



# Best Management Practices for **Indiana** Pollinator Habitat

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*There are many different kinds of pollinator species (butterflies, bees, moths, and more), including this leaf cutter bee (Megachile spp.) on a sunflower.*

## Why Should We Care About Pollinators?

Pollinators provide **pollination services** for wild plants and many of our crop species, too – one in three bites of food is due to cross-pollination by pollinators. Pollination is important for maintaining genetic diversity in plants and ensuring adequate fruit and seed production for crops, wildflowers, shrubs, and trees. Our forests, prairies, meadows, and gardens would look much different without the help of our pollinators.

Pollinators are also important prey resources for other organisms such as migrating birds, beeswolves, praying mantises, and many spiders, which in turn become food for other animals. Furthermore, as a very species-rich group, pollinators are an important component of our state's biodiversity. Indiana's pollinators include 430 species of bees, 144 species of butterflies, more than 2,000 species of moths, and many species of flower-visiting flies, wasps, ants, and beetles.



Unfortunately, Indiana's pollinator communities face many threats. In the last 15 years, researchers have documented reduced populations of honey bees, bumble bees, and several butterfly and moth species.

This publication provides information about how to establish and conserve effective pollinator habitats in Indiana — from small-scale backyard improvements to large-scale plantings.



*Figure 1. A hummingbird clearwing (Hemaris thysbe) on common milkweed.*

## Establishing Pollinator Habitat

It is clear that pollinators are essential components of ecosystems. Whether in forest, prairie, black-oak savanna, a crop field, or your backyard, pollinators create many key linkages in food webs, and help keep ecosystems functioning properly. The intricacies of pollinator-environment interactions mean that we must take a broad approach to conserve pollinators.

### Meeting the Needs of Pollinators

Regardless of the size of the habitat, you need three ingredients to provide a haven for pollinators:

1. Food
2. Habitat for shelter and nesting
3. Water



### Food

Plants are the primary food source for most pollinators. They feed on nectar, pollen, and leaves. Different types of pollinators and even the adults and larvae of the same pollinator species may require different plant foods.

To provide nectar and pollen, you need to provide flowers. It is important to provide a diversity of flowering plants, so that there are flowers in bloom throughout the whole season. To do that, plant at least three flowering plant species from each of three seasonal categories: early-, mid-, and late-season bloomers (for a total minimum of nine species).

By choosing at least three from each category, you provide options for different pollinators in each season. It's also helpful to plant several of the same flower species in a mass to allow pollinators to forage efficiently.

To help plan your pollinator planting, see *Protecting Pollinators: Recommended Indiana-native Plants for Attracting Pollinators* (Purdue Extension POL-6-W), available from the Education Store, [www.edustore.purdue.edu](http://www.edustore.purdue.edu). The more plant species you can include, the better. Native plants are preferable because of their close partnerships with native pollinators. Plants for pollinators vary in their visual cues and the pollinators recognize different colors, so providing a variety of plants is a good way to provide for a variety of pollinators.

The Indiana Native Plant and Wildflower Society (INPAWS) also provides good information about native plants for Indiana landscaping at [www.inpaws.org/landscaping/landscape-worthy-indiana-natives](http://www.inpaws.org/landscaping/landscape-worthy-indiana-natives).

Before you start planning what to plant, be sure to evaluate what is currently on your land. While you may be starting with bare dirt or turf, you may already have many good pollinator plants if you have remnant forest, prairie, or wetland.

*Recommended Indiana-native Plants for Attracting Pollinators* (POL-6-W) includes some native plants important to pollinators that are commonly found in even small, degraded natural area remnants — like spring beauty (*Claytonia virginica*) — even though they are marked on the list as “hard to find” at plant sellers. Sometimes the most important thing to do is conserve what you already have.

To learn what you have on your land consult references like the *Field Guide to Indiana Wildflowers* by Kay Yatskievych (available from Indiana University Press, [www.iupress.indiana.edu](http://www.iupress.indiana.edu)).

