

Wisconsin DNR Best Management Practices (BMPs) For Land-based Wind Energy Projects & Wildlife

The development of renewable wind energy in Wisconsin is an important component of state and federal energy policy. The [Wisconsin Office of Sustainability & Clean Energy](#) Clean Energy Plan and Annual Reports outline how clean energy is being used today and will be developed in the future. Wind energy is expected to play an important role in meeting Wisconsin's future electrical needs. The Wisconsin Department of Natural Resources (WDNR) advocates for the practical and environmentally responsible development of wind energy in the state.

However, wind power production can adversely impact wildlife through direct mortality or indirectly through habitat fragmentation and displacement with bird and bat species being especially vulnerable. Placement, number, height, rotor swept area and blade speed all determine how bats and birds are affected by wind turbines. The Renewable Energy Wildlife Institute ([REWI](#)) is an independent nonprofit that works to solve renewable energy, wildlife, and related natural resource challenges through sound science and collaboration. REWI summarizes the complexity of the issues here: [Wind Energy Interactions with Wildlife and Their Habitats](#).

The following BMPs can assist a project proponent with avoiding and/or minimizing potential impacts to rare and non-game species on land-based wind energy. Many of these BMPs can also apply to telecommunication tower projects as they are tall like wind turbines which creates potential for birds to collide with them. Use of these BMPs should reduce adverse impacts to these species and their habitats, although monitoring and adaptive management may be appropriate in some instances to address site-specific concerns and post-construction study results. REWI's [Guide to Wind Energy and Wildlife](#) is also an excellent resource during the planning process.

Broad Incidental Take Permit / Authorization for Wisconsin Cave Bats

Research has demonstrated that bats are particularly vulnerable to wind development although measures can be implemented to greatly minimize those impacts. The WDNR now includes specific wind project protocols within the [Broad Incidental Take Permit/Authorization \(BITP/A\) for Wisconsin Cave Bats](#) for the state's four listed cave bat species. All wind facilities should review this document for bat-specific priority roost and hibernacula definitions as well as required avoidance, minimization and monitoring procedures.

Early Coordination

Early Communication is imperative to good planning and development. The Association of Fish and Wildlife Agencies (AFWA) and American Clean Power (ACP) developed the [Communication Framework for Wind Energy](#). It is a useful tool that recognizes the practical value and mutual interest of opening and maintaining lines of communication between wind energy project proponents and state fish and wildlife agencies.

In compliance with [Wisconsin state statute 23.39](#), DNR is creating an online interactive map that identifies areas where placement of turbines may have significant adverse effects on bat and migratory bird populations. Energy projects should consider avoidance of these areas, to allow species movement between and within important habitats. The map includes:

- **[Important Bird Areas \(IBAs\)](#)**. An IBA is a site that provides essential habitat to one or more species of breeding or non-breeding birds. Sites may vary in size, but are usually discrete and distinguishable in character, habitat, or ornithological importance from surrounding areas. They may include public or private land.
- **Migratory Bird Concentration Sites** are essential resting and feeding areas for birds as they fly between their breeding and wintering grounds. These areas can also be locations where large numbers of migrating birds often become concentrated due to prevailing winds and water barriers. Sites are used by many different species, both rare and non-rare.
- **Migratory Bird Flyway Corridors** provide commuting and foraging areas for birds as well as possible visual cues for orientation and navigation during migration. These corridors include a 5-mile buffer along the Great Lakes, a 3-mile buffer along the Mississippi River, and a 1-mile buffer along the Wisconsin and St. Croix Rivers.
- **Bat hibernacula and maternity roosts** are areas where bats are known to congregate and are generalized to protect sensitive areas.

