goal for 2038.

5. Extrapolate agreed upon sector goals to determine Indiana's statewide monarch conservation habitat/milkweed stem goal for 2038.
6. Report and record all updates on Indiana's statewide monarch conservation habitat/milkweed stem goal to Indiana Monarch Conservation Plan and the Indiana section of the Mid-America Monarch Conservation Strategy.

GOAL II – Ensure that coordinated monarch butterfly ecological monitoring efforts in Indiana are scientifically and biologically sound.

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

Strategy 1. Engage partners and resident experts in discussions about methods for capturing ecological monitoring data for monarchs; consider required level of rigor and limitations of citizen science.

Actions/Tasks:

1. Define general data needs and requirements (e.g., what do we need to measure and how do we gather data?).
2. Determine methods for gathering citizen-collected data and consider required level of rigor and limitations of citizen science.
3. Determine methods for counting residential and other small-scale plantings toward state habitat objective.
4. Coordinate data collection.
5. Collaborate regionally when developing/implementing data collection protocols and examine opportunities to participate in existing initiatives (e.g., USGS Monarch Conservation Science Partnership, Integrated Monarch Monitoring Program).

GOAL III –Ensure monarch conservation efforts in Indiana are guided by the best available science and make efforts to identify and foster areas in need of further research.

Objective A: Identify and share best available scientific research in regards to the ecology, status and threats of the monarch butterfly and habitat conservation efforts in support of increasing populations of the species.

Strategy 1: Create or promote clearinghouse for monarch conservation research or promote existing resources to accomplish this.

Actions/Tasks:

1. Utilize Indiana Monarch Conservation Plan resources to share access to monarch related research.

2. Promote existing clearinghouses for all monarch related research (e.g. Monarch Joint Venture).
3. Create a clearinghouse for any Indiana-specific monarch or habitat related research.
4. Encourage partners to engage in conservation practices that reflect the best available science.

Strategy 2. 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:

1. Identify all in-state researchers with a shared interest or expertise in monarch species and habitat conservation and related subjects.
2. Convene a recurring monarch and pollinator science workshop/roundtable discussion.
3. Identify priority research needs for Monarchs and pollinators in Indiana, and
4. Collaborate regionally when applicable.
5. Incorporate new research findings and assess Indiana Monarch Conservation Plan to ensure that it stays current.

II. 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 percentage of grassland habitat loss between 2001 and 2011 as the largest habitat decline in Indiana (Fig. 4). In order to reverse the trend of habitat loss and the degradation of the quality of habitats most beneficial to the monarch (upland and wetland), 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 uses a land cover-based spreadsheet tool to estimate potential milkweed stem increases, whereas the “Proportional Land Area” method simply assigns a percentage of the 1.3 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 for Indiana. There is a large knowledge gap regarding 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:

5. Private Agricultural and Rural Land
6. Public and Protected Land
7. Transportation and Utility Rights of Way
8. Urban/Municipal Land

1. Private Agricultural and Rural Land Sector

Goal I: To conserve, enhance and restore monarch 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 is 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 2038.

Strategy 1: Facilitate active management of existing monarch habitat.

Action/Tasks:

1. Develop, update, and promote best management practices (BMPs) for the long-term maintenance of existing habitat (e.g. strategic mowing of roadsides, invasive species 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 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 2: 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 (CCA) and other agriculture-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, including 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 public online resource hub to serve as a clearinghouse for information on financial and technical assistance.
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 butterfly habitat can help address multiple natural resource concerns.

Actions/Tasks:

1. Develop a list of high profile species that also benefit from monarch butterfly habitat and practices (pollinators in general/threatened or endangered pollinators, northern bobwhite (*Colinus virginianus*), grassland songbirds, etc.) to expand support communities.
2. Develop a resource list for landowners similar to the list developed for professionals (this may be the same, or may have a different look and feel based on the target 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 the benefits of soil health, buffers, and Integrated Pest Management practices.

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

Actions/Tasks:

1. Increase outreach and education to CCAs 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

Goal I: Enhance existing habitat and restore potential habitat across public and protected lands in Indiana to support monarch butterflies.

Objective A: Conserve and manage existing habitat on public and protected lands for monarch butterflies.

