

PPM Energy Research

Understanding and Mitigating Bird and Bat Impacts at Wind Facilities

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Sara McMahon, Biologist



PPM-Funded Research

- In addition to project-specific surveys and studies, PPM has recently funded two basic research projects:
 - GS3C Prairie Chicken Study
 - BWEC Bat Research



Greater Prairie Chicken

Source: <http://dnr.wi.gov/org/caer/ce/eek/critter/bird/images/pchicken1.jpg>



Pallid Townsend's big-eared bat

Source: <http://www.werc.usgs.gov/bats/images/c-pallid-bat.jpg>

Prairie Chicken Study

- Good Model for Joint Research
- We are part of a multi-stakeholder collaborative, the Grassland and Shrub Steppe Species Collaborative (GS3C), with funding from:
 - PPM, FPL, Horison, KDWP, NREL, DISGEN, Greenlight Energy, TNC, USFWS
- Multi-stakeholder oversight committee reviewed scope and objectives, and reviews results. Reviewers include:
 - USDOE, USGS, USFWS, KDWP, IDFG, KSU, Grouse, Inc., TNC, PPM, FPL, and Horizon



Samantha Wisely (Left, Project Co-PI) and Karin Sinclair (Right, NREL, Technical Monitor for Oversight Committee)

Source: <http://www.k-state.edu/bsanderc/wind/>. Thanks to Samantha Wisely, Brett Sandercock and KSU for these photos.

Prairie Chicken Study Objectives

- Based on previous studies of other industry impacts, wind turbines may displace prairie chickens and related grouse species.
- Prairie chickens may have evolved to avoid tall structures, which act as perch locations for predators. This project will try to determine if that is so, and if so, what is the magnitude of the effect.
- The study examines both demography and population genetics.



Site Tour of Elk River I Facility

Source: <http://www.k-state.edu/bsanderc/wind/>

Prairie Chicken Study Components

- **4 year study:** 1 year of pre-construction data and 3 years of post-construction data at treatment sites. Surveyors will:
- **Establish Sites:** locate treatment sites, where wind development will occur, and paired reference or control sites.
- **Identify Leks:** identify 3-5 leks at each treatment and reference site.
- **Capture and mark** 25 females at each treatment site and 25 at each reference site and at least 80% of males at each lek. Mark females with VHF radio transmitters and males with color bands
- **Extract DNA** (blood) for genetic analyses.
- **Monitor movements** of females and males to determine home range, habitat use and seasonal survival rates
- **Estimate fecundity rates**
- **Analyze genetic variation** to determine if birds are moving between leks.
- **Compare results** of treatment sites to reference sites.



Removing a Prairie-chicken From a Walk-in Trap at a Lek Site
DeVaughn Fraser (Left, Research Technician) and Brett
Sandercock (Left, Project Co-PI)

Source: <http://www.k-state.edu/bsanderc/wind/>



Female Prairie-chicken with a Necklace
Radio-transmitter



Measuring Body Mass of a Prairie-chicken in a
Holding Bag. Brett Sandercock (Left, Project Co-PI)
and DeVaughn Fraser (Right, Research Technician)

Bat/Wind Studies

- Another Good Model for Joint Research
- We are also a member of the Bat Wind Energy Cooperative (BWEC), with support from:
 - USDOE, USFWS, BCI, AWEA, PPM and others
- Goal is to develop and coordinate research and identify solutions to prevent or minimize threats to bats.



