



THE WISCONSIN POLLINATOR PROTECTION PLAN

BEST MANAGEMENT PRACTICES FOR

Improving Pollinator Habitat in
Prairies, Roadsides & Open Spaces



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Providing a high diversity of flowering plants throughout the growing season is the most important action that can be taken to promote healthy pollinator communities. Pollinator habitat can be provided in small patches of land, large continuous fields, or linear strips, as in the case of roadsides and other right-of-ways. Collectively, these efforts can improve pollinator health, diversity and abundance. Open prairies, savannas and forest edge habitats provide plentiful nesting and forage opportunities for pollinators throughout the year. Because a small fraction of Midwestern land contains these habitat types, each opportunity for restoring or improving pollinator habitat is crucial.

Providing pollinator habitat is a goal that complements other management goals including erosion control, native plant propagation, and wildlife habitat. Included is a section devoted to the special considerations for roadsides, but most of the BMPs outlined below apply to a wide array of habitat improvement projects on public, private and tribal land.

Establishment timeline: What to expect for prairie plantings

Year One:

- ✿ Few flowers. Native perennial prairie plants put energy into below-ground roots, not blooms, during the first year.
- ✿ Weeds. Mowing in the first year before seed development is necessary to prevent weed establishment.

Year Two:

- ✿ Few flowers. Some early species will bloom.
- ✿ Mowing, hand pulling, or spot herbicide treatment of weeds before they go to seed.

Year Three and Beyond:

- ✿ Many flowers. Plantings will begin to resemble a diverse tallgrass prairie.
- ✿ Ongoing maintenance may consist of hand pulling and spot herbicide treatment to control weeds, and mowing, grazing, haying, or prescribed fire if desired.

Before starting a pollinator habitat project

It is important to start a habitat project with a plan that outlines short- and long-term goals, so that a management strategy can be designed to meet these goals. Your local county conservation office staff¹ may be able to provide guidance during this process. Pertinent questions to answer during the planning stage include:

- ✿ How much of the area is currently covered by herbaceous flowering plants (**forbs**) or flowering shrubs/trees? Are any of these species key pollinator plants (like lupine or milkweed)?
- ✿ Are there noxious or invasive weeds² that need to be controlled?
- ✿ Are there nearby areas that might be used as nesting habitat for bees? This may include downed wood or snags, bunchgrasses, brush piles, old rodent burrows, or hollow stems.
- ✿ What is the land use on adjacent sites? What weeds are present and what pesticides are used there that might affect the project site?
- ✿ Are there high slope areas where erosion may result from disturbing soils?

How to pick a seed mix

Healthy pollinator communities depend on a variety of flowering plants with adequate nectar and pollen resources.

- ✿ A minimum goal is at least three plant species flowering at all times from early spring through late fall, but the more diverse the wildflower mix the better. The total seed count should be comprised mostly of forb seeds so that grasses do not crowd out forbs.
- ✿ Match the seed mix to local site conditions (soil type, moisture, sun exposure, etc.) Example regional seed mixes, vendor information, planting instructions, and a seed mix calculator are provided by The Xerces Society^{3,4,5}. Regional plant lists and planting guides are available from the Wisconsin Department of Natural Resources (DNR)⁶ and Pollinator Partnership⁷.

Why choose native plants?

Some weedy and invasive² plants do provide nectar and pollen for pollinators, but the spread of these plants can crowd out other vegetation and reduce overall wildflower diversity over time.

Native plant benefits include:

- Native plants are adapted to local conditions, typically do not require fertilizer, and can tolerate drought and heat.
- Native prairie plants have deep roots, low water requirements and the ability to prevent runoff, nutrient loss and erosion.
- Native flowering plants co-evolved with native pollinators and many provide excellent pollen and nectar resources for both wild pollinators and honey bees.
- Native prairies are aesthetically pleasing and provide habitat for many wildlife and game species

- ☼ A good seed mix will contain plants that host butterfly larvae (e.g., milkweeds for monarch butterflies) and bunch grasses (e.g., little bluestem) that provide nesting habitat for bees and birds.
- ☼ If shrubs or trees are desired at your site, these can be chosen to benefit pollinators as well: American basswood, willows, and many fruit trees have flowers attractive to pollinators.
- ☼ A number of native seed nurseries that provide regionally-appropriate seed and stock are available in Wisconsin and neighboring states. Seed vendors and nurseries can be found through the Wisconsin DNR⁸, Plant Native⁹ and The Xerces Society's milkweed seed finder¹⁰. The Wisconsin DNR also hosts a list of restoration consultants¹¹.
- ☼ Annuals can be planted in the first year for rapid establishment of floral resources and weed blocking while perennial plants get established.

