

# **Study Plan for Post-Construction Monitoring Surveys**

**Wild Meadows Wind Project  
Grafton and Merrimac Counties, New Hampshire**

Prepared For:

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**October 2013**

## 1.0 Introduction

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The Wild Meadows Wind Project (Project), located in Grafton and Merrimack Counties, New Hampshire, is being proposed by Atlantic Wind, LLC (Atlantic Wind), a subsidiary of Iberdrola Renewables, LLC. The Project consists of 23 3.3-megawatt (MW) turbines and will have a maximum turbine height of approximately 150 m (492').

Atlantic Wind has proposed to conduct 2 years of post-construction monitoring at the Project, with a potential third year pending the results of Years 1 and 2. This Study Plan is based on the methods used at the Lempster and Groton Wind Projects in New Hampshire and outlines the protocol for the first and second years of monitoring after the project becomes operational (Years 1 and 2). The need for, timing, and scope of a third year of monitoring will be determined in consultation New Hampshire Fish and Game Department (NHFGD) and US Fish and Wildlife Service (USFWS).

The first and second year of post-construction monitoring will consist of a bird and bat fatality study, including weekly turbine searches, visibility class mapping, searcher efficiency trials, and carcass persistence trials. The results of the study will be summarized in an annual monitoring report for each monitoring year.

The primary objectives of bird and bat fatality surveys will be to:

1. Document the species and number of individuals of birds and bats found during searches of turbine clearings during the spring, summer, and fall; and
2. Estimate the mortality rate for birds and bats during the spring, summer, and fall of the first and second years of operation of the Project, based on the results of standardized searches, visibility class mapping and search area corrections, searcher efficiency trials, and carcass persistence trials.

## 2.0 Bird and Bat Fatality Surveys

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Bird and bat fatality searches will consist of weekly turbine searches for 29 consecutive weeks from April 15 to October 31. Seasons will be defined as:

- Bird and bat spring migration – April 15 to May 31 (7 weeks),
- Summer bird and bat activity – June 1 to August 31 (13 weeks), and
- Bird and bat fall migration – September 1 to October 31 (9 weeks).

Weekly searches will be conducted at 12 turbines (50%); therefore, as many as 348 turbine searches may be completed during each of the Year 1 and Year 2 monitoring periods.

### *Search Area*

Searches will be conducted in 120-m by 120-m plots centered on turbine bases, where possible. However, as is the case with virtually all projects on forested ridgelines in the east, conducting searches out to this area at all turbines would include forested areas and areas of very steep terrain. The typical clearing size at modern turbine pads on forested ridgelines is approximately a 75-m diameter roughly circular area. Therefore, it is assumed that at the majority of turbines, the entire leveled, graded lay-down area will be searched. In an effort to maximize searchable areas, adjacent stable side slopes and

adjacent road sections will be searched on all sides of turbines, and clearings associated with turbine staging activities and transmission lines will be searched out to 60 m from turbine bases. Transects will be established 6 m apart within search areas. The searchable areas at each transect clearing will be mapped.

#### *Visibility Class Mapping and Search Area Corrections*

Vegetation conditions, including percent coverage within search areas and vegetation height, will be monitored on a regular basis. During the growing season, the vegetation conditions at each search turbine will be assessed and mapped into different visibility classes. Visibility classes will be based on those listed below, which account for both percent vegetation cover and vegetation height:

- E = Easy (> 90 percent bare ground; sparse ground cover < 6 inches tall);
- M = Moderate (> 25 percent bare ground; ground cover < 6 inches tall and mostly sparse);
- D = Difficult (< 25 percent bare ground; < 25 percent of ground cover is > 12 inches tall);
- VD = Very Difficult (little or no bare ground; > 25 percent of ground cover is > 12 inches tall); and
- NS = Not Searchable - areas within 120-m by 120-m plots that were not searched due to safety (i.e., steep rocky berms) or vegetation such as thick shrubs or forest patches.

The size of the searchable area at each turbine will be mapped. A search area correction factor will be applied to those turbine areas that are not searchable out to 60 m on all sides of turbines. The correction factor may be based on the distribution of carcasses found at those turbines with larger search areas, but will take into account the best available methods for search area corrections at the time of analysis.