BCI Founder and President Merlin Tuttle and Jessica Kerns, University of Maryland, inspect bats as part of BWEC research. Source: BCI website <http://www.batcon.org/home/index.asp?idPage=55&idSubPage=26>

Bat Deterrent Study Objectives

- Develop deterrent: high-amplitude sonar (“jamming”) sound emission device to reduce bat fatalities at wind projects
- Test bat behavioral response in lab and field
- Based on response, pursue development of deterrent prototype for field testing at wind projects in 2007



Pacific Townsend's big-eared bat
Source:<http://www.ut.blm.gov/vernalrmpguide/ssimages/TownsendBigearredBat.gif>

Bat Deterrent Study Results

- Lab and Field testing was recently completed
- Preliminary findings suggest that bats are influenced by device
- BCI scheduled to provide more info at NWCC Wildlife Conference in San Antonio



Bats and Wind Energy Project Coordinator Ed Arnett sets up an acoustic deterring device for testing in the field (Photo by Tom Kunz, Boston University).



Dr. Cindy Moss (center) and Ph.D. student Genni Spanjer (right) explain laboratory tests on the behavioral response of big brown bats to acoustic deterrents to John Sherwell with the Maryland Department of Natural Resources (Photo by Ed Arnett, BCI).
<http://www.batcon.org/home/index.asp?idPage=55&idSubPage=137>

Applied Bat Study at Casselman Wind Project, PA

Objectives:

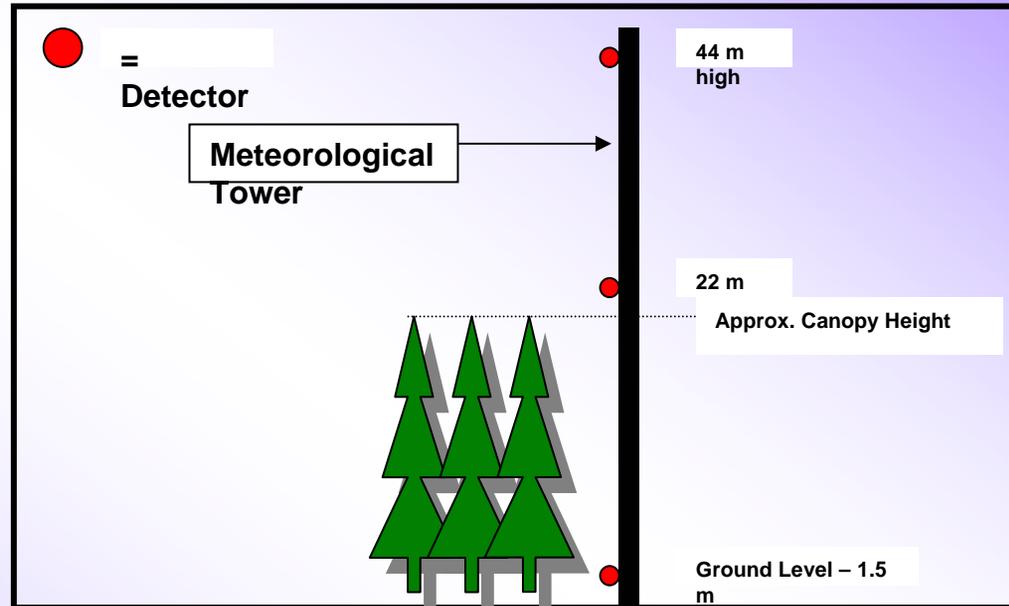
- Characterize bat activity in wooded, brushy and grassland habitats
- Correlate bat activity with weather patterns
- Develop a pre-construction risk indicator that can be used to predict bat fatality



Applied Bat Study at Casselman Wind Project, PA

Study Components

- **5 year study:** 3 years pre-construction + 2 years post-construction
- **Anabat acoustical detectors placed at 12 locations:** on 5 existing meteorological towers and 7 mobile towers
- **Placed at various heights:** anabat radars were placed on towers at heights of 1.5 and 22 and 44 m agl, and at 1.5 and 22 m on mobile towers.
- **7 Anabat locations rotated weekly:** mobile towers were rotated weekly from Aug – Oct at proposed turbine locations and two reference sites.
- **Continual radar monitoring**



