

Why wind turbines can mean death for bats

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Power-generating wind turbines have long been recognized as a potentially life-threatening hazard for birds. But at most wind facilities, bats actually die in much greater numbers. Now, researchers reporting in *Current Biology*, a Cell Press journal, on August 26th think they know why.

Ninety percent of the bats they examined after death showed signs of internal hemorrhaging consistent with trauma from the sudden drop in air pressure (a condition known as barotrauma) at turbine blades. Only about half of the bats showed any evidence of direct contact with the blades.

"Because bats can detect objects with echolocation, they seldom collide with man-made structures," said Erin Baerwald of the University of Calgary in Canada. "An atmospheric-pressure drop at wind-turbine blades is an undetectable—and potentially unforeseeable—hazard for bats, thus partially explaining the large number of bat fatalities at these specific structures.

"Given that bats are more susceptible to barotrauma than birds, and that bat fatalities at wind turbines far outnumber bird fatalities at most sites, wildlife fatalities at wind turbines are now a bat issue, not a bird issue."

The respiratory systems of bats and birds differ in important ways, in terms of both their structure and their function. Bats' lungs, like those of other mammals, are balloon-like, with two-way airflow ending in thin flexible sacs surrounded by capillaries, the researchers explained. When

outside pressure drops, those sacs can over-expand, bursting the capillaries around them. Bird lungs, on the other hand, are more rigid and tube-like, with one-way circular airflow passing over and around capillaries. That rigid system can more easily withstand sudden drops in air pressure.

The majority of bats killed at wind turbines are migratory bats that roost in trees, including hoary bats, eastern red bats, and silver-haired bats. While little is known about their population sizes, the researchers said, those deaths could have far-reaching consequences.

Bats typically live for many years, in some cases reaching ages of 30 or more. Most also have just one or two pups at a time, and not necessarily every year. "Slow reproductive rates can limit a population's ability to recover from crashes and thereby increase the risk of endangerment or extinction," said Robert Barclay, also at the University of Calgary, noting that migrating animals tend to be more vulnerable as it is.

All three species of migratory bats killed by wind turbines fly at night, eating thousands of insects—including many crop pests—per day as they go. Therefore, bat losses in one area could have very real effects on ecosystems miles away, along the bats' migration routes.

Baerwald said there is no obvious way to reduce the pressure drop at wind turbines without severely limiting their use. Because bats are more active when wind speeds are low, one strategy may be to increase the speed at which turbine blades begin to rotate during the bats' fall migration period.

Source: Cell Press

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