Bat Activity
at Ecovoltaic Sites in the Midwest

Solar Wildlife & Ecosystems
RESEARCH MEETING
NOVEMBER 17-20, 2025 | SCOTTSDALE, AZ
REWI Renewable Energy Wildlife Institute

Argonne NATIONAL LABORATORY

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U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY
SOLAR ENERGY TECHNOLOGIES OFFICE

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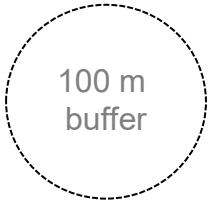
Solar-Biodiversity Research

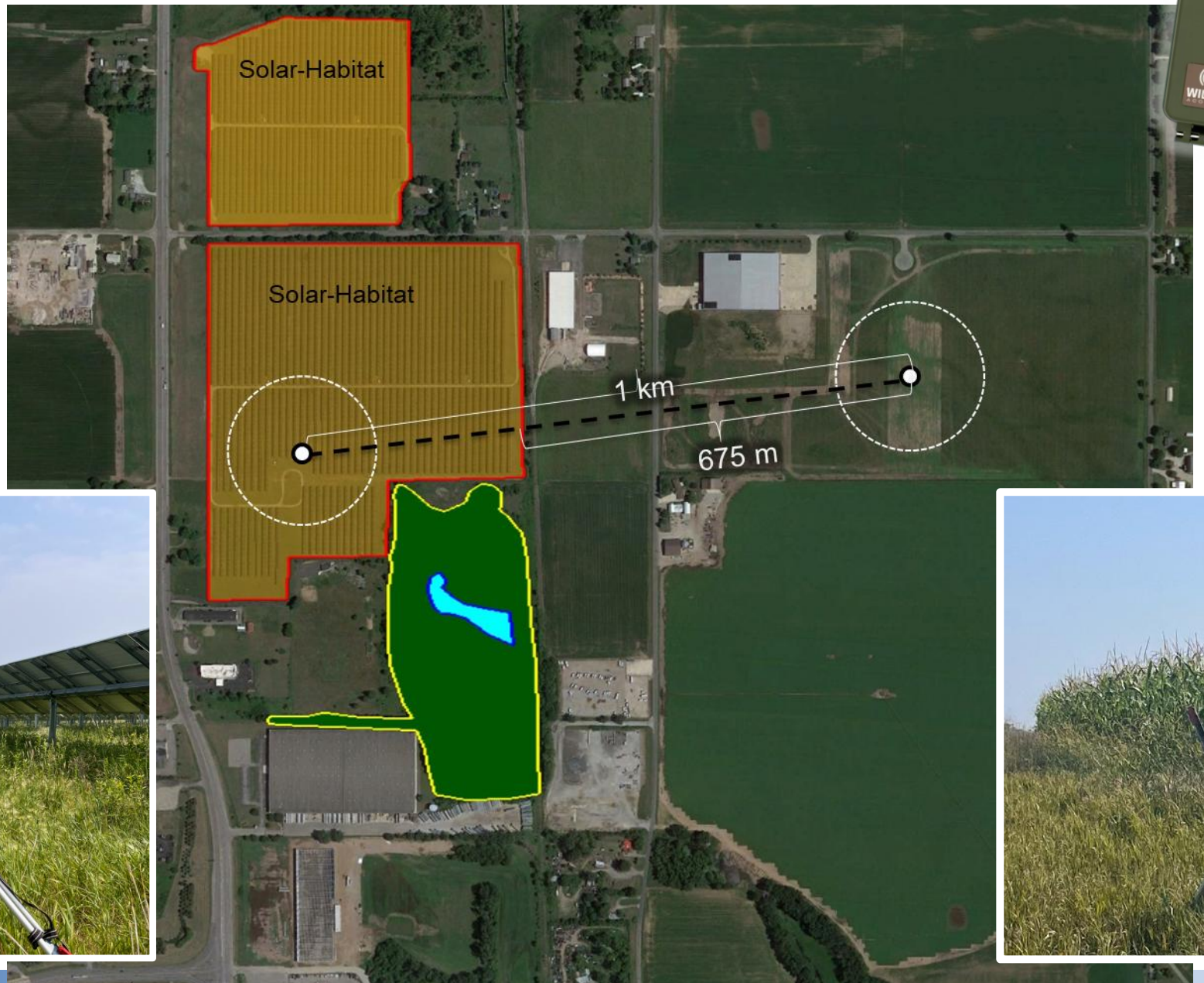
How Do Bat Communities Respond to Ecovoltaic Solar Developments?

