

**Public Service Commission of Wisconsin &
The Statewide Energy Efficiency and Renewables
Administration**

Environmental and Economic Research and Development Program

Final Report
July 2009

Evaluating Bird and Bat Migration in the Upper Mississippi River Valley and Its Implications for Siting Wind Energy Facilities: A Workshop Series for Resource Agencies and Wind Developers

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This report in whole is the property of the State of Wisconsin, Department of Administration, Division of
Energy, and was funded through the FOCUS ON ENERGY program.



EXECUTIVE SUMMARY

Date of Report:

July 2009

Title of Project:

Evaluating Bird and Bat Migration in the Upper Mississippi River Valley and Its Implications for Siting Wind Energy Facilities: A Workshop Series for Resource Agencies and Wind Developers

Project Coordinators:

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Facilitator:

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Research Category:

Environmental and/or Economic Impacts of Renewable Energy and Energy Efficiency Initiatives

Project Period:

January 2009 to July 2009

Project Goal and Objectives:

The goal of this project was to execute a workshop series to develop a collaborative approach for gathering future scientific data to guide the responsible siting of wind energy facilities within and along the Upper Mississippi River Valley.

The project objectives included: 1) identify and organize a diverse stakeholder group, 2) identify specific data gaps concerning micro- and macro-scale avian and bat migration patterns within the Upper Mississippi River Valley, 3) use a structured decision-making process to prioritize research needs and build consensus on an appropriate study design and methodology, 4) develop a framework for standardized survey methodologies that can be used to evaluate avian and bat migration patterns within the Upper Mississippi River Valley to determine the implications for siting wind energy facilities, and 5) document the process by which decisions were made and share results and information obtained from this project with other resource agency staff and the wind industry.

Summary of Activities:

1. Identified 26 participating collaborators including four Federal agency personnel, seven State agency personnel, three wind development company representatives, one wind energy advocate, seven consultants, and four members of conservation organizations.
2. Created collaborator database.
3. Created, surveyed, and correlated results of pre-workshop participant survey.
4. Scheduled and facilitated two workshops on March 4, 2009 and April 1, 2009.
5. Prepared PowerPoint presentations summarizing project results.
6. Identified two wind energy forums to present project results.
7. Presented summary of project at the 2009 Wisconsin Renewable Energy Summit on March 26, 2009 and at the Illinois Wind Working Group's Advancing Wind Power in Illinois 3rd Annual Conference on July 16, 2009.
8. Prepared summary report.

Conclusions and Recommendations:

During the workshops, stakeholders identified and prioritized information needs for understanding potential impacts to birds and bats from siting wind energy facilities along the Upper Mississippi River Valley. Lack of sufficient information prevented the stakeholders from developing a framework for standardized study designs and survey methodologies; however, the workshops set the foundation for continued stakeholder cooperation within the Upper Mississippi River Valley. It is recommended that the stakeholder group continue to work together to assemble critical mapping information, organize subgroups of bird and bat species experts to analyze species groups and behaviors, look for cooperative opportunities to partner with other wind-wildlife initiatives, and acquire funding to support the group's efforts.

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Pre-Workshop Survey Results

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Preliminary Mapping of Base Data

Preliminary List of Existing Mississippi River Valley Bird Surveys

PowerPoint Presentation - 2009 Wisconsin Renewable Energy Summit (March 26, 2009)

**PowerPoint Presentation - Illinois Wind Working Group - Advancing Wind Power in Illinois
3rd Annual Conference (July 16, 2009)**

1. INTRODUCTION

Commercial scale wind energy development is generally limited to particular regions of the upper Midwest based on wind resource potentials. As the best wind resource areas are built out, developers are shifting their interests to areas that may pose more siting challenges, especially related to wind-wildlife interactions. An example of one such area is the Upper Mississippi River Valley (UMRV), which is recognized as a globally important avian migration corridor. Increasing interest in locating wind energy facilities along the Mississippi River corridor has raised the need for objective and cost-effective means for evaluating and mitigating their potential impacts on migrating birds and bats. The time and expense involved with surveying patterns of migratory bird and bat passage in relation to distance from the Mississippi River, and the uncertainty surrounding the predictive value of collected data for defining potential impacts to birds and bats leaves wind energy developers and resource agencies in a difficult position of needing to make decisions on projects without sufficient supporting data.

The immediate challenge facing the wind development community and the regulatory agency community is the lack of scientific data to evaluate the environmental risk associated with wind development in the UMRV. In short, wind development is happening at a faster rate than the rate at which scientific data can be collected to evaluate the risk to birds and bats. Because of the speculative nature of wind development, detailed scientific studies are not economically feasible in the early developmental stages of a wind energy facility. Therefore, a regional approach to answer some of the scientific questions will be beneficial to the wind industry, regulatory agencies, and the environment.

This project represents the first step in evaluating the implications of siting wind energy facilities in the UMRV, by organizing stakeholders to identify data gaps and reach consensus on what specific scientific data should be collected, how to obtain the needed data, and how to utilize the data in the decision making process when considering wind energy facilities in the UMRV. The goal of this project was to execute a workshop series to develop a collaborative approach for gathering future scientific data to guide the responsible siting of wind energy facilities within the UMRV.

The project objectives included: 1) identify and organize a diverse stakeholder group, 2) identify specific data gaps concerning micro- and macro-scale avian and bat migration patterns within the UMRV, 3) use a structured decision-making process to prioritize research needs and build consensus on an appropriate study design and methodology, 4) develop a framework for standardized survey methodologies that can be used to evaluate avian and bat migration patterns within the UMRV to determine the implications for siting wind energy facilities, and 5) document the process by which decisions were made and share results and information obtained from this project with other resource agency staff and the wind industry.

For this project, the UMRV is generally defined as the counties in Wisconsin, Minnesota, Iowa, and Illinois, that adjoin the Mississippi River from the confluence of the Illinois River north to the confluence of the St. Croix River. Because the rivers influence on bird and bat migration remains largely unknown, the project interest area is represented as a 50-mile buffer from the Mississippi River (Figure 1).

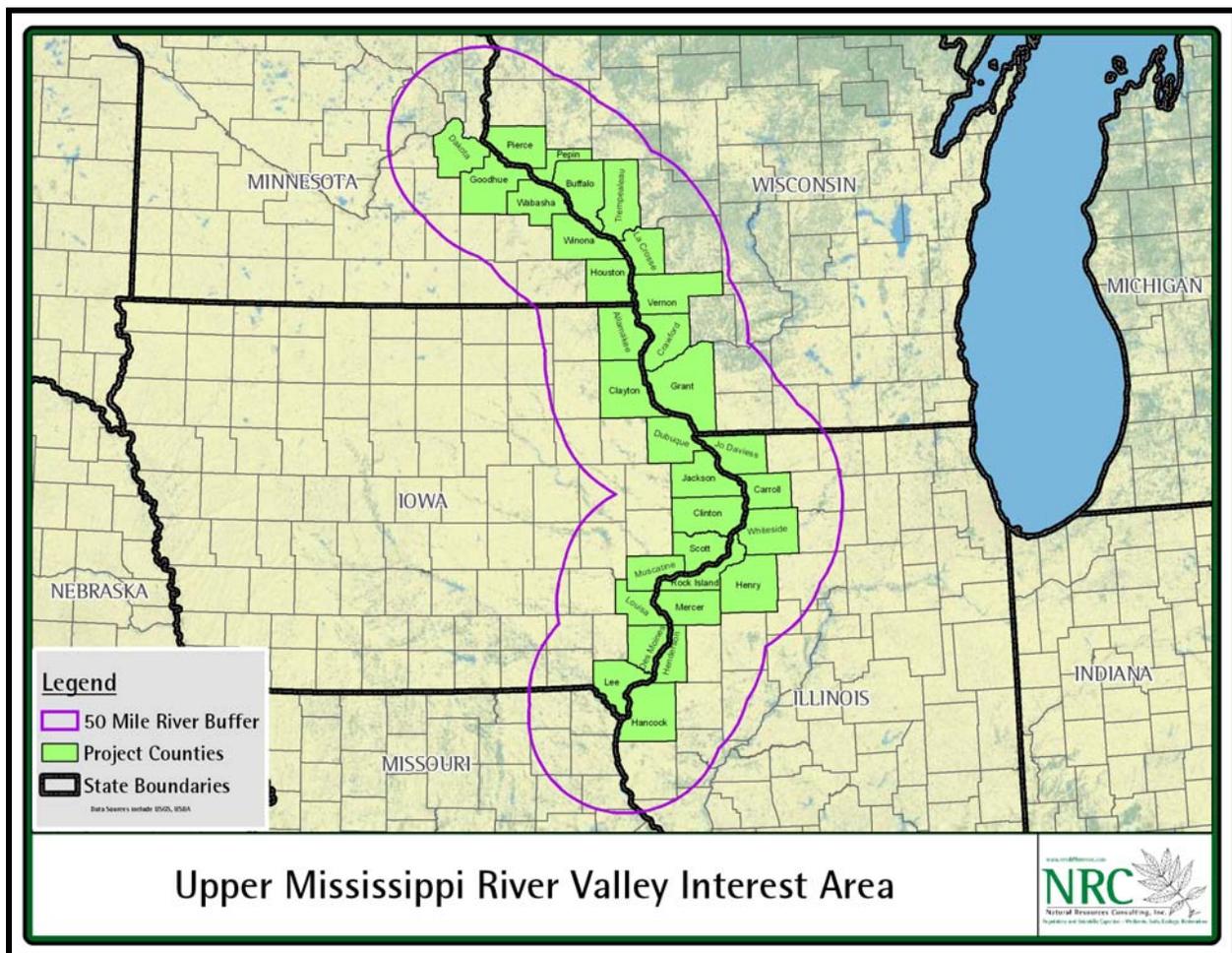


Figure 1. Upper Mississippi River Valley Interest Area for wind energy /wildlife workshop series

2. PRE-WORKSHOP ACTIVITIES

2.1 Identify and Organize Stakeholders

NRC identified over 40 potential stakeholders with regional experience in bird and bat migration and wind energy development along the UMRV through working relationships, project experience, and networking within the wind industry. All potential stakeholders were contacted and invited to participate in the workshops. Some stakeholders were unable to participate, but expressed their interest in following the project’s activities and progress. Those wishing to participate were sent a pre-workshop survey and workshop agenda. Contact information for stakeholders was organized and managed in a spreadsheet (Appendix).

