

## **SUMMARY OF WIND TURBINE ENVIRONMENTAL ISSUES**

By Carolyn Weed for the Centerville Township Commercial Wind Ordinance Committee  
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Environmental issues that should be addressed in permitting commercial wind turbine developments include impacts on wildlife and habitat; on wetlands, dunes, and other environmentally sensitive areas; and on water resources, soil erosion and sedimentation.

Bird and bat mortality, the most well known environmental problem associated with commercial wind turbines, has tarnished the green image of large-scale wind energy projects. The September 2006 issue of Audubon Magazine summarizes the problem:

For many conservationists, however, wind power remains an uncomfortable subject. It's well known that wind turbines kill both birds and bats, though exactly how often—and why—these deaths occur remains poorly understood.

The raptor kills at Altamont Pass, CA, a large wind project near the San Francisco Bay area, focused attention on the problem in the late 1980's. According to Audubon, the California Energy Commission estimates 1,300 raptors, including over 100 golden eagles, still die at Altamont every year. Lawsuits continue, with Audubon chapters currently involved in litigation citing inadequate environmental review.

More recently, the Bat and Wind Energy Cooperative, a government (US Fish and Wildlife Service and National Renewable Energy Laboratory), conservation (Bat Conservation International) and industry (American Wind Energy Association) partnership, released a report summarizing disturbing levels of bat kills at ridge-top locations in West Virginia and Pennsylvania. Fatality rates at the two sites, adjusted for predation, were estimated to be between 1,764 and 2,900 for a six-week period between August 1 and September 13 in 2004. Annual fatalities of 14,538 bats were projected for the West Virginia site if the proposed 457 turbines are constructed. Tree-dwelling and migrating bats were particularly impacted, and bat carcasses included species commonly found in Michigan. Although bat kills at many other sites are lower, a report submitted to Wisconsin Public Service Corporation and Madison Gas and Electric Company (11/21/02) discusses high mortality rates in Lincoln Township, WI, which is less than 100 miles from Centerville Township, for three species of migratory bats (hoary bats, red bats and silver-haired bats), and theorizes proximity to riparian forest as a contributing cause.

### **The Problem of Regulation**

A report issued in September 2005 by the United States Government Accountability Office, *Wind Power Impacts on Wildlife and Government Responsibilities for Regulating Development and Protecting Wildlife*, summarizes results of a study done in response to the dramatic growth of the wind industry and concerns raised by wildlife biologists. The report concludes that gaps in the literature and lack of data from wind power facilities make it difficult to develop definitive conclusions to address the potential risks to wildlife

and the effectiveness of mitigation strategies. The report notes the absence of post-construction monitoring studies. Sue Orloff of Ibis Environmental, Inc., a presenter at the 2006 AWEA/Audubon Workshop: Understanding and Resolving Bird and Bat Impacts, described a recent analysis of pre-construction wind project surveys, concluding that most projects had not followed elements of standardized protocols for wildlife surveys and site evaluation found in the National Wind Coordinating Committee's *Studying Wind Energy/Bird Interactions: A Guidance Document* and U.S. Fish and Wildlife Service's *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines*.

The United States Government Accountability Office report offers additional insight into the problems of regulating environmental impacts. Regulation is largely the responsibility of state and local governments. Although some state and local regulatory agencies require environmental assessments before construction, many state and local agencies are inexperienced and/or lack expertise in addressing environmental and wildlife impacts.

Federal law offers limited protection for wildlife affected by wind farm developments. Three federal laws may apply, though the federal government has not used any of them to prosecute wind facilities, preferring to mitigate in the hope of avoiding future harm. *The Migratory Bird Treaty Act* protects 836 species of migratory birds from take, including accidental or incidental take. Some of these species are seen in Centerville Township (<http://www.fws.gov/migratorybirds/intrnltr/mbta/mbtandx.html>).

*The Endangered Species Act* protects endangered animals anywhere, but only provides protection for endangered plants where federal ownership, funding or permits are required. Incidental take can be permitted especially when an approved habitat conservation plan is enacted. Michigan's 25 federally recognized endangered species are listed on the following site:

[http://ecos.fws.gov/tess\\_public/StateListing.do?state=MI&status=listed](http://ecos.fws.gov/tess_public/StateListing.do?state=MI&status=listed)

*The Bald and Golden Eagle Protection Act* provides strict protection for eagles, regardless of their classification with respect to the Endangered Species Act.