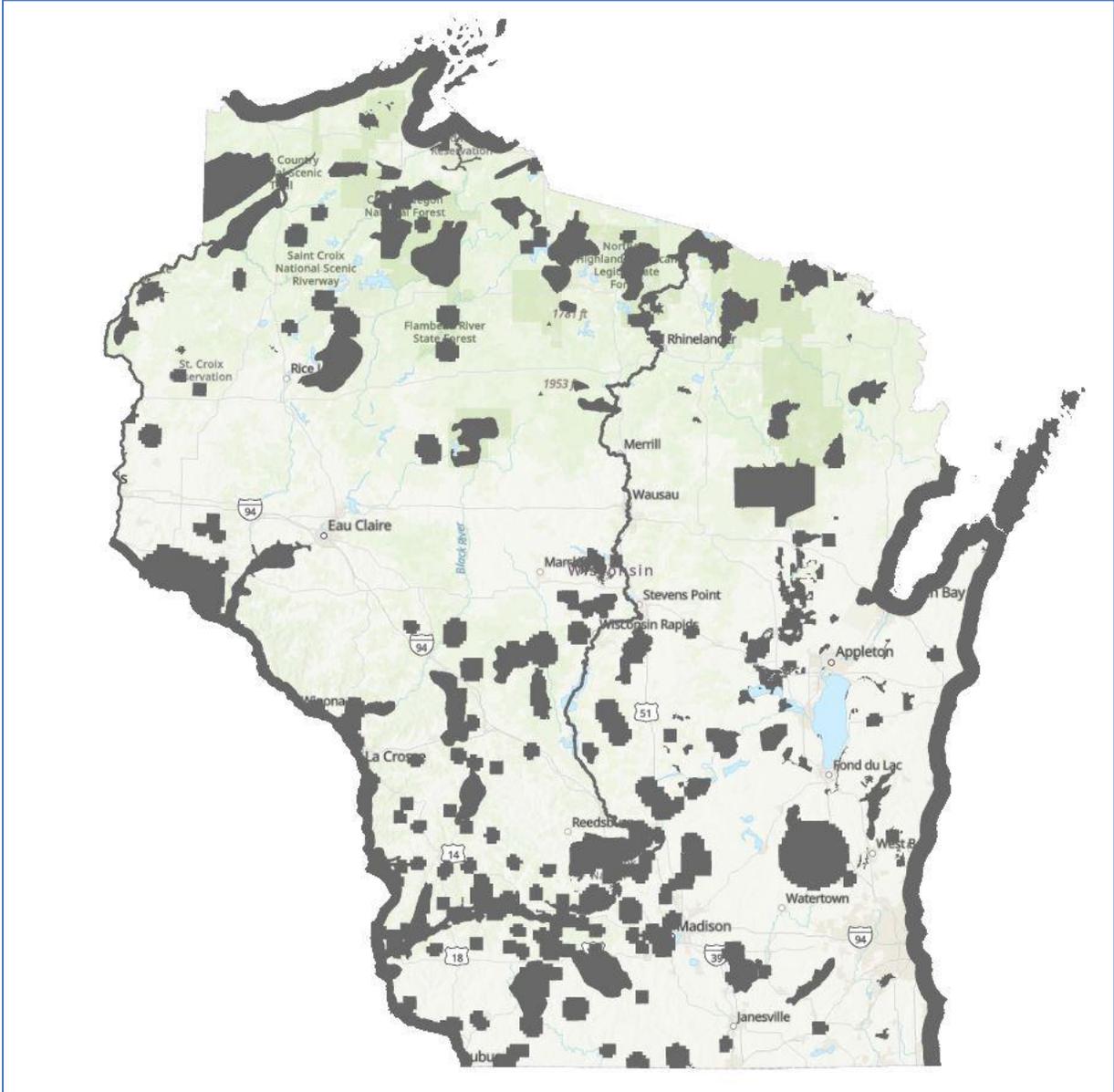


Figure 1: Locations where wind turbines are not recommended based on migratory bird and bat resources. This map will be made available online, and at that time, will be removed from this document and a link will be inserted here.