Is bat activity greater on ecovoltaic solar sites than offsite reference areas?

Example Site #1

Paired Design:
- Ecovoltaic site
- Reference site



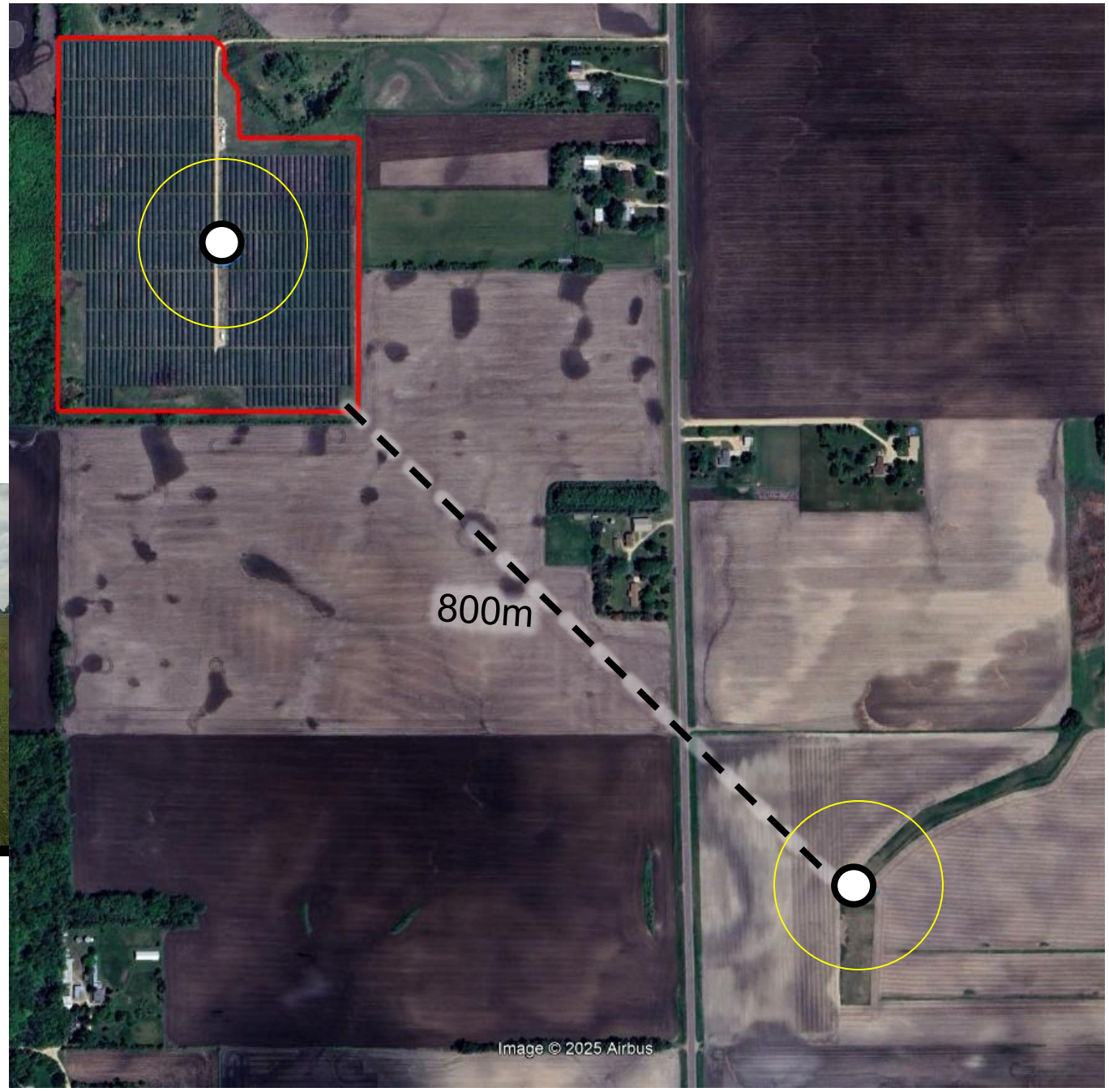


Covariates:
- Agriculture
- Grassland
- Solar-Habitat
- Forest
- Water
- Developed

Example Site #2

ONSITE

OFFSITE



Example Site #3

ONSITE

OFFSITE

AI Tools for Bat Acoustic Monitoring

Bat Software – automatic classifiers for bat species.