Because of the tight connection between caterpillars and the plant species they feed on, you can attract many butterfly species by planting their larval food plant. Keep in mind that once adult butterflies and other insects emerge, they will look for nectar or pollen. Make sure there are plenty of flowers available on which the adults can feed.



Figure 2. A sweat bee (*Augochloropsis* sp.) on a sunflower.

For more detail about the connections between pollinators and native plants, consult *Pollinators of Native Plants: Attract, Observe and Identify Pollinators and Beneficial Insects with Native Plants* by Heather Holm (available from [www.pollinatorsnativeplants.com](http://www.pollinatorsnativeplants.com)). This book discusses the specifics of how pollination works and provides details about pollinators and very specific pollinator/plant interactions.

Be careful that plants you intend for pollinator habitat have not been treated with neonicotinoid insecticides. Growers and sellers of ornamental plants, shrubs, and trees often use these systemic pesticides. Neonicotinoids are also used in large-scale agricultural settings, and can harm insect pollinators. Only purchase plants from a trusted source, and be sure to ask the seller if they used these products on plants before you buy them. You should also avoid using insecticides in your planting, because they may kill or injure pollinators.

### Habitat

Like all wildlife, pollinators require a home in which to rest, escape the weather, and (most importantly) lay eggs and provision their young. In our desire for tidy lawns, we often inadvertently eliminate suitable shelter and nesting sites for pollinators.

Important nesting sites for bees include patches of bare ground (which allow bees to access underground cavities), logs, stumps, last season's flower stems, abandoned rodent nests, and untidy corners with taller grass and flowers. Where possible, leave bare patches of ground and dead vegetation standing over the winter



Figure 3. This photo shows a hibiscus specialist bee species (*Ptilothrix bombiformis*) emerging from a ground nest.

until mid-May (by which time the pollinators will have emerged). These practices provide dormant season habitat for pollinators. If you must cut down your perennials in the fall, try to leave them in a pile on your property until mid-May and then remove.

While you may hear about homemade “bee hotels,” which can provide nesting habitat, use them with caution. Wasps often colonize these homemade bee nests, and such nests can harbor predators and pathogens if you do not properly clean and maintain them. For more information, see “Providing Nest Sites for Pollinators” from The Xerces Society ([www.xerces.org/providing-nest-sites-for-pollinators](http://www.xerces.org/providing-nest-sites-for-pollinators)).

### Water

Pollinators need water. Some are adept at getting the water they need from dew on plants. But for times of the year when there is little dew or few rain puddles, providing a shallow basin of water will provide this vital resource. Be sure to place rocks in the basin, so pollinators can easily access the water without going for a swim.

### Set Goals for Your Habitat

Setting your pollinator habitat goal is typically a two-step process:

1. Identify the pollinator group(s) you hope to benefit
2. Design an appropriate habitat that provides adult food, nesting/larval habitat, and access to water

Every landowner needs to set habitat goals for their plantings that meet their personal concerns and objectives. Many of the actions we describe below will benefit several pollinator groups at the same time. Still, you should decide up front which types of pollinators you most want to benefit. Doing so will help you refine your pollinator habitat.

For example, if your goal is simply to enhance native bee habitats, you may focus on providing a seasonally diverse array of flower species that generalist bees will use, including bare patches of ground, leaving dead vegetation for nesting sites and overwintering habitat, and setting out a shallow basin of water during the growing season.

If you also want to increase habitat for selected butterfly species, select specific plant species that are appropriate larval hosts for their caterpillars, and then plant these in numbers that are likely to attract egg-laying females.



Familiarize yourself with the life cycles of the butterfly species you wish to attract — including their host plant species, ranges, and breeding times.

A good reference for information about butterflies is *Butterflies of Indiana: A Field Guide* by Jeffery Belth (available from Indiana University Press, [www.iupress.indiana.edu](http://www.iupress.indiana.edu)). See Additional Resources (page 6) for other resources to help you identify and support pollinators.

The important thing to remember is that *the principles are the same regardless of the scale of your habitat enhancement, but the specifics of implementation may be different.*

## Special Considerations for Larger Plantings

If you want to provide pollinator habitats on a larger scale — such as for fields, forests, farms, grasslands, or rights-of-way (ROWS) — you will provide the same elements as above, but establishing and maintaining these larger plantings can require more patience, effort, and resources.