2.2 Pre-Workshop Survey

Pre-workshop surveys were sent to 27 targeted individuals identified as having a regional interest or experience in bird and bat migration and wind energy development along the UMRV. The number of individuals that were targeted represented the following groups:

- Wind Energy Developer / Advocate – 8 (29%)
- Regulatory Agency – 7 (26%)
- Research Scientist / Expert – 5 (19%)
- Consultant – 5 (19%)
- Conservation Organization – 2 (7%)

Responses were received from 23 individuals of which 18 were solicited (67% of individuals targeted) and 5 were unsolicited (individuals not targeted, but delegated or informed by their co-workers to take the survey). Nine individuals (33%) that were targeted to complete the survey did not respond. The number of targeted individuals that responded represented the following groups:

- Wind Energy Developer / Advocate – 4 (22%)
- Regulatory Agency – 6 (33%)
- Research Scientist / Expert – 3 (17%)
- Consultant – 3 (17%)
- Conservation Organization – 2 (11%)

The five non-targeted respondents were comprised of four regulatory agency representatives and one consultant. The nine targeted individuals that did not respond were comprised of four wind energy developers / advocates, two consultants, two experts, and one regulatory agency representative. The pre-workshop survey and results are included in the Appendix.

3. WORKSHOP I

3.1 Objective

The objective of Workshop I was to understand the history of wind energy development in the Upper Mississippi Valley region, and to identify data gaps and information needs regarding bird and bat migration along the UMRV. Through facilitation, stakeholders participated in the following tasks:

- **Task 1:** Develop a goal statement for the workgroup to guide discussion and outcome of workshops.
- **Task 2:** Discuss current conditions (problems and concerns) regarding wind energy siting in the UMRV.
- **Task 3:** Define region-specific avian and bat scientific information needs.

3.2 Results

Workshop I was held on March 4, 2009 at the US Fish and Wildlife Service Office in Onalaska, Wisconsin and was attended by 24 stakeholders. Participants used a structured decision making process to identify specific data gaps concerning micro- and macro-scale avian and bat migration patterns within the UMRV to help prioritize research needs, build consensus on the appropriate level of future study, and guide wind energy siting decisions.

Task 1 – Stakeholder Goal Statement

The following goal statement was developed by the stakeholders:

The goals of the Upper Mississippi River Valley (UMRV) wind-wildlife stakeholder group are to define areas for wind energy development within the UMRV that lessen the risks to migratory birds and bats, and to establish cooperation among stakeholders regarding siting of wind energy facilities at a regional level through open dialog and an understanding of the financial thresholds and natural resource implications.

Task 2 – Current Conditions

NRC prepared a PowerPoint presentation to define the purpose of the workshop series and to establish a base understanding among participants regarding wildlife use and wind energy siting in the region. A copy of the presentation is provided in the Appendix.

Participants discussed the current state of wind development with the UMRV region and the status of existing bird and bat data that is available to evaluate potential impacts. Currently wind development is occurring or being pursued in several locations along the UMRV, and many prospective sites are being considered.

Limited region-specific scientific information exists on bird and bat movement to help support wind energy project siting decisions within and adjacent to the UMRV. The US Fish and Wildlife Service has initiated a Wisconsin Focus on Energy supported project to use Nexrad Weather Surveillance Radar as a decision support tool for monitoring bird and bat migration across Wisconsin. With additional development, this project could prove useful in understanding the timing, duration, and variability of bird and bat migration events, as well as identifying important stopover locations for migrating birds and bats (http://www.focusonenergy.com/files/Document_Management_System/Environmental_Research/heglundmigration_report.pdf). Additionally, the US Fish and Wildlife Service is studying the daily movements of spring migrating songbirds using radio transmitters, which should provide new information on migrating songbird use within and adjacent to the UMRV (pers. comm. Dr. Patricia Heglund).

Task 3 – Scientific Information Needs

Scientific information needs regarding micro- and macro-scale avian and bat migration patterns within the UMRV were identified and categorized by the stakeholders during a brainstorming exercise. These information needs are organized and presented below by category:

Wildlife Species Groups

- Gather and organize all available data on bird and bat populations within the UMRV interest area and prioritize species of concern.
- Determine what information and where information is lacking for species groups and habitats.
- Locate bird / bat concentration areas within UMRV interest area, and identify potential impacts from proposed wind turbine generators.

Wildlife Habitat

- Identify habitat types within the UMRV interest area that should be avoided when siting wind facilities and/or wind turbine generators.
- Determine the importance of distinct habitat types (i.e., bluff land vs. farm land) in relation to distance from the river, and identify the potential impacts from permanent displacement of species as well as nesting displacement.
- Determine the importance of the UMRV interest area for bird / bat migration and breeding on a regional scale (i.e. as it relates to the surrounding landscape).

Wildlife Behavior

- Define bird and bat migration in terms of the following parameters:
 1. spatial distribution of height (altitude) and horizontal gradient (corridors vs. broad-front) in relation to distance from the river;
 2. temporal / seasonal migration, and how weather conditions influence movement; and
 3. abundance levels of birds and bats using the UMRV interest area.
- Determine where information is lacking on bird and bat migration and identify behaviors which may lead to greater collision risk within the UMRV interest area.
- Identify and quantify existing and potential threats to bird and bat use of the UMRV interest area.
- Determine whether displacement / behavioral avoidance may occur for resident bird species, and if possible identify which groups or species are most susceptible to displacement effects.
- Determine the most appropriate method for studying displacement or behavioral avoidance for migrating and resident bats/ birds.
- Determine if birds/bats use inland “short cuts” during migration.
- Determine the extent that migrants use agricultural land as either stopover sites or low flyover.

Wind Energy Technology

- Define the need and potential to site wind turbines within the UMRV interest area, and determine whether the area is suitable for other utility-scale energy production facilities (i.e., coal units).
- Develop primer on what makes a location suitable for wind energy development.
- Identify technologies/practices available that could be implemented to lessen the effects of wind facilities on birds and bats.
- Identify target levels of wind production relative to other renewable sources by region, and determine the most appropriate size limit or scale of operation.
- Compare and contrast impacts from wind energy to other forms of electricity.

Wildlife Resources Technology

- Determine under what conditions birds and bats are most at risk to wind energy development within the UMRV interest area.
- Identify bird/ bat migration, movements, and activity patterns along the UMRV.

- Define the level of study that is required in order to evaluate the potential species impacts of wind energy development, and identify the best combination of regional vs. site-specific studies.
- Identify the most useful technology to study bird and bat migration (geo-locators, radio tracking, NEXRAD, marine radar). Determine if such data can be related to actual fatalities at wind energy facilities and whether it can be used as a predictive tool for mitigation.
- Determine ways to make data more centralized and available.

Wind Resource and Natural Resource Mapping

- Define and map the boundary of the UMRV interest area, identify sensitive natural resource areas, and establish appropriate buffers. Describe the implications of development within those buffers.
- Identify and map areas of the UMRV which are important for migration stopover sites, roost sites and hibernacula, and compare those with areas which contain the greatest wind development potential. From this information, identify areas within the UMRV interest area where wind energy development should be considered high risk to wildlife.
- Portray spatially the relative abundance of bats and birds within the UMRV during the breeding season.
- Identify and map the current and future transmission constraints.
- Identify and map potential low risk sites, with relatively high certainty of minimal effects.

Risk Assessment

- Identify the magnitude of bird and bat movements within the UMRV in areas suitable for wind energy development, and relate actual collision risk to perceived collision risk.
- Identify if impact risks can be evaluated with current data using a meta-analysis.
- Identify similar studies or initiatives which might provide insight for the UMRV interest area.

Future Opportunities / Funding

- Develop lists with funding sources for research, potential partners, opportunities for collaboration, regional contributors, and site/project specific funding opportunities.
- Create a link between funding sources and those organizations/ companies who have the technological capabilities to collect and analyze the data.
- Develop protocol for monitoring impacts to bird and bat populations at pilot sites to capture event-based impacts within the UMRV interest area.
- Explore collaborative opportunities with other initiatives like the Great Lakes Wind Collaborative or The Nature Conservancy (e.g. mapping data collected in the field).