Strategy 1: Provide public and protected land managers with BMPs for managing monarch butterfly habitat.

Actions/Tasks:

1. Convene a recurring monarch and pollinator habitat manager workshop/roundtable discussion including identifying management techniques that have been successful and unsuccessful.
2. Adopt, update, and promote monarch butterfly habitat management BMPs for public and protected lands of Indiana.

Objective B: Restore or enhance public and protected lands in Indiana to provide habitat for the monarch butterfly.

Strategy 1: Identify potential areas on existing public and protected lands in Indiana that could be restored or enhanced to provide monarch habitat.

Actions/Tasks:

1. Develop and/or provide a user-friendly metric to help site managers prioritize the potential habitat areas. With guided questions and rankings, this will give each potential site a "score". Include a comment section for documenting site challenges or barriers.
2. Encourage individual site managers to score their own potential areas, including documenting challenges/barriers.
3. Attach metric scores (and challenges/barriers comments) for potential habitat acres with the GIS polygons.

Strategy 2: Prioritize potential restoration/enhancement acres across public and protected lands in Indiana.

Actions/Tasks:

1. Have Public and Protected Lands Sector determine priorities at state level based on land "scores" and spatial GIS analysis for monarch butterfly habitat opportunities, gaps or corridor needs.

Objective C: Work to incorporate monarch conservation needs into existing land acquisition guidelines/plans.

Strategy 1: Provide guidelines to Public and Protected Lands Sector managers on how to identify high priority land acquisitions.

Actions/Tasks:

1. Provide user-friendly metric to help site managers identify lands with existing monarch butterfly habitat or high restoration potential.
2. Provide guidelines to public and protected lands managers on best ways to manage, restore or enhance habitats to meet "good" habitat standards.

Strategy 2: Provide funding for land acquisition of properties with existing or high restoration potential habitat for monarchs.

Actions/Tasks:

1. Explore funding opportunities for land purchase and/or restoration projects in identified high priority areas (e.g. monarch habitat gaps and corridor needs).

Objective D: Utilize public and protected lands for education and outreach opportunities for monarch habitat implementation.

Strategy 1: Leverage the habitat, accessibility and staff to provide educational opportunities.

Actions/Tasks:

1. Provide and develop educational materials for public and protected lands staff.
2. Utilize protected lands as demonstration sites for the development of monarch butterfly habitat.

3. Transportation and Utility Rights of Way Sector

Goal I: Incorporate monarch butterfly conservation measures into construction, operations and maintenance activities on utility and transportation rights of way (ROW) to maintain and enhance current habitat while increasing the amount of new habitat through 2038.

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

Actions/Tasks:

1. Provide guidance on how to plant, maintain and enhance pollinator habitat within ROW using seed mixes that benefit the monarch butterfly and other pollinators for different zones within the primary breeding and migratory monarch regions.
2. Recommend seed mixes that are regionally appropriate for the geography and site conditions.

3. Any vegetation restoration activities shall 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. The utilization of short lived vegetation, i.e. a “nurse crop”, is acceptable for use as part of the seed mix to achieve the 70% cover requirement, provided it can be demonstrated that the desirable/focal vegetation is also establishing.
4. In consultation with utilities and transportation agencies, develop vegetation management practices that meet user needs with minimal/negligible impact to pollinator habitat (see Monarch Joint Venture Mowing Guidelines for an example). These practices might include practices such as selective herbicide treatments and targeted mowing regimes as part of an overall integrated vegetation management plan (IVM).
5. Provide transportation agencies and utilities with guidance on how to monitor pollinator habitat, including creating baselines for habitat quantity and quality.

6. Develop conservation strategies to prioritize habitat connectivity / creation / preservation.

Objective B: Develop monarch conservation measures for contract language for construction and maintenance activities.

Actions/Tasks:

1. Develop model contract language, and guidelines for the use of this language, for conservation measures that benefit monarch butterflies.

2. Revise existing scoping documents and long-term plans to include BMPs for monarch butterflies and other pollinators.

3. Develop and adopt regionally appropriate seed mix specifications.

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

Actions/Tasks:

1. Provide and share annual education opportunities to transportation agencies and utilities.

2. Provide and recommend transportation agencies and utilities to with information and options for landowners with utility easements regarding potential to restore the ROW with compatible pollinator-friendly habitat.