Costs and benefits

In general, the more wildflower species in a seed mix, the more expensive it is. Early spring blooming species tend to be especially costly because they are rarely harvested by combines. Native seed costs can be defrayed by hand harvesting from established local prairies with the help of volunteers (and with permission from the property manager or landowner). Limit your harvesting to <10% of available seed for any one species.

Despite the upfront costs and effort, benefits of native prairie plantings can pay off in the long run with lower inputs and maintenance requirements, reduced need for mowing and herbicide use, and less erosion and stormwater runoff.

Site preparation

Methods used to prepare the site will depend on site conditions. For sites that were historically native prairie, tree and brush removal may be enough to promote flowering plants that had been suppressed by shade. Many grassland sites, including older Conservation Reserve Program (CRP) lands and right-of-ways, require more work if they were planted with low diversity grass mixes or weedy brome grass where most forbs, except the most aggressive weedy species, have a difficult time establishing.

Removing vegetation can be done through sod removal, herbicide application, or solarization. For the pros and cons of each method, see “Establishing Pollinator Meadows from Seed” from The Xerces Society¹². Midwest-focused resources are available from the Minnesota DNR¹³, the Midwest Invasive Plant Network¹⁴, and The Prairie Enthusiasts¹⁵.

Maximizing native forb establishment

Sometimes prairie restoration projects fail pollinators because grasses establish more easily and crowd out flowering forbs. There are several steps you can take to aid forb establishment:

- ✿ Forbs should be well represented in seed mixes. Ideally, choose a mix that has a 3:1 ratio of wildflower to grass, by seed count.
- ✿ Seed in the fall (October – December). Many native forbs require a period of winter dormancy before germination. Grasses do not, and will get a head start on forbs if seeded in the spring. Note also that some forbs require scarification before they will germinate.
- ✿ Be sure to include early season forbs. Some prepackaged seed mixes are biased towards late season wildflowers. Some early season forb seed must be collected and planted as soon as it is ripe.
- ✿ Diversify grasses. Include short grasses that will not shade out forbs e.g., little bluestem, side-oats grama.
- ✿ Do not add fertilizer to native prairie plantings. Native prairie plants don't need it, and adding fertilizer will only help weeds¹⁶.

Ongoing maintenance and monitoring

Ongoing habitat management will be most beneficial to pollinators if it maximizes bloom time of a diverse array of flowering plants throughout the growing season. The management plan for a particular site will depend on site characteristics and management goals. General recommendations include the following:

- ✿ Weeds will dominate a site quickly if not controlled from the start. Scout the land and adjacent roadsides early in the season (May-June) for noxious weeds and, if possible, remove by hand before they spread. Targeted herbicides can be used on weed species that spread vegetatively or are particularly difficult to control. If herbicides are used, always follow the product label exactly for application timing and dose.
- ✿ Mature prairie plantings are drought resistant, and typically require no fertilizer or pesticides¹³. Before prairie plantings are established, however, irrigation may be warranted in dry years.
- ✿ A combination of prescribed fire and end-of-season haying are critical to stimulate flowering in many plant species. Mowing can be done in lieu of burning, but fire is better than mowing at stimulating flowering over time. For training opportunities and guidance, refer to the Wisconsin Prescribed Fire Council website¹⁷, Wisconsin DNR Forest Management Guidelines¹⁸, and Wisconsin DNR Technical Bulletin 187¹⁹.

- ✿ It is important that pollinators have access to undisturbed areas (**refugia**) while vegetation is temporarily disturbed in a mowed, grazed, or burned site. Areas like roadsides, wide fence rows, old fields, and brush patches can serve as refugia if they are within 100 ft. of the site. At sites without nearby refugia, no more than 2/3 to 3/4 of the flower patch habitat should be mowed, grazed, or burned at one time. At sites with remnant original prairie, no more than 1/3 of the area should be mowed, grazed or burned at one time.
- ✿ Whenever possible, leave dead logs and leaf litter on site; these provide nesting habitat for bees and other wildlife, and overwintering sites for butterflies.
- ✿ Protecting sensitive species is a proactive endeavor that requires on-the-ground knowledge and regular scouting. Particularly sensitive or beneficial plants like wild lupine can be flagged and protected from ongoing management practices.
- ✿ If endangered or threatened species are present on your site, Wisconsin DNR management activities must follow incidental take protocols for the given species.

How can you tell if bees like your site?

Use the simple protocol²⁰ provided by The Xerces Society and a bee guide²¹ from Michigan State University to identify bees and monitor their presence on your site.