4. WORKSHOP II

4.1 Objective

The objective of Workshop II was to formulate a research plan outlining the methods, equipment, and techniques that could be used to cost effectively and efficiently address the information needs identified in Workshop I. However, through discussion the stakeholders agreed that prior to collecting new data the group should assemble and synthesize existing information to better understand the potential problems and concerns for birds and bats from siting wind energy facilities in the UMRV.

4.2 Results

Workshop II was held on April 1, 2009 at the US Fish and Wildlife Service Office in Onalaska, Wisconsin and was attended by 16 stakeholders. The stakeholders prioritized the most important data needs and outlined a series of next steps to guide future decision making for the group, which included:

1. Completing a regional mapping effort to guide responsible siting of wind energy facilities;
2. Assembling subgroups of avian and bat experts to understand species groups behaviors, habitat use, and potential zones of impact relative to the UMRV;
3. Collaborating with other wind-wildlife organizations to share information and resources; and
4. Identifying potential funding opportunities.

A summary of the priority items and next steps are discussed below.

Complete UMRV Regional Mapping Effort

A critical first step to understanding the implications of siting wind energy facilities within or along the UMRV is to compile and distribute the applicable spatial data layers and base maps that will allow wind developers and regulators to clearly understand where wind resource areas and environmentally sensitive areas within the UMRV intersect. The stakeholders recommended that a subgroup begin to compile, organize, house, manage, and distribute base data layers for decision support.

Potential base data layers identified by stakeholders at Workshop II included, but should not be limited to:

- Wind Resource
- Transmission Line Infrastructure
- Land Cover
- Slope of Landscape
- Transportation Infrastructure
- Important Bird Areas (MN, IA, IL, and WI)
- Bird Conservation Areas (IA)
- State Parks
- State Wildlife Areas
- State Natural Areas

- Areas of Biodiversity Significance (MN)
- Waterfowl Production Areas
- National Wetland Inventory Maps
- Wisconsin Wetland Inventory
- Breeding Bird Atlas (IA, IL, WI)
- State and County Forest Lands
- National Fish and Wildlife Refuge Lands
- Land Legacy Lands
- The Nature Conservancy Lands
- Conservation Reserve Program Lands
- Wetland Reserve Program Lands
- Land Trust Properties (e.g., Mississippi Valley Conservancy)
- Wildlife Action Plans

The stakeholders agreed that this data could be compiled and managed using a Geographic Information System (GIS). EcoEnergy agreed to compile and create a preliminary example of the existing GIS data layers for this project (Appendix) based on information provided by the stakeholders. The preliminary GIS data layers require future updates and data management and should be publically accessible.

Assemble Avian and Bat Expert Subgroups

Using the GIS mapping assembled above, the stakeholders recommended that avian and bat expert subgroups be organized to collectively convey species group behaviors, habitat use, and potential zones of impact within or along the UMRV. Species groups proposed to be studied include:

- Waterfowl
- Raptors
- Songbirds
- Water Birds
- Bats
- Threatened and Endangered Species

In addition, some stakeholders suggested rather than using species groups, that birds and bats be categorized by risk level, flight heights, behavior patterns, or habitat use if possible.

Several existing bird survey data sources likely to provide information for decision support within and along the UMRV were discussed by the stakeholders and are summarized in the Appendix.

Collaborate with Other Wind-Wildlife Organizations

The results of this workshop series will be shared with existing wind-wildlife organizations. The stakeholders agreed that a UMRV Wind-Wildlife Workgroup should be developed and future collaboration with other wind-wildlife organizations is necessary. A goal is to sustain the UMRV Wind-Wildlife Workgroup as an entity within one or more of the existing wind-wildlife organizations and promote data sharing and enhance funding opportunities. The following wind-wildlife organizations were discussed as potential collaborators:

- *The National Wind Coordinating Collaborative (NWCC)* is a U.S. consensus-based collaborative formed in 1994 that identifies issues that affect the use of wind power, establishes dialogue among key stakeholders, and catalyzes appropriate activities to support the development of environmentally, economically, and politically sustainable commercial markets for wind power. NWCC members include representatives from electric utilities and support organizations, state legislatures, state utility commissions, consumer advocacy offices, wind equipment suppliers and developers, green power marketers, environmental organizations, agriculture and economic development organizations, and state and federal agencies.
- *The American Wind Wildlife Institute (AWWI)* is a 501(c)(3) organization that was established in December 2008. AWWI will focus on efforts to facilitate timely and responsible development of wind energy while protecting wildlife and wildlife habitat. AWWI is a first-of-its-kind collaboration between non-governmental organizations (NGOs), government agencies and other industry representatives.
- *Bats and Wind Energy Cooperative (BWEC)*. The Bats and Wind Energy Cooperative (BWEC) is an alliance of state and federal agencies, private industry, academic institutions, and non-governmental organizations that cooperates to develop solutions to minimize or, where possible, prevent mortality of bats at wind power turbines.
- *The Great Lakes Wind Collaborative (GLWC)* is a group established to build consensus and identify and address issues affecting the planning, development, and operation of wind power facilities in the Great Lakes region. The group provides a forum for dialogue and an opportunity for analysis and exchange of information among key stakeholders to facilitate sustainable wind power development in the region. The GLWC reaches across sectors and disciplines to identify and address the technical, environmental, regulatory, educational and financial issues related to the deployment of wind energy resources.

Potential Funding Opportunities

The stakeholders agreed that future funding is required to sustain the UMRV Wind-Wildlife Workgroup and accomplish the goals and vision of the stakeholders. The following studies and potential funding opportunities were discussed by the stakeholders:

- Radar Studies – possibly funded in conjunction with ongoing US Fish and Wildlife Service and US Geological Survey projects
- GIS Resource Mapping – funded by grant from State, Federal, or wind industry
- Pre-Construction Studies – funded by the developer to include the following:
 - Habitat Assessments
 - Bird Use Surveys (Breeding and Spring/Fall Migration)
 - Nesting Patterns of Some Species
- Post Construction Studies – funded by the developer
- Bat Monitoring – funded by developer and federal agencies (under certain conditions)

Further evaluation of potential funding sources is required and is dependent on the type of study proposed and funding availability. The UMRV Wind-Wildlife Workgroup will be responsible to

identify potential funding sources based on the project type and timeline. Potential funding sources may include:

- US Fish and Wildlife Service
- US Geological Survey
- US Army Corps of Engineers
- State Wildlife Grants
- Wind Industry
- Wind-Wildlife Organizations
- Wind Developers
- Conservation Organizations (e.g. The Nature Conservancy, National Audubon Society)

5. SUMMARY

The workshop series provided an opportunity for stakeholders to cooperatively identify and prioritize information needs for understanding the potential impacts to birds and bats from siting wind energy facilities along the UMRV. The information needs were generally categorized into 1) identifying species groups of concern, 2) recognizing important habitats, 3) understanding behavioral patterns (i.e. timing and duration of migration, flight paths and heights), 4) understanding the wind resource and the siting criteria from a wind developer's perspective, and 5) compiling and distributing applicable spatial data using GIS maps.

Lack of sufficient information prevented the stakeholders from developing a framework for standardized study designs and survey methodologies; however, the workshops set the foundation for continued stakeholder cooperation within the UMRV. It is recommended that the stakeholders form a UMRV Wind-Wildlife Workgroup that will continue to work together to assemble critical mapping information, organize subgroups of bird and bat species experts to analyze species groups and behaviors, look for cooperative opportunities to partner with other wind-wildlife initiatives, and acquire funding to support the group's efforts.

NRC will distribute the results of this workshop series to the stakeholders and wind-wildlife organizations. NRC will organize and facilitate future meetings of the UMRV Wind-Wildlife Workgroup in 2009 and discuss possible funding opportunities available to execute future tasks.

APPENDIX

List of Collaborators

Evaluating Bird and Bat Migration and the Implications of Wind Energy Development along the Upper Mississippi River Valley : A Workshop for Resource Agencies and Wind Developers

Workshop Participants

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Pre-Workshop Survey Results

Evaluating Bird and Bat Migration in the Upper Mississippi River Valley and Its Implications for Siting Wind Energy Facilities: A Workshop Series for Resource Agencies and Wind Developers

Pre-Workshop Survey Results

Question. Based on your own professional experience and opinion, list the five most apparent information gaps regarding bird and bat migration along the Upper Mississippi River Valley.

Common responses to this question regarding gaps in our information about bird and bat migration along the Upper Mississippi River Valley include:

- Lack of knowledge about the nature and extent of migration patterns and behavior for birds and bats along UMRV
 - vertical distance / gradient that species occupy from the river
 - flight heights
 - affinity for specific topographic or non-riparian habitat features adjacent to the river
 - timing and duration of migratory movements / flights (diurnal and nocturnal, as well as seasonal pulses)
 - specific pathways used by various groups of migratory birds and bats (i.e., raptors, waterfowl, swans, and passerines)
 - migratory bird behavioral responses during different weather conditions
 - Do birds use certain pathways for migration or is there broad front movement (how does this vary by bird group).
- Lack of knowledge on displacement and avoidance affects on nesting raptors and grassland birds.
- Degree of aversion to turbines – horizontally and at altitude.
- How do wind turbines influence use by migratory bird and bats in various habitats.
- Location of existing winter bald and golden eagle roosts during migration and winter.
- Location of bat hibernacula.
- Location and extent of critical, useful, and emergency migratory bird stop over sites. How do birds move between stop over habitats? How long do they stay?
- Impact of other anthropogenic features (communication towers); and how do the mortality rates compare.
- Fatality rates for songbirds have not been shown to be extraordinarily high in other parts of the US. Is there something unique about the UMRV that would result in higher fatality rates for songbirds?
- Lack of knowledge about the bird and bat species at greatest risk, and the importance of this risk.
- Lack of information on whether commercial wind developments have a significant population level impact on birds and/or bats.
- Lack of knowledge on the appropriate study design and methodology on a project and regional scale.

