



**WOLFE ISLAND ECOPOWER®
CENTRE**

**POST-CONSTRUCTION FOLLOW-
UP PLAN
BIRD AND BAT RESOURCES**

MONITORING REPORT NO. 2
JULY - DECEMBER 2009

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Prepared For:

**TransAlta Corporation's wholly
owned subsidiary**

**Canadian Renewable Energy
Corporation**

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Executive Summary

This report contains the results of the post-construction monitoring program for bird and bat resources at the Wolfe Island EcoPower® Centre for the period between July 1 and December 31, 2009 (the “Reporting Period”). The Wolfe Island EcoPower® Centre is a 197.8 megawatt (“MW”) wind plant on Wolfe Island, Township of Frontenac Islands, Frontenac County, Province of Ontario. Eighty-six 2.3 MW wind turbine generators (“WTGs”) and ancillary facilities have been placed over the western portion of Wolfe Island with additional supporting electrical infrastructure on the Kingston mainland.

This report, the second in a series, contains the results of the post-construction monitoring program for the period between July 1 and December 31, 2009. The EcoPower® Centre achieved commercial operation on June 26, 2009, and all 86 WTGs had completed their commissioning works by June 29. With intermittent and periodic turbine shutdown to allow for ‘fine-tuning’ maintenance work, the first full week of operation of all 86 WTGs was the week of July 6, 2009.

Consistent with the schedule for post-construction monitoring outlined in Section 5.1 of the Post-Construction Follow-Up Plan for Bird and Bat Resources for the Wolfe Island Wind Plant (revised February 2010) (the “Follow-up Plan”), field surveys conducted during the Reporting Period included:

- bird and bat mortality monitoring
- disturbance effects monitoring – staging and foraging migratory waterfowl
- disturbance effects monitoring – wintering raptors

Mortality monitoring was carried out by employees of Wolfe Island Wind Monitoring, an independent consulting firm, according to a schedule and methods prepared by Stantec that were based on the Follow-up Plan. In addition to carcass searches, trials to determine various corrective factors for searcher efficiency and scavenging rates were conducted during the Reporting Period.

A total of 100 carcasses of 33 bird species were collected during the Reporting Period; 81 of these were collected during the summer monitoring period (July, August and September), and 19 during the fall monitoring period (October, November and December). All species have provincial S-Ranks of S5 (i.e., Secure – common, widespread and abundant in Ontario) or S4 (i.e., Apparently Secure – uncommon but not rare). No waterfowl fatalities were observed during the Reporting Period.

Seven of the species have been identified as species of conservation priority by Ontario Partners in Flight (2006): American Kestrel (one on each of July 1 and August 31), Northern Flicker (one on October 8), Black-billed Cuckoo (one on July 14), Eastern Kingbird (one on each of July 28 and August 17), Bank Swallow (one on August 17), Savannah Sparrow (one on September 10), and Bobolink (eight fatalities between July 27 and September 10). In late summer and fall, young Bobolinks have left the nest and have joined mobile flocks of fledglings and adults that move about the breeding habitat.

Over the Reporting Period, a total of 28 Tree Swallow fatalities were recorded at 22 different WTGs. Sixteen of 28 (57%) Tree Swallow fatalities were juvenile birds. Together with Bank Swallow (one fatality), Barn Swallow (two fatalities), and Purple Martin (seven fatalities), swallows and martins represented 38 (38%) of the 100 recorded bird fatalities during the course of the Reporting Period. Two WTGs were each responsible for three swallow/martin fatalities, and five turbines were each responsible for two swallow/martin fatalities. There was no apparent clustering of swallow/martin fatalities.

Twelve raptor and vulture fatalities were recorded over the course of this Reporting Period: six Turkey Vultures, three Red-tailed Hawks, two American Kestrels, and one Merlin. Correcting seasonally for searcher efficiency, scavenger and other removal rates, and the percent area searched, the 12 raptor/vulture and 88 other bird carcasses recovered represent approximately 602 bird fatalities over the course of this Reporting Period. The estimated total bird mortality for the Reporting Period is 6.99 birds/turbine (3.04 birds/MW). The mortality rate for the six-month Reporting Period at the EcoPower® Centre, at 3.04 birds per MW, is consistent with the results in nearby New York and other studies summarized by Arnett et al. (2007). The Reporting Period (July-December) covered slightly different seasons than other studies (e.g., in New York, late April to mid-October or November). Direct comparison of mortality at the EcoPower® Centre and the other wind power facilities will be possible following a full year of field studies in 2010.

The 12 raptor/vulture carcasses recovered, when corrected for scavenger removal, represent approximately 13 raptor/vulture fatalities, over the course of this Reporting Period. The resultant total raptor/vulture mortality for the Reporting Period is 0.15 raptors and vultures/turbine (0.07 raptors and vultures/MW). The raptor mortality rate, excluding vultures, of 0.04 raptors per MW is at the mid-point of the range observed at other facilities in North America (0 – 0.09 raptors per MW; Arnett et al., 2007) and is consistent with rates observed elsewhere in Ontario (Stantec, unpublished data). It is well below the threshold for notification identified in the Follow-up Plan of 0.09 raptors per MW, which is the highest rate of raptor mortality recorded in North America, outside California, at the Stateline, Oregon facility (Arnett et al., 2007).

A total of 180 carcasses of five bat species were collected during the Reporting Period. The Hoary Bat (54 fatalities), Eastern Red Bat (44 fatalities), and Silver-haired Bat (36 fatalities), are classified as long-distance migratory tree bats and comprised 74% of all bat fatalities. The majority of bat mortality occurred between the end of July and mid-September, peaking during late August. Correcting for searcher efficiency, scavenger and other removal rates, and percent area searched, the 180 recovered carcasses represent approximately 1,270 bat fatalities over the Reporting Period. The total estimated bat mortality for the Reporting Period is 14.77 bats/turbine (6.42 bats/MW).

The 2009 bat mortality rate at the EcoPower® Centre, at 6.42 bats per MW, is at the low end of the range reported in North America and is considerably lower than the range reported in the eastern U.S. by Arnett et al. (2007). The bat mortality rate at the EcoPower® Centre is consistent with the results in nearby New York and is roughly 30-40% lower than the mortality measured at Maple Ridge, New York (9.42-11.23 bats/MW; Jain et al., 2007). The Reporting Period covered the entire fall period of concern, and so a comparison between sites is valid.

In total, eight species of waterfowl were observed foraging inland during the fall 2009 post-construction monitoring; all species were either geese and dabbling ducks. Species composition in 2009, dominated by Canada Goose, was very similar to that observed during the 2007 pre-construction monitoring. Overall, the total number of waterfowl days was significantly higher in 2009, totaling 311,774, compared to 117,838 waterfowl days in the fall of 2007. This increase appears to be attributed largely to an increase in the number of Canada Goose observations.

In the fall of 2009, areas of highest waterfowl concentrations occurred at the south end of Wolfe Island in an area bordered by Concession 5, Stevenson Rd and Ridge Rd. Scattered fields with high Canada Geese concentrations were also recorded in the east end of the study area, surrounding Bayfield Bay, and across the north end of the study area. When comparing 2007 to 2009 results, the areas of waterfowl concentration were generally similar with some localized shifting (e.g., using different fields within the same concession). However, the high concentrations of geese in scattered field across the east and north portions of the study area in 2009 were not observed in 2007. Crop preferences in the fall of 2007 and 2009 were similar, with the majority of observations in soy or corn stubble. Hay and pasture were generally not as important to foraging waterfowl during the fall season.

Generally, major waterfowl movement routes were similar in 2007 and 2009. All major routes were associated with the primary offshore staging areas, namely Reed's Bay, Pyke's Bay, Button Bay, Bayfield Bay and the small inlet off Carpenter's Point Rd. Slight changes in routes between 2007 and 2009 were likely attributable to changes in foraging fields. Waterfowl did not appear to adjust their flight height in reaction to the WTGs, with the majority of ducks and geese flying at blade sweep height. In many cases, avoidance behavior was observed, as flocks of waterfowl adjusted their flight course as they approached a WTG.

Waterfowl use of offshore staging areas, as measured through aerial surveys, showed a 6% increase between 2008 and 2009. The largest increases in abundance were noted along the north side of Wolfe Island. Bay ducks represented the largest component of this increase on the north side of Wolfe Island, with smaller increases observed in geese, goldeneye and merganser guilds. The southeastern portion of the island, including Bayfield Bay, experienced a moderate increase in waterfowl from 2008 to 2009, attributed mostly to an increase in bay ducks. The east end of Wolfe Island saw very little change in waterfowl days from 2008 to 2009. The southern portion of the island was the only survey sector to experience a decline in waterfowl abundance between 2008 and 2009, mostly attributable to a decrease in bay duck observations, although numbers in all guilds in this area were generally less abundant.

Tundra Swans, staging in off-shore areas, experienced a notable increase from 1999 to 2008 to 2009. Geese experienced no change between 2008 and 2009. Dabblers (large and small combined) experienced a 25% decrease. The small dabbler guild showed a notable decline between 2008 and 2009. This can largely be attributed to a decrease in the number of American Wigeons in Bayfield Bay, likely a result of natural or population factors, as the numbers of other small dabblers were relatively unaffected.

An apparent spike in sea duck abundance demonstrated the sensitivity of estimates for less abundant species using the waterfowl days approach. Bay ducks showed an increase of 28% from 2008 to 2009. Decreases in goldeneye and merganser were a general trend through all sectors, but the largest decrease was in Button Bay. The overall decrease in goldeneye and mergansers can likely be attributed to natural fluctuations in staging abundance; staging numbers of the goldeneye guild in particular are known to fluctuate widely among years (K. Ross, pers. comm., 2010).

Maximum wintering raptor numbers observed during various surveys in 2009 for each species were eight Snowy Owls (December 22), 15 Short-eared Owls (December 22), one Bald Eagle (December 23), eight Northern Harriers (December 23), five Red-tailed Hawks (December 8), two Rough-legged Hawks (December 8 and December 23), four American Kestrels (November 25) and two Merlins (November 25). Average raptor density, calculated as the number of raptors per kilometer of survey across the study area, was highest on December 23, 2009 (0.4 raptors per kilometer and 0.3 Short-eared Owls per kilometer).

