Argonne NATIONAL LABORATORY

AVIAN PV SOLAR INTERACTIONS

Addressing outstanding questions by employing standardized observations across multiple U.S. regions

THE CHALLENGE

Solar energy is a low carbon, sustainable resource to generate electricity, but the overall impacts of photovoltaic (PV) solar energy facilities on bird populations remain uncertain. A lack of data on bird interactions with PV facility infrastructure across the U.S. is a fundamental data gap. As PV solar energy development is taking place at an accelerated rate, understanding how birds interact with PV facilities is urgent.

ARGONNE'S SOLUTION

In a project funded by the DOE Solar Energy Technologies Office (SETO), Argonne National Laboratory (Argonne) is conducting a multi-regional study on bird interactions with PV solar energy facilities. Partnering with solar energy companies, environmental consulting firms, and universities, the research team led by Argonne make observations on birds using four methods: field surveys of bird carcasses, video recordings, wildlife photos, and acoustic recordings. These complementary data are being collected at six large-scale PV facilities in six U.S. regions—northeast, mid-Atlantic, midwest, south, inter-mountain, and pacific southwest.

The research team uses this unprecedented dataset to evaluate avian-PV solar interactions, both negative impacts and benefits. Using statistical analysis and other quantitative methods, the study aims to improve our understanding of (a) bird mortality rates and associated causes of fatality, (b) how birds utilize PV facility infrastructure, and (c) bird community species diversity in and around PV facilities. The standardized dataset also allows for the comparison of these phenomena across regions, sites, seasons, and time of day.

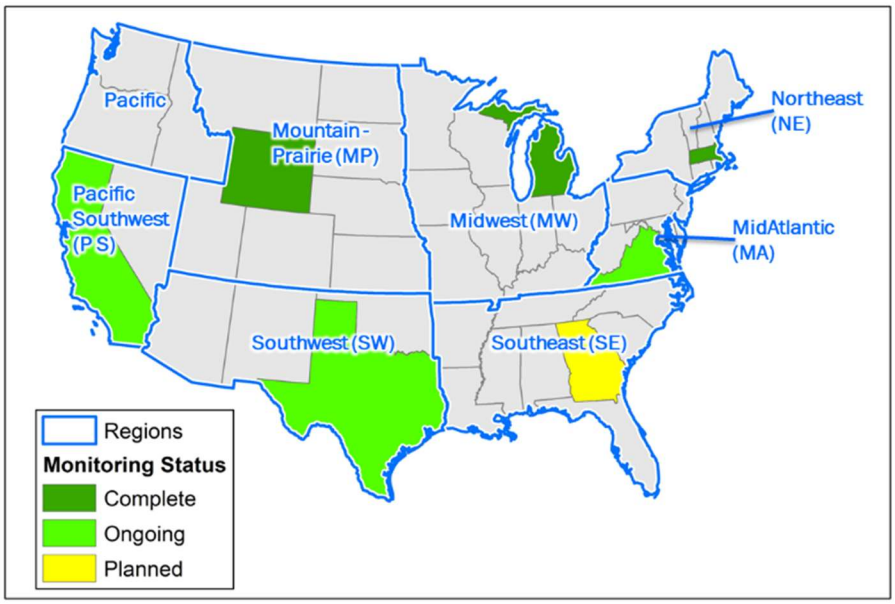
STAY CONNECTED

The progress and findings of the study will be updated on the project website **https://web.evs.anl.gov/aviansolar/**. By signing up for a mailing list, you will receive news and announcements via email.

CONTACT

Lee Walston
Ecologist
Environmental Science Division
Argonne National Laboratory
Email: lwalston@anl.gov

Yuki Hamada
Biophysical Scientist
Environmental Science Division
Argonne National Laboratory
Email: yhamada@anl.gov



Monitoring are being conducted in multiple states in the U.S. (California, Wyoming, Texas, Michigan, Virginia, Massachusetts, and Georgia).

ANTICIPATED OUTCOMES

- Understand the rates, causes, and patterns of bird mortality at PV facilities across U.S. regions.
- Understand bird behaviors relevant for their survival and reproduction that would influence their populations.
- Understand potential risks of PV solar facility infrastructure to birds.
- Inform a broader understanding of avian-PV interactions (both positive and negative), which can be useful in informing siting, design, and best management strategies.

OUTSTANDING QUESTIONS

This 3-year study addresses the following questions:

1. How do avian mortality rates at PV sites vary across U.S. regions? Are the species or guilds of bird carcasses found consistent across region?
2. What are the primary causes of avian fatalities at PV sites? Do these mechanisms vary by region?
3. How do birds behave inside PV sites? How does bird behavior vary by season, time of day, and region? Are there attributes of bird behavior at PV sites correlated with increased mortality?
4. Are patterns of bird abundance and diversity influenced by solar facility infrastructure and vegetation management?

WHAT WE LEARNED SO FAR

Using a standardized monitoring design approved by experts, we have completed the spring and fall monitoring at solar sites in 4 regions—Midwest, Northeast, Mountain-prairie, and Pacific Southwest regions to date.

We observed avian fatalities at most of the sites, but data collected thus far suggested little to no indication of collisions. Many predators were present at some sites mostly at night, such as coyotes, racoons, foxes, and domestic cats.

As anticipated, flying was the most common behavior around solar sites. Perching and walking/running varied by sites. We observed more birds close to panels in the Pacific southwest site in general and the northeast site in spring.

DATA-DRIVEN HYPOTHESES

Earlier in the project, we developed several hypotheses with experts, including:

1. Most fatalities will belong to common generalist bird species.
2. If any waterbird fatalities are detected, most will occur in the southwest.
3. Fatalities will vary by season (more fatalities in spring).
4. Most fatalities will occur at night.
5. Number of fatalities will be associated with onsite predator abundance.
6. Number of fatalities will be related to onsite avian activity and species richness.
7. Birds exhibit behaviors that differ by region.

We revise these hypotheses based on evidence we observed in our data in this study.

MONITORING DATA COLLECTED TO DATE

Region	Video recorded (hrs)	Behaviors extracted (events)	Photos collected (photos)	Acoustic data recorded (hrs)
Mid-Atlantic	1,825	TBD	191,071	1,961
Midwest	2,971	4,567	7,912	373
Mountain-prairie	2,338	305	6,056	253
Northeast	3,809	2,358	4,975	525
Pacific southwest	35,848	1,606	5,147	974
Southwest	2,147	TBD	143,770	1,752
Total	**48,938**	**8,836**	**358,931**	**5,838**