We recommend that you seek technical assistance to plan and implement large-scale plantings to make sure your planting is successful. See Indiana Technical Assistance Providers (page 6) for a list of free technical assistance resources for site preparation, establishment, and maintenance in Indiana. In some cases, these resources can provide cost-share or equipment rental payments for pollinator habitats.

Keep in mind that most of Indiana's soils and climate support forest. While grassland plantings are possible, they take a great deal of maintenance to keep them from turning into forest communities.

Arguably, Indiana forests provide more for pollinators than grasslands. Grasslands may provide a 6-foot-tall mix of diverse flowering plants for pollinators, but forests provide a 70-foot-tall mix of flowering plants! The distinct layers of forest vegetation, including the understory, shrub, and tree canopy layers, collectively provide more flowering species and more pollinator habitat than grassland. While not maintenance-free, consider planting forest as a pollinator habitat if it is appropriate for your site.



## Establishing Large-scale Plantings

The keys to establishing your pollinator habitat goals in large-scale plantings are to plan carefully, prepare the site thoroughly, and be patient. Large-scale grassland pollinator plantings are generally created from seed rather than live plants, because it is more economical per unit area. However, this means that you must prepare a seed bed, and it will typically be two or three years until most of the species establish and bloom.

Forest plantings are different. You will create this habitat by first planting tree and shrub seedlings, then plant forest wildflowers, grasses, and ferns to establish the understory.

The basic steps of establishing a large-scale habitat are:

1. Determine the acreage of the area on which you would like to establish habitat.
2. Set goals for habitat planting (see Set Goals for Your Habitat, page 3).
3. Contact a local technical assistance provider (see Indiana Technical Assistance Providers, page 6) for initial planning assistance, cost-share potential, and management plan.
4. Eliminate the existing vegetation and nearby invasive species by burning, mowing, applying herbicides, or disking. Depending on the current vegetation, properly preparing the site can take anywhere from a few months to a few years. Spend some time learning about site preparation methods; this is a key part of the process that will determine if the planting succeeds or fails.
5. Choose your plants. Make sure you know your site's soil moisture — all plants have different water needs and will not do well if their requirements are not met.
  - a. If you will plant grasses and wildflowers, refer to *Recommended Indiana-native Plants for Attracting Pollinators* (POL-6-W), available from the Education Store, [www.edustore.purdue.edu](http://www.edustore.purdue.edu). If you use a native seed company in Indiana (which we recommend for best results) they will likely recommend a pollinator seed mix.
  - b. If you will plant trees and shrubs, a good source of bare root seedlings is the Indiana Department of Natural Resources Tree Seedling Nurseries, available at [www.in.gov/dnr/forestry/3606.htm](http://www.in.gov/dnr/forestry/3606.htm).

6. Determine the ideal planting method and timing for your site. Typically, you should plant trees and shrubs from March to June, but you can also plant them in the fall if that is when plants are available for purchase. You can sow seeds in the fall, winter (dormant seeding), or spring. You can plant seeds by broadcasting them on the ground or using a seed drill. There are advantages and disadvantages to each sowing time and planting method. The wrong timing or planting method can cause the planting to fail. Consider whether you might be able to also use plugs for high-visibility areas and where there is sufficient soil moisture for them to survive.
7. Plant seeds or trees, shrubs, and understory plants.

### *Maintaining Large-scale Plantings*

Just like you would weed a garden, you will need to maintain your plantings on some level to keep it diverse and useful to pollinators. Undesirable weeds will quickly dominate a site if you do not control them from the start and throughout the life of the planting — so it is important to start maintenance the first year after planting.

Scout the land and adjacent roadsides early in the season for invasive weeds (May-June) and, if possible, remove them by hand before they own and spread their seeds. Make sure you safely dispose of all seeds that could spread and all pulled material that could reroot. You can use targeted herbicides on weed species if infestations are beyond what you can pull. If you use herbicides, always follow the product label exactly for application timing and dose. For more information, see *What Gardeners Should Know About Pesticides* (Purdue Extension publication PPP-109, available from the Education Store, [www.edustore.purdue.edu](http://www.edustore.purdue.edu)).

