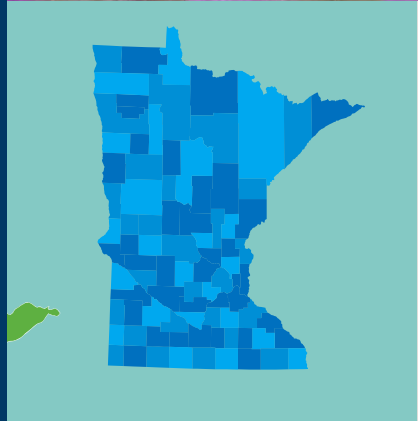
December 2024

# 2024 Minnesota State Agency Pollinator Annual Report

MINNESOTA
ENVIRONMENTAL QUALITY BOARD



# 2024 Interagency Pollinator Protection Team

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Cover photo: A fairy bee (*Perdita* sp.) perched on a flower. Photo by Heather Holm

*Upon request, this material will be made available in an alternative format such as large print, Braille or audio recording.*

# Contents

# Charge

In Minnesota, Executive Order (EO) 19-28 directs the Environmental Quality Board (EQB) to lead and convene an interagency pollinator protection team (the interagency team). This interagency team is comprised of designees from the Departments of Administration (ADMIN), Agriculture (MDA), Corrections (DOC), Education (MDE), Health (MDH), Natural Resources (DNR), Transportation (MnDOT), the Board of Water and Soil Resources (BWSR), the Minnesota Pollution Control Agency (MPCA), and the Minnesota Zoological Garden (MNZOO).

The interagency team is tasked to provide operational support, ensure interagency coordination, develop cross-agency policies and programs, and report on progress toward statewide pollinator protection goals to the EQB with an annual report.

# Introduction

Minnesota is home to a wide diversity of insect pollinators, including bees, butterflies, moths, flies, and beetles. These animals are key components of our natural ecosystems, facilitating the reproduction of many flowering plants, and help form the foundation of food chains, feeding wildlife such as birds and fish. Additionally, pollinators are needed to grow many fruits, herbs, and vegetables, including several Minnesota-grown food crops.

Unfortunately, pollinators continue to face multiple threats, such as the loss and fragmentation of their habitats, exposure to pesticides, diseases and parasites, and climate change. These factors can interact with each other and amplify negative effects on pollinators. For instance, climate change might lead to extensive drought, which lowers the quality and availability of pollen and nectar, resulting in weakened immunity of pollinators and increased susceptibility to diseases, parasites, and pesticides.

The interagency team continues to work toward the three pollinator protection goals, outlined in EO 19-28: 1) Lands throughout Minnesota support healthy, diverse, and abundant pollinator populations; 2) Minnesotans use pesticides judiciously and only when necessary, to reduce harm to pollinators while retaining economic strength; and 3) Minnesotans understand, value, and actively support pollinators. State agencies work individually and collaboratively to support policy and programs that will help us achieve these goals.

Pollinator protection is complex, because each pollinator species has its own specific life cycle and needs. In addition, there are the social aspects of conservation – the different values and needs of people and communities. For example, encouraging the conversion of turfgrass lawn to a landscape with pollinator-friendly plants may be welcomed by some communities, but rejected by others who have a different concept of what an aesthetically pleasing green space is supposed to look like. There are no simple solutions to these types of disagreements, but the interagency team is committed to collaborating across sectors, thinking creatively, and collectively moving toward our desired outcome of restoring healthy, diverse pollinator populations that sustain and enhance Minnesota's environment, economy, and way of life.

# New findings from pollinator-related research

*By Dr. Erik Runquist*

Conservation is informed by evidence-based science. Several recent studies provide insights into the status of key Minnesota pollinators, stressors affecting them, and a potential solution to help mitigate harm. In this section, we provide a summary of recent pollinator research findings.

