Bats and Wind Turbines: Risk and Solutions

Information about new study in *Biological Conservation*

A new study[1] models the impact of wind turbines on a certain bat species. What are the study's findings, what do we know about bats and wind energy, and what is the outlook for conserving bats while developing wind energy?

Bat fatalities at wind turbines are a known occurrence. What is new about the study is the attempt to put those impacts in the context of populations of one species. The study warns that wind energy development may pose a substantial threat to migratory bats in North America and that conservation measures are therefore needed.

- The study is the first to examine whether wind turbines could have population-level impacts on bats and focuses on the bat species most frequently killed by wind turbines in North America, the migratory, tree-roosting Hoary Bat.
- Basic population data is lacking for the Hoary Bat and other migratory tree-roosting bats, which are much more difficult to count than bats that hibernate in caves. The study therefore models estimated population levels for the species.
- The study then models the impacts of wind turbines on the species over a range of 100 years, based on fatality data at wind turbines in North America from 2000-2011. The modeling assumes that wind energy installations and associated fatality rates of hoary bats are held constant at the level of 2014, and assumes no mitigation.
- The authors find that, under those assumptions, the Hoary Bat population could decline by as much as 90% in 50 years if the initial population size is near 2.5 million bats and the bat reproduction rate is the same, slow rate as for other similar bat species.
- In next steps, further studies plan to also model assumptions that account for continued build-out of wind energy facilities, and for the decrease in fatalities resulting from minimization and mitigation measures.

The conservation and wind energy community have anticipated the challenge and are working on effective solutions

- Bat fatalities at wind turbines have long been a concern even though the extent of potential impacts on certain bat populations has been unclear.

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[1] W.F. Frick et al. February 2017 "Fatalities at wind turbines may threaten population viability of a migratory bat," *Biological Conservation* 209. Co-authors include Erin Baerwald of the Department of Biological Sciences of the University of Calgary who co-authored the study as part of her work at the University of Calgary. Dr. Baerwald is also, since 2015, a post-doctoral fellow with the American Wind Wildlife Institute (AWWI). Support for the study was provided by the US Fish and Wildlife Service Region 3 and by the National Science Foundation and Natural Sciences and Engineering Research Council of Canada. The study is online at http://www.sciencedirect.com/science/article/pii/S0006320716310485.

- Bat Conservation International (BCI), the wind energy industry, and government agencies have therefore been collaborating through the Bat and Wind Energy Cooperative (BWEC), and continue to work together on research and programs to better understand risk and to avoid and reduce such fatalities. BCI and BWEC's work spans pre-construction and post-construction surveys, operational mitigation, and expert participation in verification of deterrence technologies. See http://www.batsandwind.org/
- The good news, mentioned in the study itself, is that such collaboration has already identified at least one conservation method - curtailment under high risk conditions - that can reduce bat fatalities by 44-93% according to the study while minimizing impact on power generation. Research continues to further refine and improve the effectiveness of this mitigation technique.
- In 2015, building on several years of collaborative research, the wind energy industry announced a best management practice establishing a new voluntary operating protocol to reduce impacts to bats from operating wind turbines.
- Looking forward, the community continues to work to:
    - Better understand the risk to bats from operating wind turbines,
    - Further refine existing operational mitigation techniques,
    - Identify additional solutions to avoid and minimize impacts from wind turbines,
    - Support effective implementation of solutions in order to conserve bats while expanding wind energy development.

The Bat Initiative of the American Wind Wildlife Institute

- The American Wind Wildlife Institute (AWWI) in 2015 launched a new Bat Initiative to get the conservation on the ground and leverage AWWI's scientific, data-driven, and collaborative approach. In addition to its conservation, agency, and wind energy partners, AWWI collaborates with BCI and BWEC to leverage resources, ensure there is no duplication of efforts, and take advantage of mutual expertise.
- The AWWI Bat Initiative is specifically designed to:

    1. improve risk and impact assessment of bats at wind energy facilities, and
    2. verify the effectiveness of detection and deterrence technologies,

    thereby helping avoid and minimize impacts.
- To develop a more accurate and comprehensive impact assessment, AWWI has assembled one of the largest databases of public and private data, the American Wind Wildlife Information Center (AWWIC) and has begun detailed analysis of collision fatalities across North America.
- To better understand and predict risk, AWWI will determine whether there are environmental variables (such as weather, or landscape features) that explain the large variation in fatalities of migratory tree bats recorded at wind energy projects. Initially based on data from Canada, the research will produce Species Distribution Models that predict fatality risk within the area of analysis.

- To verify the effectiveness of detection and deterrence technologies, AWWI has established a Technology Verification program to catalyze rigorous, independent field testing of promising technologies. AWWI pools resources and expertise from technology vendors, wind energy companies, independent scientists, and others, and coordinates transparent evaluations of these technologies in the field. Detect and deter technologies, in addition to curtailment strategies, could prove a valuable tool in the toolbox for bat conservation.

Could Bats and Wind Energy Become a Big Conservation Success Story?

- The new study illustrates in stark terms the need for - and the value - of research to reduce the impacts of wind turbines on migratory bats. The good news, mentioned in the study itself, is that such collaborative work has already yielded at least one conservation method that can reduce bat fatalities by 44-93% while minimizing impact on power generation. See study Discussion at p. 176.
- Migratory, tree-roosting bats like the Hoary Bat have long been common and taken for granted. Little is known about these bats. As we seek to understand wind energy's impacts on these species, we will also learn more about these bats, their biology and behavior, other threats that they face including habitat loss, climate change, persecution, and ecotoxins (such as pesticides), and how to conserve the bats most at risk.
- If collaborative research and implementation efforts are sustained, and succeed in protecting bat populations through informed siting, minimization and mitigation, as wind energy continues to be developed, bats and wind turbines could perhaps become one of the most successful conservation stories in North America.

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For more information see: Bats and Wind Energy Issue Brief

https://awwi.org/wp-content/uploads/2016/06/Issue-Brief_Bats-May-2016.pdf

American Wind Wildlife Institute: The Power of Science, the Voice of Collaboration

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