

**Bird and Bat Monitoring Program for
Glance Bay Lingan Wind Power Ltd.
4MW Wind Power Project,
Lingan NS**

INTRODUCTION

This monitoring program is based on the protocol developed by Bird Studies Canada (Kingsley and Whittam, 2001). The purpose is to evaluate impacts of the two 2MW turbines planned for Lingan, NS on birds using the area for breeding, staging or migrating. Figure 1 shows the locations of the proposed turbines.

The protocol is standardized so that results can be compared among potential and existing wind power facilities elsewhere in Canada or North America. Dr. David McCorquodale will conduct the monitoring program with assistance from students from Cape Breton University. Dr. McCorquodale conducted breeding and migratory bird assessments at the Lingan site as part of the environmental assessment of the project.

The objectives of this study are as follows:

- Determine bird utilization rate (# birds observed per unit time and/or area) within the wind plant and at a control site located at some distance from the turbines;
- Determine bird mortality rate (# carcasses found per unit area) at these same points;
- Using the above two variables, calculate bird risk (mortality/utilization) at each point;
- Compare bird risk at turbines and controls;
- Identify annual periods of high and low risk;
- Determine the influence of weather on passage rate and mortality risk.

METHODOLOGY

The two turbines at the Lingan site are to be located approximately 1.5 km from one another and will therefore be considered separate survey points. A control location for each turbine has been selected to gather baseline data for comparison. These control points will be positioned approximately 250m from the turbine site and in similar habitat as the respective turbine. Control points will be flagged and geo-referenced with a GPS and marked on an aerial photo.

This paired design should allow comparison of bird utilization and mortality rates immediately surrounding the turbines and 250 m from the turbines. A distance of 250 m is the distance between the turbine and control point used in the Kingsley and Whittam report and in the case of Lingan; it is the maximum distance while maintaining similar habitats.

Both the control and wind turbine areas will be surveyed once a month during non-migratory periods and twice per week during migration periods (from late April 1 to early July, and late August through late October). As per the Conditions of Approval for the 4MW Lingan Wind Power Project

(Condition 2.2), the monitoring program will be conducted for a period of one year. The program will begin following the installation of the turbines.

Surveys will begin at first light, so that carcasses are more likely to be found before they are scavenged. The points will be visited randomly, although each turbine point and its associated control point should be visited successively (e.g. North Head turbine followed by North Head Control Point.). Additional counts will be conducted following extended fog events (i.e. 24 hours or more of fog) during migration seasons.

At each point, the observer will record the location, along with the date, start time and weather (temperature, visibility, wind speed and direction, precipitation). After these data have been recorded, a 5-minute point count will be conducted wherein all birds that are near (e.g. within 50 m of) the turbine (or, for control points, within 50 m of the center of the point) should be recorded. For each bird, the following variables will be recorded (from Morrison 1998):

- Species (if known). If not known, each bird seen should simply be recorded by number.
- Behavior (flying, perching, soaring, walking, etc).
- If flying or soaring, the zone of passage.

Four suggested zones (from Morrison 1998) are:

- Zone A: Within the blade sphere;
- Zone B: Close to the blades including passes along the edge of the rotation zone;
- Zone C: Not in the blade sphere but below the bottom tip of the blade; or
- Zone D: Out of and well above the top of the blade. If at a control point, the bird's location should be recorded in reference to the heights associated with the above zones (e.g. zone d = greater than 75 m high).

Once all points have been surveyed for bird activity, the points will be revisited and the area within a radius of 50m around each turbine (or the centre of each control point) should be searched for carcasses. It is important that these searches occur on the same day as the point counts. It is possible to have two different observers conducting the point counts and the carcass counts, so long as they are not at the same point at the same time (to avoid disrupting the point counts). The carcass searches will take longer to complete than the point counts, as all tall grass clumps, shrubs and openings to animal burrows should be searched thoroughly (Morrison 1998). If the carcasses cannot be identified, they will be photographed for future identification. Each carcass should be removed from the search zone after photographing or identification to avoid re-finding it on a later search.

For each carcass found, the observer will record its identity (to species if possible), the condition of the carcass, the estimated time of death (or time since death), the probable cause of death, and justification for why this cause was chosen. The distance and direction from the base of the turbine (or the center of the control point) will be noted and referenced on an aerial photo.

Observers may discover live birds that have been injured due to potential turbine collisions. These birds will either be captured or examined to determine the cause of injuries (again, permits are required), or the physical abnormalities should be described on the data forms (Anderson et al. 1999). Injured birds should be carefully described on the data form so that it will be recognized if later found dead. A sample data form is included as Appendix I.

CARCASS LOCATION AND PERSISTENCE

A salvage permit (Migratory Birds Convention Act) will be acquired to remove carcasses from the site and to conduct carcass persistence experiment and searcher trials. If species listed under the Species at Risk Act (SARA) are found, a separate permit under the SARA will be required.

