

Understanding the Impacts Of Wind Energy on Birds and Bats

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Photo: www.statelinewind.com



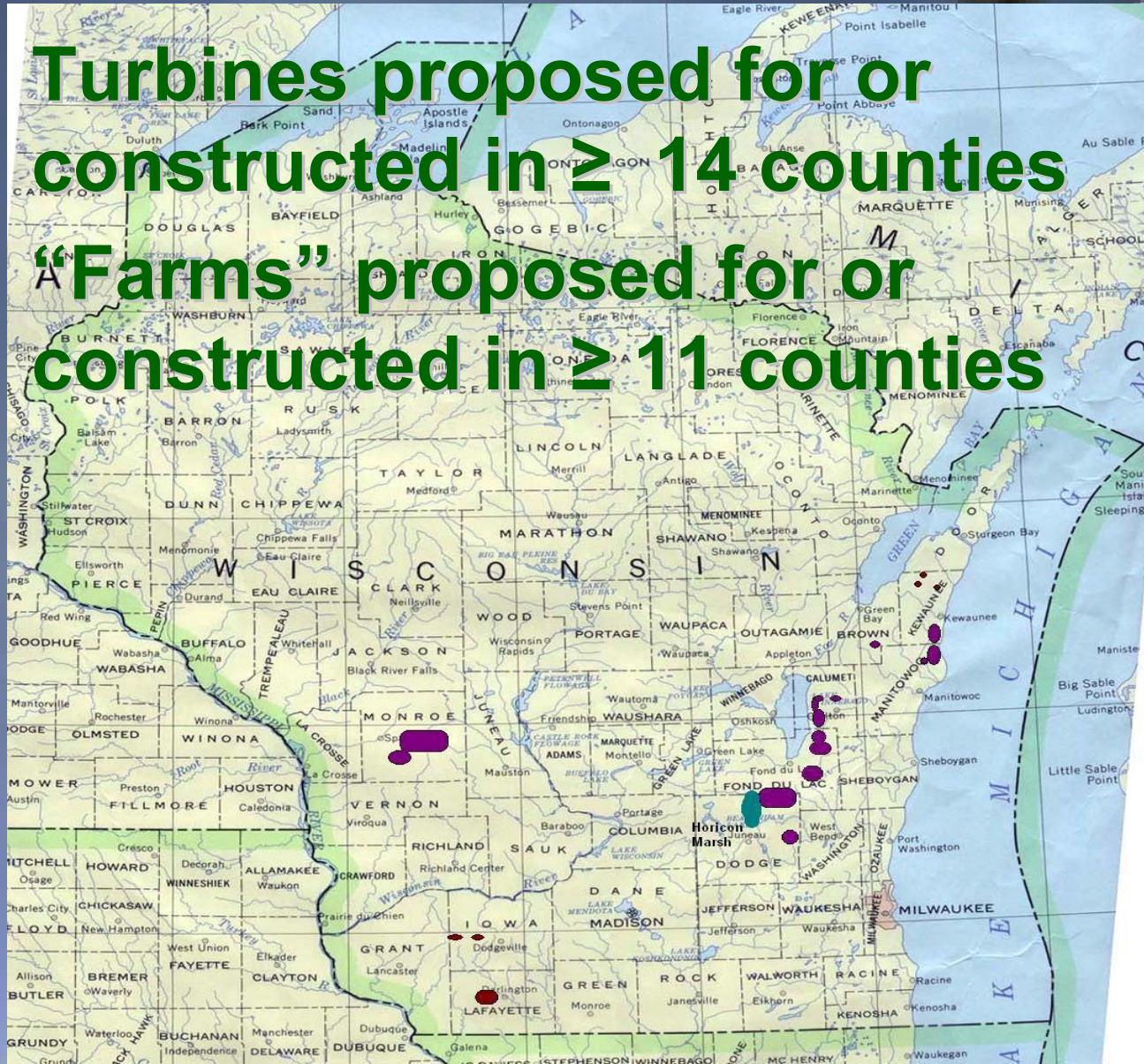


Wind energy is booming....

- **Production tax credits**
- **Uncertainty of their renewal**
- **Rising energy prices**

In Wisconsin:

- Turbines proposed for or constructed in ≥ 14 counties
- “Farms” proposed for or constructed in ≥ 11 counties





Wind energy generation does not produce emissions but construction and operation of wind facilities can have adverse environmental effects



Potential impacts to wildlife :

- **Direct injury and mortality**
- **Direct habitat loss and fragmentation**
- **Displacement from habitat due to avoidance of structures**

Injury and Mortality

The background of the slide features a close-up, low-angle view of a white wind turbine. The tower and nacelle are visible, with the blades extending outwards. The sky is a clear, bright blue, and the overall image has a slightly blurred, artistic quality.

