Bat and Wind Turbine Interactions at Wind Energy Facilities

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Overview

• Introduction of the issue
• What we currently know
• Who, when, where, why
• Patterns
• Impacts
• Research
• Guidelines
• Bats and wind in Virginia
• Future of bats and wind energy
History of Wind and Wildlife Interactions

• Birds
  – Altamont Pass Wind Farm in Alameda, CA
  – Golden Eagles, Red Tailed Hawks, other raptors
  – Nocturnal migrants
  – Birth of mortality monitoring

• When “guano hit the fan”
  – Noticed bat carcasses during bird surveys
  – 2003/2004 Mountaineer
Questions?

• Why are bats being killed?

• Why are bats flying around the turbines?

• Can’t they avoid the moving blades?
What We Know

Sites with Bat Data - 2007

R.M. Barclay, personal communication

Cryan 2008
Bat Fatality Estimates

Cryan 2008
Who?

• Migratory tree-bats

• Tri-colored bats

• Mexican free-tailed bats
$n = 3,974$

- Hoary bat
- Eastern red bat
- Silver-haired bat
- Big brown bat
- Free-tailed bat
- Eastern pipistrelle
- Little brown bat
Migratory Tree Bats

- Not widespread, but wide ranging
- Individuals make large seasonal migratory
- Seasonal variation in habitat use and behavior
Mexican Free-Tailed Bats

- Form enormous maternity colonies
- Fly fast at high altitudes
- Long distance nightly commute
- Migratory behavior
Endangered Species

- Indiana bat
- Gray bat
- Virginia big-eared bat
- Lesser long-nosed bat
- Greater long-nosed bat
Where?

• Forested ridgetops in the eastern U.S.
• Agricultural fields in the Midwest
• Grassland prairies
• Scrub habitat in the western U.S.
Where?

- Canada: 0.47 – 18.48 bats/turbine/yr
- Western U.S.: 0.7 – 3.21 bats/turbine/yr
- Midwest: 0.8 – 7.8 bats/turbine/yr
- Eastern U.S.: 20 – 63.9 bats/turbine/yr
- Highest along the Appalachian Ridges
When?

(from Johnson 2005)
Why?

• Is attraction playing a part?
  – High wind corridors
  – New clearings/linear features
  – Insects
  – Noise or blade motion
  – Turbines mistaken for roost site
  – Gathering points
  – Mating sites
Emerging Patterns

• High number of fatalities are documented from low-wind nights
• Larger turbines = more dead bats
• Dead bats are not found under non-operational turbines/stationary structures
• Bats are found closer to the base of the tower than birds
Collision Patterns

• Birds vs. bats

• Seasonal timing

• Bats may be interacting with turbines than other tall structures
Indirect Mortality

• Loss of habitat
  – Roost trees used for maternity colonies
  – Important foraging habitat
  – Migratory corridor disturbance
Cumulative Impacts

- 2158 MW by 2020
- 33,000 – 62,000 bats/yr

- 3856 MW by 2020
- 59,000 – 111,000 bats/yr

Are impacts affecting whole populations of certain species?
There is no evidence of human-induced impacts to the affected bat species that are of similar magnitude to mortality at turbines.
Research
Pre-Construction

- Habitat characterization
- Bat acoustic monitoring
- Mist netting
- RADAR studies
- Radio-telemetry studies
- Population studies
- Night vision
- Thermal imaging
Post-Construction

• Mortality Searches

• Mitigation
  – Blade feathering
  – Increased cut-in speed
  – Turbine shutdown during migratory periods
Mitigation

• Operational changes
  – increase cut-in speed
  – shut down under high risk conditions (migratory periods, weather)
  – Deterrents-Ultrasonic noise
Guidelines

• State Level

• Federal Level
Wind and Wildlife in Virginia

• There are currently no official state guidelines for dealing with wind and wildlife issues

• For Federally listed species, consultation with the USFWS is necessary
  – Incidental Take Permit (ITP)
  – No mechanism for authorizing incidental take "after-the-fact."
Wind and Wildlife in Virginia

• Western ridgetops
  – Endangered bat issues
  – Migratory corridors

• Offshore?
Wind FAC Committee

- formulating appropriate questions regarding potential wildlife impacts,
- collecting data in ever increasing detail to answer those questions,
- making risk assumptions based on sufficient data prior to construction of wind facilities,
- using best-management practices during construction, operation, and decommissioning,
- testing assumptions after construction and during wind facility operations, and
- adjusting operations and/or mitigation as needed. The tiered approach is complementary with Strategic Habitat Conservation by looking first at landscapes and then focuses on the most appropriate sites for wind-energy development, with a goal of avoiding and minimizing wildlife impacts.
Reasons to Care

• White Nose Syndrome

• Long-lived and have low reproductive rates

• Agricultural pest control

• Unknown population sizes
Future of Bats and Wind Energy

• Can the 2 coexist?
  – With appropriate siting
  – Additional research to better understand
  – Advances in technology
Thank you