Carcass removal experiments will be conducted to determine the rate at which carcasses are removed from the site by scavengers or through decay. Carcasses will be obtained through advice by CWS, NSDNR, or municipal officials for use in these experiments. These experiments involve placing freshly dead carcasses of varying sizes in known locations and monitoring them daily to measure how long they persist in the environment. Carcasses will also be used to test searchers for their ability to locate carcasses during actual surveys. An independent individual will place the carcasses and then the observer is asked to search the area as they normally would. Ideally the observer will not know that an efficiency test is underway as it might impact his/her searching strategy. All observers will be tested for searcher efficiency and rates will be calculated separately for each observer.

BAT MORTALITY

According to Nova Scotia Department of Natural Resources' (NSDNR) General Status of Wild Species in Nova Scotia, six species of bats are found in Nova Scotia and all are ranked as "Yellow" status. Yellow status means the species is sensitive to human activities or natural events. The six species include: Little Brown Bat; Northern Long-eared Bat; Silver Haired Bat; Red Bat; Hoary Bat; and, Eastern Pipistrelle.

The Lingan project site is not in the vicinity of any known bat hibernacula and bat migration has not been noted in the avian surveys completed to date. According the records held by the Atlantic Canada Data Conservation Centre, no observations have been noted of bat species.

The bat mortality survey program will be undertaken as part of the planned bird monitoring program during those periods of the year when bats are active. Surveyors will use the same control points as the bird program.

ANALYSES – BIRD USE AND MORTALITY

The bird utilization rate (# birds observed/unit time) and bird mortality rate (# dead birds/point) can be calculated for each turbine and control point. Utilization rate can also be calculated separately for each passage zone (a-d). An index of risk can then be calculated as the ratio of mortality to utilization. This ratio can be compared for turbine and control sites, to see if the area immediately around turbines is considered to be more dangerous than the area at some distance from the turbines. Habitat differences between turbine and control points are usually taken into account (by measuring standard habitat variables at each point) but because the habitat is very similar between the wind plant and the control area, it is felt there will be little difference. This ratio can also be compared across the season to determine if risk is higher during the migration, breeding, or wintering seasons, and across various weather conditions to determine if risk is higher during periods of low visibility.

The documents, “Avian Risk and Fatality Protocol” by Morrison (1998) and “Studying wind energy/bird interactions: a guidance document” by Anderson et al. (1999) will be referenced when finalizing the bird mortality protocol.

BAT SPECIES COMPOSITION

An Anabat II ultrasonic detector will be used to determine what species of bats (if any) are utilizing the Lingan study area.

The study will determine the species using the site by recording the frequency of the echolocation calls made by the bats. If possible, a count will be taken during the echolocation recording to estimate abundance of individuals.

Recordings will be conducted at three times during the active period of the year (late May, late July and late September). Recording periods will consist of three nights of recording for a minimum of four hours starting at dusk. Software specific to the Anabat system will be used to determine which species were recorded.

EVALUATION AND REVISION

Canadian Wildlife Service and the Wildlife Division of the Nova Scotia Department of Natural Resources will be provided with the opportunity to review and provide comment on any proposed revisions to the program.

REPORTING

Quarterly reports will be made available to CWS and NSDNR as well as a final report at the end of the one-year monitoring period.

References

Anderson et al. 1999. Studying wind energy/bird interactions: a guidance document.

Kingsley, A and B. Whittam. 2001. Bird Mortality Monitoring Protocol for the Wind Power Facility at North Cape, Prince Edward Island

Morrison, 1998. Avian Risk and Fatality Protocol

APPENDIX I
Sample Data Sheets

Table A. Categories of carcass condition.

Code	Description
I	Injured or dying.
F	Freshly dead with little or no decay or scavenging by insects; likely died within 48 hours.
R	Recently dead but with noticeable decay or scavenging; likely died within 2-7 days.
D	Decomposed carcass, may not be identifiable to species; likely died more than 1 week ago.
U	Unknown; impossible to determine because only feathers remain.

Lingan 4MW Wind Farm Bird Use Monitoring Data Form

BASIC INFORMATION

Date: _____ **Start time:** ____:____ **End time:** ____:____ **Turbine Number:** _____ **Observer:** _____

Temperature: ____°C

Visibility: low < 150m medium 150-500m high > 500m

Wind speed (km/hr): _____

Cloud cover (%): _____ **Wind direction:** _____

Precipitation: none rain snow fog **Barometric pressure:** _____ **Turbine Operating? (Y/N)** _____ **Turbine(s) Lit? (Y/N)** _____ **Rotation Speed:** _____ rpm

Bird Use Observations.

Use one line per bird or group of birds of the same species each time observed.

Species	Number of birds	Behaviour*	Height (zone a-d)	Distance from observer (m)	Direction of bird flight (N,S,E,W, NE,SE,NW,S)

*Behaviour should be recorded as: **foraging, mobbing** (either an animal predator or the observer), **flying – migration** (purposeful flight southward in the fall, or northward in the spring, **flying – other, perching** or **walking**).