Coordination with the [Wisconsin DNR](#) and [U.S. Fish and Wildlife Service \(USFWS\)](#) is strongly encouraged in the early planning stages of project development to ensure that appropriate surveys, methods, and locations are studied. Agencies can identify potential habitat that should be surveyed and which survey protocol(s) should be used in consultation with the project proponent. During early project planning, agencies can provide an estimate of project risk, especially to avian and bat species.

- Review online maps such as [Ecological Landscapes of Wisconsin](#) to begin the process of determining the kind of ecological area in which the energy project is proposed. Use the [DNR Managed Land Parcels Portal](#) and the [USFS National Forest Portal](#) and consider buffers to avoid state and federal lands. These areas tend to have a high concentration of species and high-quality habitats.
- Use available data from the [WDNR Endangered Resources \(ER\) Review](#) and pre-application coordination meetings to show the location of sensitive habitats such as wetlands, waterways, forested areas and grasslands. Consider a turbine layout as well as the layout of roads, power lines, fences, and other infrastructure that avoids impacting important habitat areas in addition to areas where pre-construction surveys showed high densities of birds and/or bats.
- Minimize impacts to wetlands and water resources by following all applicable provisions of local, state, and federal regulations, including developing and implementing a storm water management plan and taking measures to reduce erosion. Coordinate early with [WDNR Office of Energy](#).
- Establish non-disturbance buffer zones to protect sensitive habitats or areas of high risk for species of concern identified in pre-application meetings. [Chapter 2 of the REWI Guide to Wind and Wildlife](#) is an important resource for assessing collision risk and impacts, and [Chapter 3 of the REWI Guide to Wind and Wildlife](#) which addresses those risks.
- When conducting pre-construction surveys for bats and birds, monitoring should take place during peak migration and nesting periods and most-active times of day or night. Consider siting proposed turbine locations to avoid separating bat and bird species of concern from their daily roosting, feeding, or nesting sites. A great tool for understanding migration patterns in the Great Lakes region is [The Great Lakes Airspace Map - a Decision Support Tool](#).
- For specific recommendations for protection of eagles, please see the USFWS's [Eagle Conservation Plan Guidance](#).
- For specific recommendations for protecting bats, please see [North American Society for Bat Research - Wind Energy](#), as well as the [Land-based Wind Energy Voluntary Avoidance Guidance for the Northern Long-eared Bat | U.S. Fish & Wildlife Service](#) and [Land-based Wind Energy Voluntary Avoidance Guidance for the Tricolored Bat | U.S. Fish & Wildlife Service](#).

Minimizing Disturbance

Consider recommendations described in [Chapter 4 of the REWI Guide to Wind and Wildlife](#) to minimize disturbance during operation of the wind turbines. Specifically, the sections on deterrence and curtailment contain important considerations. Chapter 7 of the [USFWS Land-Based Wind Energy Guidelines](#) also describes best management practices that can be used to avoid and minimize impacts.

- To reduce avian collisions, place low and medium voltage connecting power lines associated with the wind energy development underground to the extent possible, unless burial of the lines is prohibitively expensive (e.g., where shallow bedrock exists) or where greater adverse impacts to biological resources would result.
 - Overhead lines may be acceptable if sited away from high bird concentration locations such as between roosting and feeding areas or between lakes, rivers, leks, and nesting habitats.
 - Overhead lines may be used when the lines parallel tree lines, employ bird flight diverters, or are otherwise screened so that collision risk is reduced.
- Avoid guyed communication towers and permanent meteorological towers at wind energy project sites. If guy wires are necessary, bird flight diverters or high visibility marking devices should be used.
- Employ only red, or dual red and white strobe, strobe-like, or flashing lights, not steady burning lights to meet Federal Aviation Administration (FAA) requirements for visibility lighting of wind turbines, permanent met towers, and communication towers. Only a portion of the turbines within the wind project should be lighted, and all pilot warning lights should fire synchronously.
- Keep lighting at both operation and maintenance facilities and substations located within half a mile of the turbines to the minimum required: Use lights with motion or heat sensors and switches to keep lights off when not required. Lights should be hooded downward and directed to minimize horizontal and skyward illumination. Minimize use of high-intensity lighting, steady-burning, or bright lights such as sodium vapor, quartz, halogen, or other bright spotlights.
- Operate turbines so that all turbines are locked, or feathered, up to the manufacturer's standard cut-in speed from 15 minutes before sunset to 15 minutes after sunrise of the following day, from April 1 to September of each year of operation. This is anticipated to reduce bat fatalities by 25-35%. See [Cave Bat/Wind BITP/A](#) for more requirements on cut-in speeds.
- The developer should include numerous (4-10) alternate turbine locations in the site layout plan. Alternate turbines allow flexibility in the site layout as issues arise with turbine locations.
- Wind projects disturb soils, surface water, and associated ground cover. These disturbances create openings for invasive species that quickly colonize sites, putting adjoining lands and habitat at risk.