Michigan offers additional protection to threatened and endangered species on private as well as public lands through *Endangered Species Protection, Part 365 of the Natural Resources and Environmental Protection Act* (Act 451 of 1994). The Michigan DNR Wildlife Division uses the Michigan Natural Features Inventory, which includes 342 species of plants and animals, to evaluate potential impacts on Threatened or Endangered species. The list for Leelanau County can be found at:

[http://web4.msue.msu.edu/mnfi/data/cnty\\_dat.cfm?h=&county=Leelanau](http://web4.msue.msu.edu/mnfi/data/cnty_dat.cfm?h=&county=Leelanau)

Michigan also protects the environment through the *Michigan Natural Resources and Environmental Protection Act* (Act 451 of 1994, MCL 324.101 et seq.). *Michigan Siting Guidelines for Wind Energy Systems* specifically refers to Part 31 Water Resources Protection (MCL 324.3101 et seq.), Part 91 Soil Erosion and Sedimentation Control (MCL 324.9101 et seq.), Part 301 Inland Lakes and Streams (MCL 324.30101 et seq.), Part 303 Wetlands (MCL 324.30301 et seq.), Part 323 Shoreland Protection and Management (MCL 324.32301 et seq.), Part 325 Great Lakes Submerged Lands (MCL

324.32501 et seq.), and Part 353 Sand Dunes Protection and Management (MCL 324.35301 et seq.).

Part 91 of this law requires a soil and erosion control permit for any earth change that disturbs one or more acres, or is within 500 feet of a lake or stream. In Leelanau County soil erosion permits are required prior to construction if the site is within 500 feet of a water body, 100 feet of a wetland, a driveway of more than 10% grade, earth disturbance of one acre and for any commercial site.

### **Harmful Impacts on Wildlife**

Detrimental effects of wind turbines on birds, bats and other wildlife that have been documented in Europe and elsewhere include:

- Collision of birds and bats with moving blades, tower, and associated infrastructure including guy wires and power lines, or caused by the wake behind rotors. Collision deaths are particularly detrimental to long-lived, slow-to-reproduce species (eagles and bats) which cannot compensate for losses.
- Disturbance/displacement/exclusion from the area around wind turbines that may be caused by turbines, vehicles, people, and/or construction.
- Barriers to movement and avoidance disrupting feeding, breeding, migration, etc.
- Change or loss of habitat.
- Behavioral changes (documented with respect to ground squirrels by UC Davis biologist Lawrence Rabin).  
<http://www.newscientist.com/channel/life/mg19025494.700-wind-turbines-send-wildlife-diving-for-cover.html>)

### **Recommendations for Reducing Impact on Wildlife**

Site selection and configuration:

The guidelines of the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources and the Washington State Department of Fish and Wildlife for siting wind turbines include the following recommendations:

- Avoid locations with known endangered species.
- Avoid known migration paths and areas where birds congregate or are conserved. (According to local ornithologist, Bill Scharf, who has observed bird migration in Leelanau County and bird mortality at tower sites, many songbirds migrate at night in broad fronts along unpredictable routes. Leelanau County experiences a bird funnel effect with birds moving northward throughout the peninsula until they reach the northern tip during spring migration.)
- Avoid areas near known bat hibernation, breeding, and migration corridors or in flight paths between colonies and feeding areas.
- Avoid areas and features that attract raptors and owls and remove carcasses that attract predators.
- Avoid designated wildlife areas, wetlands, and wooded corridors, especially those oriented in the direction of migratory movement.

- Avoid using or degrading high value habitat areas and avoid habitat fragmentation.
- Minimize roads, fences and infrastructure.
- Configure arrays to minimize mortality by grouping and orienting rows parallel to bird movement.