## Documenting Minnesota Bees

The first comprehensive list of Minnesota's bees was published in 2023.[1] The Minnesota Biological Survey and the University of Minnesota (UMN) collaborated to combine data from museum specimens and surveys to document more than 500 (and counting) species of bees. Despite a thorough initial survey of the state, it is exciting to continue to make new discoveries. In 2024, the Minnesota Biological Survey documented three species of bee in Minnesota for the first time: *Andrena parnassiae* was observed in northwest Minnesota on grass of parnassus, *Colletes ciliatus* was observed on dodder in southwest Minnesota, and *Perdita laticincta*, a specialist on sunflowers (*Helianthus*), was found in northwest Minnesota. These are specialist bees that would only be observed by looking in the exact right place at the right time, when their host plants are blooming. It is not just professional scientists exciting about spotting and documenting bees: participatory science projects open to the public have helped document the presence, abundance, seasonality, and nesting habits of a wide range of bees across Minnesota.[2]

## Rusty patched bumble bee

The US Endangered rusty patched bumble bee (Minnesota's State Bee!) has disappeared from most of its historic range, but it is still hanging on (at lower levels) in some unexpected places, like the Twin Cities metro area.[3] We now have the first study of genetic diversity and divergence within and across all known rusty patched bumble bee populations.[4] The recent declines are reflected in the genetic data, showing low genetic diversity, high inbreeding, and low colony abundance in most populations, including those in the Twin Cities. Populations with lower genetic diversity are less able to overcome stressors, especially if they are isolated. Increasing the extent of, and connections between, quality habitat would be beneficial.

## Pesticides in Prairies

The off-target movement of pesticides into pollinator habitats has been suggested as one of the drivers of the disappearance of many Minnesota prairie pollinators. Two recent studies document the presence of agricultural pesticides in native prairie remnants.[5,6] Between 2014 and 2020, eight insecticides, three herbicides, and ten fungicides were detected in grass and soil across five prairie preserves designated as Critical Habitat for endangered Poweshiek skipperling and Dakota skipper butterflies.[5] Broad-spectrum insecticides (especially

chlorpyrifos, bifenthrin, and lambda-cyhalothrin) frequently applied against the invasive and economically damaging soybean aphid were present in nearly all late summer samples. The interiors of prairies were just as likely to have detectable pesticides compared to prairie-agriculture edges. Pesticide detections occurred far within prairies, sometimes surpassing levels that could kill half of European honey bees exposed[6], a species considered more resilient to pesticide exposure than many native solitary bees. The biological consequences of exposures to pesticides at the concentrations found in these studies need further experimental testing.

## Pollinators and Solar Farms

Large-scale solar energy projects are increasingly being developed to produce renewable energy to mitigate climate change. Land used for these projects may also provide opportunities to create habitat for pollinators and other wildlife. Researchers tested eight native seed mixes created at three Minnesota solar farms.[7] The seed mixes performed similarly well, with the coverage of native wildflowers and grasses increasing and invasive weeds decreasing through time, including under the panel arrays. In a separate study, researchers found that native plantings within solar farms can result in increases in the diversity and abundance of insects, especially native bees. Solar-pollinator habitats may also provide pollinator benefits to adjacent agricultural operations.[8]

*References cited in this section are included in Appendix I*

**Survey efforts to document rusty patched bumble bee nests by DNR staff**

*Photo by EQB*

# 2024 State agency highlights

## Environmental Quality Board

- **Interagency work.** Convened the interagency team monthly to plan the implementation of the pollinator action framework, the development of the pollinator annual report, and update the progress scorecards.
- **Outreach events.** Organized the celebration of Pollinator Day at the State Fair in collaboration with the DNR and the MPCA. Participated in the Minneapolis Monarch Festival. Overall, reached over 1,500 people.