#### *Search Protocol*

It is anticipated that 23 turbine searches will be completed over 3 days per week with 7 or 8 turbine searches per survey day. Searches will generally be scheduled for the same days each week to maintain an average search interval of 7 days; however, during peak migration periods in the spring and fall, the weekly schedule may be adjusted to include searches on days following optimal nocturnal migration conditions, as well as days following foggy or stormy nights when the risk of avian collisions may be elevated. Searches will generally be scheduled to begin early in the mornings when surveyors arrive on-site, typically around 7-9 am.

During searches, carcasses found (intact or scavenged) will be photographed and documented on standardized field forms. The following information will be recorded for each carcass found and will be provided as part of an annual report:

- date and time,
- date of last search at turbine,
- technician identification,
- search plot identification,
- general weather conditions,
- ground cover conditions (e.g., vegetation type and height, wet, dry, gravel),
- distance (determined by a laser range finder) and compass direction from the turbine,
- distance and compass direction from the transect from which the carcass was detected,
- carcass condition (e.g., fresh, rigor, decomposed, intact carcass, scavenged, feather spot),
- description of injury (e.g., blunt trauma, decapitation, no evident external injuries),
- description of carcass condition (stage of decomposition, eye condition, and wing pliability for aging carcasses),
- estimate of time of death,
- carcass position (e.g., face-up or down, sprawled out or balled up),
- species, age, gender, and reproductive condition (when possible), and

- previous night's weather conditions for any carcasses found fresh and suspected to have collided with a turbine the night prior to the search.

For bats only, a measurement of the forearm and any notes regarding evidence of White-Nose Syndrome (WNS) will be documented. Evidence of WNS will include wing scarring and/or evidence of the white fungus on the face. Carcasses will be frozen and available for further analysis as necessary.

Atlantic Wind (and/or their contractor, as appropriate) will obtain the necessary state and federal permits for the collection and use of carcasses in trials and/or further identification and necropsy. Once appropriate state and federal permits are in place, any bird and bat carcasses found will be collected according to state and federal permit requirements. All carcasses that are collected during formal searches will be documented and individually bagged and frozen. Carcasses will be retained in a freezer at the Operations and Maintenance building and may be used in searcher efficiency and scavenger carcass removal trials. Any carcasses incidentally found outside of standardized searches will also be documented and collected but will be reported separately from those carcasses found within standard searches, and will not be used for estimates of take.

As was done during the Lempster and Groton studies, pictures of bat fatalities, if any, particularly *Myotis* species, will be sent to a USFWS Endangered Species Biologist, for positive identification before use of the carcass in carcass persistence or searcher efficiency trials.

Nightly weather conditions will be monitored throughout the survey period by on-site weather instrumentation. Wind speed and direction, barometric pressure, and temperature will be recorded and collected from the on-site met tower, and/or by an anemometer on a turbine nacelle. Additionally, the technician will document incidental wildlife observations, made during site visits, on standardized field forms. Extended periods of turbine shutdowns will also be documented during the study period.

If an injured bird or bat is found, when possible, the animal will be transported to a local wildlife rehabilitator. A licensed wildlife rehabilitator in Grafton County, New Hampshire will be contacted prior to the initiation of surveys to develop a protocol for transport to the facility in the event that injured wildlife is found.

#### *Search Protocol - Iberdrola Renewables' Wildlife Monitoring and Reporting System*

In addition to standard post-construction fatality surveys, Wild Meadows' maintenance personnel will document any carcasses they may find according to Iberdrola's Wildlife Monitoring and Reporting System (WMRS). Wild Meadow's Environmental Coordinator will be trained on the WMRS protocol, including the appropriate methods for carcass documentation. Wild Meadows' maintenance personnel will be informed of the timing of standardized searches and carcass persistence and searcher efficiency trials so that carcasses found by maintenance staff may be reported but left in place. Any carcasses found by Wild Meadows or other site personnel will be documented as incidental fatalities and not included in the estimate of take calculated as part of the formal fatality monitoring being conducted.

#### *Reporting of Listed Species*

If a known or suspected state or federally listed species or species of concern (e.g., eagle) is found by anyone on-site, the appropriate state and/or federal agencies will be contacted within 24 hours and arrangements will be made to submit the carcass to the agency.

