Feathers from deceased birds help scientists understand new threat to avian populations

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A working turbine at a wind energy facility in Northern California. Credit: Todd Katzner

As concerns over the world's declining bird population mount, animal ecologists have developed an analytical approach to better understand one of the latest threats to feathered creatures: the rise of wind and solar energy facilities.

"Bird mortality has become an unintended consequence of renewable energy development," said Hannah Vander Zanden, an assistant professor of biology at the University of Florida. "If we want to minimize or even offset these fatalities, especially for vulnerable populations, we need to identify the geographic origin of affected birds. In other words, are the dead birds local or are they coming from other parts of North America?"

Birds can be killed when they collide with wind turbines, fly into solar panels they mistake for bodies of water, or become singed by the intense heat from concentrating solar power plants. While the death rate of birds due to these energy facilities is far less than deaths due to domestic cats and collisions with building, efforts to mitigate this problem is important, scientists say.

Vander Zanden and colleagues performed geospatial analyses of stable hydrogen isotope data obtained from feathers of 871 individual birds found dead at solar and wind energy facilities in California, representing 24 species.

Their analysis of natural-occurring markers in the feathers provided information about where the feathers were grown based on the water the birds consumed.

"With these markers, we could determine whether the bird was local or if it was migrating from somewhere else," said Vander Zanden, who is the principal investigator of UF's Animal Migration and Ecology Lab.

Results from the study, published in *Conservation Biology*, show that the birds killed at the facilities were from a broad area across the continent. Their geographical origins varied among species and included a mix of local and nonlocal birds.

Researchers found most birds killed at solar facilities were nonlocal and peaked during the migratory periods of April and September through October. The percentage of migratory birds found at wind facilities nearly matched that of local birds, at 51%, Vander Zanden said.

"This kind of data can help inform us about best strategies to use to minimize or mitigate the fatalities," she said. "For example, facilities management could work with conservationists to improve the local habitat to help protect local birds or improve other parts of the species' range where the migratory birds originate."

The results also illustrate the power of stable isotope data to assess future population growth or decline patterns for birds due to a variety of reasons.

"Studying the remains of animals is a noninvasive approach to get information that is otherwise hard to track and apply to conservation," Vander Zanden said. "It's a great way to understand the mysteries about animals."

More information: The geographic extent of bird populations affected by renewable-energy development, *Conservation Biology* (2024). DOI: 10.1111/cobi.14191

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