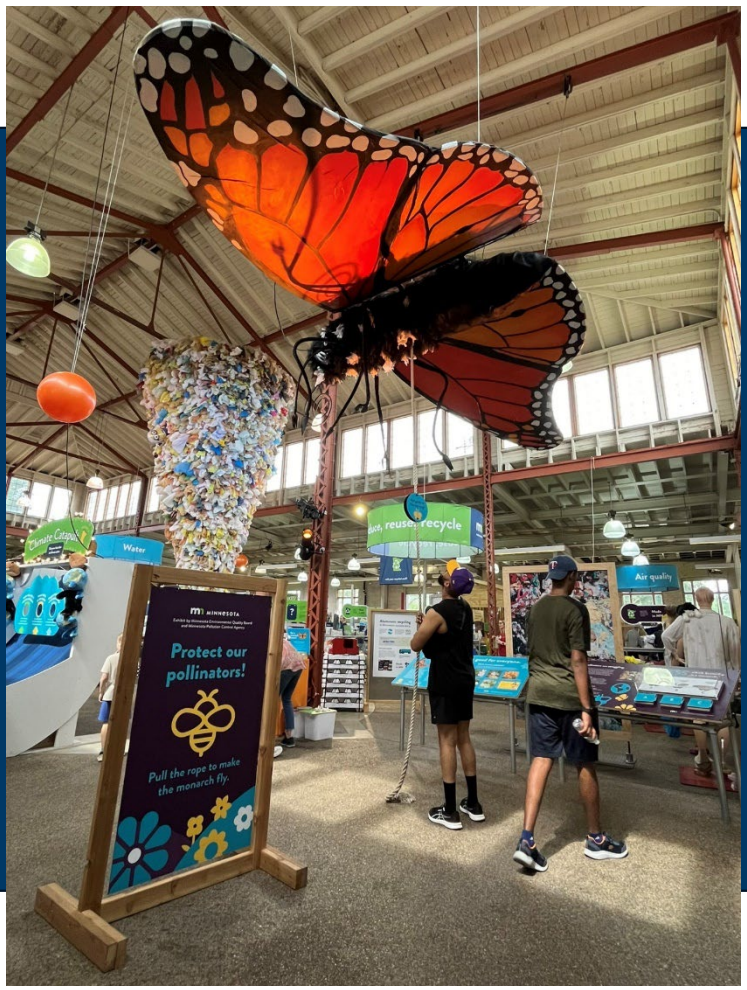
## Board of Water and Soil Resources

- **Lawns to Legumes (L2L) Program.** Since the launch of the program in 2019, there have been 8,200 installed, 10,000 beneficial pollinator trees and shrubs planted, 2,000 new gardeners with completed projects, and more than 160 metric tons of carbon sequestered per year. In 2024, 10 grants were also awarded to local organizations to build Pollinator Pathways – corridors of native plants connecting isolated pollinator habitat areas.
- **Habitat Enhancement Landscape Program.** This program, focused on restoring and enhancing diverse native habitat across the state, continues to gain momentum in supporting pollinators and other wildlife species. In 2024, 15 new grants – including 107 projects over 2,000 acres were awarded to enhance and restore conservation lands and natural areas. There was high demand for project funding with 38 applications requesting enhancement of over 4,000 acres.
- **Habitat Friendly Utilities and Solar Programs.** These programs build collaboration with utility companies and conservation partners to increase landscape resiliency (along with co-benefits such as plant diversity, pollinator habitat, carbon sequestration, soil health, and water management) in solar projects and along utility corridors. Nearly 70 projects meet the Minnesota Habitat Friendly Solar standard, covering over 7,000 acres.
- **Conservation Easements.** Includes over 6,400 easements covering more than 260,000 acres that provide valuable pollinator habitat. Programs include Reinvest in Minnesota and Wetland Bank that currently focus on permanent wetland restoration, adjacent native grassland wildlife habitat complexes and permanent riparian buffers.

## Department of Natural Resources

- **Native seed packets.** Distributed 20,000 native seed packets at state parks and outreach events.
- **Outreach events.** Interacted with thousands of attendees at the State Fair, Minneapolis Monarch Festival, and other pollinator themed events.

- **Project to support regal fritillary butterflies.** Hand harvested seed from early season prairie plants and started a project to plant prairie violets to support regal fritillary butterflies.
- **Native plant nursery.** Increased production of native plants at Minneopa State Park, with over 4,000 plugs planted this year and roughly $8,000 worth of seed harvested to supplement the plantings.
- **Minnesota Biological Survey (MBS).**
    - *Three new species records for Minnesota: Andrena parnassiae*, *Colletes ciliatus*, and *Perdita laticincta*.
    - Staff monitored a rusty patched bumble bee nest that was discovered by a private landowner in southeastern Minnesota. MBS continued rusty patched bumble bee nest searching on public lands, though to date has only found nests of other bumble bee species.
    - Staff conducted one of the first efforts to estimate the population size of a solitary bee (*Colletes andrewsi*) using mark-release-recapture by marking individual bees using paint pens. This was a highly successful project with a high recapture rate and suggests that populations of this specialist bee are generally very small, fewer than 100 individuals.




