A smart curtailment approach for reducing bat fatalities and curtailment time at wind energy facilities
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facilities

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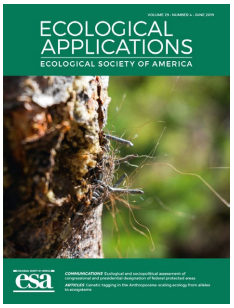
Abstract

The development and expansion of wind energy is considered a key global threat to bat populations. Bat carcasses are being found underneath wind turbines across North and South America, Eurasia, Africa, and the Austro-Pacific. However, relatively little is known about the comparative impacts of techniques designed to modify turbine operations in ways that reduce bat fatalities associated with wind energy facilities. This study tests a novel approach for reducing bat fatalities and curtailment time at a wind energy facility in the United States, then compares these results to operational mitigation techniques used at other study sites in North America and Europe. The study was conducted in Wisconsin during 2015 using a new system of tools for analyzing bat activity and wind speed data to make near real-time curtailment decisions when bats are detected in the area at control turbines ($N = 10$) vs. treatment turbines ($N = 10$). The results show that this smart curtailment approach (referred to as Turbine Integrated Mortality Reduction, TIMR) significantly reduced fatality estimates for treatment turbines relative to control turbines for pooled species data, and for each of five species observed at the study site: pooled data (–84.5%); eastern red bat (*Lasiurus borealis*, –82.5%); hoary bat (*Lasiurus cinereus*, –81.4%); silver-haired bat (*Lasionycteris noctivagans*, –90.9%); big brown bat (*Eptesicus fuscus*, –74.2%); and little brown bat (*Myotis lucifugus*, –91.4%). The approach reduced power generation and estimated annual revenue at the wind energy facility by ≤ 3.2% for treatment turbines relative to control turbines, and we estimate that the approach would have reduced curtailment time by 48% relative to turbines operated under a standard curtailment rule used in North America. This approach significantly reduced fatalities associated with all species evaluated, each of which has broad distributions in North America and different ecological affinities, several of which represent species most affected by wind development in North America. While we recognize that this approach needs to be validated in other areas experiencing rapid wind energy development, we anticipate that this approach has the potential to significantly reduce bat fatalities in other ecoregions and with other bat species assemblages in North America and beyond.

Citing Literature



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