Objective D: Foster/Develop partnerships between industry and conservation groups on monarch conservation efforts along rights-of-way.

Actions/Tasks:

1. Continue to foster information-sharing and supportive partnerships through the Rights-of-Way as Habitat Working Group (Energy Resources Center, University of Illinois at Chicago) and other regional and national efforts.
2. Support research that will help make the business case for investing in monarch and pollinator habitat establishment and management in ROW environments.
3. Engage vegetation management contractors in monarch and pollinator habitat discussions.
4. Build networks and partnerships that will aid in tracking monarch habitat accomplishments and progress towards habitat goals on rights-of-way, including milkweed species baseline data and the response to management activities. 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.
5. Create awareness for ongoing collaborations between utility and transportation groups (e.g. Candidate Conservation Agreement with Assurances (CCAA)).

4. Urban/Municipal Lands Sector

Goal I: To create, conserve, enhance and restore habitat on 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: 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, home owners associations (HOAs), universities and 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 well-being 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 (e.g. develop "weed" policies that are more monarch butterfly habitat friendly).
4. Develop a simple, effective reporting tool so partners can report their actions to the Monarch Conservation Plan Coordinator.
5. Foster existing citizen science programs to allow citizen partners to self-report/monitor efforts.

Strategy 2: 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 treating blighted/vacant properties (e.g. Is it cheaper to establish habitat than it is to mow regularly?)
4. Help partners recruit and engage volunteers for establishment of new habitat projects.
5. Develop a reporting tool so partners can easily and effectively report establishment of new habitats.

Objective B: Increase awareness of the value of monarch habitat in urban environments as well as the availability of financial and technical assistance programs.

Strategy 1: Create a clearinghouse of all the various urban outreach, education and technical assistance plans and programs so that partners can have readily available for their reference an inventory of all resources available to them.

Actions/Tasks:

1. Inventory of existing monarch and pollinator programs.
2. Contact state/federal/local agencies and NGOs on programs.
3. Create a "one stop shop" to serve as a clearinghouse (e.g. ISDA's Story map web page).

Strategy 2: Develop a consistent message that speaks to how monarch butterfly habitat contributes to clean water, increased quality of life, and healthier ecosystems, especially in urban settings.

Actions/Tasks:

1. Use messaging to promote the use of residential native plantings and their contribution to clean water and healthy ecosystems.
2. Use messaging to promote the use of native plantings on school grounds and other public buildings/spaces for reduced maintenance costs, environmental benefits and public education.

III. COLLABORATION AND PARTNERSHIPS

Collaboration and Partnerships

Monarch and pollinator conservation requires a collaborative approach. Success is dependent on an active group of partners supported by the tools, resources and linkages necessary to carry out this multi-faceted campaign. Existing and potential partners include but are not limited to federal and state agencies, city/county governments, non-governmental organizations, community-based groups, corporations, businesses, educational institutions, and private citizens. A fundamental part of the 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 the plan's success.

Fulfilling the mission will also require a concerted effort to identify and implement effective methods and approaches that are science-based, effective, and practical. It is the intention that all interested parties act in partnership for 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 all stakeholders working together will practical options and solutions critical to the overall success be realized.

Goal I: To promote and cultivate collaboration and partnership across agencies, organizations, and stakeholder groups in support of the 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:

1. Identify and target major partner events for presentation and/or delivery of the Indiana Monarch Conservation Plan.
2. 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 1: Engage collaborative partners in regular and timely discussions about individual and collective priorities and additional opportunities for collaboration. Formalize commitments as necessary.

Actions/Tasks:

1. Convene an annual meeting of leaders of collaborative organizations for the purpose of setting priorities, accomplishment reporting, and commitment of resources.
2. Indiana Monarch Conservation Plan 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 1: Find or create opportunities for discussions with school educators, park naturalists, and environmental educators to explore, develop and promote basic monarch butterfly

conservation education toolkits.

Actions/Tasks:

1. Create Monarch Butterfly Education Toolkit.
2. Identify education partners.
3. Create an environmental education work group.
4. Take the lead in convening educator-specific monarch butterfly and pollinator workshops for the purpose of information sharing and strategy development.
5. Initiate collaboration in the development of a 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 to easily access Monarch Butterfly Education Toolkits, find volunteer opportunities, download educational materials and locate conservation program information.