**EQB set up a booth next to the pollinator-themed exhibition in the Eco Experience building at the 2024 Minnesota State Fair.**

**The monarch was mounted from the ceiling and hung above state fair visitors where they could pull the large-scale wings flap for all to see.**

*Photo by EQB*

## Department of Agriculture

- **Minnesota Water Quality Certification Program.** The program added 118,285 acres of farmland certified by the MDA between Sep. 2023 – Aug. 2024. Certified acreage implements management practices that increase on-site water infiltration and reduce runoff and erosion issues. Practices like this help keep pesticides on the application site and reduce impacts to adjacent habitat and surface water.
- **Funding integrated pest management (IPM) research.** Distributed $378,059 to fund IPM research projects across the state.
- **Education and outreach.** Participated in 64 outreach and recertification events, highlighting IPM and pollinator concerns; distributed over 8,900 pesticide best management practice documents between Sep. 2023 – Aug. 2024.
- **Outreach on treated seeds.** Introduced a new outreach document on treated seeds focused on addressing pollinator exposure concerns tailored for seed retailers, including big box stores.
- **Comments on federal pesticide regulatory updates.** Submitted comments to the Environmental Protection Agency on three topics: endangered species insecticide strategy, herbicide strategy, and treated seed regulation. The comments emphasized the need for clear proposed regulations, enforceability, and protections for pollinators and vulnerable species from pesticides and treated seeds.

## Department of Transportation

- **Habitat creation.** Updated seeding manual and agency seeding standards with an emphasis on native seed use.
- **Habitat management.** Continued using integrated vegetation management, including biological control (insects) and prescribed fire. Expanded number of trained prescribed fire staff statewide.
- **Rusty patched bumble bee monitoring.** Piloted new rusty-patched bumble bee monitoring protocols developed by U.S. Geological Survey and U.S. Fish and Wildlife Service.
- **Nationwide bumble bee conservation benefits agreement (CBA).** Participated in the development of the nationwide bumble bee CBA.
- **Monarch butterfly Candidate Conservation Agreement with Assurances (CCAA).** Continued participation in the nationwide monarch butterfly CCAA.

## Minnesota Zoological Garden

- **Pollinator Conservation Initiative.** Produced 1000+ individuals of the Poweshiek skipperling ("The Most Minnesotan Butterfly"), and then released hundreds of them back into the only known remaining US populations in Michigan. Nearly extinct in the wild in 2022, wild populations of this globally Critically Endangered butterfly now appear to be rising thanks to these efforts. The MNZOO is a central member of the Poweshiek Skipperling International Partnership (www.savingskippers.org).
- **Dakota skipper rearing program.** Continued the world's only managed propagation and reintroduction effort for Dakota skippers. Several hundred more Zoo-reared skippers were released at Glacial Lakes State Park (thanks to funding from the Legislative-Citizen Commission on Minnesota Resources) in 2024 to continue reintroduction efforts.

- **Bumble bee surveys.** MNZOO scientists continue to monitor rusty-patched bumble bees and populations of other bumble bees on Zoo grounds and collaborate with other researchers studying rusty-patched genetics.
- **Pollinator habitat research.** MNZOO scientists are conducting habitat quality inventories and continuing prairie pesticides occurrence research with the long-term goal of identifying prairies that may be suitable candidates for future Minnesota reintroductions of Poweshiek skipperling and Dakota skipper.
- **Outreach events.** MNZOO staff hosted tables at the Minneapolis Monarch Festival and a Science Spotlight at the Bell Museum, talked about pollinators to hundreds of kids at summer MNZOO camps, and has distributed thousands of native wildflower seed packets to zoo guests.

**Neighbors gathered to participate in a Lawns to Legumes program community planting event.**

*Photo by Sarah Linnes-Robinson*

# Prioritizing the implementation of the Pollinator Action Framework

In 2022, the interagency team began to develop a Pollinator Action Framework ("Framework") to guide the strategic alignment of resources for action around our three pollinator protection goals and the desired outcome. The Framework includes actions state agencies can ***lead*** by taking administrative action, actions the state legislature can ***enact*** by writing laws and allocating funds, and actions the state can ***encourage*** individuals, communities, and organizations to participate in. The Framework was finalized in the 2023 Minnesota State Agency Pollinator Report. In 2024, the interagency team began the process of identifying ongoing and potential new projects that fit under the action items, with the goal of providing a guide for the implementation of the framework.

Participants in this exercise include members of the interagency team serving as representatives of their agency. For each action in the Framework that has an agency "lead" or "encourage" role, participants identified ongoing projects/programs, or ideas for potential new projects/programs, that would fit under that action and advance the framework goal. They identified their agency as taking a lead or supporting role in the project and gave each project an impact score and an effort score.

