



## Post Construction Avian and Bat Fatality Study Protocol

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#### *Protocol Outline: Objectives, Methods, Reporting Requirements*

The purpose of this protocol outline is to establish the approach and methods that will be used by a qualified expert to prepare a scope of work for a post-construction avian and bat fatality study at an operating wind power facility. This outline is also intended to be reviewed by regulating agencies for the purposes of approving the approach to the post construction study. This outline is purposefully intended to follow the model developed and utilized by Curry & Kerlinger, LLC and the Technical Advisory Committee of Maple Ridge Wind Farm in Lewis County, New York. Following this model, which received critical input by the Technical Advisory Committee and a qualified statistician, will enable the regulating agencies and interested public the ability to compare the results with all projects that follow a similar protocol, including the Maple Ridge Wind Farm.

#### **Objectives**

The objectives of the post construction fatality study are to provide a quantitative estimate of the number of bird and bat fatalities that occur at the operating wind plant during the study period. Specifically, estimates of numbers of fatalities will be determined for:

- ⌚ Birds (collective fatalities of all species),
- ⌚ Bats (collective fatalities of all species),
- ⌚ Bird species (species by species),
- ⌚ Bat species (species by species),
- ⌚ Raptors (all species collectively),
- ⌚ Waterfowl (all species collectively),
- ⌚ Songbirds (all species collectively), and
- ⌚ Night migrants (all species collectively and individual species).

#### **Methods**

##### Carcass Surveys

To determine fatality rates at a project site, a subset of turbines and meteorological towers will be searched weekly. This level of search frequency is being used on the Maple Ridge Wind Farm. The number of turbines and meteorological towers to be searched will be determined based upon selecting sampling effort that yields the best precision of fatality estimates. A qualified statistician will be consulted on a project-by-project basis to determine the appropriate sampling size prior to site selection.



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Site selection will be conducted through a process of randomization and stratification. All turbine locations will be surveyed, and classified broadly as bare ground, agricultural (crop), agricultural (grassland), brush and wooded. In hayfields or old fields, mowing of vegetation beneath wind turbines will be conducted so that carcasses could be found more easily. Mowing will begin as soon as field technicians observed an increase in height of spring vegetation and will then be ongoing.

The survey will consist of searchers walking in parallel transects within an overall search area of 130m by 120m, centered on the tower. The searchers will use a staggered rotation for determining the first turbine to be searched on a given day to ensure that turbines will be searched at different times over the course of survey periods.

When a carcass or injured bird or bat is found, a Global Positioning System (GPS) will be used to determine geographic coordinates, and a range finder and compass were used to determine distance and bearing from the tower. The carcass will be photographed in the position in which it was found, using a digital camera, and a preliminary identification, including age and sex, will be made. The carcass will then be placed in a plastic bag labeled with date, species, tower number, and incident report number, and taken to a freezer to be stored in accordance with the U.S. Fish and Wildlife Service (FWS) permit requirements.

If the carcass or injured animal found was listed as a threatened or endangered species, or a species of concern, the FWS will be notified immediately by telephone, and collection of the dead/injured animal was to be delayed until specific direction for proceeding was received from the FWS.

### **Searcher Efficiency and Carcass Removal Study**

It is recognized that the number of carcasses found under the towers is lower than the total number of birds and bats likely to have been killed. There are at least three correction factors that need to be accounted for. The first is the possibility that the searchers will miss carcasses due to the amount of ground cover or the size and camouflage of the species. A second possibility is that the carcasses are removed prior to the time the searchers arrive on location after the collision event occurred. Finally, the estimate of incidents must be adjusted by the ratio of the number of towers searched to the number of operational towers in the wind farm. Applying these correction factors to the actual number of carcasses found during standardized surveys prevents underestimation of fatality. These correction factors are determined by searcher efficiency and carcass removal studies.

The objective of a searcher efficiency study is to estimate the proportion of carcasses that a searcher is able to find from the total number of carcasses that may be present beneath a turbine. A detection probability is calculated to estimate the total number of birds and bats by the wind turbines when corrected for a detection bias.

Three independent searcher efficiency trials and carcass removal trials will be conducted annually for birds, and two for bats. For birds, trials will be conducted in spring, summer and fall. For bats, trials will be in spring and fall. Bird and bat carcasses will be placed randomly beneath wind turbines scheduled for search that day on the morning prior to the turbine search. Reasonable efforts will be made to conduct blind tests so that searchers would not be aware they were being tested.

The objective of a carcass removal study is to determine the average length of time that avian and bat carcasses remain under the turbines before being removed from the study



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area by scavengers. A carcass removal rate will be used to adjust for removal bias when estimating the total number of carcasses present.

Carcasses will be checked for the first seven days after they are placed out, and then will be checked weekly for 3-4 weeks or until the carcass was removed or decomposed.

### ***Estimation of Fatalities***

Estimates of fatalities will be calculated using the actual number of carcasses found during carcass searches, the detection probability (searcher efficiency) defined as the estimated proportion of detectable carcasses found by searchers during all trials, the mean carcass removal rate expressed as the number of days that a carcass remains under the turbine before being removed from the study area by scavengers, and the interval in days between searches. To estimate the total number of fatalities for the study period, the estimator proposed in Erickson et. al. (2003) or a comparable estimator will be used.

### ***Reporting***

In an effort to observe the fatality estimates and understand the impacts of a project on avian and bird populations as soon as feasible, studies will be conducted in years 1, 2 and 5 following energization of the facility. Conducting studies in the early years of a project also minimizes the long term nuisance of participating farmers by having searchers on their property and mowing activities. Studies conducted in these years between April and November shall be reported to the permitting agency by March 1 of the following year.