

**Guidelines for Windpower Project Ecological Study**  
**Recommended by the**  
**Maine Department of Environmental Protection and**  
**Maine Department of Inland Fisheries and Wildlife**

January 8, 2008

These guidelines are intended to assist wind power developers in Maine and supplement existing Maine statutes and rules developed under the Site Location of Development Law and Natural Resources Protection Act for ecological impact and are focused on assessing potential avian and bat impacts from large scale wind power development in Maine.

- Initial site screening: Initial siting requirements should include screening for bird, bat and wildlife habitat using known data. For initial siting applicants should screen known data on bird, bat, wildlife in the general area of the development and on the specific project site (consulting DIF&W Essential Habitat maps, consult with USFWS on endangered and threatened species, review *Beginning with Habitat Maps*, DIF&W/DEP database of significant wildlife habitat, state database for G1, G2, S1 and S2 imperiled communities). While required for application submittal, screening information should be shared early on in the siting process with DEP, DIF&W, and DMR staff to gather feedback for the applicants and aid in the determination of where to focus additional investigations for final application submittal. Early consultation based on screening information is crucial to determine study needs to study designs.
- Pre-construction study requirements: The Department and review agencies will generally require the submittal of at least two migratory seasons, spring and fall, of bird/bat nocturnal radar, diurnal surveys for migratory birds and raptors, and acoustic studies for bats. If high value resources or habitats are present (e.g. eagle nest, high raptor use, migration corridor, endangered or threatened species), scoping and additional study will be required.
- Methodology for bird and bat pre-construction studies: Bird and bat studies should follow the *Methodologies for Evaluating Bird and Bat Interactions with Wind Turbines in Maine*, including Appendices I-IV, compiled by Maine Audubon based on work of the Maine Windpower Advisory Group, DIF&W, and Wildlife Windpower Siting committee (draft April 12, 2006). When methodologies will vary from specific recommendations in this *Methodologies* document, applicants should consult with DEP and DIF&W.
- Seasonal surveillance period: In most cases, radar studies should be done of at least one fall and one spring migration with at least 20-30 nights each season, representing various seasonal weather fronts. *See Methodologies* at p. 4.

- Combination of approaches advisable:<sup>1</sup> Preconstruction bird and bat studies by multiple methods: nocturnal bird/bat nocturnal radar,<sup>2</sup> diurnal surveys for migratory birds and raptors, acoustic studies for bats, and other studies should be conducted for a minimum of two migratory seasons in the site area. If high use by bird/bats or high-value habitat or species are identified, four migratory seasons may be necessary. Particular attention should be paid to identification of site characteristics that may attract birds/bats such as thermals, forested ridge lines, saddles, etc.
- Lighting: Site design should consider limiting lighting of related maintenance buildings, power stations, etc. equipment that may attract birds in bad weather and insects (therefore bats) at night. Lighting on the towers themselves should consider research on attraction of birds (bats shown not to be attracted to red F.A.A. lighting). See NRC at p. 86 and p. 321.
- Post-construction bird and bat mortality: Mortality studies for birds and bats should be conducted for a 2-3 year period (i.e. 2-3 spring and 2-3 fall migration seasons) within 5 years of start of operation. These studies should follow the *Methodologies* recommended for post-construction review and consult with DEP/IF&W when an applicant desires to vary from recommended methodologies.
- Post-construction study plan: The post construction study plan should be correlated to pre-construction study design to provide robust data on environmental impacts that are comparable between the pre and post construction condition.. For example, before-after/control impact (BACI) design is useful for impact study design. See NRC pp. 280-83.
- Use of thermal imagery: While relatively new, use of thermal imagery has been documented to be valuable when compared with radar data on birds, bat and insect activity in windpower areas. See NRC p 329. Initial application of thermal imaging at a few sites is encouraging: when used with long-range imagery capability has been found capable of detecting 100% of the small passerine (song bird) passage within 3000 meters of the unit. See NRC p 332. When combined with height information (presumably from radar), thermal imagery is the only sensing instrument found to be “excellent” by the National Research Council for

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<sup>1</sup> The National Research Council’s review of observational/monitoring methods found that: “In many cases, using a combination of approaches will be of value as no single method can be used for unambiguously assessing natural populations or the effects of wind turbines on biotic communities. Each approach has its own strengths, limitations, and biases. Investigators should understand the limitations, applicability, and operational considerations of each method before deploying them in the field. Local field guides and taxonomic keys for species identification are essential tools for investigators . . . “  
*Environmental Impacts of Wind-Energy Projects*, National Research Council of the National Academies (2007) at p. 285.

<sup>2</sup> In addition to the *Methodologies* document commending use of both X-band radar pointed vertically and S-band radar pointed horizontally, note that the National Research Council concludes that marine radar should have a transmitter power as high as possible (25kW or greater). See *Methodologies* at p. 3 and NRC at p. 317.

detection, tracking and quantification of bird and bat passage. *See NRC, Table C-2 pp. 286-87, see also NRC pp. 331-336.* If initial screening or initial studies indicate significant concern with potential wind facility rotor interaction with bird/bats species in the projection area or a potential migration corridor, or other specific concerns, use of thermal imagery provide another technology to confirmation migration passage rates and bat activity in vicinity of turbines..If significant mortality occurs at a site despite the best pre-construction review, thermal imagery may be used for post-construction investigation of bird/bat interaction with windpower facilities.

- Mortality species identification: If post-construction studies indicate substantial bird/bat mortality, identification of the species present in the area surrounding a windpower project is essential to assess facility impacts. For carcasses and partial remains, specific identification may require bird feather or bat hair samples. *See NRC pp 338-39.* Mitochondrial and DNA markers can determine sources populations of birds/bats that move long distances and identify geographic origin of bats and birds killed at wind-energy facilities.. *NRC p. 338.* Bat hair and bird feather samples are maintained in national repositories (American Museum of Natural History for birds/bats tissues collected below wind turbines and Conservation Genetics Research Center at UCLA for feathers samples for genetic analysis) and when conditions specifying use of repositories for samples may be appropriate in certain circumstances. *See NRC at 291.*
- Maine studies: Studies conducted for projects in Maine will provide valuable data nationally for windpower development in forested ecosystems. Because much existing research on bird and bat population impacts has occurred in desert, prairie, or open agricultural landscapes, research being conducted for Maine projects will contribute to scientific understanding of questions on which limited research data exists. *See NRC pp. 132-38* on information needs and research recommendations.