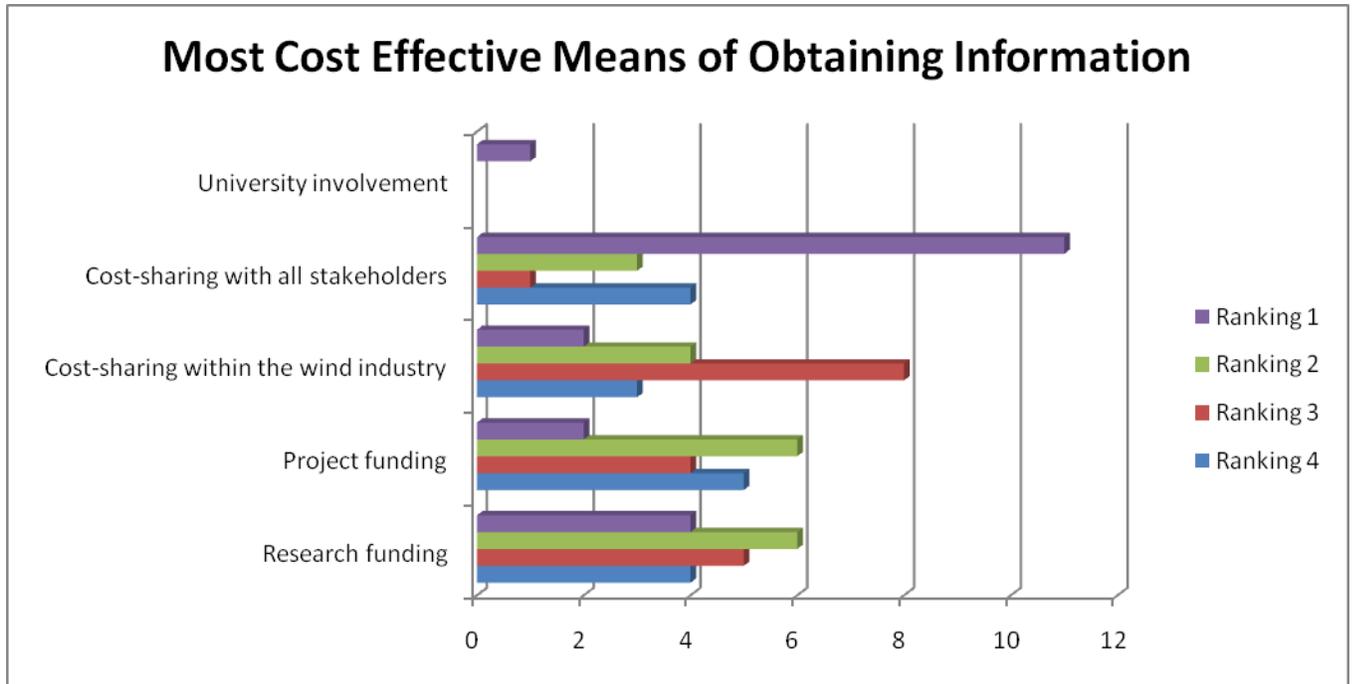
- Identification of highest wind development locations in relation to locations of important bird/ bat use areas.
- What percentage of birds and bats that breed north of the UMRV use the valley for migration
- Lack of information on how habitat can be improved to benefit bird and bat migrants.

Question. List five factors limiting your ability to obtain the data necessary to understand the information gaps.

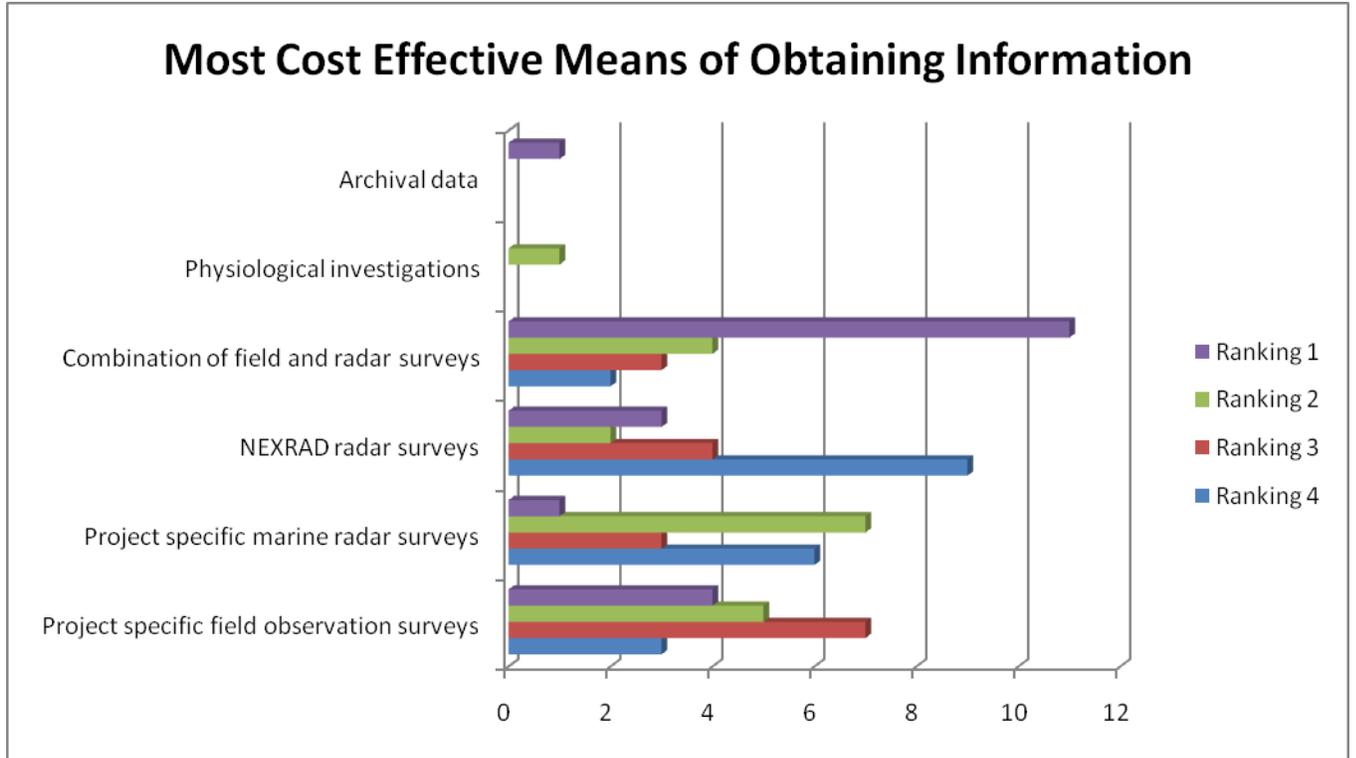
The following is a list of common responses:

- Lack of funding (**over 50% of responses cited lack of funding as the number one factor**)
- Lack of guideline for where turbines can be sited
- Determining the highest priority data to collect
- Difficulty in finding the right tools for a broad, region wide study
- Adequate technology is often unavailable, and those that are, can be quite expensive.
- Disagreement on scale (project vs. cumulative or regional); determining where to collect the data, and for how long to collect the data. Duration is often limited by funding.
- Synthesis and evaluation of existing bird and bat information relative to the UMRV
- Lack of data sharing among win-energy companies; often times multiple entities studying the topics can lead to large inconsistencies.
- No coordinated effort
- Lack of observers, volunteers, and available expertise.
- Regulatory incentives and support needed.