#### Lighting:

There is a growing body of evidence suggesting that lights near and on towers can attract birds and bats particularly during poor weather. The United States Government Accountability Office report refers to a hypothesis that bats are attracted to insects that, in turn, are attracted by tower lighting. One of the largest known bird tower collision events (30,000 dead birds on two September nights in Eau Claire, WI) is generally believed to have been caused by lighting (see *Wind Turbines and Birds A Background Review for Environmental Assessment*, a Canada Wildlife Service 2005 document). A sodium vapor-lit substation and foggy conditions were implicated in a wind turbine bird collision event in West Virginia. However, results of studies are not conclusive and recommendations on color (white or red) and flashing versus steady light are contradictory. A recent Michigan tower study found that bird losses were lower at towers with flashing rather than steady red lights, but the U.S. Fish and Wildlife Guidelines warn that red lights of any type may attract night-migrating birds. Tower lighting can be avoided altogether by not permitting tower heights that require FAA lighting (200 feet or more) and by prohibiting other on site lighting.

#### Tower height/turbine size:

It is not clear whether fewer taller turbines with larger rotors cause more or less mortality than larger numbers of smaller turbines. However, experience with communication towers clearly demonstrates that taller towers experience higher rates of mortality. The results of a long term (29 year) study in Florida showed that towers less than 300 feet high did not pose significant threats to migrating birds (*Notice of Inquiry Comment Review Avian/Communication Tower Collisions* prepared for the FCC, 2004).

#### Tower and turbine design:

According to the American Bird Conservancy, guy wires and lattice towers, which encourage perching and nesting, are associated with higher rates of bird mortality and should be prohibited. U.S. Fish and Wildlife Service recommends tubular towers with pointed tops with no exterior ladders or platforms. (It is worth noting that the United States Government Accountability Office report indicates that Altamont, CA studies are not conclusive on the issue of lattice towers.)

#### Location of power lines:

Because birds are known to collide with electrical lines (GAO report), the American Bird Conservancy and the U.S. Fish and Wildlife Service recommend that power lines be installed underground (in accordance with best practice guidelines).

#### Operation during seasonal migrations:

Highest bird and bat mortality occurs during seasonal migrations. U.S. Fish and Wildlife Service suggests that turbines may need to be shut down during periods of high seasonal concentrations of birds. The same policy would be appropriate for migrating bats.

Operation during low visibility weather conditions:

Highest tower mortality rates are associated with low visibility conditions, especially fog and poor weather conditions (see *Wind Turbines and Birds A Background Review for Environmental Assessment*, a Canada Wildlife Service 2005 document). Turbines should be shut down when such conditions occur during spring and fall songbird and bat migrations.

Rotational speeds of rotors:

The majority of bat kills documented in Pennsylvania and West Virginia occurred on nights when average wind speeds were low, but turbine blades were moving at relatively high speeds (as reported by the Bat Wind Energy Cooperative 2004). Bat experts do not yet understand the echolocation abilities of migrating bats and the effect of turbine speed on echolocation. Experts have proposed that bat mortality may be reduced by turning turbines off or reducing blade speeds during bat migration seasons when low wind and/or foggy, low visibility conditions occur (see GAO report, also per my conversation with Daniel Alberts of Lawrence Tech.). Research also suggests birds may experience a visual smear effect that makes them less able to detect fast-moving rotor blades, although blade striping does not seem to reduce mortality (GAO report).

Construction process:

Construction activities should be organized and timed to minimize impacts on wildlife from noise, disruption of habitat, and the presence of vehicles and people.

## **Recommendations for Reducing Other Environmental Impacts**

Environmentally sensitive areas:

Avoid wetlands, dunes and other environmentally sensitive areas.

Erosion control and water quality (see DEQ FAQ and Kansas guidelines):

- Integrate the overall construction design and activities to fit the physical features of the site. Avoid fragile or unstable sites and sites that require construction activities on steep slopes.
- Stage construction and stabilization activities to minimize the area and duration of disturbance.
- Identify control measures that will minimize erosion.
- Identify controls that will prevent off-site sedimentation.
- Time construction to minimize damage to vegetation.
- Keep construction of improved roads and auxiliary structures to a minimum.
- Reseed disturbed areas with native vegetation.

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Exhibit \_\_\_\_ (RR-5)

Witness: Russ Romme

Public Service Commission of Wisconsin

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