**Impact** was defined as the positive effect a project would be expected to have in advancing the Framework action toward its goal. A higher score means a greater likelihood positive effect. Impact was scored based on the following components:

1. Magnitude: Score 1 if the project has a statewide reach, 0 if it does not have a statewide reach.
2. Rare/specialist: 1= specific focus on rare/specialist species or habitats, 0= does not have specific focus.
3. Efficacy: 1= has proven results (i.e. successful pilot program), 0= no proven results.
4. Scalability: 1= can be expanded beyond a single project, 0= difficult or impossible to scale up.

**Effort** was defined as the amount of time, work, resources, or complexity required to implement the project under consideration. A higher score means more effort would be needed to undertake the work. Effort was scored based on the following components:

1. Readiness: Score 1 if there is no existing program, 0 if there is already an existing program.
2. Capacity (resources): 1= current staff/resource level not adequate, 0= current staff/resource level adequate.
3. Legislative action: 1= requires, 0= does not require.
4. Lead/encourage: 1= state agency is the lead, 0= external partner is the lead.

The result of the scoring effort was a list of projects with impact and effort values between 0 and 4. Projects could then be plotted on a graph with axes for effort and impact (see example in Figure 1), allowing for comparison and eventual prioritization. The interagency team will discuss the full results of this analysis with agency leadership to continue prioritizing and implementing this work.

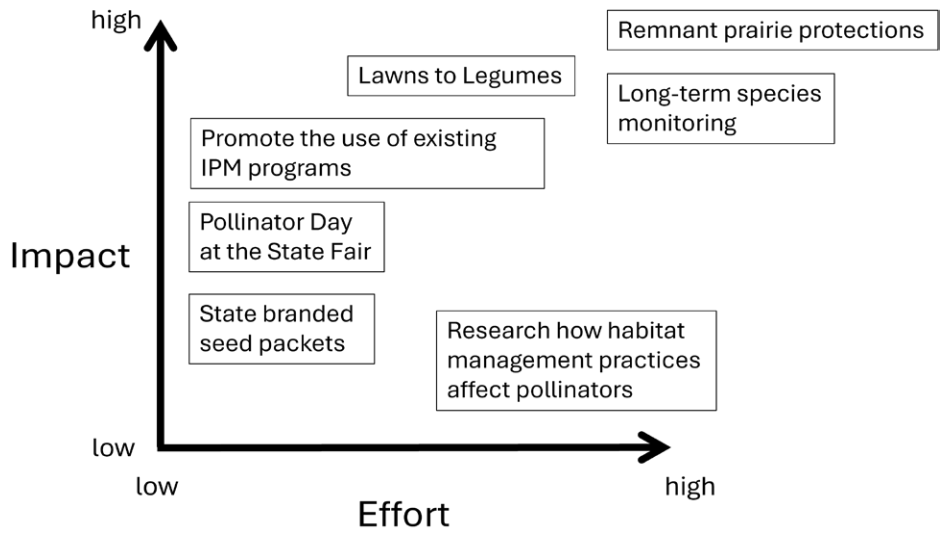



**Figure 1.** Example projects plotted based on effort and impact, from the perspective of staff of the lead state agencies involved.

# Scorecards

In 2019, the interagency team developed scorecards to help Minnesotans understand progress toward the pollinator protection goals and the desired outcome. For each goal, the scorecards included indicators for progress, and identified measures, which allowed us to determine (where data was available) the status and trends for each indicator. These scorecards were updated on a yearly basis.

In 2021, the interagency team decided to update the scorecards every three years, allowing more time for change to be reflected in the status and trends for each indicator. After the development of the Framework, the interagency team worked to connect the scorecards to the actions in the Framework, this way both documents serve as accountability tools, using the Framework to guide our work and the scorecards to reflect on progress toward our pollinator protection goals.

The 2024 scorecards are a result of a thorough evaluation of the previous measures used in our past scorecards, actions from the framework that could be used as measures to inform the status and trends, plus extensive research into new reliable sources of information that would allow us to paint a more accurate picture of the status and the trends of our progress toward the pollinator protection goals in Minnesota.

The scorecards include the following components:

- **Indicator:** key component of a pollinator protection goal/the desired outcome used to communicate progress made.
- **Measure:** data used to quantitatively evaluate progress made toward the indicator.
- **Status:** describes the state or condition of an indicator at a determined time.
- **Trend:** describes the general direction of the progress made toward a particular indicator.

Below are the scorecard's keys to status and trend.