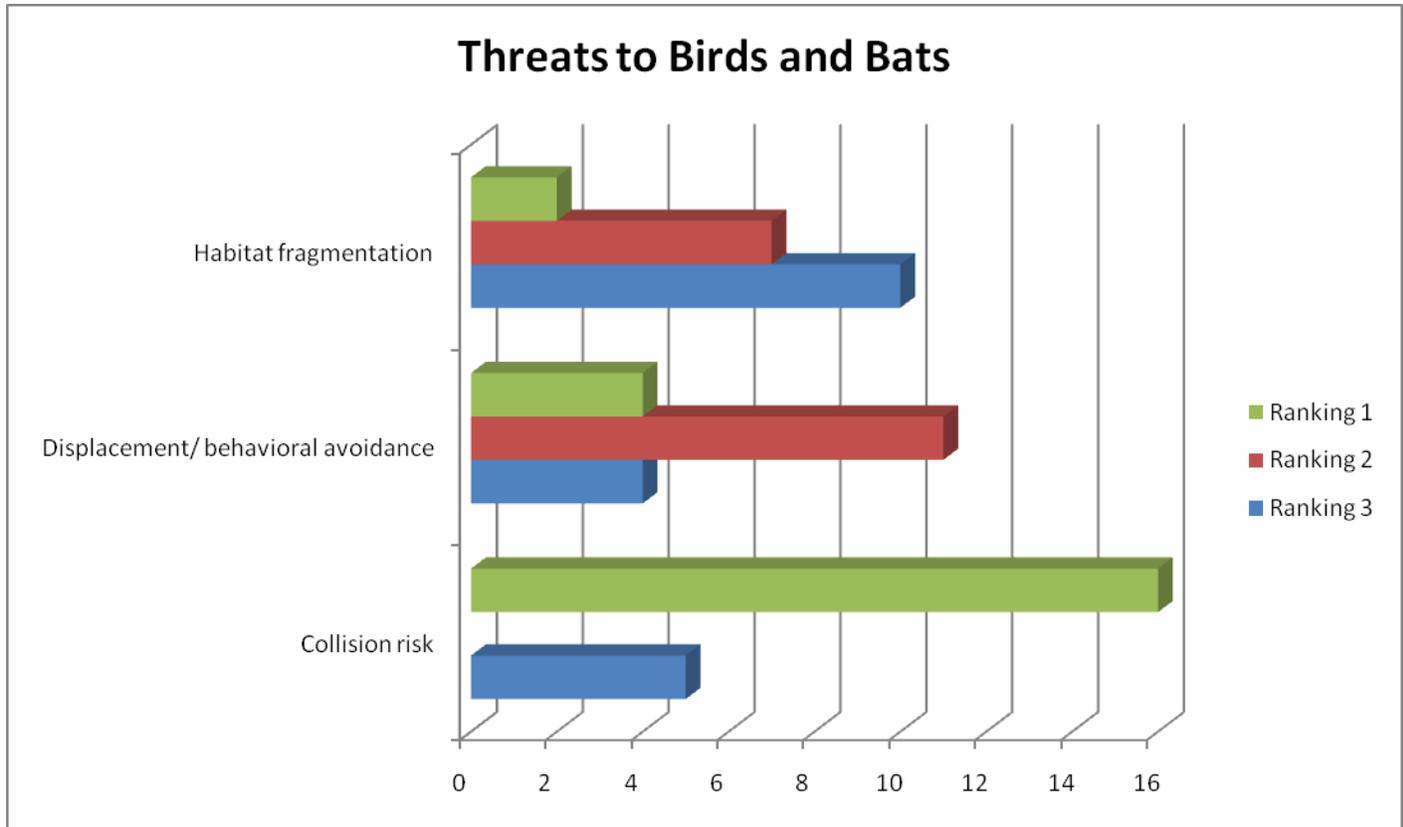
Question. What are the most cost-effective means of obtaining information on bird and bat use along the Upper Mississippi River Valley? (rank them in order of importance with 1 being the highest and 4 being the lowest)



Question. What are the most efficient means of obtaining bird and bat information for assessing potential impacts of siting wind energy facilities along the Upper Mississippi River Valley? (rank them in order of importance with 1 being the highest and 4 being the lowest)



Question. What do you perceive to be the major threats to birds and bats from wind energy development along the Upper Mississippi River Valley? (rank them in order of importance with 1 being the highest and 3 being the lowest)

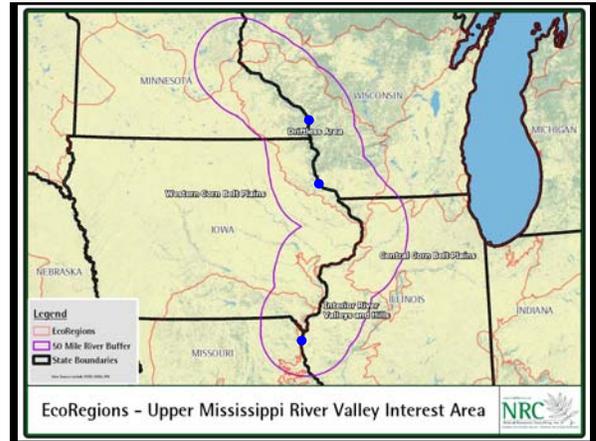
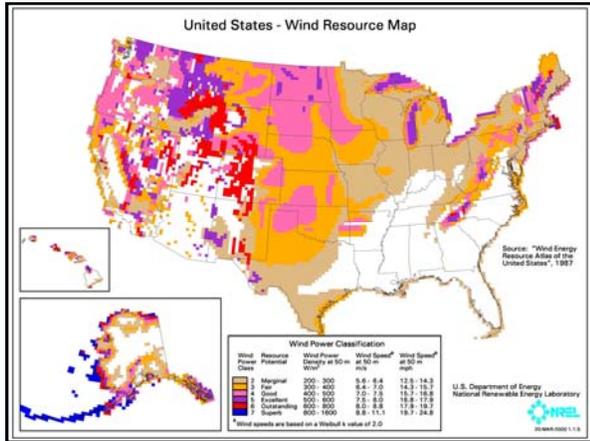


**PowerPoint Presentation
Workshop I - Background
(March 4, 2009)**

Siting Wind Energy Facilities Along the Upper Mississippi River Valley

Sponsored by:
 Natural Resource Consulting, Inc.
 Behlke Consulting, Inc.
 River Country RC&D Council, Inc.

Funded by:
 Wisconsin Focus on Energy
 Economic and Environmental Research Program

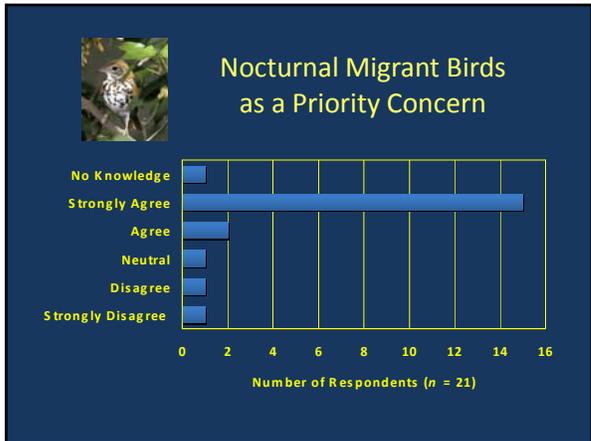
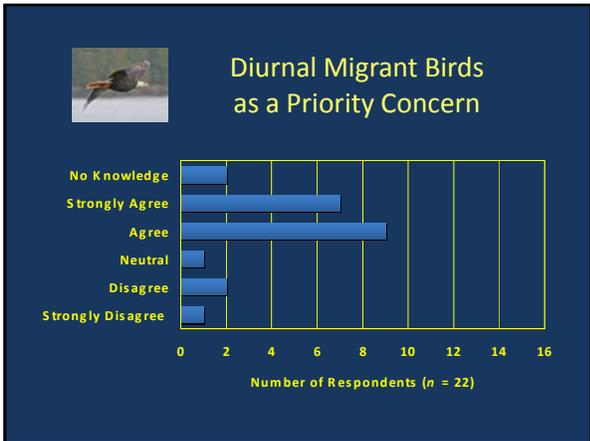
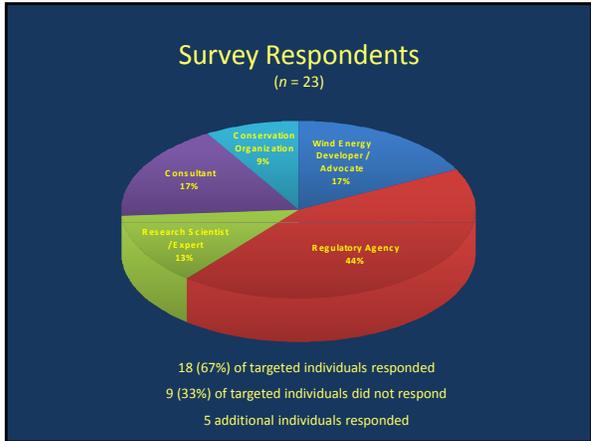
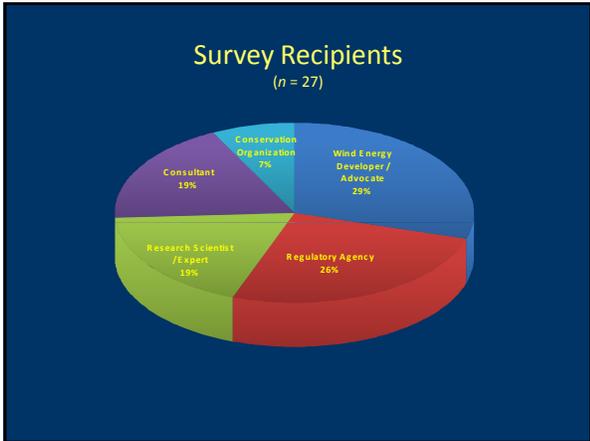


