

Optimizing dual use solar to increase ecosystem services (ecovoltaics): benefits and best management practices

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What are ecovoltaics?

Ecovoltaics are ecologically informed photovoltaic (PV) solar energy developments that co-prioritize electricity generation with ecosystem function.¹

Currently, there are over 400 ecovoltaic sites recognized in the United States.²

Most ecovoltaic sites focus on soil and vegetation management to optimize the following ecosystem services: soil health, biodiversity conservation, and crop pollination.

Research at ecovoltaic sites focuses on examining the effects of different seed mixes, management methods, and scale of development on ecosystem service outcomes.

Seed Mixes

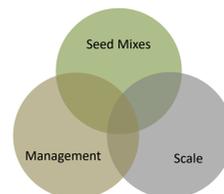
Varies among low diverse (clover-dominated) mixes to high diverse, native-dominated mixes.

Management

Vegetation management includes mowing, selective herbicide applications, and (in some cases) sheep grazing.

Scale

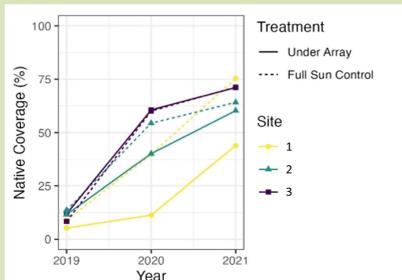
Research conducted at community-scale (1-10 MW) and utility-scale (>10 MW) ecovoltaic sites.



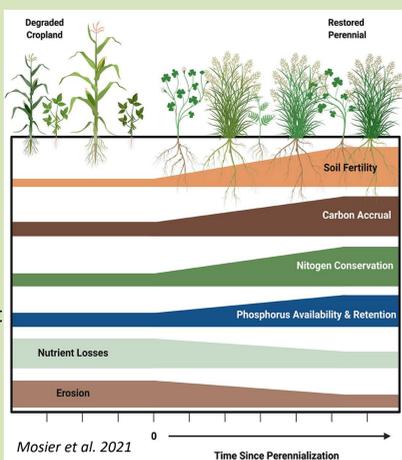
Example ecovoltaic sites in the Midwestern U.S. (credit: Argonne National Laboratory)

Vegetation and Soil Health

Research has documented **increased** native plant coverage (%) and decreasing number of weeds over time at ecovoltaic sites.³ Shade-tolerant species perform best near the PV arrays.

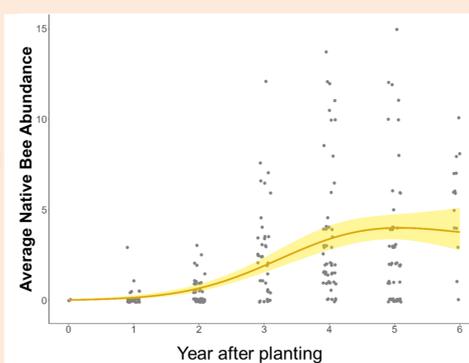


Deep rooting perennial plant species improve a variety of factors important for soil health, including organic matter and nutrient content, soil structure, and microbial activity.⁴ Thus, strategic vegetation management at solar facilities can help promote soil restoration and increase soil related ecosystem services.

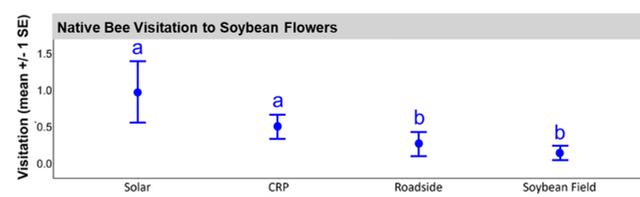


Insects and Pollination

20X increase in native bee abundance in the first 4 years after planting native seed mixes at ecovoltaic sites in the Midwestern U.S.⁵



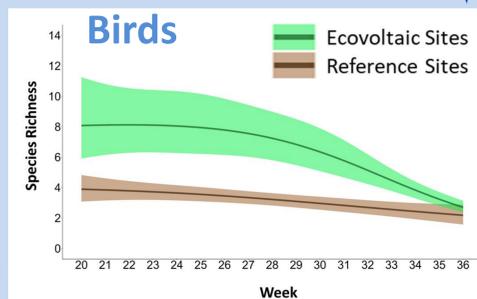
Native vegetation established at ecovoltaic sites has the potential to support a high diversity of native bee species.⁶



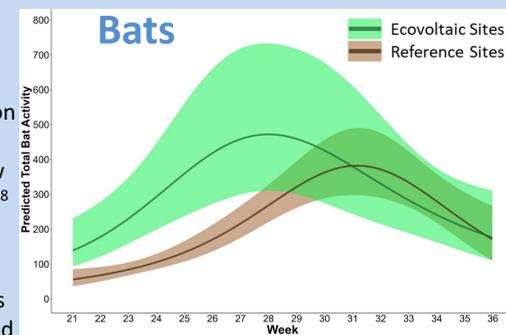
Native bees visited soybean crops near ecovoltaic sites at greater rates compared to other land uses.⁵

Birds and Bats

Greater grassland bird species richness has been observed on ecovoltaic sites in the Midwestern U.S., suggesting that ecovoltaic sites could play an important role in conserving grassland bird populations.⁷



Greater bat activity at ecovoltaic sites early in the season when foraging resources are low in other habitats.⁸



Collectively, this research suggests that properly sited and managed ecovoltaic sites can benefit biodiversity.

Best Management Practices to Optimize Ecovoltaics

- 1. Location, Location, Location!** Construct PV projects on previously-disturbed lands.
This provides the greatest potential to offset impacts and opportunities for ecosystem service net gains
- 2. PV Design & Configuration.** Construct PV panels with sufficient spacing and height for vegetation growth.
Raising the PV panels (>1 m from ground) will allow for greater vegetation diversity
- 3. Seed Mixes.** Select regionally-appropriate seed mixes that perform well in a variety of shaded and unshaded environments.
Native species preferred.
- 4. Management.** Develop and execute a robust vegetation management plan.
Mowing frequency and timing to control weeds and maximize blooms
- 5. Effective communication and adaptive management**

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