Raptor numbers in 2009 were generally lower than those in 2006. Overall, the average density of raptors during the afternoon surveys in November and December 2006 and 2009 were 0.8 and 0.2 raptors per kilometer, respectively. The average density of Short-eared Owls during the early evening surveys for November and December 2006 and 2009 were 0.2 and 0.1 owls per kilometer, respectively. Looking at individual species, the greatest differences between 2006 and 2009 were observed in Northern Harriers (87 versus 19 observations), Red-tailed Hawks (43 versus 10 observations) and Rough-legged Hawks (34 versus 5 observations). Snowy Owl (6 versus 12 observations) and Merlin (0 versus 3 observations) were the only two species that showed an increase in observations in 2009.

Numbers of wintering raptors and owls are known to vary significantly from year to year, based on prey conditions in their northern breeding and southern wintering areas. Results from across Ontario in 2009, as reported in surveys conducted at other sites (Stantec, unpublished; Environment Canada, pers. comm.) and on the OntBirds listserv, indicate that the number of wintering raptors and owls in the winter of 2009-2010 were generally lower than average. Overall, the results of the 2009 post-construction winter raptor monitoring indicate that raptors continued to utilize the study area. Differences in raptor density observed within the study area between 2006 and 2009 are reflective of observations throughout the Kingston area and across southern Ontario. These differences observed between the pre- and post-construction monitoring are likely attributable to natural variation.

A more thorough discussion of raptor behavior, including an analysis of the complete winter season (November 2009-March 2010), will be provided in the subsequent Monitoring Report No. 3.

We conclude that mortality and disturbance effects monitoring should proceed in 2010 according to the February 2010 Follow-up Plan. With respect to the mortality monitoring, it is recommended that the alternating once-weekly/twice-weekly carcass search schedule for each turbine, as implemented thus far, be changed. In order to reduce uncertainty surrounding the scavenger correction factor, and ultimately the corrected mortality rates, it is suggested that all the WTGs in the EcoPower® Centre be split into two treatments. One treatment, consisting of 43 WTGs located throughout the study area should be the subject of once-weekly carcass searches, the other (remaining 43 WTGs) should be searched twice-weekly. Mortality rates would be calculated separately for the two different treatments. Based on 2009 observations of large carcass visibility and persistence, we believe weekly surveys for the first group of WTGs will be sufficient to identify mortality of raptors and vultures.

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1.0 Introduction

1.1 PROJECT OVERVIEW

TransAlta Corporation, through its wholly owned subsidiary Canadian Renewable Energy Corporation (“CREC”), has developed a 197.8 MW wind plant on Wolfe Island, Township of Frontenac Islands, Frontenac County, Province of Ontario. Eighty-six 2.3 MW WTGs and ancillary facilities have been placed over the western portion of Wolfe Island (**Figure 1, Appendix A**) with additional supporting electrical infrastructure on the Kingston mainland.

BirdLife International, in cooperation with Bird Studies Canada and Nature Canada, has identified Wolfe Island as an Important Bird Area (“IBA”) due to the presence of globally and continentally significant numbers of “congregatory” waterfowl species that gather offshore during the spring migration (information is available at www.bsc-eoc.org/iba/site.jsp?siteID=ON037). In addition, Wolfe Island supports notable landbird populations (albeit not in numbers of global or continental importance) including wintering raptors and Tree Swallows.

The high quality grassland habitat that attracts wintering raptors also supports a high abundance and diversity of grassland breeding bird species of conservation priority (Cadman et al., 2007; Ontario Partners in Flight, 2006). As discussed in Section 7.9.1 of the Environmental Review Report (“ERR”), Wolfe Island is a Category 4 Level of Concern Project from the perspective of bird use, based on criteria provided in Environment Canada’s *Wind Turbines and Birds: A Guidance Document for Environmental Assessment* (April, 2007a).

Wolfe Island would be a Sensitivity Rating 3 (High) project for bats based on the criteria provided in the Ontario Ministry of Natural Resources *Guideline to Assist in the Review of Wind Power Proposals: Potential Impacts to Bats and Bat Habitats* (August 2007). Potential concerns with bats are generally associated with the Project’s proximity to the shoreline of Lake Ontario, which could potentially act as a corridor or channeling feature for migrating bats.

Recognizing the IBA designation related to waterfowl, as documented in the Project’s ERR, and the importance of the area to wintering raptors and breeding grassland birds, extensive primary pre-construction data were collected through multiple-year bird and bat baseline studies on Wolfe Island. These data were further augmented with secondary data from published and unpublished sources to generate a robust data set from which to assess the potential effects of the Project during its operation phase.

The potential bird and bat effects and associated mitigation measures, based upon this dataset, ornithological advice, and professional opinion, among other factors, are provided in ERR Section 7.9. Additionally, bird and bat post-construction monitoring commitments are provided in ERR Section 9.4. These commitments provide the first step of confirming the ERR predictions of potential effects and provide the basis from which the need for mitigative actions, if any, may be determined.

1.2 POST-CONSTRUCTION FOLLOW-UP PLAN

A formal Post-Construction Follow-up Plan for Bird and Bat Resources (“Follow-up Plan”) was developed among CREC, Environment Canada / Canadian Wildlife Service, the Ontario Ministry of Natural Resources, Natural Resources Canada, and Ducks Unlimited Canada (collectively the “parties”) in consideration of the unique features of Wolfe Island. The final Follow-up Plan was posted to the Wolfe Island Project website in May, 2009 following a period of public comment on a draft Follow-up Plan.

The Follow-up Plan was subsequently revised to reflect site-specific findings available from the 2009 studies on Wolfe Island, and revised guidance materials available from the regulatory agencies. The revised Follow-up Plan (February, 2010) has been posted on TransAlta’s Wolfe Island EcoPower® Centre website at www.transalta.com/wolfeisland for stakeholder information. Hard copies are also available at the Township office on Wolfe Island and at the public library on Wolfe Island. The previous version of the Plan (May, 2009), a summary of stakeholder comments received on the draft Follow-up Plan, and written notification of the revised Follow-up Plan are also available on the Project website, the Township office and the public library on Wolfe Island for stakeholder review.

The objective of the Follow-up Plan was to set out the methods used to assess the direct and indirect effects of the 86 WTGs on the birds and bats of Wolfe Island and, if necessary, to implement appropriate measures to mitigate adverse environmental effects so they do not become significant. The Follow-up Plan was designed by the parties to achieve all of the provincial and federal commitments and requirements.

The Follow-up Plan is to be fully implemented upon commencement of commercial operations. The implementation of the Follow-up Plan will test the predictions of the ERR prepared in accordance with the Ontario *Environmental Assessment Act* and the Canadian *Environmental Assessment Act*. Should any unanticipated adverse environmental effects be identified, it is the goal of the Follow-up Plan to mitigate those effects such that they do not become significant.

1.3 MONITORING REPORT OVERVIEW

The Follow-up Plan specifies bi-annual post-construction monitoring reporting for periods ending June 30 and December 31. This report, the second in a series, contains the results of the post-construction monitoring program for the period between July 1 and December 31, 2009 (the “Reporting Period”), further divided into the summer monitoring period (July, August and September), and the fall monitoring period (October, November and December). The EcoPower® Centre achieved commercial operation on June 26, 2009, and all 86 WTGs had completed their commissioning works by June 29. With intermittent and periodic turbine shutdown to allow for ‘fine-tuning’ maintenance work, the first full week of operation of all 86 WTGs was the week of July 6, 2009.

Consistent with the schedule for post-construction monitoring outlined in Section 5.1 of the Follow-up Plan, field surveys conducted during the Reporting Period included:

- bird and bat mortality monitoring
- disturbance effects monitoring – staging and foraging migratory waterfowl
- disturbance effects monitoring – wintering raptors

Surveys designed to assess disturbance effects to birds from operating WTGs, as described in Section 2.2 of the Follow-Up Plan, were initiated in the fall of 2009 since the construction phase of the Project was on-going during the breeding bird season in 2009. The schedule for commencement of each remaining survey type is summarized below.

Waterfowl Pairs Surveys	May 2010
Grassland Point Counts and Area Searches	June 2010
Wetland Point Counts and Area Searches	June 2010
Woodland Point Counts and Area Surveys	June 2010

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2.0 Methods

2.1 MORTALITY MONITORING

2.1.1 Field Surveys

Mortality monitoring was carried out by employees of Wolfe Island Wind Monitoring, an independent consulting firm. Their activities were carried out according to a schedule and methods prepared by Stantec that were based on the Follow-up Plan.

The Follow-up Plan specifies that carcass searches are to be conducted at half the WTGs twice per week and at the other half once per week; the two groups shall be rotated so that one week the subset of WTGs receives the less intensive treatment, and the next week the more intensive treatment. Prior to the start of carcass searches, a schedule was prepared to ensure all turbines received the appropriate coverage (**Appendix C**).

Carcass searches for birds and bats were conducted at operating WTGs on weekdays during the Reporting Period, consistent with the Follow-Up Plan. Carcass searches were not conducted under hazardous weather conditions (e.g., thunder and lightning), or when maintenance or reclamation activities prevented access or presented a safety concern. A complete summary of survey dates, times, and weather conditions is provided in **Appendix D**.

The carcass searches consisted of one surveyor searching clear or minimally-vegetated portions (as recommended by Environment Canada [2007b]) of a 60 m radius area under each WTG, walking concentric transects spaced at 7 m intervals starting at 2 m from the turbine base. The search area radius and the locations of the transects at each WTG were determined using laser rangefinders with an accuracy of ± 1 m.

If a bird or bat carcass was discovered, the following information was recorded:

- date and time it was found
- state of decomposition
- estimated number of days since death
- injury sustained (or best estimate if the carcass was in poor condition)
- species (or best estimate if the carcass was in poor condition)
- distance and direction from the nearest WTG
- substrate in which the carcass was found.

Carcasses were photographed, collected, and transported to an on-site freezer by Wolfe Island Wind Monitoring for confirmation of species by Stantec, if necessary. Those that were found in reasonable condition were kept for later use in searcher efficiency trials.

2.1.2 Correction Factors and Data Analysis

Information to calculate various corrective factors for searcher efficiency and scavenging rates was also collected during the Reporting Period. Correction factors were calculated to account for carcasses that fell in areas that were not searched as a result of dense vegetation, standing water or other obstacles, for carcasses that were overlooked, and for carcasses that were removed by scavengers prior to the search.