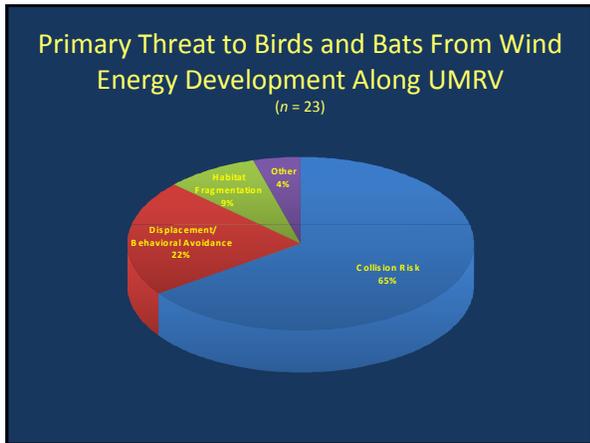
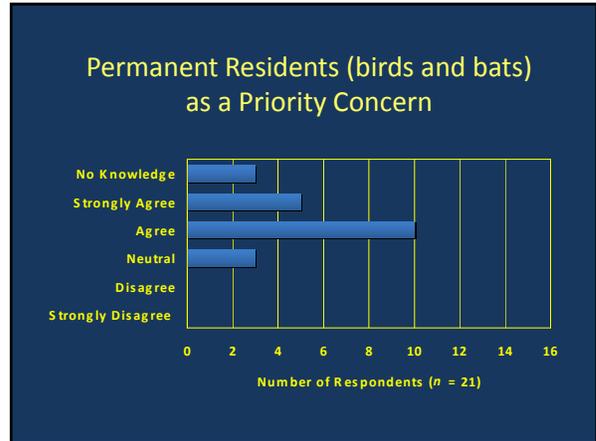
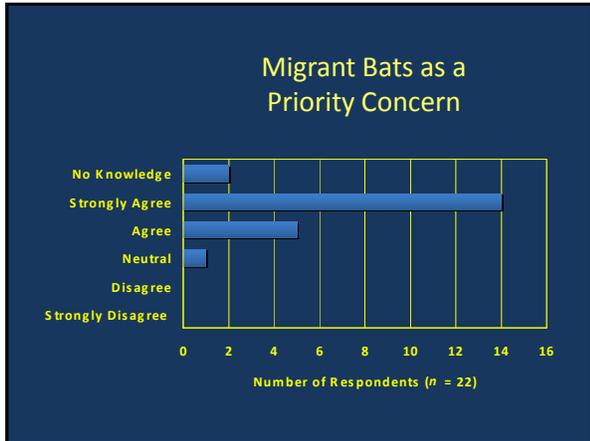


Issues Surrounding Wind Energy Siting in the Upper Mississippi River Valley



- Scientific / Information Needs on Bird and Bat Migration
- Financial Challenges for Addressing Information Needs
- Policy Issues Related to Wind Energy Siting





Information Needs Regarding Migration Behavior and Movements

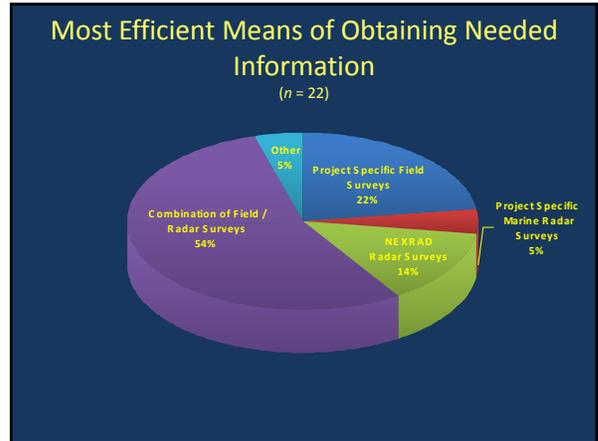
- Flight heights w/in UMRV
- Horizontal gradient of bird / bat concentration
- Pathways or Broad Front Movements
- Timing and duration of migratory movements
- Affinity for topographic or non-riparian habitat features adjacent to river valley

Information Needs Relative to Important Habitat Areas

- Location and extent of important migratory bird stopover habitat
- Location of bat hibernacula and winter eagle roosting sites
- Areas of highest wind energy development potential

Factors Limiting Ability to Obtain Data

- Funding
- Determining highest priority data to collect
- Adequate technology and proper tools
- Disagreement on scale of studies (project level or regional / cumulative)
- Synthesis and evaluation of existing data relative to UMRV
- No coordinated effort / Lack of data sharing among wind energy developers



A3 Problem Solving



Objectives:

- Candid Investigation
- Encourages Collaboration
- Plan-Do-Check-Act (PDCA) Process
- Documents Decisions
- Result Oriented

A3 – Elements

- **Objectivity:** Roots of Process are Grounded in the Scientific Method of Inquiry
- **Cause and Effect:** Deeper Understanding of Problem and Opportunity
- **Coherency and Consistency:** Address Problems that are Important
- **Systems Viewpoint:** Purpose, Goals, Needs and Priorities are Shared

A3: 10 Step Process

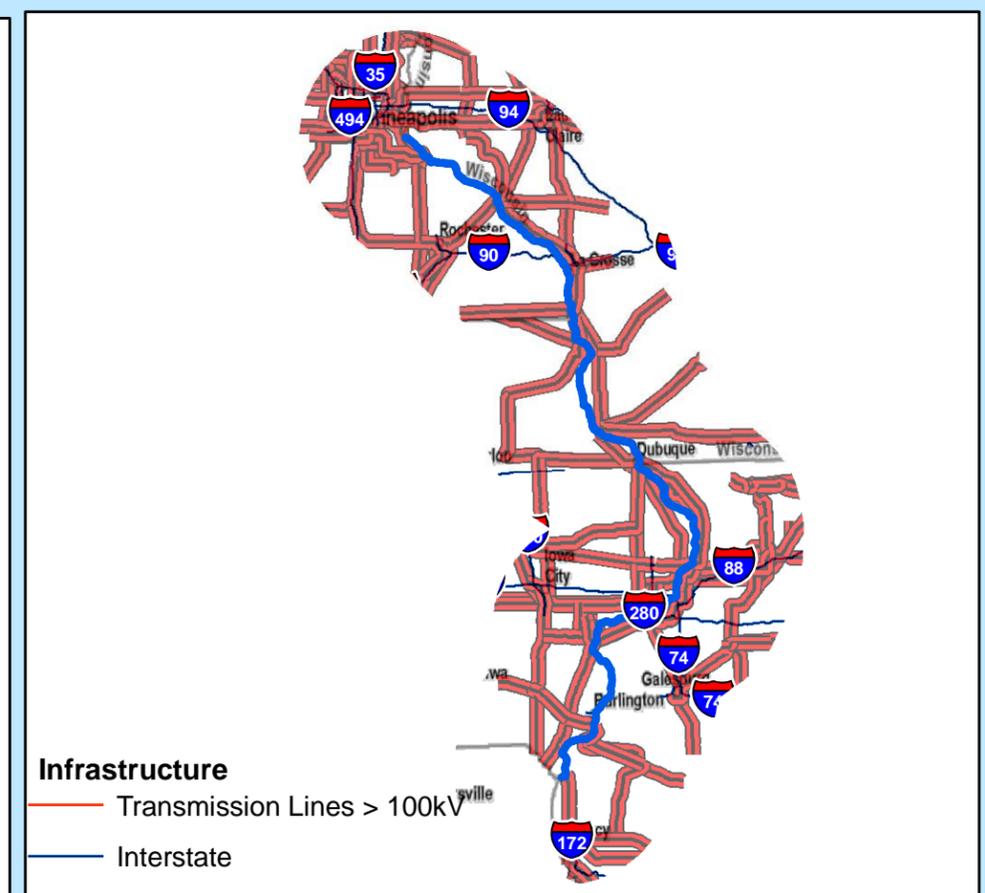
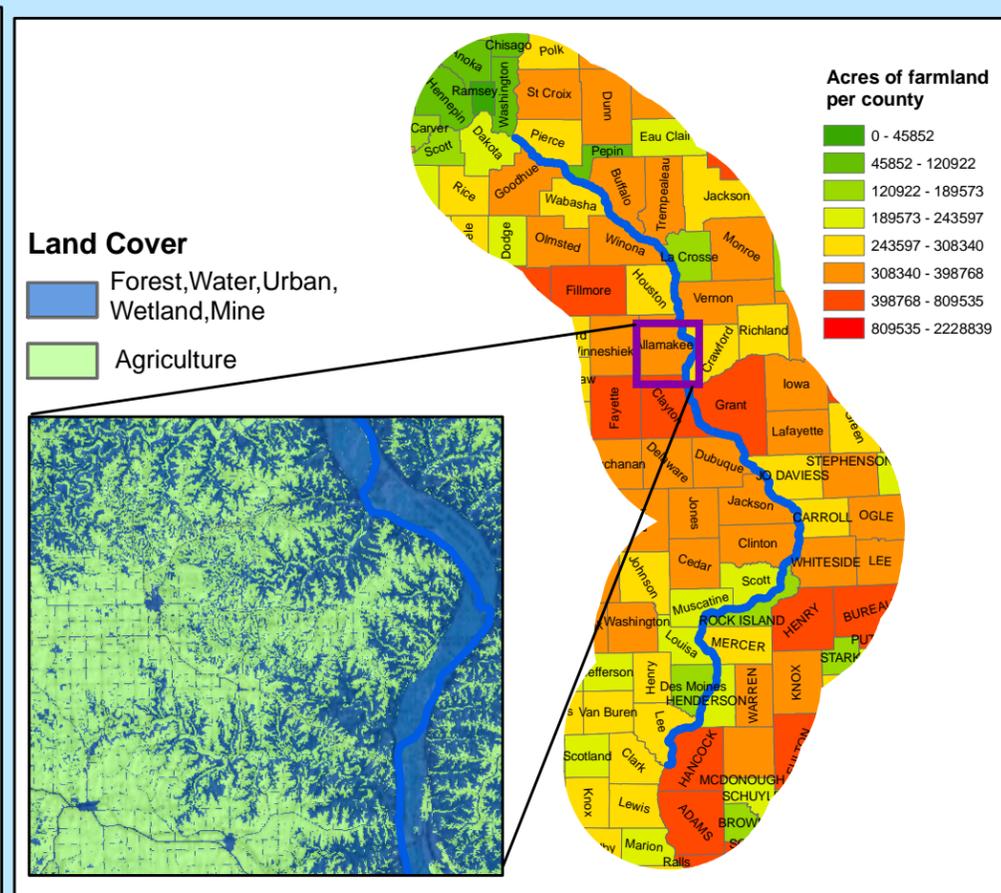
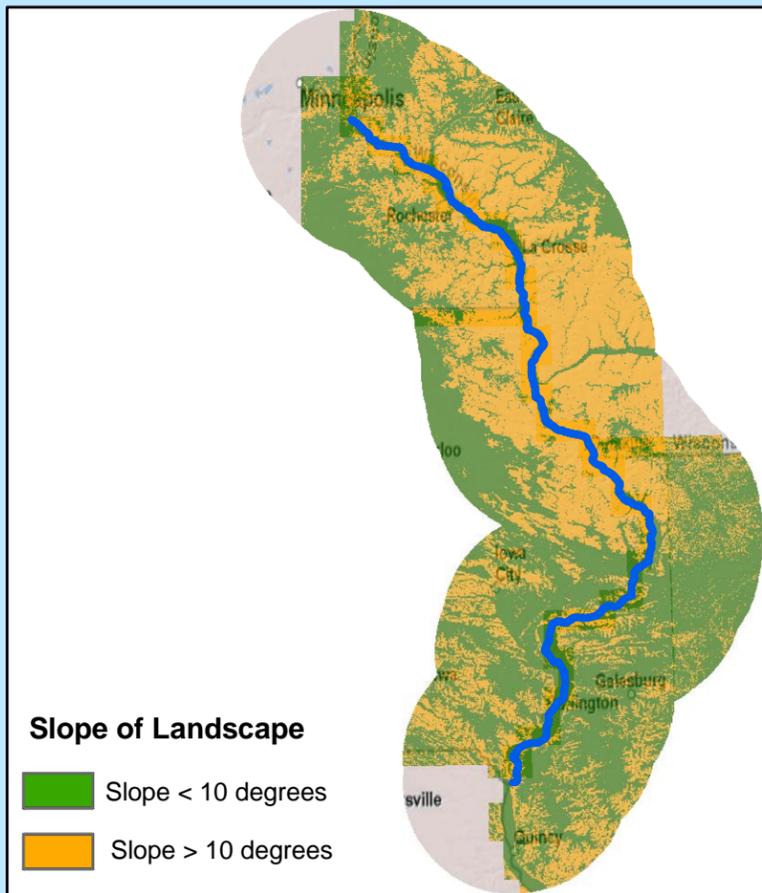
- Step 1:** Conduct research to understand the current situation
- Step 2:** Conduct root cause analysis
- Step 3:** Devise countermeasures to address root causes
- Step 4:** Develop a target state
- Step 5:** Create an implementation plan
- Step 6:** Develop a follow-up plan with predicted outcomes
- Step 7:** Discuss plans with all affected parties
- Step 8:** Obtain approval for implementation
- Step 9:** Implement plans
- Step 10:** Evaluate results

