



## Use of Innovative Technologies to Develop Management Tools for Wildlife Friendly Wind Power.

### Background:

The development of more sustainable, domestically available energy resource options is becoming a priority within the U.S. Of those options, wind energy is at the top of the list. By 2012, it is projected that more than 155,000 turbines will dot the U.S. landscape. Several benefits of wind energy have been identified including economic benefits of development, renewability of the resource, lack of water consumption and emissions during operation, and relatively low environmental impact on humans and landscapes (U.S. Department of Energy, 2005).

USGS Northern Rocky Mountain Science Center (NOROCK) in collaboration with US Fish & Wildlife Service (FWS) and National Park Service (NPS) have recently identified that research related to wind energy development is high priority in the Upper Midwest and Northwest.

Wildlife habitat disruption and fragmentation is a concern with development of the wind industry. In 2005, the Western Governors' Association's Wind Task

Force Report estimated that a 100 megawatt wind facility typically extends across 4,942 acres with between 50-67 towers. This is about 148 acres of land displaced for wind towers, roads and ancillary facilities which fragments the landscape and disrupts habitats within the developed areas.

Local migratory bird route alterations are also a concern with wind development. Recent studies document that birds crossing wind turbines alter their routes to avoid stimuli such as lights and blades. However, more research is needed to document route alterations and develop predictive models to help managers address the actual wildlife impacts.

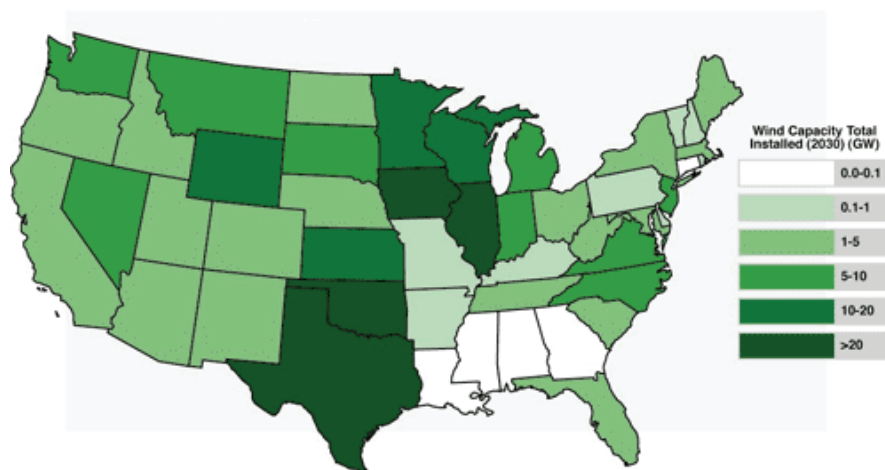


Figure 1. Map of projected wind power capacity by state in 2030. Adapted from U.S. Department of Energy—National Renewable Energy Laboratories, 2008.

### Project Scope:

Research at NOROCK addresses two critical projects recommended by our collaborators: 1) bird migration elevations in relation to wind turbines and 2) development of a risk assessment and decision support system for wildlife friendly wind power.

The objective of NOROCK research is to develop a model of how birds use important landscapes so that managers can make knowledgeable decisions on wind energy development sites that are more protective of migratory bird species, both on land and in flight.

Such a model is being developed in collaboration with scientists at the Upper Midwest Environmental Sciences Center, the EROS Data Center, and the Western Geographic Science Center. Our efforts focus on using structured decision making to reach consensus among managers and scientists for building the model.

### Decision Support Systems:

NOROCK scientists are developing tools that are capable of identifying the presence of birds in NEXRAD Doppler weather radar. This data has been archived for over a decade, and researchers should not only be able to map bird migration routes throughout flyways in the recent past, but follow migration changes in the future.

We are also developing a toolbox specifically for wildlife and wind energy managers that includes a suite of models for birds at migration staging areas that (1) evaluates what species are vulnerable in that landscape; (2) evaluates where a group of turbines should be placed to minimize effects on birds at migration staging areas, including habitat avoidance;

(3) evaluates how individual turbines might be managed to minimize mortality; and (4) can be used to simulate alternative turbine development locations within the landscape. A visual display of the risk to birds would be provided based on 3D simulated movements of birds from roosting and loafing concentrations to feeding sites.

### Long Term Goals:

This close collaboration with natural resource managers is important to our long term success. This will be even more critical once the magnitude of energy development across the U.S. is recognized. For example, FWS has estimated that migrating whooping cranes may soon be experiencing 10,000 new turbines along their migratory paths. Our goal is to have a collaborative team available to address the placement and operation of wind energy developments in places particularly important to migratory birds and national wildlife refuges, and to provide the science-based tools for the team to use.



*Whooping cranes. Photo courtesy of U.S. Fish & Wildlife Service.*

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The Northern Rocky Mountain Science Center is located in Bozeman, Montana and includes three field stations in Montana and one duty station in Wyoming. For more information on NOROCK's research, please visit <http://nrmsc.usgs.gov> or contact the Center Director: Jeff Kershner 406-994-5304 or [jkershner@usgs.gov](mailto:jkershner@usgs.gov)

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