

# Energizing the Monarch Butterfly Migration

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The iconic monarch butterfly faces numerous threats in its migration across North America. Habitat loss, invasive species, pesticide use effects, disease, drought, and changing temperatures have collectively squeezed a vice of stressors on monarch butterfly populations. At the same time, the U.S. is undergoing a great energy transition towards renewable energy. Development of large utility-scale solar and other renewable energy projects is transforming landscapes in some parts of the country.

What will this energy transformation mean for pollinators like the monarch butterfly? That largely depends on the landscape change it brings. Fortunately, this changing landscape has given birth to a new form of land use: *agrivoltaics*. Agrivoltaics is the coupling of energy generation and agricultural production and can be represented by a mix of land uses that produce on-farm income, like grazing, crop production, or honeybee hive management. Agrivoltaics may also include *ecovoltaics* which often refers to establishing pollinator habitat. Such pollinator habitat can also benefit on-farm yields in surrounding croplands<sup>1</sup>.

## Can Solar Energize the Monarch Migration?

The *Solar Futures Study*<sup>2</sup> published in 2021 by the U.S. Department of Energy estimates that as much as 10.2 million acres may be required for solar development to achieve the 2050 renewable energy targets. Incorporating agrivoltaics into these changing lands can help diversify agricultural economies, reduce pesticide use, and increase pollinator habitat. But can these lands also help fuel the monarch migration?

The monarch butterfly population has undergone severe declines since the 1980s. This past winter (2023-2024) reported the second lowest populations for eastern monarch butterflies since they have been measured<sup>3</sup>. As noted, these declines are the result of a combination of factors, chief among them habitat loss and degradation. Loss of habitat reduces the butterflies' resilience to other stressors, such as pesticide use, severe weather, and drought.

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<sup>1</sup> Pollinator habitat near soybean fields was found to have a positive effect on insect visitation and soybean yield. See Levenson et al. 2022, [doi.org/10.1016/j.agee.2022.107901](https://doi.org/10.1016/j.agee.2022.107901), and Garibaldi et al. 2021, [doi.org/10.1016/j.tree.2021.03.013](https://doi.org/10.1016/j.tree.2021.03.013).

<sup>2</sup> Read more at [energy.gov/sites/default/files/2021-09/Solar%20Futures%20Study.pdf](https://energy.gov/sites/default/files/2021-09/Solar%20Futures%20Study.pdf).

<sup>3</sup> Read more at [worldwildlife.org/stories/eastern-migratory-monarch-butterfly-populations-decrease-by-59-in-2024](https://worldwildlife.org/stories/eastern-migratory-monarch-butterfly-populations-decrease-by-59-in-2024).

The reverse can be true, as well. Including pollinator habitat as part of solar energy development can provide much-needed habitat for monarchs and other wildlife. Monarchs rely on milkweeds for egg laying and larval caterpillars, as well as diverse flowering plants as nectar sources for adult butterflies. Native plants such as these are available from native plant suppliers throughout the U.S.<sup>4</sup> Enhanced pollinator plantings can increase yields in surrounding fields<sup>5</sup>. Recognizing these benefits, solar developers are incorporating pollinator habitat as part of their agrivoltaic planting plans.

### **Pollinator Habitat Can be Risky Business**

While greatly needed, creating pollinator habitat can be risky business for solar operators. But it's not the potential for stinging insects that draws concern; statistically speaking, people have a better chance of dying from catastrophic storms than from a bee sting<sup>6</sup>.

Rather, providing habitat to species at risk of extinction, while noble and beneficial, may unintentionally result in increased regulatory restrictions and operational limitations on a site operator. A species listed under the U.S. Endangered Species Act (or comparable tribal or state regulations) can add time, cost, and complexity to managing land and maintaining facilities over the life of a project.

