

REDUCING BAT FATALITIES AT WIND TURBINES WITH DIM SUPPLEMENTAL LIGHTING

Background. Industrial wind turbines are causing accidental fatalities of bats in unprecedented numbers. The magnitude of this problem may threaten the persistence of ecologically important species, and widespread bat fatalities are becoming increasingly problematic to wind energy development. A common characteristic of bats that die most often at wind turbines is that they live in trees and it is possible they approach turbines after mistaking them for trees.

Although bats are most famous for their ability to detect and eat insects in darkness using sound, they rely on their vision for navigating across nighttime landscapes. Bats also use vision to find roosts in trees and when approaching other large structures. Moreover, bats can see extremely dim light in the ultraviolet (UV) part of the spectrum, which most humans and birds cannot.

Considering that bats might mistake wind turbines for trees and that bats can see dim light in parts of the spectrum that other animals cannot, there may be ways of reducing bat fatalities at wind turbine with dim UV light. Currently, bat fatalities can be reduced by curtailing wind turbine operation at the cost of energy production, but even under such management fatalities remain high and more reliable, efficient, and financially predictable fixes are needed.

Abstract. The present invention is directed to a system, method, and apparatus for dimly illuminating wind turbines with flickering UV light at night as a means of preventing bats from approaching wind turbines and reducing or preventing bat fatalities. The system includes mounting one or more UV illuminators on turbine nacelles (machinery enclosures atop the monopole tower) and illuminating surfaces of the turbine monopole and blades with dim ($1 \mu\text{w}/\text{cm}^2$), flickering UV light (365nm peak wavelength) that is invisible to human observers and is not likely visible to birds. Preliminary tests demonstrate that the types of bats most affected by wind turbines can see this type of dim illumination and that it works to reduce activity of bats in natural settings.

Opportunity. Scientists with USGS, University of Hawaii at Hilo, and Bat Research and Consulting are looking for an industry partner interested in helping to test this new method of potentially reducing bat fatalities at wind turbines. The work must occur at a wind facility experiencing high numbers of bat fatalities because this will increase the chances of experimentally detecting an effect of UV illumination should one exist. Wind turbines ≤ 80

m tall will also ensure good ground-based behavioral observations in response to UV.

This work will progress in two stages: *Stage 1* will involve equipping 1 wind turbine with illuminators during the late summer of 2015 and observing the effects of illumination through video monitoring during a short, 10-day observation period. If this first stage reveals promising results, such as reductions in bat activity near turbines and no adverse effects, we will progress to the next stage. *Stage 2* will involve equipping 20 to 26 turbines with illuminators for a longer, 75 to 90-day experimental trial during the summer and autumn of 2016. This experiment will determine whether dim UV illumination reduces bat activity and fatality, as measured by video monitoring and daily ground searches beneath the turbines.

Aside from providing site access and logistical support equipping turbines with UV illuminators, financial support and permitting for the research is not expected from industry partners. Research would be completed under a USGS Technical Assistance Agreement.

Keywords

- bats
- deterrents
- energy development
- wind turbines
- wildlife

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This technology is jointly owned by USGS, University of Hawaii at Hilo, and Bat Research and Consulting. It is protected under US patent application 61/091,257. The USGS is looking for a partner to further the testing of this technology at an operational wind energy facility. Interested parties should contact:

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