**Preliminary Mapping of Base Data
(Land Cover, Transmission Lines, Percent Slope)**

Mississippi River Study Area



Maps contain data from the following sources: Upper Mississippi Basin Stakeholder Network, Wisconsin DNR, ESRI, Multi-Resolution Land Characteristics Consortium, and Platts.



Preliminary List of Existing Mississippi River Valley Bird Surveys

Evaluating Bird and Bat Migration in the Upper Mississippi River Valley and Its Implications for Siting Wind Energy Facilities: A Workshop Series for Resource Agencies and Wind Developers

Preliminary List of Existing Mississippi River Valley Bird Surveys

Provided by Jeff Gosse, USFWS (March 30, 2009)

Waterfowl survey: Weekly aerial surveys of Upper Mississippi National Wildlife refuge are conducted from late September until December by the US Fish and Wildlife Service on the major pools of the Upper Mississippi River from Lake Pepin to Keokuk. Contact Lisa Reid (507-494-6234) for data.

American Woodcock Survey: an annual survey of rodding American Woodcock is conducted by the USFWS in Minnesota, Illinois, and Wisconsin. Contact Sean Kelly, USFWS (612-713-5470) for information.

Mourning Dove Survey: an annual survey of Mourning Doves during the breeding season is conducted by the USFWS in Minnesota, Illinois, Iowa, and Wisconsin. Contact Sean Kelly, USFWS (612-713-5470) for information.

Christmas Bird Count: dozens of Christmas Bird Counts are conducted the last two weeks of December and early January along the Mississippi River which indicates populations of birds within a 15-mile diameter circle. The count is sponsored by the National Audubon Society and both current and historic counts are online at: <http://www.audubon.org/Bird/cbc/>. Note that these counts **does not** measure winter bird populations as frequently claimed but more correctly represents late fall bird populations as many species are often still migrating during this period.

Marshbird Survey: an experimental secretive marshbird survey was conducted at various sites throughout Wisconsin in 2008 and will again be conducted in 2009 by Patuxent USFWS personnel and volunteers. Contact Andy.Paulios@wisconsin.gov or Mark Seamans (USFWS, 301-497-5866).

Midwinter Bald Eagle Survey: a survey is conducted midwinter in 43 states including all Mississippi River states and is sponsored by USGS and the U.S. Army Corps of Engineers. See the website for details: <http://ocid.nacse.org/nbii/eagles/>.

Golden Eagle Survey: a midwinter survey of Golden Eagles is conducted by the National Eagle Center (Wabasha, MN) using volunteers in the Driftless Area of Wisconsin, Minnesota, and Iowa. Contact Scott A. Mehus (651-565-4989 ext. 101) at the National Eagle Center for information or scott@nationaleaglecenter.org.

Nightjar survey: a survey of Whip-poor-wills and Common Nighthawks has been conducted at various sites in the Driftless Area the past two years. Contact <http://www.ccb-wm.org/nightjars.htm> for details or call Mike Wilson (College of William and Mary—757-221-1649) for route location and data results.

Midwest Crane Count: An annual survey of breeding Sandhill Cranes is conducted in late spring by the International Crane Foundation of Baraboo, Wisconsin and covers 5 Midwestern states including the Driftless Region. Contact information available at: <http://www.savingcranes.org/>

Miscellaneous Raptor Surveys: occasionally carried out at Prescott and La Crosse, Wisconsin, at Effigy Mounds National Monument, Iowa, and Winona, Minnesota during spring and fall migration. Data is irregularly published in the various journals of the state ornithological societies (*The Loon*--Minnesota, *The Passenger Pigeon*--Wisconsin, *The Meadowlark*--Illinois, *Iowa Birdlife*--Iowa).

Breeding Bird Surveys: regularly conducted in various locations throughout the Driftless Area. These are 25-mile surveys with a total of 50 point counts taken at half-mile intervals and conducted by the Patuxent Wildlife Research Center. Data is online at <http://www.pwrc.usgs.gov/BBS/>. Incidental observations of birds are published seasonally in state bird journals.

Breeding Peregrine Survey: nesting Peregrines are annually monitored in the Driftless Region. Contact Jackie Fallon for details. Cell: 651-485-7218 pefgirl@hotmail.com. For historical data contact Bob Anderson, director of the Raptor Research project at 563-382-6300 or rrp@mchsi.com.

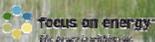
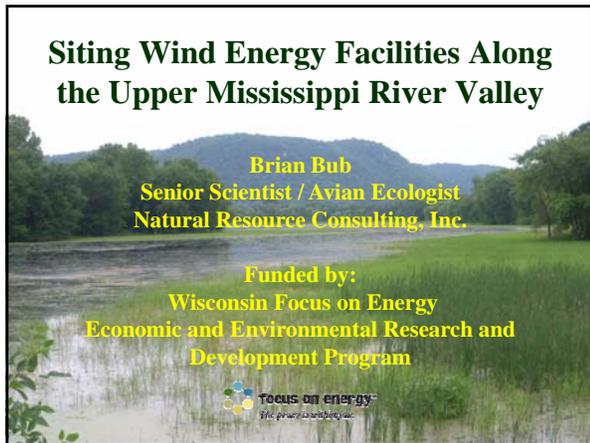
USFWS Region 3 Ecological Services - Biological Resources Maps:
http://www.fws.gov/midwest/wind/wind_maps/index.html

PowerPoint Presentation
2009 Wisconsin Renewable Energy Summit
(March 26, 2009)

Siting Wind Energy Facilities Along the Upper Mississippi River Valley

Brian Bub
Senior Scientist / Avian Ecologist
Natural Resource Consulting, Inc.

