

Birds and Bats: Impacts and Regulation

Understanding Federal and State
requirements protecting ecological resources



NYSERDA

Wind Energy Guidebook for Local Governments
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Overview

Heavy construction work, common to development of all power generating facilities and other major structures, may affect ecological resources during construction and operation. Common ecological concerns related to any type of construction include loss or change of habitat for foraging, wintering, migrating, and nesting birds, as well as change in vegetative cover types. Other concerns are specific to wind projects and include injury to or death of birds and bats due to collisions with turbine/tower structures.

From federal laws to State surveillance and monitoring guidelines, there are many requirements in place to protect these ecological resources. Depending on the level and type of wildlife impact estimated for a proposed wind project, appropriate avoidance, minimization, or mitigation strategies can be developed.

1. Bird Impacts

Early wind projects, notably in California, experienced a high number of avian strikes as a result of turbine design and poor siting. Modern-day projects are constructed with turbines designed to reduce the potential for avian perching and collisions, and locations are more intensely scrutinized. In addition, newer turbines are much larger in capacity, requiring fewer turbines to achieve a desired overall capacity.

Still, according to the American Wind Wildlife Institute, (AWWI) “The potential for biologically significant impacts to wildlife continues to be a source of concern as populations of many species overlapping with proposed wind energy development are experiencing long-term declines as a result of habitat loss and fragmentation, disease, non-native invasive species, and increased mortality from numerous other anthropogenic activities.” (American Wind Wildlife Institute, 2016). Since the early experience with bird fatalities, the wind industry, scientists, and state and federal agencies have been working together to understand the relationship of birds to wind turbines and how to better site and operate turbines while still receiving an adequate wind resource. Lessons learned from that time are being applied to today’s proposed and operating projects. Bird collision rates are subject to a wide range of factors that include weather, seasonality, species, turbine design, and site characteristics. Typically, passerines (perching birds, including songbirds) are the group most impacted by wind turbines.

Bird mortality due to human activity is not limited to wind turbines. Studies show that wind turbines, on average, are less harmful than some other human-made structures or predators (Figure 6-1). It is not the intent of this graphic to diminish the impact wind turbines have on local bird populations in light of the expansion of wind power development, but rather put the impact in perspective.

Figure 6-1. Top Common Human-Caused Threats to Birds (U.S. only. Ordered by Median Estimate of Bird Mortality Annually. As of 2017)
 (Source: U.S. Fish & Wildlife Service, <https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php>)

Hazard/Type	Min Range	Max Range	Median/Avg. Estimated
Habitat Loss/Conversion	N/A	N/A	N/A
Collision - Building Glass	365,000,000	988,000,000	599,000,000
Collisions - Communication towers	-	-	6,600,000
Collisions - Electrical lines	8,000,000	57,300,000	25,500,000
Collision - Vehicles	89,000,000	340,000,000	214,500,000
Collisions - Land-based Wind Turbines	140,438	327,586	234,012
Collisions - Offshore Wind Turbines	N/A	N/A	N/A
Collisions - Solar Panels	N/A	N/A	N/A
Electrocutions	900,000	11,600,000	5,600,000
Burning -Solar Towers	N/A	N/A	N/A
Poison	-	-	72,000,000
Cats	1,400,000,000	3,700,000,000	2,400,000,000
Oil Pits Trail 2006	500,000	1,000,000	750,000
All	1,863,540,438	5,098,227,586	3,324,184,012
All (excluding cats)	463,540,438	1,398,227,586	924,184,012
Industry only (excludes cats and vehicles)	374,540,438	1,058,227,586	709,684,012

* N/A: Not Available

In reviewing 170 North American wind facility collision-fatality-monitoring studies, the AAWI reports that most studies show fatality rates of three to five birds per megawatt (MW) per year, inclusive of all affected species (American Wind Wildlife Institute, 2016). The highest fatality rate reported was 14 birds per MW per year.

2. Bat Impacts

Bat fatalities have also been associated with wind turbines, typically caused by collisions. Some earlier evidence suggested that rapid changes in air pressure near the rotating blades may be responsible for bat deaths, but more recent studies have suggested that such occurrences are not very common (American Wind Wildlife Institute, 2016). Like birds, bats are also known to collide with other man-made structures, such as lighthouses, television towers, communication towers, large windows, tall buildings, power lines, and barbed-wire fences. The numbers of bats killed from specific incidents at these types of structures appear to be small.