There are numerous published and unpublished approaches to incorporating these corrective factors into an overall assessment of total bird and bat mortality. Currently, as documented in the Follow-up Plan, Environment Canada and the Canadian Wildlife Service recommend the following correction formula:

$$C = c / (Se \times Sc \times Ps), \text{ where}$$

C is the corrected number of bird or bat fatalities

c is the number of carcasses found

Se is the proportion of carcasses expected to be found by searchers (searcher efficiency)

Sc is the proportion of carcasses not removed by scavengers over the search period

Ps is the percent of the area searched.

Correction factors for raptors and vultures are expected to be significantly different than those for small birds and bats, for the following reasons:

- searcher efficiency rates are higher than average for larger birds
- larger and heavier birds are more likely to land closer to the wind turbine generators
- scavenger rates are lower for larger birds as they are harder for scavengers to carry off. There is also some evidence from western North America that scavengers may have an aversion to the carcasses of large hawks (Strickland and Morrison, 2008).

As a result, Se and Ps are estimated to be 1.0 for raptors and vultures. An estimate of Sc for raptors and vultures is available from preliminary results of a January scavenger trial using raptor and vulture carcasses on Wolfe Island (Stantec, in prep). Therefore, in calculating the total number of bird fatalities, raptor and vulture fatalities were corrected separately. The corrected number of raptor and vulture fatalities was added to the corrected number of other bird fatalities to obtain the total number of bird fatalities:

$$C = (c_1 / (Se_1 \times Sc_1 \times Ps_1)) + (c_2 / (Se_2 \times Sc_2 \times Ps_2)), \text{ where}$$

C is the corrected number of bird fatalities

c_1 is the number of raptor or vulture carcasses found

c_2 is the number of other carcasses found

Se is the proportion of raptor/vulture carcasses (Se_1) or other carcasses (Se_2) expected to be found by searchers (searcher efficiency)

Sc is the proportion of raptor/vulture carcasses (Sc_1) or other carcasses (Sc_2) not removed by scavengers over the search period

Ps is the percent of the area searched for raptors/vultures (Ps_1) or other carcasses (Ps_2).

The total number of bird or bat fatalities was divided by the number of turbines (i.e., 86) and the number of MW (i.e., 197.8) to obtain mortality rates by turbine and by MW for the Reporting Period.

2.1.2.1 Searcher Efficiency

Searcher efficiency trials are designed to correct for carcasses that may be overlooked by searchers during the survey periods. Environment Canada (2007b) provides detailed recommendations on determining searcher efficiency, expressed as a proportion of carcasses expected to be found by individual searchers.

During the Reporting Period, searcher efficiency trials involved a “tester” that placed bat carcasses under WTGs prior to the standard carcass searches over a period of several weeks between June 3 and June 30, 2009 to test each searcher’s detection rate. The trials involved 20 test bat carcasses for each of the three searchers. Bat carcasses were used because they are representative of the smallest animals (birds or bats) that are likely to be encountered during carcass searches. As well, because of their colouring, bat carcasses are representative of the most camouflaged animals (birds or bats) that may be encountered. For these reasons, the use of bat carcasses for searcher efficiency trials provides a conservative approach to correcting for bird mortality, and an appropriate approach to correcting for bat mortality.

Searcher efficiency is expressed as a proportion of unscavenged carcasses found by individual searchers. Searcher efficiency (Se) was calculated for each searcher as follows:

$$Se = \frac{\text{number of test carcasses found}}{\text{number of test carcasses placed} - \text{number of test carcasses removed by scavengers}}$$

Because searchers surveyed varying numbers of turbines over the course of the mortality monitoring, it was necessary to find a weighted average which reflected the proportion of turbines each searcher surveyed. This weighted average, or overall Se, was calculated as follows:

$$Se_o = Se_1(n_1/T) + Se_2(n_2/T) + Se_3(n_3/T)$$

where: Se_o is the overall searcher efficiency;
 $Se_1 - Se_3$ are individual searcher efficiency ratings;
 $n_1 - n_3$ is quantity of all turbines surveyed by each searcher; and
T is the total number of turbines surveyed by all searchers.

2.1.2.2 Scavenger Trials

Scavenger trials are designed to correct for carcasses that are removed by predators and commissioning activities before the search period. These trials involve the distribution of carcasses in known locations at each WTG, followed by periodic checking to determine the rate of removal.

During the Reporting Period, three two-week scavenger trials were conducted during the months of July, August and September. In August and September, trial carcasses were also placed at Meteorological ("MET") towers. As recommended by Environment Canada (2007b), two dead, dark-coloured chicks were placed in two locations within the 60 m search radius around each of the WTGs and MET towers. If there was more than one substrate type (e.g., gravel, hay, crop, or ploughed soil), the two chicks were placed on different substrates. UTM coordinates were taken at each chick location and the distance and direction from the WTG or MET tower were measured.

Chick carcasses were placed on July 19, August 16, and September 13, 2009, with their presence or absence recorded during regularly-scheduled carcass searches over the subsequent two weeks. Some regularly-scheduled checks could not be carried out due to maintenance or land reclamation at WTG search areas, and a small number of field data sheets were misplaced from the August and September scavenger trials. As a result, to ensure the value of S_c accurately reflected the variable search interval, trial carcasses were only included in the calculation if data were available from all three scheduled checks.

Proportions of carcasses remaining after each search interval were pooled to calculate the overall scavenger correction (S_c) factors as follows:

$$S_c = \frac{n_{\text{visit1}} + n_{\text{visit2}} + n_{\text{visit3}}}{n_{\text{visit0}} + n_{\text{visit1}} + n_{\text{visit2}}}, \text{ where}$$

S_c is the proportion of carcasses not removed by scavengers over the search period

n_{visit0} is the total number of carcasses placed

$n_{\text{visit1}} - n_{\text{visit3}}$ are the numbers of carcasses remaining on visits 1 through 3

2.1.3 Percent Area Searched

Environment Canada has indicated that 85% to 88% of carcasses fall within 50 m of a WTG base (C. Francis, pers. comm., January 2008). Environment Canada (2007b) also specifies that for a WTG of the size as those on Wolfe Island, most bat carcasses fall within 50 m.

Furthermore, it is generally agreed in the literature that the density of carcasses decreases with distance from the WTG base (e.g., Jain et al., 2007; Kerns et al., 2005 [as cited in Arnett et al., 2008]). Although carcass searches were conducted in clear or minimally-vegetated areas within a 60 m radius of the WTG base, the density of carcasses (i.e., the number of carcasses per unit area searched) is expected to be much lower between 50 m and 60 m from the WTG compared to those areas closer to the WTG. Calculation of the percent area searched based on a 60 m radius circle incorrectly assumes an even distribution of carcasses within this area, and could therefore lead to overestimation of mortality.

Accordingly, and to be comparable to the results of post-construction monitoring reported for other Ontario wind power facilities, and in accordance with the Follow-Up Plan, the percent area searched was calculated based on a 50 m radius circle.

Ps was calculated for the summer period based on data collected during regularly-scheduled surveys in mid-July and updated throughout August as necessary, and for the fall period based on data collected during regularly-scheduled surveys in November. In each season, searchers filled out a 60 m radius circle diagram with 5 m x 5 m grid cells for each WTG, sketching areas searched and identifying areas that could not be searched due to vegetation cover or other factors. The area searched was determined for each WTG or MET tower by counting the number of searched grid cells within 50 m, and dividing the summed area of those cells by the total area within a 50 m radius circle to determine the percent area searched for that turbine (Ps_x, where x is the turbine number or the MET tower).

$$Ps_x = \frac{\text{area searched within 50 m radius circle}}{\pi (50)^2}$$

The overall Ps for the facility during the search period was calculated as the average of Ps₁ through Ps₈₆, with Ps for MET towers calculated separately:

$$Ps = \frac{Ps_1 + Ps_2 + Ps_3 + \dots + Ps_{86}}{86}$$

2.2 DISTURBANCE EFFECTS

2.2.1 Foraging Waterfowl Surveys

In spring and fall on Wolfe Island, geese and dabbling ducks that stage in the surrounding bays move inland at dawn to forage in agriculture fields. At dusk, the waterfowl return to the bays to roost for the night. Studies were completed to examine any changes in patterns in foraging or movement across the study area compared to pre-construction conditions.

The post-construction fall foraging waterfowl surveys were conducted using the same protocols as the pre-construction baseline surveys carried out in the fall of 2007. Weekly daytime surveys were conducted for 17 consecutive weeks during peak waterfowl migration and staging, between September 2 and December 23, 2009. Survey dates, times and weather conditions for each visit are provided in **Appendix D**.

These daytime surveys consisted of two experienced surveyors driving all north-south roads and the majority of the east-west roads in the study area at slow speeds (i.e., 30-40 km/h), using binoculars to scan fields and open areas. Information on species, numbers, location, and activity for all waterfowl observed in inland agricultural fields was recorded and mapped.

Data on waterfowl use of fields was calculated in the form of “waterfowl days”, as described in Dennis and Chandler (1974) as cited by Ross (1989). This analysis involves averaging results for each successive pair of surveys, multiplying the results by the number of days separating each pair, and summing over the migration period.

2.2.2 Overland Waterfowl Movement Surveys

The purpose of the overland movement surveys was to record movement of waterfowl across the study area at dawn and dusk, when waterfowl are most active. The post-construction waterfowl movement surveys were carried out using the same protocols established during the pre-construction baseline surveys conducted in the fall of 2007.

The surveys were conducted weekly for 17 consecutive weeks. Dawn surveys were conducted on September 2, 10, 16, 23, 30, October 7, 14, 21, 28, November 4, 11, 18, 25, and December 2, 8, 16 and 24, 2009. Dusk surveys were conducted on September 1, 9, 15, 22, 29, October 6, 13, 20, 28, November 3, 10, 18, 24, and December 1, 7, 16 and 23, 2009. Bays and marshes were frozen over by the December 16 survey. During each survey, two observers were stationed at separate points placed at locations with locally high elevation and good visibility towards the bays. One observer was situated on the western side of the study area, with views towards Pyke's Bay, Big Sandy Bay Wetland and Reeds Bay Wetland. The other observer was situated on the eastern side of the study area with views towards Bayfield Bay Marsh and Button Bay Wetland. On December 23, 2009, surveyor illness resulted in only the west station being surveyed during dawn and dusk movement.

The same two locations were used for each survey in both the 2007 and 2009 waterfowl studies. Movement of waterfowl flocks was mapped and the height, direction, and flight path were recorded along with the size of the flock and species, where possible. Survey times and weather conditions are summarized in **Appendix D**.