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

Strategy 1: Develop a website or listserv that centralizes environmental Monarch Butterfly Education Toolkit and information.

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

Actions/Tasks:

1. Identify local/regional organizations that might form independent volunteer teams/crews (e.g., business clubs, church groups, school districts and universities/colleges) or individuals that would be receptive to volunteering.
2.
3. Create and/or provide information and tools necessary for self-guided monarch conservation action.
4. Coordinate with target groups to develop an understanding of their resources and needs in order to assist them with delivering monarch conservation.

IV. OUTREACH AND EDUCATION

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 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 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. Monarch outreach and education efforts will 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 for insects, pollinators, wildlife species, and the overall quality of life for Indiana's citizens.

Goal I: To increase public knowledge of monarch conservation in Indiana.

Objective A: Create a communication strategy for consistent messaging.

Strategy 1: Develop tools for use by media representatives to enhance promotion of monarch conservation.

Actions/Tasks:

1. Create a media package, including a media tips document and
2. templates for press releases for use at key events.
3. Identify media outlets that are most receptive to promoting monarch conservation.

Strategy 2: Increase visibility and recognition of the Indiana Monarch Conservation Plan.

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 fact sheet for monarch conservation and the plan.
2. Develop a communication tip tool for improving and providing consistency in communication.

Objective B: Create a central, online clearinghouse for the dissemination of monarch conservation information.

Strategy 1: Create a website to serve as the information portal and to increase awareness of the Plan.

Actions/Tasks:

1. Determine who will host site.
2. Design and launch website, collating existing monarch content and creating new content where needed.
3. Incorporate Plan website into partner organizations' online presence.
4. Keep website active and current with regular posts and updates.

Strategy 2: Establish a social media presence for better promotion of monarch conservation.

Actions/Tasks:

1. Identify individual/organization to serve as a social media coordinator.
2. Create accounts on pertinent platforms.
3. Connect with other conservation social media.
4. Increase visibility of 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 from partner and other organizations.
2. Classify programs by content, geography, target audience, etc.
3. Provide most current science and best management practices (BMPs) for programming.

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

Actions/Tasks:

1. Use program catalog to identify gaps in topics, geography, and target audiences.
2. Conduct a needs assessment of target audiences and evaluate current resources.

Strategy 3: Implement the enhancement of programming based on the needs assessed and the gaps identified.

Actions/Tasks:

1. Update/create new outreach and education materials to address existing gaps.
2. Identify outreach organizations within geographical gaps to facilitate programs.

3. Conduct annual survey of agencies and partners with existing programs regarding use of existing website and social media platforms to determine how platforms are being used.

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 sectors and support work groups (identified at 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 I: Create and fund an effective leadership structure that is reflective of this public/private collaboration to support the Plan.

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

Strategy 1: Develop and implement a Memorandum of Agreement (MOA) 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 rules and procedures for determining membership and decision-making.
3. Determine appropriate evaluation metrics for the 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.

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 to support operational and programmatic needs.

Strategy 1: Develop a long-term 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 funding to keep a Coordinator and to support program needs.

CONCLUSION

Given the geographic and ecological significance of Indiana to the migration path and breeding grounds of the iconic monarch, the implementation of the Plan is of critical importance—or simply put, Indiana makes monarchs. This Plan is intended to promote the conservation, enhancement and restoration of habitats for monarchs and other significant pollinators in Indiana. As such, it is important to note that the Indiana Monarch Conservation Plan is a living document and will be updated, adapted and modified as conditions, best available science, and the status of the monarch change.

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APPENDIX A. INDIANA MONARCH CONSERVATION PLAN STEERING COMMITTEE 2017-2019

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Laura Hilden, IN DOT | Environmental Services	lhilden@indot.in.gov

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
Heather	Maurer	Keep Indianapolis Beautiful
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
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 Utility Rights of Way Sector		
Brian	Kortum	NiSource
Stephen	Beard	Duke Energy
Matt	Kraushar	Indiana Department of Transportation
Laura	Hilden	Indiana Department of Transportation

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

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.