Casselman Bat Study

Results from 1st Year

- Bat activity was highest mid-Aug – mid-Sept and Oct, and immediately after sunset and declined until just before sunrise
- Activity ↑ with ↑ forest cover, though differed by height (greatest at 22 m)
- Activity ↑ with ↑ temperature, though differed by height (greatest at 1.5 m)
- Activity ↓ with ↑ wind speeds

Applied Bat Study at Hoosac Wind Project, MA

Objectives:

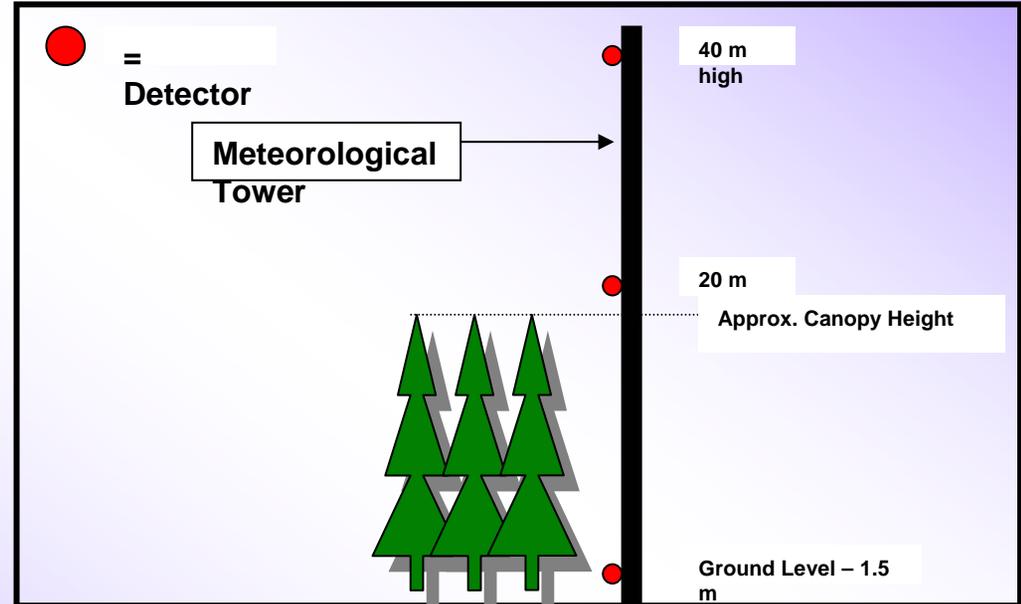
- Characterize bat activity over site (forested habitat).
- Is the site one that shows high or low overall use pre-construction, and how does that correlate to post-construction fatality?
- Develop a pre-construction risk indicator that can be used to predict bat fatality



Applied Bat Study at Hoosac Wind Project, MA

Study Components

- **3 year study:** 1 year pre-construction + 2 years post-construction
- **Acoustical detectors on 5 meteorological towers**
- **Placed at various heights:** Anabat detectors were placed on towers at heights of 1.5, 20 and 40 m agl.
- **Anabat monitoring** starting in July 2006



Other Applied Studies

- Bats: pre-construction radio collaring and anabat radar surveys in TX, PA, VT and NY.
- Birds: pre- and post-construction fatality monitoring and raptor nest monitoring
- Grassland nesting birds: pre- and post-construction monitoring of curlews to look at potential displacement
- Mammals: pre and post-construction monitoring of Washington ground squirrels to track population levels



Washington ground squirrel

Source: Karen Kronner, NWC

Research Priorities

- What are the best and most cost-effective **predictive pre-construction tools** to predict post-construction avian and bat fatality (i.e. observational data on bird use, abundance and behavior, topography, etc.)?
- What are the **appropriate search intervals and methodologies for pre-construction avian use surveys and post-construction fatality monitoring**? These studies are expensive, and we want to use them judiciously to predict and confirm collision risk.
- **Are bats attracted to turbines, and if so, can we deter them definitively?**