2.2.3 Aerial Waterfowl Surveys

The purpose of the aerial waterfowl surveys was to record the abundance of staging waterfowl in the bays, shorelines and coastal marshes around Wolfe Island. The surveys focused on both the western and eastern portions of the island.

Aerial surveys were conducted in association with Canadian Wildlife Service ("CWS"), following the methods used by CWS as outlined in Ross (1989). The same methods were used for CWS's 1999 waterfowl surveys, the 2008 pre-construction monitoring and the 2009 post-construction monitoring.

Pre-construction surveys were undertaken by Stantec and CWS in the fall of 2008. In the fall of 2009, CWS conducted aerial waterfowl surveys of Wolfe Island between late September and early January as part of their eastern Lake Ontario studies and provided the results to Stantec.

In the fall 2008, surveys were conducted on September 9, 24, October 10, 31, November 6, 18, December 12, 18 and January 9. In the fall of 2009, surveys were conducted on September 9, October 26, November 4, 18, December 2, 16 and January 7. Survey dates, times and weather conditions are summarized in **Appendix D**. Marshes and inner bays were frozen over by the December 18 survey in 2008 and December 16 survey in 2009. The outskirts of the bays and the St. Lawrence River north and south of Wolfe Island generally remained open through the end of the January surveys.

Surveys were conducted by two qualified surveyors accompanied by one pilot and were conducted from a four-seater fixed-wing aircraft. One surveyor was situated in the front passenger (shore) side of the plane, while the other was situated in the back left, behind the pilot (offshore side). The plane departed from the Kingston airport and completed a standardized route following a line roughly 200 metres off the shoreline. Waterfowl numbers were assessed, and individuals were identified to species where possible, and to larger species grouping (guild) when segregation to species was not possible. Observations were recorded on microcassette and later transcribed onto paper data forms.

Data were recorded according to a sector system as established by CWS (see **Figure 2.0, Appendix A** and **Table 2.1, Appendix B**). Data for each of the major staging areas (i.e. Bayfield Bay, Button Bay, Pyke's Bay and Reed's Bay) were collected separately so specific results could be discerned from the sectors. Species were grouped into one of eight guilds (**Table 2.2, Appendix B**). Data on waterfowl use of bays are presented in the form of "waterfowl days", as calculated in Dennis and Chandler (1974) and cited by Ross (1989). This analysis involves averaging results for each successive pair of surveys, multiplying the results by the number of days separating each pair, and summing over the migration period.

2.2.4 Winter Raptor Surveys

Pre-construction baseline winter raptor surveys were conducted to establish areas of raptor use and general behaviour in the study area. The purpose of the post-construction winter raptor use surveys is to assess potential displacement or disturbance effects (i.e., distribution and abundance) to these species compared to pre-construction conditions.

The post-construction winter raptor surveys were carried out using the same survey protocols as the pre-construction baseline surveys conducted in 2006-2007. On each date, a late afternoon survey was conducted for raptors and an early evening survey (from just before sunset to dusk) was conducted for Short-eared Owls. Two vehicles were used on each survey, with an experienced surveyor and a driver in each vehicle. The use of two vehicles allowed the study area to be more thoroughly covered during the early evening period.

All north-south roads and most of the east-west roads in the study area were driven at slow speeds (i.e., 30-40 km/h). The fields and woodlots were scanned using binoculars to detect any raptors, and a spotting scope was used for closer inspection of stationary birds. All raptors and owls were recorded and their locations mapped.

On each visit, weather conditions and the route taken were recorded. The weather conditions at the time of each survey are summarized in **Appendix D**. Visibility during each of the surveys was good or excellent.

Winter raptor surveys were completed once every two weeks in November, 2009 through March, 2010. This report provides the results from the November and December surveys only, the two months that fall within the Reporting Period (i.e., July to December 2009). Results of the full 2009-2010 winter raptor survey (November 2009 to March 2010) will be provided and discussed in the subsequent bi-annual report, Monitoring Report No. 3. Monitoring Report No. 3 will also provide additional detailed analysis and discussion related to raptor behavior.

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3.0 Results

3.1 MORTALITY MONITORING

3.1.1 Correction Factors

3.1.1.1 Searcher Efficiency

Individual searcher efficiency during the Reporting Period ranged from 55% to 70% (**Table 3.1, Appendix B**). The overall searcher efficiency was subsequently calculated by weighting the individual searcher efficiencies, according to the proportion of WTGs surveyed seasonally by each individual, over the Reporting Period. The weighted searcher efficiency for the summer period was 62.9%, and for the fall period 63.3% (**Table 2, Appendix B**). These values were applied to assess bat and small bird mortality rates.

Searcher efficiency for raptors and vultures was assumed to be 100% due to the size of these birds.

3.1.1.2 Scavenger and Other Removal Factors

The 2009 scavenger trials were complicated by inadvertent trial carcass displacement or removal by widespread commissioning, construction, and site reclamation activities, such as increased truck traffic, site grading, and access road width adjustment. Site reclamation activities continued through the summer and early fall periods. Where possible, field crews noted where a scavenger trial carcass absence was likely due to construction activities. However, it was not possible to be absolutely certain of the agent of carcass removal.

It is apparent that the same complicating factors applicable to the detection of trial carcasses are also applicable to detection of actual fatalities. Accordingly, the trial data were analyzed to account for all carcass removal, both from scavengers and from commissioning and reclamation activities.

Analysis of the scavenger trial indicates that during the Reporting Period, on average, 39.3% of trial carcasses were not removed by scavengers or through maintenance and site reclamation activities over the average search interval (**Table 3.2, Appendix B**). The proportion of carcasses not removed declined as the summer progressed from July (48.2%) through August (37.3%) to September (32.5%) (**Table 3.2, Appendix B**). These values were applied to assess bat and small bird mortality rates.

It is important to note that this correction factor value is only applicable to the Reporting Period, and should not be applied to any subsequent monitoring period, as it takes into account carcasses removed through the maintenance and site reclamation activities under WTGs. Additional scavenger trials will be undertaken during the next reporting period in accordance with the schedule outlined in the Follow-Up Plan.

The scavenger removal rate of raptor and vulture carcasses is expected to be less than for that of bats and smaller birds. Based on the preliminary results of a scavenger trial conducted on Wolfe Island using three Red-tailed Hawk and three Turkey Vulture carcasses in January 2010 (Stantec, in prep.), approximately 94.0% of raptor and vulture carcasses were not removed by scavengers over the average search interval (n=17). Although just one Red-tailed Hawk carcass was moved by scavengers during the trial, it was refound within the search radius on February 16, 2010.

3.1.1.3 Percent Area Searched

The average proportion of the 50 m radius search area that was physically searched during the summer period was 57.3% at WTGs and 16.9% at MET towers. During the fall period, the average proportion was higher: 85.5% at WTGs and 65.8% at MET towers. This reflected a larger minimally-vegetated area in the fall as crops were removed and natural vegetation died back. These values were applied to assess bat and small bird mortality rates.

Ps for raptors and vultures was assumed to be 100%. The large size of raptors and vultures meant that carcasses were visible in vegetation that would obscure smaller birds or bats, and the longer persistence times of the large carcasses meant that carcasses would be present over several weeks, through changing vegetation or standing water conditions, greatly increasing the likelihood of detection.

3.1.2 Direct Effects - Birds

Raw mortality data for the Reporting Period is provided in **Appendix E**.

An Avian and Bat Observation Form is available on the Project website to receive comments from the public regarding bird and bat observations related to wind plant operations. No comments were received from the public during the Reporting Period.

A total of 100 carcasses of 33 bird species were collected during the Reporting Period. A summary is presented in **Table 3.3 (Appendix B)**. All native species have provincial S-Ranks of S5 (i.e., Secure – common, widespread and abundant in Ontario) or S4 (i.e., Apparently Secure – uncommon but not rare). Three species (i.e., domestic pigeon, European Starling, House Finch) are not native to Ontario and have provincial S-Ranks of SNA (i.e., Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities). Three bird carcasses were not identifiable to genus or species, given their advanced state of decomposition.

Seven of the species have been identified as species of conservation priority by Ontario Partners in Flight (2006). Based on the observation dates, five were likely breeding within or near the EcoPower® Centre: American Kestrel (one on each of July 1 and August 31), Black-billed Cuckoo (one on July 14), Eastern Kingbird (one on each of July 28 and August 17), Bank Swallow (one on August 17), and Bobolink (eight fatalities between July 27 and September 10). Two of the species, Savannah Sparrow (one on September 10) and Northern Flicker (one on October 8), were likely struck during migration (although both were recorded as breeding during pre-construction monitoring on Wolfe Island as well). American Kestrel and Bobolink are discussed further below.

Over the Reporting Period, a total of 28 Tree Swallow fatalities were recorded at 22 different WTGs. Together with Bank Swallow (one fatality), Barn Swallow (two fatalities), and Purple Martin (seven fatalities), swallows and martins represented 38 (38%) of the 100 recorded bird fatalities during the course of the Reporting Period. Two WTGs were each responsible for three swallow/martin fatalities: T17 (three Tree Swallows) and T51 (one Tree Swallow, one Bank Swallow and one Purple Martin). Five turbines were each responsible for two swallow/martin fatalities: T29, T30, T57, T59, and T77. There is no apparent clustering of swallow/martin fatalities, although T29 and T30 are located adjacent to each other in the southwestern portion of the EcoPower® Centre.

Tree Swallow fatalities were observed between July 2 and September 7. Sixteen of 28 (57%) Tree Swallow fatalities were juvenile birds. Adult fatalities were split evenly between the months of July and August, whereas the majority of juvenile fatalities occurred in July. Five of seven (71%) of Purple Martin fatalities were juvenile birds and occurred between mid-August and the first week of September.

Eight Bobolink fatalities were recorded; seven were detected between July 27 and August 27, with the eighth occurrence on September 10. At this time of the year, young Bobolinks have left the nest and have joined mobile flocks of fledglings and adults that move about the breeding habitat (Martin and Gavin, 1995). Bobolinks were identified in the ERR as a species potentially at higher risk of collision with WTG blades due to their aerial courtship displays, which generally take place in May.

Five Mourning Dove fatalities were recorded during the Reporting Period. Four were recorded at T34; two were found on October 15 and one was found on each of October 26 and 29. The fifth Mourning Dove fatality was noted at T57 on September 23. In late September and October, migrating Mourning Doves are generally congregating into migratory flocks and moving southward, generally flying at low altitudes (Otis et al., 2008). However, migratory timing for Mourning Doves can be difficult to describe because of the overlap with overwintering individuals (Otis et al., 2008).