A 2013 review of 75 North American post-construction studies found the highest mean bat fatality rates have been documented at wind power projects in the Midwest and the Eastern Forest Region (Hein, 2013). Although many of these documented fatalities were at wind power projects associated with long treed ridgelines in the Mid-Atlantic Appalachian Mountains, the high rate of bat mortality in the East may be attributable, in part, to other factors (Arnett, 2008). According to the AWWI, there have been no consistently established patterns of mortality related to landscape types; however, on average, fatality rates have been lower at wind farms located in the Western U.S. (American Wind Wildlife Institute, 2016).

Studies identified several other patterns associated with bat fatalities, without definitively identifying any one factor. The fatalities were found to be skewed toward migratory bats and consistently peak in midsummer through fall. The studies found that the fatalities were not concentrated at any one turbine location (they were distributed across the facility), and FAA lighting (red strobe lights) did not seem to have any influence on the collisions (American Wind Wildlife Institute, 2016).

Studies are underway to determine the effectiveness of taking mitigation actions, including curtailing blade rotation at low wind speeds and use of ultrasonic transmitters to deter bats from the blade area as a means of mitigating bat fatalities.

3. Federal Laws and Requirements

3.1 Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

The Federal Migratory Bird Treaty Act (MBTA) has been in place for more than a hundred years. It prevents the harm or disruption of any migratory bird without a permit. The Bald and Golden Eagle Protection Act, enacted in 1940, provides additional federal protection to these two important species. This Act established that a “take, possess[ion], purchase, or barter,” except pursuant to federal regulations, will result in criminal penalties.

The U.S. Fish & Wildlife Service (FWS) is in charge of enforcing both of these Acts and is responsible for issuing permits under them. These policies and their application to wind energy development are further described in the FWS [Land-Based Wind Energy Guidelines](#)¹ (U.S. Fish & Wildlife Service, 2012). Developers are required to follow these guidelines and must get the appropriate permits for the “take” of these species before projects being operating. More information on permits is available at [Eagle Permits: Eagle Incidental Take and Take of Eagle Nests](#).²

3.2 Endangered Species Act

Species categorized as endangered or threatened by the federal government are protected under the Endangered Species Act, which “ensure[s] that [federal agencies’] actions are not likely to jeopardize the continued existence of these species or destroy or adversely modify their critical habitat.” Guidelines for developers to abide by this Act are also listed in the FWS Land-Based Wind Energy Guidelines (U.S. Fish & Wildlife Service, 2012).

As of 2007, the Bald Eagle is no longer included on the Endangered Species Act (ESA) list of threatened species.

4. State Surveying and Monitoring Guidelines

Environmental assessments of wind energy projects commonly require pre- and post-construction monitoring of the project area to determine the project's impact on avian and bat species. Surveys include researching the biological resources within the project area, migration patterns of birds/bats passing through the project area, and the protective status of migratory and nesting/resident species in an area where turbines are being considered. Bird and bat surveys are often conducted during the spring and fall seasons to identify the migratory patterns of birds and/or bats as they pass through the project area.

In 2008, the New York State Department of Environmental Conservation (DEC) implemented guidance for assessing the potential impacts of commercial wind projects on bird and bat species. In June 2016, the DEC released the updated [Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects](#).³ The guidelines are comprehensive and include measures for conducting both pre- and post-construction impact surveys. They outline the recommendations proposed by DEC for commercial wind developers, including characterizing bird and bat populations at site locations, documenting bird and bat mortality rates, and identifying other indirect effects. By recommending consistent protocols and methodologies, the guidelines will allow for comparison of data across different sites and years, which “may contribute to a statewide understanding of the ecological effects of wind energy generation” (NY Department of Environmental Conservation, 2016).

The implementation of the 2008 guidelines resulted in the completion of more than 20 post-construction monitoring surveys submitted to the DEC. Department staff reviewed the data to assess impacts of the operating commercial wind projects on avian and bat species. The results of the surveys were utilized to update and revise the guidelines in 2016. The post-construction reports regarding the impacts on avian species from operating New York State commercial wind farms are consistent with the 2016 results collected by AWWI. The results of the post-construction studies regarding bat mortality are also consistent with the AWWI 2008 review of projects throughout North America; bat mortality at projects in New York State is greater than at projects located in the western part of the U.S.

5. New York State Threatened and Endangered Species Listings

The FWS maintains a list of all threatened species, endangered species, and critical habitats by the state in which they occur. As of August 2016, 13 animals and eight plants found in New York State are listed as either threatened or endangered by the USF&WS (U.S. Fish & Wildlife Service, 2015). New York State maintains its own list of endangered and threatened species that contains additional species to the FWS list (NY Department of Environmental Conservation, n.d.). It is important that project sponsors consult these lists early on during site selection of their wind project. An environmental consultant can refer to these lists and advise the project sponsor about the likelihood of potential impacts. Ultimately, it is the responsibility of the agencies to determine whether any of the species on either list may be at risk of being impacted and what level of surveys and analyses are required to identify that risk.