## Key for Status

| | |
|---|---|
| **Good** | Meets goals and expectations |
| **Fair** | Nearly meets goals and expectations |
| **Poor** | Behind goals and expectations |
| **?** | Not enough data or data too variable |

## Key for Trends

| | |
|---|---|
|  | Getting better |
|  | About the same |
|  | Getting worse |
| **?** | Not enough data or data too variable |

*For more details about the sources of information and data used to update the scorecards, please visit: [www.eqb.state.mn.us/pollinators/pollinator-reports](www.eqb.state.mn.us/pollinators/pollinator-reports)*

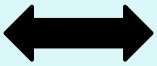
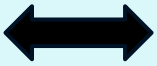
In the following sections we include the updated scorecards for each of the state's pollinator protection goals and the desired outcome.

## GOAL 1

# Lands in Minnesota support healthy, diverse, and abundant pollinator populations

**KEY OUTCOME**

More food sources, nesting, and overwintering sites for pollinators

| INDICATOR | MEASUREMENT (ACRES) | STATUS | TREND |
|---|---|---|---|
| Habitat restoration on public lands | Wildlife Management Area restoration | FAIR |  |
| Habitat restoration on private lands | Lawns to Legumes Program, Minnesota Conservation Reserve Enhancement Program, New Easement Enhancement Program | FAIR |  |
| Habitat enhancement (improved quality of already existing habitat) | Habitat Enhancement Landscape Program | FAIR |  |
| Land protection | Acres of public land | FAIR |  |


**Summary**

Minnesota remains committed to work for lands that provide food, nesting and overwintering habitat for pollinators. The data shows a stable trend for restoration work in public lands, as well as habitat enhancement of existing pollinator habitat and habitat protection. For instance, during the last five years, DNR's land portfolio has changed by less than one tenth of a percent; on average, the DNR acquires 9,000 acres per year and sells 508 acres per year statewide.

The increased interest and participation in programs such as Lawns to Legumes, are creating a movement to support pollinators by installing pollinator-friendly gardens and transitioning away from landscapes that offer little to no benefit to wildlife. Continued investments in this program are key to not only increasing the amount of pollinator habitat, but also the connectivity between these areas.

# GOAL 2
# Minnesotans use pesticides judiciously and only when necessary

**KEY OUTCOME**

Reduced impacts to pollinators from pesticides through integrated pest management (IPM)

| INDICATOR | MEASURE | STATUS | TREND |
|---|---|---|---|
| IPM development | Grant data from: Legislative-Citizen Commission on Minnesota Resources; Minnesota Invasive Terrestrial Plants and Pests Center; Agricultural Growth, Research, and Innovation Program; Specialty Crop Block Grant, Crop Research Grant, and the National Institute of Food and Agriculture | FAIR |  |
| IPM promotion | MDA pesticide and IPM distribution, UMN Extension events where pollinator/IPM information presented | FAIR |  |
| IPM adoption | Metropolitan Mosquito Control District data, Minnesota Water Quality Certification Program (number of IPM, soil health, and wildlife endorsements) | ? |  |


**Summary**

Minnesota remains committed to the judicious use of pesticides which is a tenant of IPM. IPM is a science-based approach to pest management that seeks to prevent the build-up of pest populations beyond an economically harmful level by applying a variety of tools from pest monitoring to a combination of management techniques that prioritizes the use of options with the least possible hazard to people, property, and the environment.

The data shows a stable trend for IPM development. Minnesota continues to invest in the development of IPM for crop systems and their pests. Since 2021, the number of grants awarded for IPM development increased in comparison to the previous five years, and has remained relatively steady through 2023, the last year reported.

Minnesota IPM promotion has continued an upward trend since 2021. More pesticide best practice guidance is reaching Minnesotans year after year, pesticide recertification trainings have incorporated more pollinator specific information into mandatory trainings, while the UMN Extension Service and MDA staff have increased the amount of outreach focused on highlighting pesticide use and pollinator exposure concerns.

Data on the adoption of IPM in Minnesota is variable and difficult to quantify uniformly for all industries, user groups, and regions. However, the reliable data available reflect an upward tread; for example, the Minnesota Water Quality Certification Program has endorsed over 190 farms covering over 90,000 acres for IPM, soil health, and wildlife practices, which means those farms excel at incorporating land management practices that provide habitat and reduce risk to pollinators and wildlife from pesticides.