Because Indiana's climate and soils tend to favor forests over grasslands, woody species tend to heavily invade grassland plantings over time. You will need to regularly mow or burn to keep grassland plantings open. In some cases, you will need to cut woody stems and treat them with herbicide. Be aware that the timing of your mowing and fire maintenance has substantial implications for conserving both pollinators and birds.



Figure 4. This photo shows red admirals (*Vanessa atalanta*) on butterflyweed.

Useful resources to help you avoid harming pollinators and birds include *Mowing: Best Practices for Monarchs* (available from Monarch Joint Venture, [monarchjointventure.org](http://monarchjointventure.org)) and *Agricultural Practices That Conserve Grassland Birds* (Michigan State University Extension publication E3190, available from the MSU Extension Bookstore, [shop.msu.edu](http://shop.msu.edu)).

## **Additional Resources**

### **Indiana Technical Assistance Providers**

*Indiana Department of Natural Resources Wildlife Biologists*  
[www.in.gov/dnr/fishwild/2716.htm](http://www.in.gov/dnr/fishwild/2716.htm)

*USDA-Natural Resources Conservation Service Indiana Field Service Centers*  
[www.nrcs.usda.gov/wps/portal/nrcs/main/in/contact/local](http://www.nrcs.usda.gov/wps/portal/nrcs/main/in/contact/local)

*U.S. Fish and Wildlife Service Partners for Fish & Wildlife*  
[www.fws.gov/midwest/partners](http://www.fws.gov/midwest/partners)  
812-334-4261

*Pheasants Forever Farm Bill Biologists*  
[pheasantsforever.org/getdoc/d68502f8-71ec-423c-a8a0-dbaf1e2851b2/Farm-Bill-Biologists.aspx](http://pheasantsforever.org/getdoc/d68502f8-71ec-423c-a8a0-dbaf1e2851b2/Farm-Bill-Biologists.aspx)

Southwestern Indiana counties — 812-827-1087

Northeastern Indiana counties — 260-484-5848 x124

Northwestern Indiana counties — 574-952-0169

Southeastern Indiana counties — 812-346-3411

### **Pollinator Identification and Reporting Resources**

*Bumble Bee Watch*  
[www.bumblebeewatch.org](http://www.bumblebeewatch.org)

*Discover Life Apoidea page*  
[discoverlife.org/mp/20q?search=Apoidea](http://discoverlife.org/mp/20q?search=Apoidea)

*Journey North Monarch Butterfly page*  
[learner.org/jnorth/monarch/index.html](http://learner.org/jnorth/monarch/index.html)

#### ***Additional Help on Pollinator Identification***

Contact:

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1811 Executive Drive, Suites C-D

Indianapolis, IN 46241

(513) 591-4302

[rjean@envsi.com](mailto:rjean@envsi.com)

[www.ENVSI.com](http://www.ENVSI.com)

### **Other Useful Resources**

*National Wildlife Federation's Garden for Wildlife*  
[www.nwf.org/Garden-For-Wildlife/Certify.aspx?campaignid=WH09ASLP&s\\_src=CWH\\_GoogleMini\\_butterfly](http://www.nwf.org/Garden-For-Wildlife/Certify.aspx?campaignid=WH09ASLP&s_src=CWH_GoogleMini_butterfly)

*National Wildlife Federation's Butterfly Heroes*  
[www.nwf.org/Butterfly-Heroes.aspx](http://www.nwf.org/Butterfly-Heroes.aspx)

*The Xerces Society*  
[www.xerces.org](http://www.xerces.org)

## References

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Hopwood, J.L. 2008. The contribution of roadside grassland restorations to native bee conservation. *Biological Conservation* 141: 2632-2640.



### Find Out More

Find more publications in the  
*Protecting Pollinators* series  
by visiting the Purdue Extension  
Education Store

[www.edustore.purdue.edu](http://www.edustore.purdue.edu)

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