

Bats and Wind Energy 101

- Overview of issue of bats and wind turbines
- California bats
- Bats and wind in California



Photo by E. Pierson

Bat Mortality at Wind Farms

- Mortality first documented in Australia
- Bat fatalities have been recorded at wind facilities in Europe and North America (both US and Canada)
- 2003/2004 – bat fatalities at Mountaineer in W. Virginia hit the news
 - BWEC formed
- 2005 – Summerview in Canada
 - not just a problem of forested ridgetops

What species?

- 11 bat species, out of the 45 that occur north of Mexico, have been found as fatalities at wind farms
 - migratory tree bats
 - (hoary, red and silver-haired)
 - Mexican free-tailed bats
 - Eastern pipistrelle
 - Little brown bat

Why?

- Number of hypotheses proposed in Kunz et al 2007
- Taller turbines?
- More of them on the landscape
- Cryan 2007 flocking and mating hypothesis

Pre-construction surveys

- Goals
 - Determine species occurrence and diversity
 - Activity levels
 - Need to account for daily, seasonal, and year-to-year variability
 - Potential migration routes
- Need to focus on questions that will allow us to link pre-construction bat activity with post-construction mortality

Pre-construction survey techniques

- Acoustic monitoring
 - Ground level
 - Rotor swept zone
- Radar
- Mist netting
- Exit counts/roost searches

Post-construction surveys

- Carcass searches
- Should link to pre-construction monitoring
- Assess search frequency during time periods with high bat activity
 - Need to look at scavenging rates
- Turbines can be stratified
 - Some searched daily, some weekly, some biweekly
 - Daily searches allow correlation with weather variables
- Radar/infrared imaging

Sources of field sampling bias

- Episodic fatalities
- Carcass removal by scavengers
- Searcher efficiency
- Failure to account for the influence of site conditions
- Fatalities or injured bat that may land or move outside search plots

2008 Review of Bat Fatalities at North American Wind Energy Facilities

- Fatalities heavily skewed toward migratory bats, specifically lasiurines, in most studies
- Consistently reported peaks of fatalities in midsummer through fall
- Fatalities were not concentrated at individual turbines
- FAA lighting (red strobes) did not influence bat fatalities
- Fatalities were highest during periods of low wind speed, and were related to weather variables associated with passage of weather fronts.

Current research projects

- BWEC - Pennsylvania
- PEIR - California
- Canada

Important to start gathering more data from areas that currently have little data

So, what about California?



California Bats

- 25 species in three families
 - Phyllostomidae
 - Vespertilionidae
 - Molossidae
- 12 special status species
 - 1 federally endangered
 - 11 DFG species of special concern



California Bats

- Behavior
- Echolocation and acoustic monitoring
- Which species are most at risk from wind facilities?

Why these species?

- Hoary, red and silver-haired
- Mexican free-tailed bats
- Western mastiffs ?

Bats and Wind in CA

- High Winds
- Altamont
- PIER research
- CA Bat Conservation Plan



Site Selection

- Ideally new wind farms would be located where impacts to bats are minimal or nonexistent
- BUT, there is limited information about bat migration and habitat use in California
- Sites of concern:
 - forested ridges
 - major river corridors
 - those within 500 feet of water bodies, riparian and forest edges, and major roosts or hibernacula
 - Migration routes (currently unidentified, other than river corridors)

Selected Bat/Wind References

- Arnett, E.B., W. K. Brown, W.P. Erickson, J.K. Fiedler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Koford, C.P. Nicholson, T.J. O'Connell, M.D. Piorkowski, R.D. Tankersley, Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. *Journal of Wildlife Management* 72(1):61-78.
- Cryan, P.M. and A.C. Brown. 2007. Migration of bats past a remote island offers clues toward the problem of bat fatalities at wind turbines. *Biological Conservation* 139:1-11.
- Cryan, P.M. 2003. Seasonal distribution of migratory tree bats (*Lasiurus* and *Lasionycteris*) in North America. *Journal of Mammalogy* 84(2):579-593
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<http://www.fort.usgs.gov/BatsWindmills/>

<http://www.bu.edu/cecb/wind/video/>

THE END