- **Highly variable by site**
- **Mortality rates by sites can be unpredictable**
- **Averages of mortality estimates from region, nation, continent are not very informative**

Injury and Mortality cont'd

At extremes, estimated thousands of raptors killed at Altamont Pass, CA and thousands of bats on ridge tops in West Virginia and in prairie in Canada



Most sites find much less, but some at levels to warrant concern

Injury and Mortality cont'd

- **Study methodologies and our understanding of important factors improving with time**
- **Many early studies should be viewed more as indicators rather than accurate estimates of impacts, particularly for bats**

Injury and Mortality cont'd

- **Study in northeastern Wisconsin from 1999-2001 estimated ~1.29 birds and 4.26 bats/turbine/yr**
- **For sake of comparison, converts to ~1.95 birds and 6.45 bats/MW/yr**
- **Study located in patchy agricultural landscape**

Injury and Mortality cont'd

- **Relatively high bat mortality unexpected**
- **Early indication that migrating bats can be very susceptible to strikes at wind facilities**



National Park Service

Injury and Mortality cont'd

- **Study at Top of Iowa project estimated 0.49 and 1.07 birds and 7.34 and 9.81 bats/MW killed during each of the eight and nine month study seasons, respectively**
- **Bat mortality occurred largely during fall migration**
- **Site is largely agricultural, with 3 wildlife management areas nearby**

Injury and Mortality cont'd

- **High levels of bat mortality may be serious concern because relative to most passerine bird species, bats have:**
 - **Long life spans**
 - **Lower reproductive rates**
 - **High adult survival**
- **Studies out east indicate most bats killed are adults, further hindering recovery from any population impacts**

Habitat Loss and Fragmentation



- Also highly variable by site
- Fragmentation can be a significant problem in intact habitat blocks, whether prairie, forest, mountain ridge tops, or desert
- If the face of a modern turbine is rotating along the horizontal axis, direct loss (area beneath turbine) may be 4 to 6 acres/turbine

Habitat Loss and Fragmentation cont'd

- **Numerous studies (e.g., Miller in CO) have found that even gravel footpaths and narrow roads can create edge effects**
- **Fragmentation most negatively impacts interior breeding species and those dependent on large, contiguous habitat blocks**

Habitat Loss and Fragmentation cont'd

The network of roads, transmission lines, and other associated infrastructure can have greater habitat impacts than the turbines themselves



www.verveenergy.com.au

Habitat Loss and Fragmentation cont'd

- **In Wisconsin there has been little fragmentation or proposed fragmentation of terrestrial or aquatic habitats**
- **Most projects have been sited in largely agricultural, already patchy landscapes**

Habitat Loss and Fragmentation cont'd

- **A final type of habitat fragmentation that is rarely considered is that of aerial habitats**
- **Those species most affected by wind energy spend much of their time in air**
- **We do not fully know or understand how the appearance of 400' spinning structures may impact hunting, courtship, travel of those species**

Displacement and Avoidance

Many species, particularly prairie, grassland, shrub-steppe species, have evolved to avoid tall structures

Current USFWS guidance (under review and revision) recommends no turbines ≤ 5 mi of prairie grouse leks



www.transalta.com

Displacement and Avoidance cont'd

- **Some species may acclimate to the presence of turbines and return to breed or forage nearby**
- **Many others (e.g., bobolinks) have exhibited reduced breeding densities within areas close to (≤ 80 m) turbines while species such as lapwings have exhibited avoidance at distances of 250 to 500 m from turbines**

Displacement and Avoidance cont'd

- There are few studies conducted before construction that would allow adequate comparisons of activity to that observed post-construction



www.geog.ucsb.edu

Displacement and Avoidance cont'd

The background of the slide is a photograph of a wind turbine. The turbine is white and is positioned diagonally across the frame, with its tower extending from the bottom right towards the top left. The sky is a clear, bright blue. The text is overlaid on this image.

- **We currently lack good information on avoidance and displacement influences on:**
 - **changes in long term breeding densities**
 - **landscape scale losses of breeding or foraging habitat**
 - **changes in migration patterns**

Displacement and Avoidance cont'd

- **Displacement from an individual project area may not seem significant, but cumulative impacts over a landscape may impact species' abilities to build or restore energy reserves for breeding or migration**
- **Cumulative impacts of displacement a growing concern in WI, particularly along the Niagara Escarpment**

What do we need/want to know?



www.unisa.edu.au

Information needs cont'd

- **What type of pre-construction behavioral or occurrence data would help to predict risk?**
- **Better data on migration patterns (e.g., routes, timing, flight height) of potentially vulnerable species (birds and bats)**
- **What costs do habitat fragmentation and displacement have to bird and bat species?**

Information needs cont'd

- **More and better paired pre- and post-construction studies to develop better predictive capabilities from pre-construction studies**
- **Better information on effects of lighting regimes and whether there are lighting or auditory signals that could serve as deterrents**
- **Information on effectiveness of operational mitigation strategies**

Information needs cont'd

Aerial wildlife activity in areas that are currently unstudied/understudied (e.g., offshore in Lake Michigan, Lake Superior)



www.hydrogeographicsociety.org

What are we working on?

- **Mapping sensitive resource areas in Wisconsin and surrounding region to try to identify sites inappropriate for wind development and those of less concern from a wildlife resource perspective**
- **Methodology for obtaining bird migration information from existing NEXRAD weather data**

What are we working on?

cont'd

- **Development of better research tools for assessing bat movements**
- **Identifying ways to fill the information gaps, hopefully through development of public/private partnerships**



Thanks!