# GOAL 3
## Minnesotans understand, value, and actively support pollinators

**KEY OUTCOME**
More action through community commitments

| INDICATOR | MEASURE | STATUS | TREND |
|---|---|---|---|
| Community commitments | Lawns to Legumes program grantees, number of Pollinator Pledges by The Xerces Society for Invertebrate Conservation | FAIR |  |
| Informed communities | Organized outreach events, Outreach events participation, Lawns to Legumes program website visits | FAIR |  |


**Summary**

Minnesotans continue to show interest in helping pollinators. From attending pollinator-related events like the Minneapolis Monarch Festival, which celebrates the migration of the monarch butterfly each year, to applying to the Lawns to Legumes program to transform their yard to pollinator-friendly habitat, we see a steady increase in public participation to protect pollinators.

State agencies have also increased their participation in events where there are opportunities to share pollinator protection information and materials like native seed packets, buttons, pins, and pamphlets. For the past two years we have celebrated Pollinator Day at the State Fair as an interagency effort and with the collaboration of multiple organizations bringing their expertise and enthusiasm to the public. We have reached thousands of people with information about how to help pollinators from wherever they are by participating in community science programs, or planting pollinator-friendly plants, or learning about the judicious use of pesticides in their land.

There is still room to grow, to build more strategic relationships, increase our engagement with communities who are not part of community commitments, to improve our communication to reach more audiences and make materials more accessible.

# DESIRED OUTCOME

## Healthy, diverse pollinator populations that sustain and enhance Minnesota's environment, economy, and way of life

| GROUP | INDICATOR | MEASURE | STATUS | TREND |
|---|---|---|---|---|
| **Imperiled pollinators** | Rusty patched bumble bee | Survey data | **POOR** | ? |
| | Monarch butterfly | Numbers from Mexico's overwintering sites | **POOR** | ↘ |
| | Dakota skipper | Survey data | **POOR** | ↔ |
| **Common pollinators** | Brown belted bumble bee | Bumble bee watch (community science data) | **GOOD** | ? |
| | Bumble bee communities | USFWS | **?** | ? |
| **Managed pollinators** | European honey bee honey production | Honey yields (NASS) | **FAIR** | ↔ |

### Summary

Recent survey efforts conducted by the Minnesota Biological Survey (MBS) and the UMN have yielded important data about bee diversity in Minnesota (For details, visit MBS website.) Now we know our state is home to over 500 species of bees! However, the knowledge gap about most wild pollinators and their needs is still very large.

Unfortunately, this scorecard shows several species remaining in poor status, and the eastern population of the monarch butterfly continues to trend downward over time. During the 2023-2024 season, it covered only 2.2 acres of land in overwintering sites in Mexico's fir forests, 59% lower than the acreage covered the previous winter.

Reintroduction efforts of the Dakota skipper have not been as successful as hoped in southwestern Minnesota, and it is too soon to fully assess the new reintroduction effort at Glacial Lakes State Park. Nevertheless, we are far from having the once thriving populations of this species in Minnesota's prairies.

Data from the United States Department of Agriculture for honey yield per colony is used as a proxy for honey bee health. Honey yield has slowly but steadily declined over the last 30 years. In 2022, the most recent year for which data are available, the yield was 51 lb., or about 15% lower than the most recent 10-year average. Despite these declines in Minnesota honey yield, honey bee colony numbers remain near all-time highs globally.

## Call to action

Pollinators need our help. This report provides important information for decision makers and members of the public to take action to protect Minnesota's pollinators. The scorecards illustrate the need to invest more in protections and data generation to better understand the impact of our actions and the status of pollinator populations.


We can all play a role in helping pollinators, from participating in community science programs, spreading the message with our peers, and planting more pollinator-friendly plants, to participating in programs and supporting legislation that benefit pollinators and wildlife.

Let's do it!

## Acknowledgements

The interagency pollinator protection team would like to thank the following organizations for collaborating with us in the development of this report, providing feedback on the prioritization process of the Pollinator Action Framework or contributing data and feedback to update the scorecards.

- Minnesota Invasive Terrestrial Plants and Pests Center
- Metropolitan Mosquito Control District
- University of Minnesota Bee Lab
- University of Minnesota Department of Entomology
- University of Minnesota Extension Service
- United States Fish and Wildlife Service
- United States Department of Agriculture
- The Xerces Society for Invertebrate Conservation

# Appendix I. References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