Kaleidoscope Pro

WILDLIFE ACOUSTICS

Sonobat

12 ecovoltaic sites, **12** paired reference sites

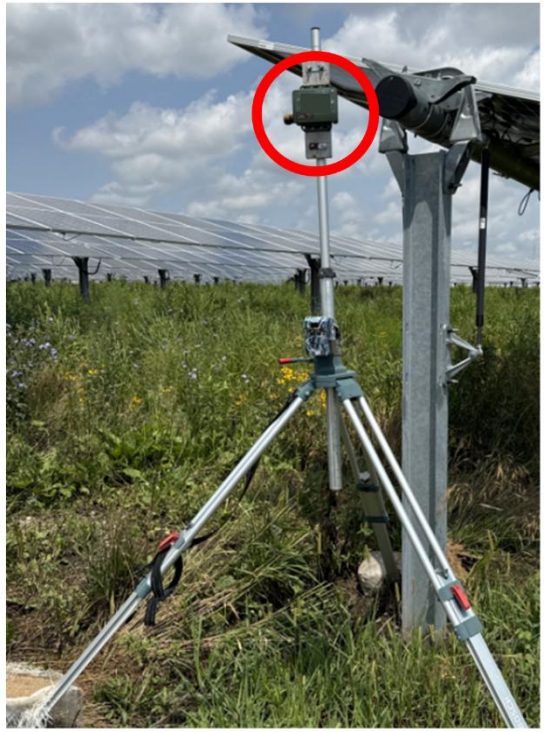
16-week monitoring season (May – Sept)

Is bat activity greater on ecovoltaic sites after accounting for landscape covariates?

Bat Community Responses

>200,000 ultrasonic Recordings

- Full-spectrum ultrasonic WAV files analyzed using 2 automatic classification programs
  - Kaleidoscope Pro
  - SonoBat