Funded by:
Wisconsin Focus on Energy
Economic and Environmental Research and Development Program


Workshop Need Identified



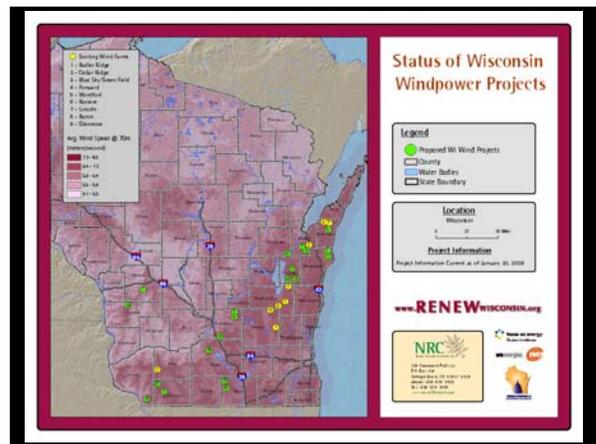
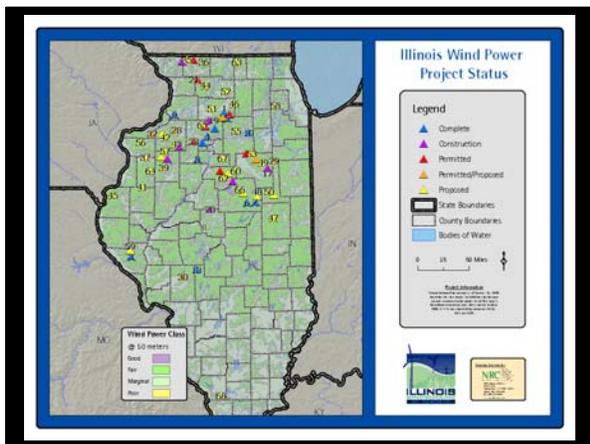
1. Wind Development Interest in UMRV
2. High or Uncertain Risk to Wildlife (birds and bats)
3. Lack of Sufficient Data to Support Decisions
4. Financial Risk to Wind Developers – Viable Project?



What is Driving Wind Development Interest in UMRV?

- Suitable Wind Resource
- Access to Transmission
- Land Acquisition
- Reliable Power Purchaser / Market







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High or Uncertain Risk to Wildlife




- Diverse Habitats Provide Corridors & Stopover Sites
- Known Continental Migratory Bird Flyway
- Considered Globally Important Bird Area
- Meets Guideline Definitions of High or Uncertain Risk

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Overview of Impacts

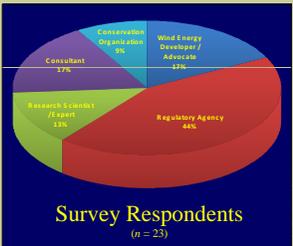
- Collision Mortality
- Habitat Loss / Fragmentation
- Displacement / Behavioral Avoidance



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Approach to Workshop Series

- Identify Stakeholders
- Pre-Workshop Survey
- Workshop I – March 4
- Workshop II – April 1



Category	Percentage
Regulatory Agency	43%
Consultant	27%
Wind Energy Developer / Advocate	4%
Research Scientist	13%
Conservation Organization	13%

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Workshop I – March 4, 2009



- Goal Statement
- List of Issues
- Identify Data Needs
- Set Priorities

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Draft Goal Statement

The goals of the stakeholder group are to define areas for wind energy development within the UMRV that lessen the risks to migratory birds and bats, and to establish cooperation among stakeholders regarding siting of wind facilities at a regional level through open dialog and an understanding of the financial thresholds and natural resource implications.

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Need Categories Identified – Workshop I

- Scientific**
(Species Groups / Habitat / Behavior)
- Mapping**
(Wind vs. Natural Resource Areas)
- Technology**
(Wind and Wildlife Related)
- Funding / Opportunities**
(List of Funding Sources / Opportunities)



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Determining Priorities – Workshop I

1. Identify, Define, and Map Zones for Wind Energy Development
2. Synthesize Existing Information on Birds, Bats, and Habitat
3. Determine Bird and Bat Species Groups Most at Risk and Understand Behavior Patterns

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Workshop II – April 1, 2009

- Refine Priorities
- Identify Solutions
- Determine Methods
- Identify Funding & Collaboration Opportunities




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Final Report / Action Plan



Final Report Summarizing:

- Needs Identified
- Priorities Agreed Upon
- Opportunities
- Action Plan for Implementation

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Acknowledgements



- AgWind Energy Partners, LLC
- Behlke Consulting, Inc.
- DeTect Inc.
- EcoEnergy, LLC
- Illinois Department of Natural Resources
- Iowa Department of Natural Resources
- Minnesota Department of Natural Resources
- RENEW Wisconsin
- River Country RC&D Council, Inc.
- U.S. Fish and Wildlife Service
- Wind Capital Group
- Wisconsin Department of Natural Resources
- Wisconsin Focus on Energy EERD Program
- Wisconsin Society for Ornithology



For More Information Contact:
Brian Bub
bbub@nrc-inc.net

**PowerPoint Presentation
Illinois Wind Working Group
Advancing Wind Power in Illinois
3rd Annual Conference
(July 16, 2009)**

Siting Wind Energy Facilities Along the Upper Mississippi River Valley: A Workshop Series for Resource Agencies and Wind Developers



Brian Bub
Senior Avian Ecologist







Advancing Wind Power in Illinois - IWWG 3rd Annual Conference
July 15-16, 2009 - Bloomington, Illinois
Wildlife and Environmental Issues



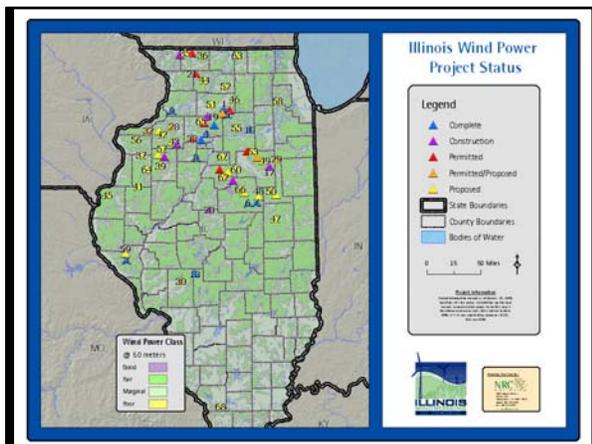
Overview

1. Need for the Workshop Series
2. Summary of Workshop Results
3. Recommendations of Stakeholder Group




Workshop Need Identified

1. Wind Development Interest in UMRV
2. High or Uncertain Risk to Wildlife (birds and bats)
3. Lack of Sufficient Data to Support Decisions
4. Financial Risk to Wind Developers – Viable Project?





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High or Uncertain Risk to Wildlife




- Diverse Habitats Provide Corridors & Stopover Sites
- Known Continental Migratory Bird Flyway
- Considered Globally Important Bird Area
- Meets Guideline Definitions of High or Uncertain Risk

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Potential Impacts to Birds and Bats

- Collision Mortality
- Habitat Loss / Fragmentation
- Displacement / Behavioral Avoidance

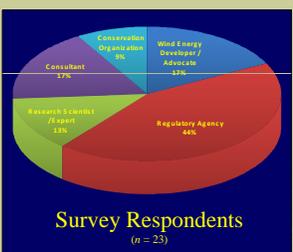




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Approach to Workshop Series

- Identify Stakeholders
- Pre-Workshop Survey
- Workshop I – March 4
- Workshop II – April 1



Survey Respondents (n = 23)

Category	Percentage
Regulatory Agency	44%
Research Scientist	23%
Consultant	27%
Conservation Organizations	6%

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Workshop I – March 4, 2009



- Reviewed Current Conditions
- Drafted Goal Statement
- Identified Region Specific Avian and Bat Scientific Information Needs

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Goal Statement

... define areas for wind energy development within the UMRV that pose a reduced risk to migratory birds and bats, and to establish cooperation among stakeholders regarding siting of wind facilities at a regional level through open dialog and an understanding of the financial thresholds and natural resource implications.

Information Needs Identified



Resource Mapping

- wind resource areas, important bird areas, wildlife refuges, known stop over sites

Species Groups

- raptors, waterfowl, waterbirds, songbirds, bats

Behavior

- gradients, pathways/corridors, broad front, short cuts, daily and seasonal timing

Workshop II – April 1, 2009



- Set Priorities
- Identify Opportunities (Funding/Collaboration)
- Recommendations



Priorities

1. Identify, Define, and Map Zones for Wind Energy Development
2. Synthesize Existing Information on Birds, Bats, and Important Habitat Areas
3. Determine Bird and Bat Species Groups Most at Risk and Understand Behavior Patterns




Recommendations



- Form UMRV Wind-Wildlife Workgroup
- Compile, Maintain, and Distribute Mapping Data
- Establish Species Expert Subgroups
- Partner with other Wind-Wildlife Initiatives
- Seek Funding to Support Activities

Acknowledgements

- AgWind Energy Partners, LLC
- Behlke Consulting, Inc.
- DeTect Inc.
- EcoEnergy, LLC
- Illinois Dept. of Natural Resources
- Iowa Dept. of Natural Resources
- Minnesota Dept. of Natural Resources
- RENEW Wisconsin
- River Country RC&D Council, Inc.
- RMT Inc.
- U.S. Fish and Wildlife Service
- Wind Capital Group
- Wisconsin Dept. of Natural Resources
- WI Focus on Energy EERD Program
- Wisconsin Society for Ornithology

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