The New York State Natural Heritage Program maintains a [database](#)⁴ on the locations of rare plants and animals, and significant natural communities found within New York State (NY Department of Environmental Conservation, n.d.). Proposed development sites should be screened against the database. The screening focuses on identifying rare species and significant natural communities at or in the vicinity of the proposed project site as well as rare species of birds and bats within a larger area around the site. DEC staff can also provide useful insight on the occurrence of listed species or species of concern in a proposed development area. Local birding groups may also provide information on migrant and resident bird species in a local area.

6. Habitat Impacts

Loss of habitat and vegetation can occur during the construction process as a result of increased human presence, noise, motion, and alteration of the terrain for roads, buildings, foundations, or other permanent site-infrastructure elements. Although developers generally try to select sites with minimal tree cover, tree removal does occur at most projects for construction needs and access roads. Selective tree removal to improve wind exposure can also result in a loss of forested habitat.

Site topography and project layout have the largest impact on loss of habitat issues. Construction in steep areas can produce more disturbances due to the need for more cut-and-fill excavation work. Loss of habitat can be mitigated through revegetation actions or setting aside other sections of land from development. Plans for site work should be reviewed to ensure sufficient soil and water quality control measures, like those required for other construction projects, are in place.

Surveys of habitat and vegetation often focus on:

- Landcover types and condition of the habitat
- Whether any threatened or endangered vegetation exists in the proposed development area
- Whether the area is already fragmented
- What species are thought or known to require that habitat or vegetation for survival (critical habitat)

7. Strategies for Lessening Bird and Bat Impacts

Depending on the level and type of wildlife impact estimated for a proposed wind project, appropriate avoidance, minimization, or mitigation strategies can be developed. Examples of these strategies include the following:

- Relocate turbine (depending on topography, wind resource, and access to land) or remove from the proposed project layout if there are no suitable alternatives.
- Minimize impacts of electrical wires on birds by burying cable when practical and installing bird diverters on overhead lines.
- Minimize lighting at operation and maintenance buildings, substation, and interconnection facilities.
- Prevent birds from flying into guy wires on meteorological towers by using bird diverters (not applicable for turbine towers).
- Alter operations, such as shutting down turbines during certain times (e.g., bird migration and bat activity seasons) to reduce turbine strikes.
- Replace or rehabilitate lost habitats in nearby areas.

The FWS [Land-Based Wind Energy Guidelines](#)¹ include general guidelines for mitigation of and compensation for adverse impacts (U.S. Fish & Wildlife Service, 2012). In addition, the Bats and Wind Energy Cooperative (BWEC), formed in 2003, 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.” BWEC’s research includes ongoing studies on new techniques, such as operational mitigation and deterrents, that hold promise to lessen harm to bat species (Bats and Wind Energy Cooperative, n.d.).

References

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U.S. Fish & Wildlife Service. (2012). Land-based Wind Energy Guidelines. Retrieved August 3, 2016 https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf

U.S. Fish & Wildlife Service. (2015, February 13). Listed species believed to or known to occur in New York. Retrieved August 3, 2016 <https://ecos.fws.gov/ecp0/reports/species-listed-by-state-report?state=NY&status=listed>

Additional Resources

- Behavioral Responses of Bats to Operating Wind Turbines
<http://batsandwind.org/pdf/hornetal2008.pdf>
- NY Natural Heritage Program
<http://www.dec.ny.gov/animals/29338.html>
- List of Endangered, Threatened and Special Concern Fish & Wildlife Species of New York State
<http://www.dec.ny.gov/animals/7494.html>
- Bat and Wind Energy Cooperative
<http://batsandwind.org/>
- Biodiversity and Wind Siting Mapping Tool (interactive map)
<https://www.nature.org/en-us/about-us/where-we-work/united-states/new-york/stories-in-new-york/working-with-wind>,
and direct link at: <http://www.ebd.mapny.info/>
- Annual Report for the Maple Ridge Wind Power Project Post-construction Bird and Bat Fatality Study
<https://tethys.pnnl.gov/sites/default/files/publications/Jain-et-al-2007.pdf>

Questions?

If you have any questions regarding birds and bats impact and regulations, please email questions to cleanenergyhelp@nyserda.ny.gov or request free technical assistance at nyserda.ny.gov/Siting. The NYSERDA team looks forward to partnering with communities across the State to help them meet their clean energy goals.

Section End Notes

¹ https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf

² <https://www.regulations.gov/document?D=FWS-R9-MB-2011-0094-1838>

³ <https://tethys.pnnl.gov/sites/default/files/publications/NYSDEC-2016.pdf>

⁴ <http://www.dec.ny.gov/animals/29338.html>

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