Ecovoltaic Site

Reference Site

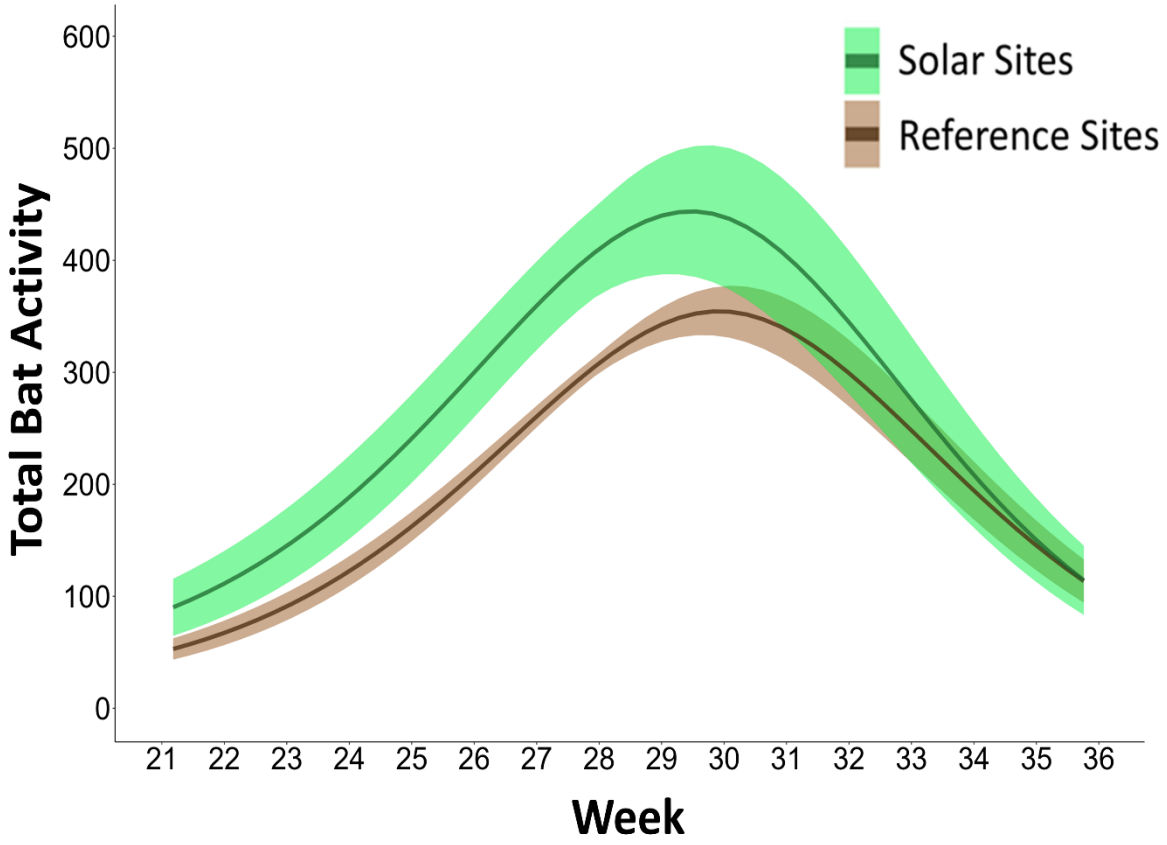
- 2 different analyses: **Total bat activity** and **species-specific activity**

Total Bat Activity

>90,000 total bat detections

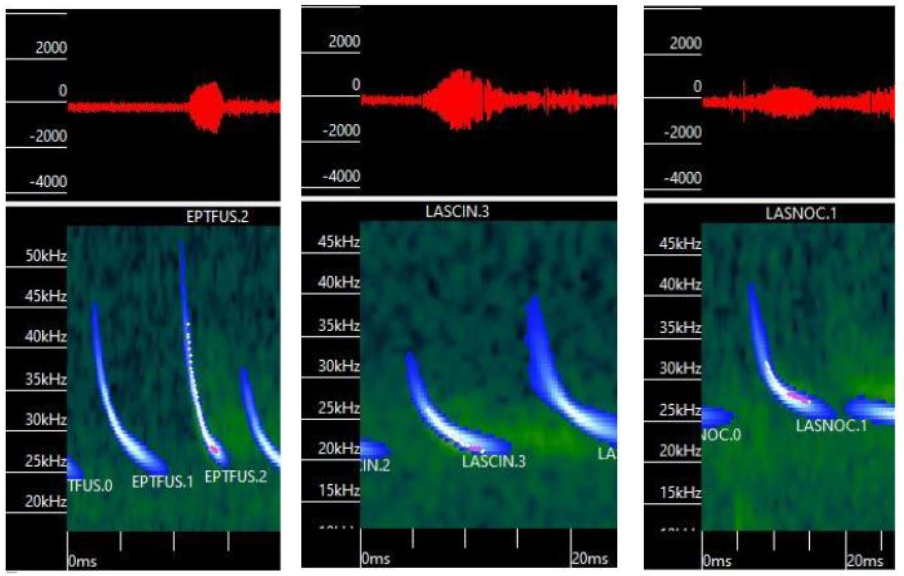
Generalized Additive Mixed Models (GAMM)

Total bat activity (regardless of species) was ~50% greater on ecovoltaic sites in the first half of the season *



* Accounting for site and landscape covariates

Species-specific Bat Activity



Big Brown Bat
(*Eptesicus fuscus*)

