Wind Wildlife Research Fund

RESULTS SUMMARY

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Bat Activity Rates Do Not Predict Bat Fatality Rates at Wind Energy Facilities

A study supported by the Wind Wildlife Research Fund investigates the relationship between pre-construction bat acoustic activity and post-construction bat fatality rates at wind energy facilities to evaluate the effectiveness of using pre-construction acoustic activity monitoring to assess collision risk for bats from operational wind farms.

Studies have found wide variation in bat fatality rates at wind energy facilities in North America.[1] Assessing collision risk to bats in an area before building a new facility is an important component of the siting and development of any wind energy project, and conducting bat acoustic activity monitoring using echolocation surveys has been standard practice for baseline wildlife assessments.[2] The assumption has been that sites with relatively low pre-construction bat acoustic activity rates yield relatively low post-construction fatality rates (i.e., low risk), and that higher pre-construction acoustic activity rates correlate with higher post-construction risk. However, this relationship has been called into question,[3] highlighting that the factors driving the variation in bat fatality rates remain largely unknown. The goal of this project was to pair pre-construction bat acoustic activity surveys with fatality estimates from the same wind facilities to evaluate the ability of pre-construction acoustic activity to predict post-construction collision risk.

The full paper is published in the journal *Acta Chiropterologica* and is available online.

ABOUT THE STUDY DESIGN

The research team tested the hypothesis that bat acoustic activity rates measured prior to wind energy facility construction predict bat fatality rates after turbines become operational. The team compiled pre-construction bat acoustic activity rates and post-construction bat fatality rates collected between 2006 and 2018 for 52 wind energy facilities across the U.S. and Southern Alberta, Canada. Most of the studies in the dataset were performed by the same research team and used standardized sampling methodology. A majority of the bat species found as fatalities at wind turbines have low frequency calls; therefore, the research team analyzed low-frequency bat species separately from high-frequency bat species. Researchers also evaluated whether microphone position (ground vs. raised) accounted for differences in pre-construction measurements of bat activity. Further, the season during which the data were collected was carefully considered in order to account for differences in bat activity during different seasons. Finally, the team examined the relationship between post-construction acoustic activity and fatality rates at the same operational wind energy facilities.

KEY TAKEAWAYS

- Bat acoustic activity rates (based on echolocation surveys) prior to wind facility development did not predict bat fatality rates at operational wind energy facilities.
- Although the timing of peak bat acoustic activity rate (fall) and peak fatality rates are highly correlated, fall acoustic activity rates were not predictive of fatality rates at an individual wind facility.
- Bat acoustic activity at operational wind facilities (i.e., post-construction) was not correlated with bat fatality rates recorded during the same time period.
- Bat acoustic activity rates may be too variable to serve as a reliable predictor for bat fatality rates at wind facilities.

NEXT STEPS

- According to the results of this study, pre-construction bat acoustic activity surveys do not predict risk to bats during wind energy facility operation. Researchers and wind energy developers therefore should investigate other strategies to predict bat collision risk.
- Correlating individual species' acoustic activity rates with its fatality rate estimates may reveal species-specific relationships that are obscured by the inclusion of multiple species.
- Implementing a species-specific approach to predicting bat collision risk is supported by fatality data and results from minimization studies that indicate considerable variation among bats in behavior affecting risk.

ADDITIONAL ANALYSIS

In addition to the main objective of the study detailed above, the investigators used data from a subset of paired studies that collected both pre- and post-construction acoustic activity levels to investigate a hypothesis posited by some wind-wildlife researchers that bats may be attracted to wind turbines, and therefore activity (and, possibly, collision risk) increases at wind energy facilities post-construction. Although the sample size was limited (only four facilities collected the data required for this analysis), the data showed that bat acoustic activity increased between the final year of pre-construction and the first year of post-construction at all four facilities during all four seasons. However, much more statistically robust analyses would need to be conducted to truly test this hypothesis.

[1] American Wind Wildlife Institute (AWWI). 2018. AWWI Technical Report: A Summary of Bat Fatality Data in a Nationwide Database. Washington, DC.

[2] U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines. 2012. https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf.

[3] Hein, C, J Gruver, E Arnett (2013). Relating Pre-construction Bat Activity and Post-construction Bat Fatality to Predict Risk at Wind Energy Facilities: A Synthesis. DOI: 10.13140/RG.2.1.2884.7765.