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Wind turbines are taking toll on bats

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ATLANTIC CITY - The major ecological concern when five wind turbines were built here several years ago was whether they would kill migrating birds.

They have, including two ospreys and a peregrine falcon. But as it turns out, it isn't the death of birds that is drawing the most attention. The real casualty is bats.

The New Jersey Audubon Society is halfway through a three-year study on the impact of the turbines, and so far twice as many bats as birds have died.

David S. Mizrahi, the society's vice president of research and monitoring, said preliminary estimates show the turbines have killed 30 birds and 60 bats in 18 months of observation.

While Mizrahi is still trying to answer the key question - how many bats die compared with how many are exposed to the spinning blades? - many other wind turbine locations in the U.S., Europe and Canada are filing similar reports.

Many are migrating bats, and the peak number of deaths is in early autumn, although some species found dead are not even known to migrate. Little is known about bat migrations, and this could stand in the way of a solution.

Most of the dead are species that roost in trees. Many are insect eaters that benefit humans by eating mosquitoes and crop-eating pests.

"We really need them around. I think bats are a very important factor to the ecology in general," said Jim Cramer of the U.S. Fish and Wildlife Service field office in Pleasantville.

The main ones dying in this region are the hoary bat and Eastern red bat. The silver-haired, little brown and big brown bats are also at risk, though they tend to migrate farther inland. The eastern pipistrelle has also been found dead at turbines, though it's unknown whether this species even migrates. So far, there has not been a problem with the endangered Indiana bat.

With more turbines proposed, including several wind farms off the New Jersey coast and two systems taller than 400 feet expected to go on line at the U.S. Coast Guard base in Cape May in 2011, wildlife officials want answers.

"This is so new, we probably haven't begun to discuss all the ramifications. We're very much in favor of wind energy but we have a responsibility to be concerned about birds and bats," said Cramer.

The first question to answer is why do bats die at turbines. The blades spin at speeds of 160 miles per hour but bats, with their unique echolocation system used to hunt down moving prey, are pretty good at avoiding collisions. Dead birds are often found under skyscrapers and other tall structures while dead bats are rarely discovered.

Indeed, a Canadian study showed half of the dead bats avoided the turbine blades. The study, led by Erin F. Baerwald of the University of Calgary, found that 90 percent of the fatalities are from internal hemorrhaging, mostly of the lungs.

The study blamed barotrauma (the "baro" part of the name comes from barometric pressure) because the spinning blades create zones of low pressure. Bats entering these zones may be suffering decompression symptoms similar to "the bends" scuba divers get.

Birds' lungs can withstand the sudden drop in pressure, and most of their deaths are due to collisions. Bats are mammals with more sensitive respiratory systems that can not take the change in pressure: Their lungs expand too much, and their capillaries burst.

When Baerwald did necropsies on bats, she found lung injuries that included pulmonary hemorrhaging, ruptures of alveolar walls, lesions, edema, congestion and lung collapse. About half the bats showed collision damage but much of that may have come after barotrauma.

The largest pressure differential is at the tips of the blades, and it increases with blade speed. The pressure drop from large commercial turbines is higher than the known rate that kills Norway rats in laboratory experiments.

There are still more questions than answers, and many revolve around bat migrations. New Jersey wants to put wind farms off shore, but are their bats migrating there?

Mizrahi said birdwatchers at the Avalon Sea Watch often see red bats coming in from the ocean, possibly on a migratory route from New England.

"They could be blown off shore by winds, or are using the sea as a migration corridor. We don't know," said Mizrahi.

Another concern is migrating bats may take advantage of the same high-wind corridors that are ideal for wind turbines.

Answers could help mitigate the impacts, a topic the Fish and Wildlife Service is already discussing with the Coast Guard. It could be as simple as preserving bat habitat, such as caves and abandoned mines, or as complex as adjusting the speed of the blades.

"My hope is we'll find a way to be able to use turbines and reduce mortality rates," Cramer said.

With bats in the Northeast already suffering from a mysterious disease called "white-nose syndrome," wildlife officials want to make sure wind turbines don't make matters worse.

Vice President Paul Gallagher of the Atlantic County Utilities Authority, which put up the five 1.5-megawatt turbines here, said they could be turned off at key times. Gallagher noted 31 bats died here during one four-day period in September 2007.

"It makes sense just to shut them down for that time period," Gallagher said.