



Designing Revegetation Projects with Pollinators in Mind

There are a number of conservation practices to consider when designing revegetation projects. The following revegetation design practices benefit pollinators broadly:

Prioritize native plants in designs. Roadsides with native plants support more species of pollinators and larger populations of pollinators. Native flowering trees, shrubs, and wildflowers provide nectar and pollen or are host plants for butterflies and moths. Native grasses are host plants for some species of butterflies and also provide shelter.

Prioritize sourcing native plants locally. Plant materials that are sourced locally or within the ecoregion are best for pollinators because the phenology (flowering period) may differ among ecoregions. Bloom times of non-locally sourced plants have the potential to be out of sync with pollinators. This may be particularly problematic for bee species that are pollen specialists because they are reliant on the pollen from a small subset of plants and time their emergence from overwintering with the bloom time of their host plants. Locally sourced ecotypes are also adapted to local conditions.

Increase flowering plant diversity and abundance. High flowering plant diversity provides sustained resources throughout the growing season to best support robust pollinator populations and communities. Having 45 percent cover of flowering plant vegetation across a growing season in seed mixes should be the goal in order to prevent grasses from outcompeting wildflowers. Flowering plant cover could be spread out throughout the growing season, with 15 percent cover of species that flower in spring, 15 percent in summer, and 15 percent in autumn.

Include species with overlapping and sequential bloom periods. Providing a diversity of flowering plants throughout the growing season supports species with multiple generations as well as those that time their emergence and flight period with the bloom of certain plant species. This approach also better supports a diversity of pollinators.

Consider irrigation needs. Determine the irrigation needs for the plant materials used (e.g. transplants vs. seeds). Are there watering needs? When should watering occur? Planting or seeding may need to be done at specific times of the year to accommodate watering needs. For example, in the arid west, planting is often done in the fall/winter to take advantage of winter rains.

When revegetation projects occur in areas with imperiled pollinators, the following considerations can be beneficial:

Include key host plants for target pollinator species. Providing caterpillar host plants is a well-established way to sustain butterfly and moth populations. When planning a project to support imperiled species, it is necessary to include specific native host plant species matched to support the particular butterfly or moth species that are adapted to feeding on them. For example, planting milkweeds (*Asclepias* spp.) will contribute to the recovery of the monarch butterfly.

Consider the bloom time of flowering plants within the project area. Include a number of different species of flowering plants that will bloom during the flight time of focal pollinators. Adults butterflies and moths often have limited flight times; therefore, make sure that in addition to host plants, a site has plenty of flowering plants during the adult flight time of focal species.

Include key nectar and/or pollen plants for target pollinator species. Some pollinator species have specialized diets and need the floral resources from certain flowering plants to survive. For example, bees that are pollen specialists can only rear their young on pollen from a certain species or groups of closely related plants. Adult butterflies are often generalist foragers of nectar, but some species may exhibit preferences for nectar from certain plants.

Consider additional specific habitat needs, such as nesting or overwintering habitat. Some imperiled species have very specific habitat needs. For instance, a bumble bee species may prefer nesting aboveground in a particular type of insulated cavity. In general, including a diversity of plants in revegetation plans can help to ensure that vegetation structure that can act as shelter and overwintering habitat. Trees and shrubs may not be appropriate for every revegetation project; in those situations, including a diversity of grasses can increase vegetation structure.

Consider the connectivity of planned revegetation sites to existing habitat within the landscape. Developing a landscape connectivity map of the project area and adjacent lands can be a base for designing a revegetation plan that improves pollinator habitat within the context of larger landscape connectivity. Projects that can increase the connectivity of existing roadside habitat will benefit pollinator conservation. If remnant roadside habitat exists, for example, it would be very beneficial if revegetation projects with high plant diversity were installed adjacent to or nearby.

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Roadside habitat in Massachusetts. (Photo credit: Tara Mitchell.)

Consider the connectivity of planned revegetation sites to existing habitat within the landscape. Developing a landscape connectivity map of the project area and adjacent lands—using information collected during the vegetation assessment that locates areas of high, medium, and low pollinator habitat qualities—can be a base for designing a revegetation plan that improves pollinator habitat within the context of larger landscape connectivity. Corridors with high-quality habitat support more butterfly species, including specialist species, and population persistence. It is also important to prioritize those projects that can increase the connectivity of existing roadside habitat. If remnant roadside habitat exists, for example, it would be very beneficial if revegetation projects with high plant diversity were installed adjacent to or nearby.

Consider timing of revegetation projects. While high quality revegetation is ultimately beneficial to pollinators, it can lead to a temporary decrease in the availability of food and nesting resources for pollinators. If a revegetation project is being conducted in an area with an imperiled pollinator, ideally the project should be timed to avoid adult flight times or other sensitive times in the species' life cycle.

For more details 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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Banner Photo: Native roadside habitat in California. (Photo: Jessa Kay Cruz.)