#### *Searcher Efficiency Trials*

Searcher efficiency trials will be conducted throughout the study period. Carcasses will be discretely marked and placed in search areas, at random distances and directions from turbines, by the trial coordinator early in the morning prior to scheduled turbine searches. Any carcasses not found during searches will be retrieved at the end of the survey day. Results of trials will be documented on standardized field forms. There will be a target of at least 20 small birds, 20 medium or large birds, and 20 bats to be placed during each study year. Carcasses will be distributed among visibility classes within searchable areas. Carcasses will be of native species, if available and pending permit conditions; otherwise, surrogate non-native species will be obtained from other sources such as local wildlife rehabilitators or labs. Trials will be distributed across survey seasons to account for variable scavenger

activity. The percent of carcasses found during trials will be used to estimate the level of bird and bat take during the study period.

#### *Carcass Persistence Trials*

Carcass persistence trials will be conducted during each survey season and will be completed independently of the searcher efficiency trials. There will be a target of at least 20 small birds, 20 medium or large birds, and 20 bats to be placed during each study year. Carcasses will be distributed among different vegetation classes within searchable areas. Fresh bird and bat carcasses of native species (if possible) will be discretely marked and monitored until they are removed by scavengers or completely decomposed. Carcasses will be checked during the first 5 days after they are placed, then again on days 7, 10, 14, and on additional days, if necessary. During the trial periods, the status of all carcasses, including all evidence of scavenging or decomposition, will be documented on standardized field forms. The carcass persistence data will be used to estimate the percent of carcasses that remain detectable in search areas during the 7-day interval between standardized searches.

#### *Annual Monitoring Report*

The annual report will summarize the number, dates of discovery, species, and locations of bird and bat fatalities detected during turbine searches. A summary of carcass distributions in search plots and the results of searcher efficiency and carcass persistence trials will be provided. An estimate of bird and bat fatality will be calculated for the monitoring period.

Several fatality estimator methods have been used for past studies and new estimators are currently being developed. Certain estimators are more appropriate to use depending on the relationship between search interval and carcass persistence at the site. For example, when carcass persistence time is greater than the search interval, the Shoenfeld (2004) and Huso (2010) estimators may underestimate or overestimate mortality. Atlantic Wind will evaluate the most appropriate estimator for the study at the time of data analysis and reporting.

The estimates of facility-related bird and bat mortality will be based on:

1. Observed number of carcasses found during standardized searches for which the cause of death is assumed to be facility-related;
2. Carcass persistence, expressed as the estimated average probability a carcass is expected to remain in the study area and be available for detection by the searcher during search intervals;
3. Searcher efficiency, expressed as the estimated proportion of carcasses found by searchers within search plots in variable visibility classes; and
4. Proportion of searchable area within different visibility classes within turbine plots.

Additional analyses and summary will include the distances bird and bat carcasses are found from turbines and the distribution of fatalities among turbines in relation to topographical setting and project design features (i.e., saddle, crest, location within turbine string, Federal Aviation Administration lighting, etc.).

The final report will be submitted to the NHFWD and USFWS for review 60 days prior to the start of consecutive monitoring periods. The report will be used to evaluate study results and define potential study changes, if necessary.

#### *Adaptive Management*

Although the Project is not expected to have an unreasonable adverse impact on bird or bat populations, Atlantic Wind intends to implement an adaptive management strategy once the Project is operational. The body of knowledge associated with how birds and bats interact with wind development in the northeast is continuing to grow. In addition, the population status of individual species is dynamic and influenced by a wide range of environmental, biological and anthropogenic changes. An adaptive management strategy will allow decisions and actions to be tailored to a specific problem/circumstance, should it arise (e.g., a specific species, location, weather pattern, wind speed, or season), at the specific point in time at which it occurs.

Decisions made under the adaptive management strategy will be based upon the formal post-construction monitoring results (proposed to occur during the first 2 years of operation) as well as incidental observation of mortality documented by facility personnel. Post-construction results and incidental mortality will be reported to the NHTGD and USFWS, and these agencies will be consulted should a biologically significant event occur. A biologically significant event would include the individual injury or death of a listed species or an eagle, or the large scale injury or death of any avian or bat species or groups. Consultation with these agencies will be held to determine whether the reported event (or other matter of concern) is isolated, and if further action is feasible or required.