

A sign of Hope: The Use of Roadside Rights-of-Way for Monarchs and other Pollinators.

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It is August 2020 and we are all adjusting to living with Covid-19, living with stress, depression, loneliness, working at home, unprecedented eruptions of violence in American cities, and feelings of helplessness and lack of control. We are going to leave that all behind for a few moments whilst we take a quick, peaceful look at butterflies and bees and birds (no unicorns though), and the use of roadsides rights-of-way (ROWS) for pollinator habitats.



The Monarch is probably the most recognized butterfly in North America and is noted for its spectacular migration. East of the Rockies the monarchs migrate up to 4,500km each fall to winter in the high-altitude fir forests in Central Mexico. West of the Rockies the monarchs winter in groves along the California coast. We have all heard about the plight of these lovely butterflies, especially the decline in their numbers, an estimated 80% for eastern population (Brower et al. 2012) and 90% for the western population (Shultz et al. 2017) which has spurred a wide-range of conservation efforts. It is not just monarchs however, there has been a huge decline in bees with beekeepers in the US and Europe reporting declines in managed bee populations.

Monarchs and other pollinators are critical for our food supply. Two-thirds of crop species, including fruits, vegetables, nuts, spices, seeds, and livestock forage all rely on natural pollination. Bee pollination adds more than \$15 billion in value to agricultural crops annually. Multiple factors contribute to this decline among which are climate change, exposure to pesticides and toxins, invasive species, disease, and predation, but perhaps the most significant is the loss of habitat. Transportation agencies have responded to this plight resulting in the changing face of roadside ROWs.

Since in the beginning of the Interstate system Departments of Transportation have been responsible not only for the upkeep of road infrastructure but also for the land adjacent to roads. It is these roadside ROWs that are being viewed as potential habitats for pollinators. The Presidential Memorandum issued in 2014 (<https://obamawhitehouse.archives.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b>) established a task force, consisting of heads of fifteen agencies, to create guidelines and strategies for evaluating the effectiveness of using pollinator friendly seed mixes for restoration and reclamation projects. Member agencies were charged

with developing plans to enhance pollinator habitat in their managed lands and facilities and to create policies with respect to road and other rights of way; the use of integrated vegetation and pest management; increased native vegetation; and application of pollinator friendly best management practices and seed mixes.

Rights-of-way along roads, railways, and power corridors have the potential to provide a large opportunity to restore, enhance and maintain habitat for monarchs and other pollinators. Roadsides provide an extensive network of linear habitat. There are over 17 million acres of roadside ROWs managed by state DOTs. These can provide food, breeding, and nesting opportunities for pollinators. They can also assist in the dispersal of pollinators by linking fragmented habitats. However, there are risks associated with the use of roadside ROWs as pollinator habitat, including vegetation management especially mowing when monarch eggs and larvae are present, and the blanket use of pesticides. Mowing is conducted for safety reasons, ensuring traffic visibility and even though it kills some larvae it also creates an open roadside habitat favored by monarchs. Mowing also encourages milkweed regrowth and controls invasive species such as wild parsnip, non-native phragmites, and lespedeza, commonly known as Chinese bush clover. Lespedeza was introduced decades ago for hay, improved ground cover, the control of soil erosion, and as a food source and cover for wildlife. It has since naturalized and is now viewed as a noxious weed.

There are other risk factors apart from mowing when looking at the use of roadside ROWs for pollinator habitats. An obvious risk is traffic collisions, especially at the time of migration. Pollinators are also exposed to road salts, heavy metals, and other toxins. Depending on the broader landscape, they could also encounter insecticide run-off from nearby agricultural acres.

In order to establish monarch habitats, roadside managers need information to assist them in investing limited monetary resources wisely. It is not so simple as sowing seed mixes and changing mowing patterns. Monarch habitats require nectar sources for the adult monarchs, usually in the form of a wide variety of blooming plants that benefit pollinators in general, and plants for larval development provided by plants in the milkweed subfamily. To identify and select suitable roadsides for use as pollinator habitat information is needed about traffic volume, toxic levels, plant diversity and habitat width. Consideration has to be given to the broader landscape context: is this roadside near to arable land? Will there be increased danger of exposure to agricultural chemicals? Will it impact travel safety?



To this end, in January 2016 the Federal Highway Administration created Pollinator and Roadside Best Management Practices.

https://www.environment.fhwa.dot.gov/env_topics/ecosystems/Pollinators_Roadsides/BMPs_pollinators_roadside.aspx

The report identifies two key steps that State Departments of Transportation (DOTs) and other transportation agencies can take to improve the quality of roadside habitat for pollinators.

Firstly, there is a need to adjust roadside vegetation management techniques to accommodate pollinator resource needs, and secondly, the enhancement and restoration of native roadside vegetation needs to include plant materials that improve pollinator habitat.

The report found that use of pollinator-friendly roadside management practices such as reduced mowing and targeted herbicide use can reduce roadside maintenance costs. Two further findings were that roadsides with pollinator habitat features such as abundant flowering plants can draw tourists, resulting in positive economic benefits to States and local communities, and that farmers and ranchers nearby may benefit economically from roadside habitat because of the ecosystem services such as pollination and pest control the habitat supports.

The report also concluded that roadsides managed with pollinators in mind can achieve multiple goals of stabilizing roadsides, reducing storm water pollution, supporting wildlife, and building public exposure and appreciation for the local landscape.

Building on the FHWA report the National Cooperative Highway Research Program has just issued report 942 on Evaluating the Suitability of Roadway Corridors for use by Monarch Butterflies. (2020). The NCHRP found that there was a high degree of interest and dedication to providing pollinator and monarch habitat along roadsides. The study addresses the suitability of roadsides as habitat for monarchs and other pollinators, and even with the risks from mowing, traffic collisions, exposure to a variety of toxins and heavy metals, the conclusion is that roadsides are of vital importance in increasing available habitats.

The results of the research have been the creation of four products to assist roadside managers in optimizing potential habitat for monarchs in their road rights-of-way. These are: A Landscape Prioritization Model for Roadside Habitat for Monarchs; A Rapid Assessment of Roadside Habitat for Monarchs; The Roadside Monarch Habitat Calculator; and Decision-Support Tools for roadside managers. These are all available at:

<https://monarchjointventure.org/mjvprograms/science/roadsidehabitat>



The initiatives taken by transportation agencies to restore and create pollinator habitats are a source of hope for us. If you think about all the towns and cities spread out across the country, with their nature preserves, state parks and citizens' gardens you have lots of habitat but it is fragmented by large tracts of arable land and urban sprawl. With the continued and growing use of roadside ROWs as pollinator habitat these fragmented areas could be linked. In the meantime, our highways become areas of natural beauty giving pleasure to travelers as they wend their way along the ribbons of highway.

References.

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