Twelve raptor and vulture fatalities were recorded over the course of this Reporting Period: six Turkey Vultures, three Red-tailed Hawks, two American Kestrels, and one Merlin. Based on the dates of recovery, two of the fatalities were likely of individuals breeding within or in the vicinity of the EcoPower® Centre (one American Kestrel on July 1 and one Red-tailed Hawk on July 14). The Merlin, the second American Kestrel and the vultures were presumed to be staging in or moving through the EcoPower® Centre during fall migration (two Turkey Vulture fatalities were recorded in mid-August, with the rest of the raptor and vulture fatalities occurring between August 31 and November 18). Based on the conclusions of the pre-construction fall raptor report (Stantec, 2008b), the remaining two Red-tailed Hawk fatalities (November 11 and November 17) were presumed to be wintering birds.

Bird fatalities were distributed quite uniformly through the summer period (July-September). Fewer fatalities were recorded in October and November, and only one fatality was noted in December (**Figure 3, Appendix A**). The highest number of bird fatalities over the course of the Reporting Period occurred at T34 (seven fatalities, including four Mourning Doves) and T29 (five fatalities), both of which are located in the southwestern portion of the EcoPower® Centre (**Figure 4, Appendix A**). Five WTGs, scattered throughout the study area, had four recorded fatalities each (T1, T17, T51, T57, T77).

Correcting seasonally for searcher efficiency, scavenger and other removal rates, and the percent area searched, the 12 raptor/vulture and 88 other bird carcasses recovered represent an estimated bird mortality rate for the Reporting Period of 6.99 birds/turbine (3.04 birds/MW) (**Table 3.4, Appendix B**). Bird mortality rates were much higher in summer (July through September) than in fall (October through December) (**Table 3.4, Appendix B**).

The 12 raptor/vulture carcasses recovered, when corrected for scavenger removal, represent an estimated total raptor/vulture mortality rate of 0.15 raptors and vultures/turbine (0.07 raptors and vultures/MW) for the Reporting Period (**Table 3.4, Appendix B**). Excluding vultures, the raptor mortality rate is 0.08 raptors/turbine (0.04 raptors/MW) for the Reporting Period.

Despite the large number of waterfowl staging and foraging in and surrounding the EcoPower® Centre, no waterfowl fatalities were observed during the Reporting Period.

3.1.3 Direct Effects - Bats

Raw mortality data for the Reporting Period is provided in **Appendix E**. An Incidental Avian and Bat Observation Form is available on the Project website to receive comments from the public regarding bird and bat observations related to wind plant operations. No comments were received from the public during the Reporting Period.

A total of 180 carcasses of five bat species were collected during the Reporting Period. A summary is provided in **Table 3.5 (Appendix B)**. The Little Brown Bat (13 fatalities) and Big Brown Bat (13 fatalities), comprising 14% of all bat fatalities, have provincial S-Ranks of S5 (i.e., Secure – common, widespread and abundant in Ontario). The Hoary Bat (54 fatalities), Eastern Red Bat (44 fatalities), and Silver-haired Bat (36 fatalities), comprising 74% of all bat fatalities, are ranked S4 (i.e., Apparently Secure – uncommon, but not rare) and are classified as long-distance migratory tree bats. Twenty bat carcasses (11%) could not be identified to species, given their advanced state of decomposition, desiccation, or condition of the carcass.

The majority of bat mortality occurred between the end of July and mid-September, peaking during late August (**Figure 3, Appendix A**). The highest number of bat fatalities over the course of the Reporting Period occurred at T70 (eight fatalities). Four WTGs had six recorded fatalities each (T15, T27, T37, T47) and five WTGs had five recorded fatalities each (T36, T41, T50, T74, T79) (**Figure 4, Appendix A**). Three of the WTGs with higher numbers of recorded fatalities (i.e., T36, T37, T41) are located in the most southerly portion of the EcoPower® Centre. The other WTGs are scattered throughout the EcoPower® Centre. None of the WTGs with higher numbers of recorded bat fatalities were observed to have high numbers of bird fatalities.

Correcting for searcher efficiency, scavenger and other removal rates, and percent area searched, the 180 recovered carcasses represent an estimated total bat mortality rate for the Reporting Period of 14.77 bats/turbine (6.42 bats/MW) (**Table 3.6, Appendix B**).

In an effort to correlate bat mortality to wind speed, wind speed data for the Reporting Period was downloaded from the MET tower in the northwest portion of the EcoPower® Centre. Wind speed is recorded at 10 minute intervals and these data were summarized to obtain a mean wind speed for each twelve hour period from 18:00 to 06:00. Wind speeds recorded at a height of 78 m were used to correspond to wind speeds in the blade sweep area. Mean wind speed was calculated over the twelve hour period from 18:00 the night before until 06:00 the day of each carcass search. For example, mean wind speed for August 18 was calculated from 18:00 August 17 to 06:00 August 18. **Figure 5, Appendix A** compares bat mortality to mean wind speed. When considering the results depicted in **Figure 5**, it is important to consider the lag period over the search interval. If, for example, higher mortality occurred across the EcoPower® Centre on a single low wind night, detection of the carcasses would be spread out over the search interval (three to six days).

3.2 DISTURBANCE EFFECTS MONITORING

3.2.1 Foraging Waterfowl Surveys

In total, eight species of waterfowl were observed foraging inland during the fall 2009 post-construction monitoring; all species were either geese and dabbling ducks. Canada Goose was the most abundant species, representing 95% of all observations. Mallard represented 4% of all observations with only very small numbers of the remaining six species (Cackling Goose, Snow Goose, Brant, American Black Duck, Northern Pintail, Green-winged Teal) observed. Species composition in 2009, dominated by Canada Goose, was very similar to that observed during the 2007 pre-construction monitoring. **Table 3.8, Appendix B** compares the species composition in 2007 and 2009.

The number of waterfowl days at inland foraging areas in fall 2007 and fall 2009 are shown in **Figure 6, Appendix A**. Overall, the total number of waterfowl days was significantly higher in 2009, totaling 311,774, compared to 117,838 waterfowl days in the fall of 2007. This increase appears to be attributed largely to an increase in the number of Canada Goose observations. It also may be attributable to a later freeze-up, which resulted in one more survey in 2009 (when surveys ended on December 23) than in 2007 (when surveys ended on December 17). If the December 23, 2009 survey results are excluded from the 2009 analysis, the number of waterfowl days in 2009 was 292,069, which still represents substantially larger numbers of foraging waterfowl than in 2007.

In the fall of 2009, areas of highest waterfowl concentrations occurred at the south end of Wolfe Island in an area bordered by Concession 5, Stevenson Rd and Ridge Rd. Scattered fields with high Canada Geese concentrations were also recorded in the east end of the study area, surrounding Bayfield Bay, and across the north end of the study area. When comparing 2007 to 2009 results, the areas of waterfowl concentration were generally similar with some localized shifting (e.g., using different fields within the same concession). However, the high concentrations of geese in scattered field across the east and north portions of the study area in 2009 were not observed in 2007.

Crop preferences in the fall of 2007 and 2009 were similar, with the majority of observations in soy or corn stubble. Hay and pasture were generally not as important to foraging waterfowl during the fall season (**Table 3.9, Appendix B**). Fields used as the primary inland foraging areas were often different between weekly visits. It is presumed that waterfowl foraging inland moved about in response to changing foraging opportunities, hunting pressures, and field management, for example, moving away from a previously productive foraging site as the food was depleted by the flock, or after the field was tilled.

3.2.2 Overland Waterfowl Movement Surveys

Summaries of the fall 2009 morning and evening waterfowl movement surveys are provided in **Tables 3.10** and **3.11 (Appendix B)**, respectively. **Figures 7.0 and 8.0 (Appendix A)** compares the major routes used by waterfowl in fall during the 2007 pre-construction and 2009 post-construction monitoring. Generally, major movement routes were similar in 2007 and 2009. All major routes were associated with the primary offshore staging areas, namely Reed's Bay, Pyke's Bay, Button Bay, Bayfield Bay and the small inlet off Carpenter's Point Rd. Slight changes in routes between 2007 and 2009 were likely attributable to changes in foraging fields. Routes used by waterfowl were typically similar during morning and evening movement, with the directions reversed. Morning movement of diving ducks from Button Bay to Bayfield Bay, in a route over the St. Lawrence River then crossing Carpenter's Point, was observed in both 2007 and 2009. During the morning surveys, a modest amount of movement into the survey area from the north was observed in 2009, but not in 2007.

Generally, waterfowl observed during the 2009 post-construction monitoring flew between WTGs. In many instances, flocks of Canada Geese appeared to alter their course to avoid WTGs. In most cases, these were minor adjustments to avoid individual WTGs. On occasion, a flock of Canada Geese was observed to alter their route up to 500m to avoid a cluster of WTGs.

Canada Geese represented the majority of movement observations in both 2007 and 2009, representing 82% and 84% of observations respectively. Dabblers represented 13% and 9% and diving ducks 2% and 7% in 2007 and 2009, respectively. Other species observed during the two years, including Common Merganser, Snow Goose and Tundra Swan, represented a very small number of observations.

The results of the 2009 fall waterfowl movement monitoring indicate that the majority of waterfowl moving between bays and inland foraging areas flew at WTG blade sweep height. Of the 77,227 observations during morning and evening movement monitoring, 64,867 (84%) were observed at blade sweep height for at least a portion of their flight. Wind speed appeared to be a significant factor influencing flight height, with flights below blade sweep height often occurring during high wind conditions.

3.2.3 Aerial Waterfowl Surveys

Waterfowl data collected during fall 2008 and fall 2009 aerial surveys were grouped into guilds and waterfowl days were calculated for each sector. There was a 6% increase in total waterfowl days from 2008 (2,234,702) to 2009 (2,360,965). For comparison, the data provided by CWS from aerial surveys conducted in the fall of 1999 were analyzed using the same approach. **Appendix F** presents the waterfowl days by guild for each sector for fall 1999, 2008 and 2009. The waterfowl days by guild for each major staging area (i.e., Bayfield Bay, Button Bay, Pyke's Bay and Reed's Bay) for fall 2008 and 2009 are also provided in **Appendix F**; data specific to each major staging area were not collected by CWS in 1999.