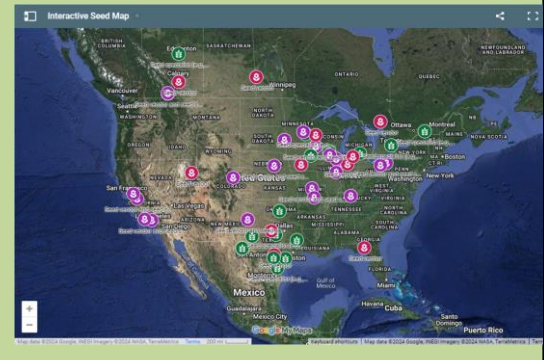
### **Rewarding a Helping Hand**

For this reason, the [Rights-of-Way as Habitat Working Group](#), facilitated by the University of Illinois Chicago's (UIC) Sustainable Landscapes Program, created a conservation agreement known as the Monarch CCA (Candidate Conservation Agreement with Assurances). This agreement promotes upfront commitments to sustain or create habitat for the monarch butterfly. In exchange, companies receive regulatory assurances that no additional endangered species regulations will be required in recognition of their proactive conservation commitments.

This prospect has motivated solar developers and owners to consider enrolling in the program. Since its authorization in 2020, the program has resulted in over one million acres of monarch

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Check out our online map of native seed vendors and specialists at [rightofway.erc.uic.edu/resources/seed-expert-map/](http://rightofway.erc.uic.edu/resources/seed-expert-map/).



<sup>4</sup> Check out our online map of native seed vendors and specialists at: [rightofway.erc.uic.edu/resources/seed-expert-map/](http://rightofway.erc.uic.edu/resources/seed-expert-map/).

<sup>5</sup> See Walston et al. 2024, [iopscience.iop.org/article/10.1088/1748-9326/ad0f72](https://iopscience.iop.org/article/10.1088/1748-9326/ad0f72); Levenson et al. 2022, [doi.org/10.1016/j.agee.2022.107901](https://doi.org/10.1016/j.agee.2022.107901); and Garibaldi et al. 2021, [doi.org/10.1016/j.tree.2021.03.013](https://doi.org/10.1016/j.tree.2021.03.013).

<sup>6</sup> From [injuryfacts.nsc.org/all-injuries/preventable-death-overview/odds-of-dying/](https://injuryfacts.nsc.org/all-injuries/preventable-death-overview/odds-of-dying/).

habitat commitments across the U.S. While being the largest voluntary conservation agreement in the U.S., it still requires more enrollment to achieve the levels of conservation needed for the butterfly. Previous studies have suggested that millions of acres of monarch habitat are required to achieve levels of conservation needed to avoid the threat of the migratory butterfly population's extinction<sup>7</sup>.

Biodiversity and wildlife habitat have been marginalized (literally) along field edges, fencerows, roadsides, and utility corridors. The Monarch CCAA offers energy and transportation land managers a chance to demonstrate commitments for monarch conservation, biodiversity net gain, and support for recovering other at-risk species.

Solar companies considering enrollment are encouraged to review resources available on the Monarch CCAA Toolkit<sup>8</sup>, including enrollment guidance, webinars, and the application form. Contact UIC's Sustainable Landscapes team with additional questions at [dsalas4@uic.edu](mailto:dsalas4@uic.edu).

### **Learn More About the Monarch CCAA**

The Rights-of-Way as Habitat Working Group at the University of Illinois-Chicago led a national collaborative effort to develop a voluntary conservation agreement to provide habitat for the monarch butterfly. The effort is unprecedented in terms of its cross-sector participation and geographic extent. The agreement spans the entire contiguous 48 states and is helping agencies and companies transform their vegetation management to benefit wildlife in need. Learn more at [rightofway.erc.uic.edu/national-monarch-ccaa/](http://rightofway.erc.uic.edu/national-monarch-ccaa/).

### **About the University of Illinois Chicago Sustainable Landscapes Program**

The University of Illinois Chicago (UIC) [Energy Resources Center](#) is home to the Sustainable Landscapes Program and the [Rights-of-Way as Habitat Working Group](#), which convenes people at the intersection of biodiversity and infrastructure.

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<sup>7</sup> See Thogmartin et al. 2017, <https://iopscience.iop.org/article/10.1088/1748-9326/aa7637>

<sup>8</sup> See [rightofway.erc.uic.edu/working-group-access/monarchccaatoolkit](http://rightofway.erc.uic.edu/working-group-access/monarchccaatoolkit).