In addition, these disturbances can cause erosion and transport of sediment into adjacent waters. The [Office of Energy](#) may recommend BMPs to minimize construction and maintenance impacts to soil, water, and existing ground cover.

- Reduce the introduction and spread of invasive species by following applicable local and state policies for noxious weed control, cleaning vehicles and equipment arriving from areas with known invasive species issues, using locally sourced topsoil, and monitoring for and rapidly removing noxious weeds at least annually. Refer also to [Chapter NR 40, Wisconsin's Invasive Species Identification](#).
- Use native species when creating plan for seeding or planting during restoration.
- Avoid impacts to hydrology and stream morphology and do not fragment hydrological corridors (especially those with a north-south orientation or those that the last mile runs into Lake Michigan or Lake Superior), especially where federal or state-listed aquatic or riparian species may be involved.
- Minimize the number and length of access roads. Use existing roads when feasible.
- Follow federal and state measures for handling toxic substances to minimize danger to water and wildlife resources from spills.

Post Construction Studies – Bat and Avian Fatality Monitoring

Turbine design and fatality protocols have evolved with the potential to influence actual fatalities and fatality estimates. Therefore, fatality studies should be conducted on new projects, with modern technology, in differing ecological landscapes of Wisconsin in order to understand project impacts and to establish valid avian and bat fatality estimates. In addition, understanding which species are being killed is important for understanding how to avoid and minimize fatalities.

Bat survey protocols have been developed by the Wisconsin Department of Natural Resources (WDNR) as technical guidance and can be found in Appendix A of the [Broad Incidental Take Permit/Authorization for Wisconsin Cave Bats](#). These protocols can be used for both birds and bats and will ensure that valid methods are used to collect data and that protocols are consistently used on projects located in Wisconsin. These protocols should be used in conjunction with DNR Wind BMPs, an Endangered Resources Review, and Chapters 5 and 6 of the [United States Fish and Wildlife Service Land-Based Wind Energy Guidelines](#).

Wisconsin endangered species law ([Wisconsin State Statute 29.604](#)) and associated rules ([Wisconsin Administrative Rule Chapter NR 27](#)) prohibit the taking of endangered or threatened species without a [Regulatory Removals Broad Incidental Take Permit/Authorization](#).

A wildlife salvage/collection permit must be obtained from the WDNR ([DNR Scientific Collector's Permit information](#)) and [USFWS](#) to facilitate legal transport of injured animals and/or carcasses. For eagles, please see the USFWS web page [Eagle Incidental Take Wind Energy Permits](#). The USFWS and [WDNR Endangered Resources Liaison](#) should be notified within 5 working days if any eagles or federal/state-threatened/endangered species are discovered.

The post-construction fatality study data will be used to evaluate the overall impacts of the project on birds and bats. All data, including maps and electronic data files, should be filed with the WDNR and shared with the PSC, regional USFWS Office, and other interested parties.