Special considerations for roadsides and other right-of-ways

Roadsides cover over 10 million acres of land in the U.S. and 150,000 acres in Wisconsin. Right-of-ways provide nesting and egg-laying habitat for bees and butterflies, and have the potential to act as corridors for pollinator movement^{22,23}. Right-of-ways with flowering plants offer nectar and pollen for pollinators, and those with native plants have been shown to be especially beneficial to bees and butterflies^{23,24}.

Roadside maintenance requires a balancing act to control erosion (see Wisconsin NR 151²⁵), stop the spread of invasive weeds (see Wisconsin NR 40²⁶), protect driver safety, and provide attractive vistas for drivers. Once established, native prairie plants along roadsides can fulfill all of these goals. Establishing prairie plants along roadsides raises unique challenges, but ongoing projects and research give examples for how to address them:

“Well planned, sustainable native vegetation supports transportation goals for safety and efficiency by stabilizing slopes, reinforcing infrastructure, and improving the road user’s experience by creating natural beauty and diversity along the roadside.”

Federal Highway Administration handbook for practitioners³³

Issues and guidance for roadside maintenance to benefit pollinators

Issue	Potential Solution	Guidance/Reference
Plants near the road edge must tolerate road salting.	Choose salt tolerant native forb species within the salt zone of roads.	The “Native Seed Mix Design for Roadside” ²⁷ manual from the Minnesota DOT provides guidance for balancing pollinator benefit, salt tolerance, region, cost and other factors in choosing roadside seed mixes.
A fast green-up time is required for erosion control.	An annual cover crop (oats or winter wheat) can be seeded in the first year after planting.	
Mowing is timed to cut off seed heads of invasive species, which often coincides with bloom time for wildflowers.	Mowing in a staggered fashion, or restricting regular mowing to the first 8 ft. of roadside, allows wildflowers in other roadside areas to bloom.	Wisconsin DOT has mow timing guidelines for public safety and weed control ²⁸ . Guidelines for roadside wildflower planting are available through programs in Ohio ²⁹ and North Carolina ³⁰ .
Driver safety (wildlife-car collisions)	For visibility, the road shoulder (~8 ft. from road edge) can be mowed regularly, and other areas of the right-of-way mowed less frequently.	Infrequently mowed perennial vegetation may be less preferred by deer than new vegetative growth ³¹ . Roadside shrub plantings in Indiana harbored more birds but did not result in more roadkill than roadsides without shrubs ³² .
Pollinator safety (pollinator-car collisions)	Provide plantings that offer nesting and forage opportunities along each side of the road so that bees and butterflies have less reason to cross traffic.	Prairie roadsides harbor more butterflies than weedy or grassy roadsides, yet present lower butterfly mortality risk ²⁴ . Even on narrow edges of high-traffic roads, prairie plantings harbor more bee species than weedy roadsides ²³ . An overview of studies related to traffic impacts on pollinators is available in a Federal Highways Administration report ²² .
Disconnect between planting implementation and long-term management.	Successful right-of-way pollinator plantings require collaboration among landowners, natural resource experts, engineers and maintenance staff/volunteers.	Communication, maintenance, budgets, schedules, and many other issues are covered in “A Manager's Guide to Roadside Vegetation Using Native Plants” from the Federal Highway Administration ³³ .

References

- ¹ Directory for county conservation contacts: <http://wisconsinlandwater.org/files/pdf/WILandWaterDirectory.pdf>
- ² The Wisconsin Dept. of Natural Resources list of invasive plant species: <http://dnr.wi.gov/topic/Invasives/species.asp?filterBy=Terrestrial&filterVal=Y>
- ³ The Xerces Society seed mix and planting guidelines: <http://www.xerces.org/pollinator-seed/>
- ⁴ The Xerces Society plant lists. <http://www.xerces.org/pollinator-conservation/plant-lists/>
- ⁵ The Xerces Society seed mix calculator. <http://www.xerces.org/xerces-seed-mix-calculator/>
- ⁶ Wisconsin DNR Technical Bulletin 188. 1995. "Plant Species Composition of Wisconsin Prairies: An aid to selecting species for planting and restorations based upon University of Wisconsin-Madison Plant Ecology Lab data." <http://dnr.wi.gov/topic/research/publications/bulletins/>
- ⁷ Pollinator Partnership regional planting guides – use the "Eastern Broadleaf Forest Continental" guide for southern Wisc. and the "Laurentian Mixed Forest" guide for northern Wisc. <http://pollinator.org/guides.htm>
- ⁸ Wisconsin DNR list of native plant nurseries: <http://dnr.wi.gov/files/pdf/pubs/er/er0698.pdf>
- ⁹ Plant Native nursery finder: <http://plantnative.org/>
- ¹⁰ The Xerces Society listing of milkweed seed providers: <http://www.xerces.org/milkweed-seed-finder/>
- ¹¹ Wisconsin DNR list of restoration consultants: <http://dnr.wi.gov/files/pdf/pubs/er/er0699.pdf>
- ¹² The Xerces Society. "Establishing Pollinator Meadows from Seed." <http://www.xerces.org/wp-content/uploads/2013/12/EstablishingPollinatorMeadows.pdf>
- ¹³ Minnesota DNR. "Going Native: A Prairie Restoration Handbook for Minnesota Landowners." <http://files.dnr.state.mn.us/assistance/backyard/prairierestoration/goingnative.pdf>
- ¹⁴ Midwest Invasive Plant Network guidance for weed management: <http://www.mipn.org/control/>
- ¹⁵ The Prairie Enthusiasts protection and management of Midwestern prairies and savannas: <http://www.theprairieenthusiasts.org/>
- ¹⁶ Blumenthal, Dana M., et al. 2005. "Effects of prairie restoration on weed invasions." *Agriculture, ecosystems & environment* 107.2: 221-230.
- ¹⁷ Wisconsin Prescribed Fire Council education and training: <http://prescribedfire.org/>
- ¹⁸ Wisconsin DNR Forest Management Guidelines, Chapter 17: Fire Management: <http://dnr.wi.gov/topic/ForestManagement/documents/guidelines/chapter17.pdf>
- ¹⁹ Wisconsin DNR Technical Bulletin 187. 1994. "Bibliography of fire effects and related literature applicable to the ecosystems and species of Wisconsin." <http://dnr.wi.gov/topic/research/publications/bulletins/>
- ²⁰ To distinguish among various kinds of bee, wasp, and fly, refer to the "Streamlined Bee Monitoring Protocol" from The Xerces Society: <http://www.xerces.org/streamlined-bee-monitoring-protocol/>
- ²¹ Michigan State University Extension. October 2015. "Bees of the Great Lakes Region and Wildflowers to Support Them." 110-page pocket guide for identifying bees, plus wildflower planting guidelines. http://shop.msu.edu/product_p/bulletin-e3282.htm
- ²² The Xerces Society for Invertebrate Conservation in collaboration with ICF International. 2015. "Literature Review: Pollinator Habitat Enhancement and Best Management Practices in Highway Rights-of-Way." Prepared for The Federal Highway Administration. https://www.environment.fhwa.dot.gov/ecosystems/documents/pollinators_BMPs_in_highway_ROW.asp
- ²³ Hopwood, J. 2008. "The contribution of roadside grassland restorations to native bee conservation." *Biological Conservation* 141.10: 2632-2640.

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- ²⁴ Ries, Leslie, et al. 2001. "Conservation value of roadside prairie restoration to butterfly communities." *Conservation Biology* 15.2: 401-411.
- ²⁵ Wisconsin DNR, Chapter NR 151. "Runoff management." http://docs.legis.wisconsin.gov/code/admin_code/nr/100/151.pdf
- ²⁶ Wisconsin DNR, Chapter NR 40. "Invasive species identification classification and control." http://docs.legis.wisconsin.gov/code/admin_code/nr/001/40.pdf
- ²⁷ Minnesota DOT. "Native Seed Mix Design for Roadsides." <http://www.dot.state.mn.us/environment/erosion/pdf/native-seed-mix-dm.pdf>
- ²⁸ Wisconsin DOT roadside mowing policies: <http://wisconsindot.gov/Pages/doing-bus/real-estate/roadsides/mowing/default.aspx>
- ²⁹ Ohio DOT roadside pollinator habitat guidelines: <http://www.dot.state.oh.us/districts/D09/Documents/Planting%20Guidelines.pdf>
- ³⁰ North Carolina DOT roadside wildflower program: http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/wildflowerbook/
- ³¹ The Xerces Society. "Pollinators and Roadsides: Managing Roadsides for Bees and Butterflies." http://www.xerces.org/wp-content/uploads/2010/05/roadside-guidelines_xerces-society1.pdf
- ³² Roach, Gerald L., and Ralph D. Kirkpatrick. 1985. "Wildlife use of roadside woody plantings in Indiana." *Transportation Research Record* 1016.
- ³³ Federal Highway Administration, US DOT. October 2007. "A Manager's Guide to Roadside Vegetation Using Native Plants." <http://flh.fhwa.dot.gov/about/css/documents/rr-managers-guide.pdf>