Hoary Bat
(*Lasiurus cinereus*)

Silver-haired Bat
(*Lasionycteris noctivagans*)

Hoary bat

Silver-haired bat

Big brown bat

: Bat Conservation International

~20,000 accepted species-specific detections
(filtered to increase confidence in species ID)

3 species regularly detected

Species-specific Bat Activity

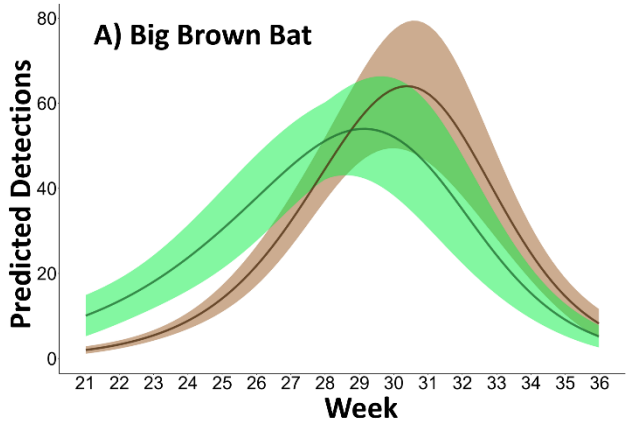
- Species-specific differences in activity
- Some bat species were more active on ecovoltaic sites (Hoary, Big brown)

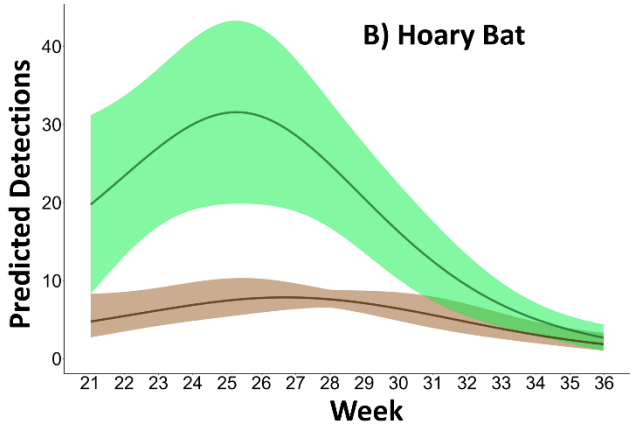
Hoary bat

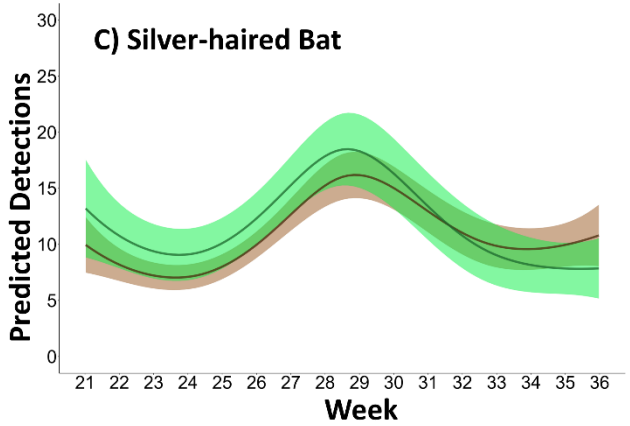
Silver-haired bat

Big brown bat

: Bat Conservation International







Solar Sites

Reference Sites

Bat Conclusions

- Total bat activity (regardless of species) was greater on ecovoltaic sites in the first half of the season
- Species-specific differences in bat responses to ecovoltaic sites
- Bat activity was never greater in reference agricultural fields

Bats in the Midwestern U.S. do not avoid ecovoltaic solar sites. Rather, they may be attracted to these sites early in the season (May-June) when resources are limited in the surrounding landscape

ELSEVIER

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Bat activity at ecovoltaic solar energy developments in the Midwestern United States

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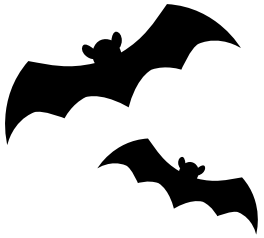

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