Table 3.12, Appendix B, compares the number of waterfowl days in each sector in 1999, 2008 and 2009, inclusive of major staging areas. The total waterfowl days were very similar among the three years, with a 6% increase between 2008 and 2009. The largest increases in abundance were noted in Sectors 7 and 8, along the north side of Wolfe Island. Bay ducks represent the largest component of this increase in Sectors 7 and 8, with smaller increases observed in geese, goldeneye and merganser guilds. The southeastern portion of the island, including Bayfield Bay, (Sector 9) experienced a moderate increase in waterfowl from 2008 to 2009, attributed mostly to an increase in bay ducks. Sector 11, along the east end of Wolfe Island saw very little change in waterfowl days from 2008 to 2009. Sector 10, along the southern portion of the island was the only sector to experience a decline in waterfowl abundance between 2008 and 2009. The decline in Sector 10 was mostly attributable to a decrease in bay duck observations, although numbers in all guilds were generally less abundant in this sector.

Table 3.13, Appendix B, compares the waterfowl days in each of the major staging areas in 2008 and 2009. Of the major staging areas, Reed's Bay experienced the largest increase in waterfowl days, attributed mostly to an increase in the number of geese with smaller increases in bay ducks and mergansers. Bayfield Bay experienced an increase in waterfowl days in 2009, attributed to high bay duck numbers. Pyke's Bay saw a modest increase from 2008 to 2009, predominantly attributable to geese. Button Bay experienced a decrease in waterfowl days from 2008 to 2009. Although all guilds experienced a slight decrease, lower numbers of bay ducks account for the majority of Button Bay's lower waterfowl days. It is evident that the decrease in Button Bay was responsible for the overall decrease in waterfowl days observed in Sector 10.

Table 3.14, Appendix B, compares the waterfowl days for each guild in 1999, 2008 and 2009. The swan guild showed an increasing trend through the three years. Tundra Swan was the predominant species in this guild. Geese and large dabblers were relatively consistent from 2008 to 2009, but were down from 1999 observations. Small dabblers saw a large decrease in waterfowl days from 2008 to 2009. However, small dabblers in 2009 were similar to 1999 numbers. Overall, bay ducks showed an increase from 2008 to 2009, with waterfowl days up in Sectors 7, 8 and 9, which more than offset the decrease observed in Sector 10. Waterfowl days for sea ducks experienced a large spike in 2009, which can be attributed to a single flock of 227 birds observed on October 26, 2009. Waterfowl days for goldeneye and merganser guilds decreased from 2008 to 2009. The most significant decrease for mergansers was observed in Sector 10, which includes Button Bay. Goldeneye numbers were down in Sectors 7, 10 and 11 in 2009 compared to 2008.

3.2.4 Winter Raptor Surveys

Wolfe Island has been identified as a significant wintering area for a variety of species of raptors and owls. Results of the pre-construction winter raptor monitoring, which was conducted from November 2006 to March 2007, showed that some species can become abundant during winter months, including one Species at Risk, the Short-eared Owl. In order to provide an assessment of disturbance effects to wintering raptors and owls, a late afternoon survey was conducted for raptors and an early evening survey (from just before sunset to dusk) was conducted for Short-eared Owls.

A complete summary of raptors and owls recorded during each survey in November and December 2009 is provided in **Tables 3.15 and 3.16 (Appendix B)**. Northern Harrier (19 observations) was the most abundant raptor observed during the afternoon surveys, followed by American Kestrel (13 observations) and Snowy Owl (12 observations). Short-eared Owl (15 observations) was one of the more abundant species during the early evening surveys. Maximum numbers observed during any one survey in 2009 for each species were eight Snowy Owls (December 22), 15 Short-eared Owls (December 22), one Bald Eagle (December 23), eight Northern Harriers (December 23), five Red-tailed Hawks (December 8), two Rough-legged Hawks (December 8 and December 23), four American Kestrels (November 25) and two Merlins (November 25).

Average raptor density, calculated as the number of raptors per kilometer of survey across the study area, was highest on December 23, 2009 (0.4 raptors per kilometer and 0.3 Short-eared Owls per kilometer). The highest numbers of Snowy Owls, Short-eared Owls and Northern Harriers were all recorded on this date. Raptor observations were generally spread throughout the study area.

As with the results of the 2006-2007 pre-construction raptor surveys, areas of particularly high raptor and Short-eared Owl density (defined as more than five raptors per kilometer or more than three owls per kilometer in the pre-construction wintering raptor report) were mapped. No specific areas of high raptor density, as defined above, were observed during the November-December 2009 survey period. Areas of high owl density, as defined above, are shown in **Figure 9.0, Appendix A**. Generally, higher concentrations of Short-eared Owl activity were most commonly observed centrally within the study area, between Conc. 7 Rd, Ridge Rd, Conc. 5 Rd and Baseline Rd. A concentration was also observed near the south end of Conc. 9 Rd on December 22, 2009.

For comparison, results from November and December 2006, pre-construction winter raptor monitoring are also provided in **Table 3.15, Appendix B**. Raptor numbers in 2009 were generally lower than those in 2006. Overall, the average density of raptors during the afternoon surveys in November and December 2006 and 2009 were 0.8 and 0.2 raptors per kilometer respectively. The average density of Short-eared Owls during the early evening surveys for November and December 2006 and 2009 were 0.2 and 0.1 owls per kilometer respectively.

Looking at individual species, the greatest differences between 2006 and 2009 were observed in Northern Harriers (87 versus 19 observations), Red-tailed Hawks (43 versus 10 observations) and Rough-legged Hawks (34 versus 5 observations). Snowy Owl (6 versus 12 observations) and Merlin (0 versus 3 observations) were the only two species that showed an increase in observations in 2009.

Numbers of wintering raptors and owls are known to vary significantly from year to year, based on prey conditions in their northern breeding and southern wintering areas. Results from across Ontario in 2009, as reported in surveys conducted at other sites (Stantec, unpublished; Environment Canada, pers. comm.) and on the OntBirds listserve, indicate that the number of wintering raptors and owls in 2009-2010 are generally lower than average. **Table 3.17, Appendix B** summarizes the result of the Kingston Christmas Bird Count ("CBC") from 2000 to 2009, and demonstrates annual fluctuations in wintering raptor numbers in the Kingston area. The results are presented as number of birds observed per party hour. The CBC data suggests that 2006 was peak year for many raptor species with high numbers of Northern Harriers, Red-tailed Hawks, Short-eared Owls and Rough-legged Hawks.

3.3 NOTIFICATIONS

Section 3.2 of the Follow-up Plan outlines mortality and disturbance thresholds which trigger contact with Environment Canada / Canadian Wildlife Service, the Ontario Ministry of Natural Resources, and Natural Resources Canada. There were seven notifications filed during the Reporting Period (**Table 3.7, Appendix B**), all related to mortality of bats or raptors and vultures.

Through the initial months of the Reporting Period, it was determined that the May 2009 Follow-up Plan lacked clarity regarding the thresholds for high annual mortality rates for birds and bats. The nature of the correction factors applied to obtain the fatality thresholds in the May 2009 Follow-up Plan (65 bird fatalities or 49 bat fatalities over a consecutive three-week period) was unclear. During the initial months of the Reporting Period, Stantec mistakenly applied additional correction factors specific to Wolfe Island to the thresholds listed in the May 2009 Follow-up Plan, and compared to them the field findings, resulting in notifications to agencies when fatality levels were lower than the threshold. These invalid notifications are also listed in **Table 3.7 (Appendix B)**, although they were subsequently withdrawn. The revised February 2010 Follow-up Plan has clarified the notification thresholds for high annual mortality rates for birds and bats, and has provided for changes to site-specific correction factors.

Notifications and the agency responses are provided in **Appendix G**.

3.3.1 High Annual Mortality Rates – Raptors and Vultures

The threshold for high annual mortality rates – raptors as outlined in the Follow-up Plan is two raptor or vulture fatalities noted over a six-week period. Five of the seven notifications were related to raptor and vulture fatalities, and were submitted on July 17, August 18, September 8, November 10 and November 23, 2009 (**Table 3.7, Appendix B**). Each notification involved two raptor or vulture fatalities over periods of varying length, but less than six weeks (**Table 3.7, Appendix B**). The November 10, 2009 notification for high annual mortality rates – raptors was amended on November 11 to include one additional raptor fatality observed on November 11.

3.3.2 High Annual Mortality Rates – Bats

The threshold for high annual mortality rates – bats as outlined in the May 2009 Follow-up Plan was 49 bat fatalities noted over a consecutive three-week period. Two of the seven notifications were related to bat fatalities, and were submitted on August 18 (57 bat fatalities) and August 28 (61 bat fatalities, 2009 (**Table 3.7, Appendix B**).

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4.0 Discussion and Recommendations

4.1 DIRECT EFFECTS – MORTALITY

4.1.1 Birds

A review of avian mortality rates from 14 wind power facilities across North America with modern turbines was conducted by Arnett et al. (2007). Results from these facilities were based upon standardized mortality monitoring using a systematic survey process for a minimum of one year and incorporating scavenging and searcher efficiency bias corrections. These studies yielded avian mortality rates ranging from 0.95 to 11.67 birds per MW per year. At the two sites located in the eastern U.S., bird mortality rates ranged from 2.69 birds per MW per year (Mountaineer, WV) to 11.67 birds per MW per year (Buffalo Mountain, TN) (Arnett et al., 2007). Bird mortality at the nearby Maple Ridge, NY facility ranged from 3.44 to 3.82 birds per MW per year (Jain et al., 2007), while the results of four recent six-month studies in New York (Noble Bliss, Noble Ellenburg, Noble Clinton) yielded bird mortality rates ranging from 0.50 to 2.86 birds per MW per year (Jain et al., 2009).

The mortality rate for the six-month Reporting Period at the EcoPower® Centre, at 3.04 birds per MW, is consistent with the results in nearby New York and other studies summarized by Arnett et al. (2007). The Reporting Period (July-December) covered slightly different seasons than the other studies (in New York, late April to mid-October or November). Direct comparison of mortality at the EcoPower® Centre and the other facilities will be possible following a full year of field studies in 2010.

The raptor mortality rate, excluding vultures, of 0.04 raptors per MW is in the middle of the mortality range observed at other facilities in North America (0 – 0.09 raptors per MW; Arnett et al., 2007) and is consistent with rates observed elsewhere in Ontario (Stantec, unpublished data). It is well below the threshold for notification of 0.09 raptors per MW, which is the highest rate of raptor mortality recorded in North American, outside California, at the Stateline, Oregon facility (Arnett et al., 2007). The majority of the raptor and vulture fatalities appeared to be individuals migrating through the study area.

Tree Swallows, other swallows and Purple Martins comprised 38% of the recorded fatalities. Although Tree Swallows and Barn Swallows were identified as having an elevated risk of collision in the ERR based on their observed flight heights, they were not identified as one of the main species at risk of collision overall. Large numbers of Tree Swallows congregate on Wolfe Island during the summer, prior to fall migration. The combination of large numbers of Tree Swallows and their behaviour (aerial foraging within the blade swept zone) resulted in 28 recorded fatalities. This number is small relative to the estimated 10,000 Tree Swallows reported to use the site in the IBA Site Summary for Wolfe Island (IBA Canada, undated) and the estimated Ontario population of 400,000 (Cadman et al., 2007).

Bobolinks, which have been identified as a species of conservation priority by Ontario Partners in Flight (2006), were identified as having an elevated risk of collision in the ERR due to their aerial flight displays. Eight Bobolink fatalities were recorded, which is small relative to the estimated 1,000-1,500 that were observed in the study area during pre-construction surveys (approximately 1,050 counted during area searches, plus others observed during point counts; Stantec, 2008a) and the estimated Ontario population of 800,000 (Cadman et al., 2007). Six other species of conservation priority were on the list of fatalities, however, only one or two fatalities of each were recorded. This level of mortality is not considered to be a concern at the population level for these six species.

4.1.2 Bats

Arnett et al. (2007) summarized the bat mortality rates from 22 wind facilities in North America where recent standardized mortality monitoring was conducted using a systematic survey process for a minimum of one year and incorporating scavenging and searcher efficiency corrections. The bat mortality rates ranged from 0.3 to 53.3 bats per MW per year. Of the seven sites located in the eastern U.S., the bat mortality rates ranged from 14.9 to 53.3 bats per MW, while the results of four recent six-month studies in New York (Noble Bliss, Noble Ellenburg, Noble Clinton) yielded bat mortality rates ranging from 2.50 to 11.23 bats per MW (Jain et al., 2009).

The 2009 mortality rate at the EcoPower® Centre, at 6.42 bats per MW, is at the low end of the range reported in North America and is considerably lower than the range reported in the eastern U.S. by Arnett et al. (2007). The bat mortality rate at the EcoPower® Centre is at the midpoint of the range in nearby New York and is roughly 30-40% lower than the mortality measured at Maple Ridge, NY (9.42-11.23 bats/MW; Jain et al., 2007). The Reporting Period covered the entire fall period of concern, and so a comparison between sites is valid.

Johnson (2004, as cited by Ontario Ministry of Natural Resources, 2006) indicated that over 90% of bat fatalities at wind plants occur between mid-July and the end of September. In 2009, the peak of bat mortality occurred at the EcoPower® Centre in the late August. Long-distance migratory tree bats comprised 74% of identified fatalities.

4.2 INDIRECT EFFECTS – DISTURBANCE

4.2.1 Migratory Waterfowl

Results of the inland foraging surveys indicate an increase in waterfowl abundance in 2009, over 2007. Canada Goose observations constituted the majority of this increase. The area of highest Canada Goose concentration was in the southern portion of the study area, between Pyke's Bay and Button Bay. Numbers of geese observed in this area were relatively similar between 2007 and 2009. The increase in Canada Goose abundance in 2009 appears to be attributed to larger flocks observed in the eastern and northern portions of the study area, in the vicinity of Bayfield Bay and the Lower Gap.

There is no evidence to suggest that changes in waterfowl abundance over the two year period would be attributed to changes of the conditions on the island. The increase in Canada Goose abundance between 2007 pre and 2009 post-construction monitoring was likely the result of natural variability.

Within the general areas of higher waterfowl concentrations, it was noted that the waterfowl often chose to forage in different, but adjacent, fields when comparing 2007 and 2009. Although waterfowl were not observed directly adjacent to wind turbines (i.e., within 100m) during the post-construction monitoring, flocks were often foraging in the vicinity of (i.e., within 500m) and between strings of turbines. This result suggests the proximity to wind turbines is not an important factor to the foraging field selection of waterfowl. Factors that are likely to have more significant influences on foraging field selection would include foraging opportunities, hunting pressure and field management.

Route selection during waterfowl morning and evening movement was very similar during fall 2007 and fall 2009. The major movement routes occurred in and out of the primary off-shore staging areas for geese and dabblers, including Reed's Bay, Pyke's Bay, Button Bay, Bayfield Bay and the small inlet off Carpenter's Point Rd. Waterfowl did not appear to adjust their flight height in reaction to the WTGs, with the majority of ducks and geese flying at blade sweep height. Flight height did, however appear to be affected by wind conditions, with lower flight heights being more prevalent during periods of stronger winds. However, the waterfowl did appear to adjust their flight route to avoid flying in close proximity to turbines. In many cases, obvious avoidance behavior was observed, as flocks of waterfowl adjusted their flight course as they approached a turbine.

The total numbers of waterfowl days were very similar in 1999, 2008 and 2009. The 6% increase between 2008 and 2009 is not significant relative to natural variability and the uncertainty related to sampling on this scale. Despite the consistent overall totals, the distribution of waterfowl between the five Wolfe Island sectors fluctuated between years. Specifically, Sectors 7 and 8 (north shore of Wolfe Island) both experienced a general increasing trend from 1999, 2008 to 2009. Sector 9 (including Bayfield Bay) experienced a decrease in abundance from 1999 to 2008 with numbers increasing again in 2009. Sector 10 (south shore, including Button Bay and Pyke's Bay) showed a large increase from 1999 to 2008, followed by a drop in 2009. Sector 11 (west shore, including Reed's Bay) had very similar abundance in 2008 and 2009, but was down from 1999 numbers. Overall, the data suggest similar numbers of waterfowl were staging in the bays surrounding Wolfe Island in 1999, 2008 and 2009, with variable distribution between sectors.

When comparing only 2008 to 2009, Sector 10 (south shore) was the only sector to experience a decline in abundance. This decrease in Sector 10 is almost completely attributable to a decrease in waterfowl use of Button Bay; specifically a decrease in bay ducks, which accounted for a 45% decline in total waterfowl days for Button Bay. However, this decline of bay ducks in Button Bay was more than offset by the increase observed in Bayfield Bay. Evidence from morning movement surveys (both pre- and post-construction) suggest that large flocks of bay ducks make daily movements between Button Bay and Bayfield Bay. If Button and Bayfield are considered as a single feature supporting staging bay ducks, a 22% collective increase in bay duck use was observed between 2008 and 2009. In all years, the Button Bay / Bayfield Bay complex appears to be the most important area for staging bay ducks.

Tundra Swans experienced a notable increase from 1999 to 2008 to 2009. Sector 10 (south shore), including Carpenter's Point and Button Bay, and Sector 9, including Bayfield Bay, appear to be the most important staging areas for swans. The Ontario Breeding Bird Atlas (Cadman et al., 2007) suggests this species has experienced a significant increase in Hudson Bay Lowlands breeding population (67% increase in probability of observation) since the first atlas period (1981-1985). An increased breeding population likely explains the increase in staging migrants from 1999 to 2008. However, the difference in abundance between 2008 and 2009 is more likely due to natural fluctuations than population trends.

Canada Geese and large dabbling numbers were down in Button Bay in 2009 from 2008. Generally lower numbers in Button Bay were accounted for by larger numbers in Sectors 7 and 11, which include the north and west shores. The aerial surveys did not record the large increases in goose abundance between 2008 and 2009 that was observed during the inland foraging surveys. It is possible that off-shore aerial surveys would underestimate geese, as they would not detect geese foraging inland in agricultural fields.

The small dabbling guild showed a notable decline between 2008 and 2009. This can largely be attributed to a decrease in the number of American Wigeons in Bayfield Bay. The decrease in the number of American Wigeons is likely a result of natural or population factors, as the numbers of other small dabblers were relatively unaffected. Dabblers (large and small combined) experienced a 25% decrease. The apparent spike in sea duck abundance appears to be a manifestation of the waterfowl days calculation and can be attributed to a single flock of 227 birds on October 26, 2009. Decreases in goldeneye and merganser were a general trend through all sectors, but the largest decrease was in Button Bay. The decrease in goldeneye and mergansers can likely be attributed to natural fluctuations in staging abundance; staging numbers of the goldeneye guild in particular are known to fluctuate widely among years (K. Ross, pers. comm., 2010).

4.2.2 Wintering Raptors

Annual numbers of most overwintering raptors are dependent upon the number of meadow voles, the populations of which vary in a cyclical fashion. The density of raptors overwintering on Wolfe Island may be dependant upon the meadow vole population on the island itself and/or vole populations further north that will influence the extent of raptor migration.

Christmas Bird Count (“CBC”) results (**Table 3.17, Appendix B**), which include observations throughout the Kingston count circle, generally correlate to the differences observed in the 2006 pre-construction and 2009 post-construction monitoring on Wolfe Island. The CBC indicates that December 2006 represented a peak year for many species, specifically Northern Harrier and Red-tailed Hawk. Higher than average numbers of Short-eared Owls and Rough-legged Hawks were also recorded in 2006. Each of these species was less common during the 2009 CBC. However, the CBC showed a slight increase in Snowy Owls between 2006 and 2009 and large increase in Bald Eagles.

Overall, the results of the 2009 post-construction winter raptor monitoring indicate that raptors continued to utilize the study area. Differences in raptor density observed within the study area between 2006 and 2009 are reflective of observations throughout the Kingston area and across southern Ontario. These differences observed between the pre- and post-construction monitoring are likely attributed to natural variation.

Due to the overall low raptor density in 2009, areas of particularly high raptor density (more than five raptors per kilometer) were not observed. Areas of particularly high Short-eared Owl density (three or more owls per kilometer) were observed and shown in **Figure 9.0, Appendix A**. These areas were all located in close proximity to Short-eared Owl concentrations observed in 2006. Additional areas of Short-eared Owl concentrations along Conc. 2 Rd and Conc. 3 Rd in 2006 were not observed in 2009. A more thorough discussion of raptor behavior, including an analysis of the complete season (November through March), will be provided in the subsequent Monitoring Report No. 3.

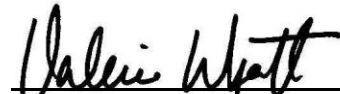
4.3 RECOMMENDATIONS

Mortality and disturbance effects monitoring should proceed in 2010 according to the February 2010 Follow-up Plan.

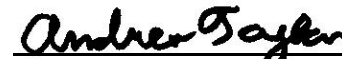
With respect to the mortality monitoring, it is recommended that the alternating once-weekly/twice-weekly carcass search schedule for each turbine, as implemented thus far, be changed. Currently the average search interval at any given turbine varies from three to six days, and introduces some imprecision into the establishment of the correction factor for scavenger removal, which is expressed as the percentage of carcasses removed over the average search interval.

It also makes it very difficult to correlate fatalities with weather conditions. In order to reduce uncertainty surrounding this correction factor, and ultimately the corrected mortality rates, it is suggested that all the WTGs in the EcoPower® Centre be split into two treatments. One treatment, consisting of 43 WTGs located throughout the study area should be the subject of once-weekly carcass searches, the other (remaining 43 WTGs) should be searched twice-weekly. Mortality rates would be calculated separately for the two different treatments (similar to Jain et al., 2007, 2009). Based on 2009 observations of large carcass visibility and persistence, we believe weekly surveys for the first group of WTGs will be sufficient to identify mortality of raptors and vultures.

STANTEC CONSULTING LTD.



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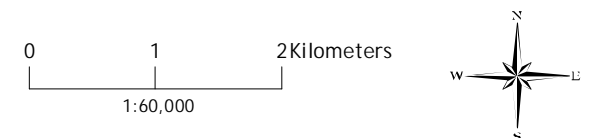
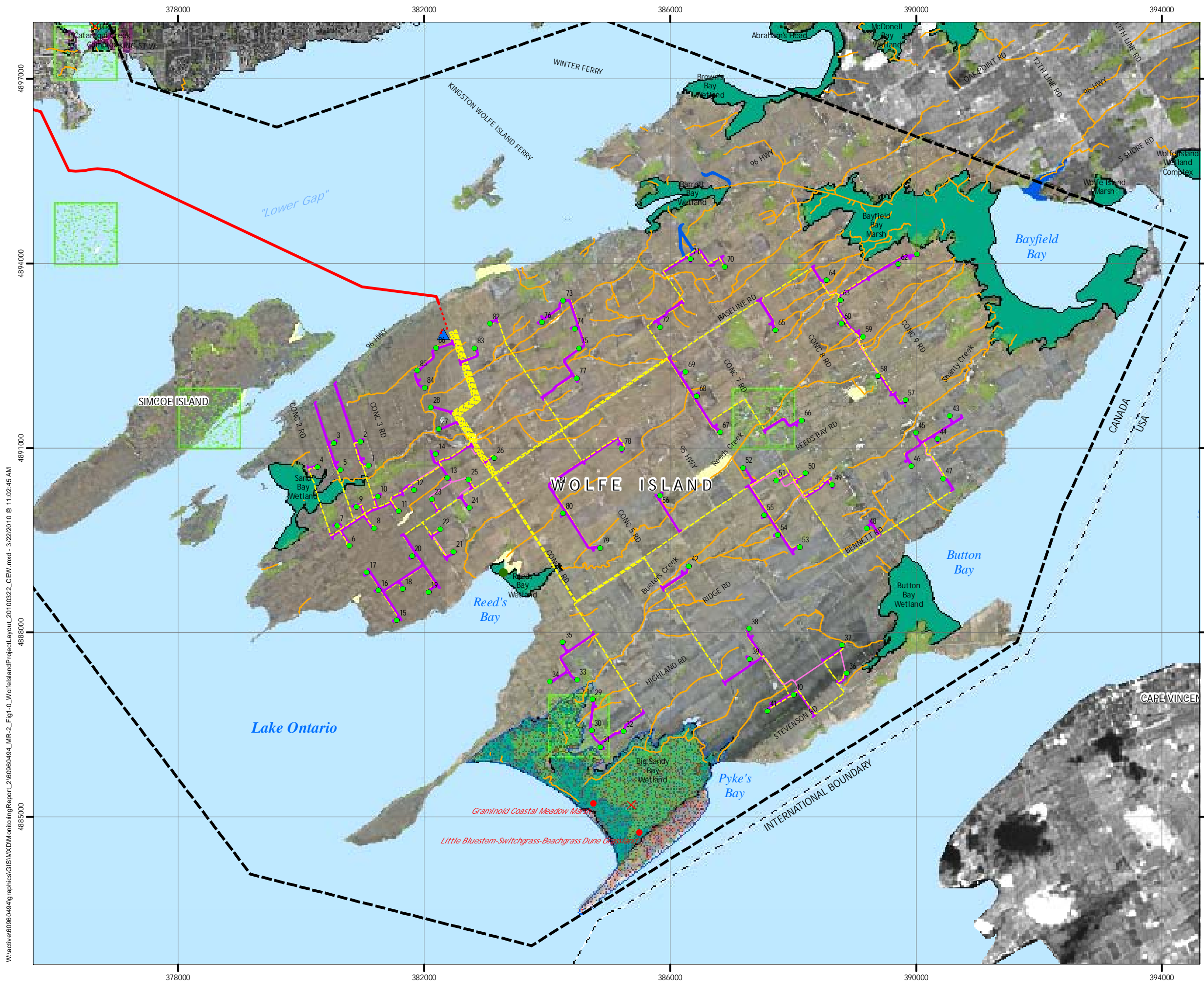
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Appendix A

Figures



Legend

- Study Area
- Gardiners Transformer Station
- Turbine Layout
- 230 kV Submarine Cable
- 230 kV Transmission Line - Underground
- Access Roads
- 34.5 kV Collector Lines
- 230 kV Substation / Operation & Maintenance Building
- Temporary Road
- Crane Walk Path

Area of Natural or Scientific Interest (ANSI)

- Earth
- Life

Wetlands

- Provincially Significant Wetland
- Non-Provincially Significant Wetland
- Unevaluated Wetland

Other Natural Areas

- Earth Science Site
- International Biological Program Site
- Life Science Site
- Vegetation Communities
- Warm Water Streams
- Cataraqui Region Conservation Authority Lands
- Rare Species Occurrence
- Woodlot

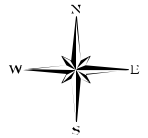
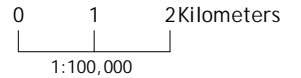
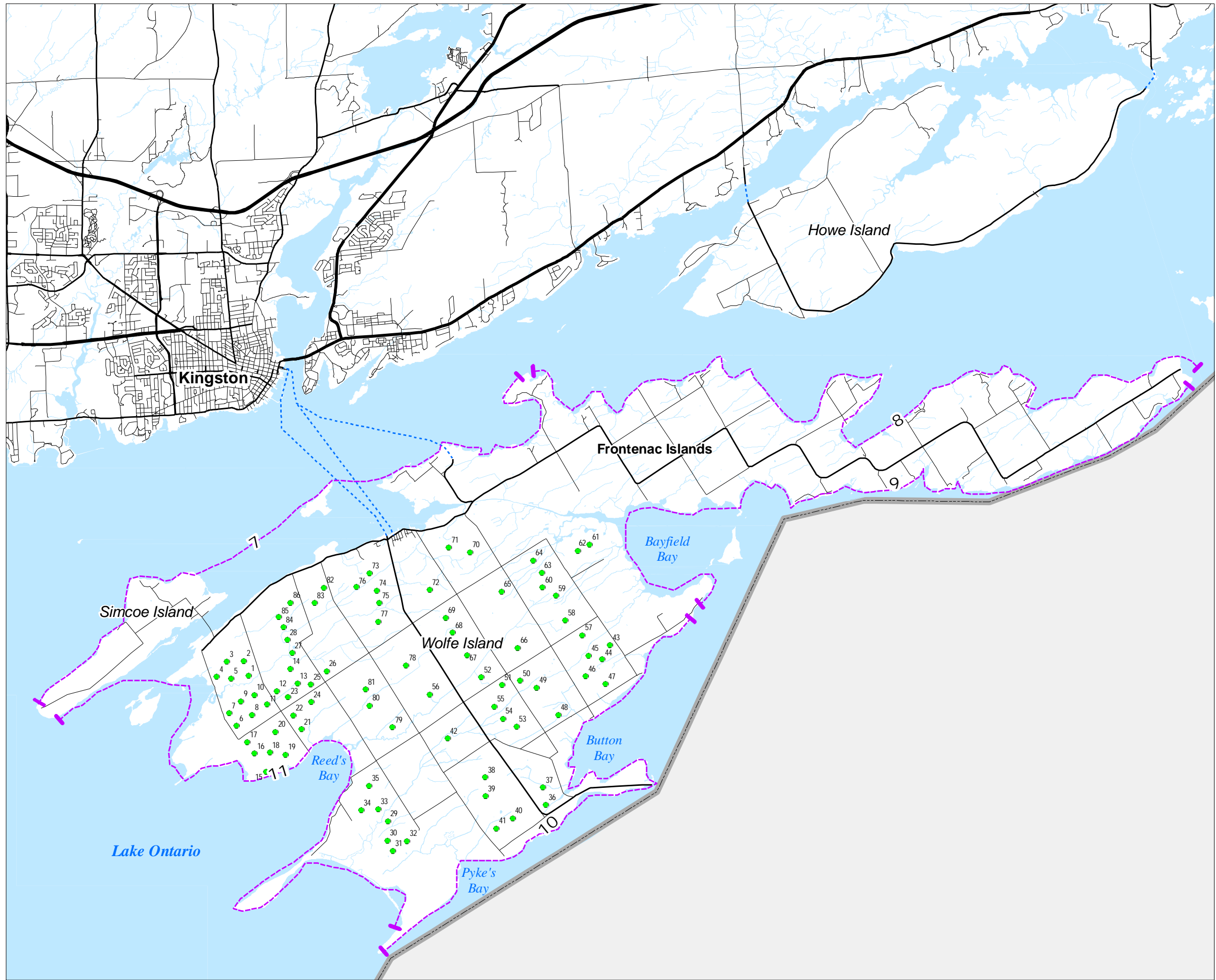
Notes

- Coordinate System: UTM NAD 83 - Zone 18 (N).
- Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009.
- Image Sources: © LIDAR (study area coverage), January 2006; © LANDSAT7 (U.S. coverage), 1999; © City of Kingston (city coverage), 2005.

Natural environmental features and hydrological data is from the Ministry of Natural Resources Peterborough District NRVIS 2006 and the Cataraqui Region Conservation Authority, 2006.

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Legend

- