WINDMILLS STILL KILLING BATS

By Peter Shoenfeld

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Massive bats kill occurred in 2003 and 2004, at the Mountaineer Wind Energy Center (MWEC) on Backbone Mountain in Tucker County. In 2003, dead bats were collected between August 18 and September 30. This resulted in a projection of around 2000 bats killed during that period, with a 90% upper confidence limit of 4000. This author worked on those projections. The species most often found were the Red Bat, Hoary Bat, and Eastern Pipistrelle. These are all migratory forest bats, and the recorded fatalities occurred during their migration period.

The 2003 event was severe enough to threaten the future of wind energy in the Appalachian region. For this reason, a major scientific research project was initiated, with goals of both understanding and preventing or mitigating future bat kills. This is the mission of the Bats and Wind Energy Cooperative (BWEC), formed in 2003 by Bat Conservation International (BCI), the US Fish and Wildlife Service, the American Wind Energy Association (AWEA), and the National Renewable Energy Laboratory of the US Department of Energy (NREL). The project is led by Ed Arnett and Dr. Merlin Tuttle, of BCI, and has an initial three year timeline. Their website is http://www.batcon.org/home/default.asp

The first year(s initial review and field work phase of BWEC(s study has been completed. While analysis is still pending, there is evidence for some important conclusions:

- Massive bat kills appear probable whenever wind farms are sited on forested Appalachian ridges using current technology
- The kill rate appears to be weather dependent, which suggests the possibility of mitigation by simply shutting turbines down at critical times.
- The bats appear to actually be attracted by the spinning blades and the deaths are caused by collision with them. This suggests the possibility of mitigation by some alteration to blade design.
- Much more work is needed and planned..

BWEC conducted fieldwork last summer both on Backbone Mountain and at the nearby Meyersdale, PA facility, using a common mortality search protocol. Development, standardization, and validation of these protocols was a major objective of the first year(s effort. The fieldwork also included radar and infra-red imager data collection. Initial results were presented at NWCC Wildlife Research Meeting V on November 3. This author and Frank Young of the Highlands Conservancy attended.

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A full research report is expected in February, 2005. The first year's emphasis is largely on methodology. Here is a digest of what was reported:

- Greg Johnson of Western Ecosystems Technology, Inc. (WEST) presented a review of existing studies. Bat mortality estimates have been made for 12 projects. Three of these projects (Buffalo Mountain, TN, Meyersdale, PA, and Backbone Mountain, WV) are on Appalachian ridgetops, and showed very high projected bat mortality. The problem appears to be worse at Backbone and Meyersdale, both of which are heavily forested and proximate, than at Buffalo Mountain, which is reclaimed strip mine land several hundred miles away. The other nine projects are on un-forested land at mid-western and western US locations of varying topography. None of these showed high bat mortality.

Dr. Tuttle has offered opinions that very high mortality should be expected at wind farms built on forested, Appalachian ridge tops, and that major mortality may not be limited to the migration season.

Wally Erickson of WEST led the mortality protocol development. Since it is not possible to find all the bats that have been killed, a protocol is needed to support estimation of total numbers killed from the lesser numbers actually found.

Another objective is to identify and quantify environmental, temporal, geographic and operational factors that contribute. Failure to consider significant factors can lead to estimates that are biased, i.e., inaccurate. Too small sample sizes can lead to estimates that are very rough. A good protocol will successfully address these problems without increasing cost unnecessarily. The 2003 MWEC avian study protocol had limitations in these areas, and additionally was focused on birds, not bats.

The new protocol is better thought out, calls for more frequent and intensive searches, and has better bias removal. More specifically, daily rather than weekly searches were often used, and sample sizes over 200 (vs. 30 in 2003) were used in testing the percentage of carcasses that searchers were likely to find. Preliminary mortality results were reported by Erickson for Meyersdale, and for Backbone by Jessica Kerns of the University of Maryland Center for Environmental Science Appalachian Laboratory. Searches were conducted for six weeks, through August and the first two weeks in September. Here are some preliminary findings:

- 466 dead bats were found at Backbone (44 turbines) and 290 at Meyersdale (20 turbines). More analysis is needed to derive projections of actual numbers killed, or to compare these with those for 2003. Suffice it to say that what happened in 2003 has happened again in 2004, and that the quantification, when completed, should be better.
- There appears to be a greater than random day-to-day variation in numbers killed. Weather dependence has been suggested, with lower risk on windier nights. The evidence for this is greatly strengthened by strong correlation between daily numbers killed at Backbone and at Meyersdale.
- Males are more vulnerable than females.
- The presence of lights or anemometers makes no significant difference.

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- One turbine at Backbone was in a non-operational, free-wheeling, blades-feathered status throughout the test period. No fatalities were recorded there vs. an average of around 10 per turbine at the others.

The apparent dependence on weather and turbine status suggests a ray of hope for a practical, low-tech fix. To the extent that the kills occur. principally at predictable times or turbines, they can be eliminated by just shutting down the right units at the right times.

The loss in revenue will depend on the sharpness of these predictions. More analysis and certainly much more data will be needed to see how this theory holds up.

Radar studies were reported by Brian Cooper of ABR, Inc. Radar is used for determining the actual numbers of birds and bats passing through an area, and establishing relationships between numbers present, exposed and killed. Since radar can not distinguish birds from bats, supplemental observation with night vision goggles were used to establish ratios. Radar data were collected at Backbone, but not at Meyersdale, and at two other Pennsylvania sites (Casselman and Martindale). This work has not yet progressed to the point of suggesting strong conclusions.

The infra-red imaging studies were reported by Jason Horn of Boston University. This technology shows exciting promise for this work. Flights of bats, birds, and insects are all recorded in video, but can be distinguished. Video recordings of 303 actual bat flights through the turbine sweep zones at Backbone were obtained. From these it appears that the bats are attracted to and investigate both moving and non-moving turbine blades, that they seek to avoid the moving blades, and that they are generally, but unfortunately not always, successful.