



## Environment and Siting

### *Supporting research on impacts to birds, bats and habitats from wind development*

**T**raditional fossil fuel resources used for generating electricity emit criteria pollutants, their precursor gases and greenhouse gases<sup>1</sup>. Wind-generated energy does not. Although there have been many life-cycle analyses of wind turbine systems, these studies focused on energy payback time and reduced fossil fuel emissions and they do not comprehensively analyze impacts to wildlife. However, concern for impacts to wildlife, including birds and bats, can be significant for wind energy development in some locations. In general, siting is a key factor in avoiding and minimizing impacts to wildlife.

The National Renewable Energy Laboratory's (NREL) National Wind Technology Center (NWTC) has been engaged in research related to wildlife impacts from wind energy development since the early 1990s. Beginning with fatalities to raptors in the Altamont Pass Wind Resource Area (WRA) in California, the NWTC has focused on understanding how and why wildlife, particularly birds and bats, are impacted by wind turbines and developing ways to avoid and minimize such impacts.

DOE/NREL was involved in the early formation of the National Wind Coordinating Collaborative (NWCC) and has been consistently involved in all wind-wildlife related activities. Formed in 1994, the NWCC identifies, defines, discusses, and collaboratively addresses wind-wildlife and wind-habitat interaction issues by seeking broad stakeholder involvement on scientific and public policy questions. Since its inception, the NWCC has hosted seven wind-wildlife research meetings. The eighth research meeting is scheduled for October 2010. Information on all the NWCC activities can be found at <http://www.nationalwind.org/issues/wildlife.aspx>.

Two general types of impacts to birds and bats from wind development are of concern:

1. *direct mortality*, from collisions and
2. *indirect impacts*, such as the animal's avoidance of an area or through habitat degradation, loss, abandonment, or fragmentation.



Greater Prairie-Chicken near wind facility in Kansas. PIX17374

Currently, the NWTC represents DOE as a key contributor on three collaborative research efforts. Each of these collaborative efforts includes representatives from the wind industry, environmental organizations, the DOE/NREL Wind Program, and other stakeholders. These collaborations include:

1. **NWCC's Grassland Shrub Steppe Species Collaborative (GS3C):** The GS3C is currently supporting a multi-year research effort to study the habitat effects of wind turbines on greater prairie-chickens in the Smoky Hill region of Kansas. The Before-After Control-Impact study is designed to assess whether wind development will cause demographic or genetic dispersal impacts to the chickens. An NREL staff member acts as Technical Monitor to the Oversight Committee of the GS3C. Research is currently in progress; results will be released once the research is completed. Information on this collaborative can be found at <http://www.nationalwind.org/issues/wildlife/g3c.aspx>.
2. **Bats and Wind Energy Cooperative (BWEC):** The BWEC is focused on studies involving bat and wind turbine interactions. NREL is supporting two BWEC research projects: 1) testing the effectiveness of changing the cut-in speeds of wind turbines to reduce bat fatalities and 2) evaluating the effectiveness of acoustic deterrent devices in reducing bat fatalities. The results of both approaches show promise in reducing bat fatalities, although further research is needed. Additional information on this collaborative can be found at <http://www.batsandwind.org/>.

<sup>1</sup> Environmental Impacts of Wind Energy Projects, National Research Council of the National Academies. 2007



Red Tailed Hawk at Altamont Pass wind facility. PIX17329

3. **Sage Grouse Collaborative (SGC):** This newly formed collaborative focuses on wind facility habitat impacts on sage grouse. Study design details and selection of research project sites is in progress. NREL will serve as a Technical Monitor to the Steering Committee of the SGC. Additional information on this collaborative can be found at <http://www.nationalwind.org/sagegrouse.aspx>.



Sage Grouse. LuRay Parker, Wyoming Game and Fish Department/PIX17429

In addition to supporting field research, NREL has contributed to the development of tools and resources and provided technical support. Examples include development of the NWCC wildlife fact sheets (1999, 2004, and 2010), development of the NWCC Metrics and Methods document (1999, 2010), providing technical advice on wind turbines and how they interact with the environment, hosting experiments on turbines at the NWTC such as early stage testing of bat deterrent devices, and technical support and presentations to industry, other federal agencies, state agencies, environmental groups, and other stakeholders. Recently, NREL served as an alternate to the Wind Turbine Guidelines Advisory Committee, which developed recommendations for the Department of Interior to develop national guidelines for how to avoid and minimize the impacts of land-based wind farms on wildlife and its habitats.



Research is being conducted to determine mitigation strategies that reduce bat fatalities including the application of acoustic deterrents on test turbines. PIX17401

## Further Information

NREL's Wind-Wildlife Impacts Literature Database (WILD) is a searchable bibliographic database of documents that focuses on the effects of wind energy development on wildlife. The database includes documents (domestic and international) from journal articles, conference proceedings, government publications, books, and utility company reports. Maintained by the NWTC, the database is continually updated as new publications become available.

The NWCC has recently published an updated fact sheet on Wind Turbine Interactions with Birds, Bats, and their Habitats. The fact sheet contains data on bird and bat rates at various wind energy facilities where data have been collected and is publicly available. The NWCC fact sheet can be found at <http://www.nationalwind.org/publications/wildlifewind.aspx?>

The American Wind Energy Association (AWEA) is also concerned with wildlife impacts from wind development. AWEA is a national trade association representing wind power project developers, equipment suppliers, services providers, parts manufacturers, utilities, researchers, and others involved in the wind industry. AWEA and its members are involved in supporting research, both through direct funding contributions and in-kind contributions including providing project site access for research data collection as well as other collaborative research projects. The Association has also developed a fact sheet on this topic. It can be found at <http://www.awea.org/pubs/factsheets.html>.

## National Renewable Energy Laboratory

1617 Cole Boulevard, Golden, Colorado 80401 • 303-275-3000 • [www.nrel.gov](http://www.nrel.gov)

NREL is a national laboratory of the U.S. Department of Energy  
Office of Energy Efficiency and Renewable Energy  
Operated by the Alliance for Sustainable Energy, LLC

NREL/FS-500-47254 • June 2010

Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 10% post consumer waste.

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