

Pollinator Habitat on Roadsides: Big picture considerations to increase resilience and adaptability of roadsides

Increasing resilience for pollinators requires a multifaceted approach across the landscape. Roadsides represent hundreds of miles of potential habitat, and therefore present a valuable opportunity to advance pollinator conservation in the face of changing weather patterns that are being observed more frequently. These include floods, drought, hail, extreme heat, polar vortexes, intense storms like hurricanes and tornados, increasing temperatures, more frequent wildfires. Now more than ever vegetation needs to be more adaptive and resilient.

Three key components of increasing resilience to extreme weather for pollinators are:

1. **Create and restore habitat.** Habitat with abundant pollinator-attractive floral resources that bloom from spring through fall is required to support large, diverse pollinator communities that can persist over time. Larger populations are generally better able to withstand bad years and extreme weather events that become more frequent with climate change. Maintaining a diverse pollinator community is key to ensuring that the valuable ecosystem service performed by these animals remains consistent in the future.
2. **Increase habitat connectivity.** Habitat corridors act as pathways, connecting larger natural areas that act as reservoirs of pollinator diversity. Because roads and other rights-of-way create vast networks crisscrossing the landscape, linear habitats created or maintained alongside them are ideal for improving habitat connectivity for pollinators. This is an area where DOTs and other managers of roadsides can make especially meaningful contributions to the resilience of wild pollinators.
3. **Reduce additional drivers of insect decline.** Reducing drivers of pollinator decline, such as pesticide exposure, habitat loss, and invasive species is important because these different stressors can interact with each other and with extreme weather to magnify negative effects on pollinators.



Roadside vegetation with a diverse assemblage of plants will provide habitat for pollinators and increase landscape connectivity.
(Photo: Wyoming DOT.)

Building Resilient and Adaptable Roadside Pollinator Habitat

When creating roadside habitat for pollinators, following a few basic principles can help make habitat more resilient to extreme weather. Resilient habitat will help to foster resilient pollinator communities.

- ***Pay Attention to Flowering Phenology.*** Ensure that a minimum of three species of nectar plants bloom at all times during the season of activity for bees and butterflies. This practice will ensure that important food resources are always available for pollinators. This practice may also help reduce effects of phenological mismatches between hosts and pollinators by ensuring that some floral resources will be available throughout the active season. If possible, work to better understand what specialist pollinators might be found in the area, including imperiled pollinators, and include specific flowering resources for those species if possible.
- ***Provide Nesting Habitat for Native Bees.*** About 70 percent of native bees nest in the ground, and installing vegetation like bunch grasses that can provide access to small patches of earth will provide areas for these species to build nests. About 30 percent of native bees nest in wood or pithy-stemmed plants. Retaining downed logs and snags where possible will provide nesting habitat for some of these species, while planting native, pithy-stemmed plants like goldenrod or wild rose will provide nesting habitat for others.



Bumble bee nest at the base of a native bunch grass. (Photo: Sarah Nizzi / Xerces Society.)

- ***Biodiversity Is Key—Include a Variety of Native Plants.*** The best approach for creating resilient, sustainable roadside habitat is to harness the benefits of biodiversity, planting a diverse assemblage of plant species.
 - Habitat with a diverse native plant community can support more species of pollinators, including more specialist pollinators, than a habitat with only a few plant species.
 - A diverse native plant community will have greater habitat heterogeneity that provides an array of microclimates that serve as important refugia for pollinators during heatwaves and other extreme weather events.
 - Generally speaking, more-diverse habitats are also better able to provide ecosystem services such as erosion control, improved soil health, and pollination over time than species-poor ecological communities.
 - Finally, diverse plant communities will be better able to withstand bad years and extreme weather events than species-poor communities. This may be especially important in regions where opposing conditions will both become more common. For example, in many regions both flooding and drought will become more common. It can be difficult to find plant species that can thrive in the range of expected conditions, so including a variety of plant species will help to ensure that at least some will do well in any given year or season.
 - Creating resilient pollinator habitat along roadsides has many additional benefits beyond pollinator conservation. Pollinator habitat also provides benefits such as erosion control and reduced runoff. This helps reduce the impacts of flooding, which will be critical in many areas where increased flooding is projected, and in coastal areas where sea level rise will increase the frequency of coastal flooding. Creating diverse plantings along roadsides can also increase soil health, which in turn increases carbon sequestration, helping to mitigate extreme weather and contributing to nature based solutions.

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Big bluestem in roadside. (Photo: Carmelita Nelson.)

For more detail, please see: Pollinator Habitat Conservation Along Roadways, Volumes 1-16. National Academies of Sciences, Engineering, and Medicine. Washington, DC: The National Academies Press.

Project materials available here: <https://www.trb.org/NCHRP/NCHRPWOD362.aspx>

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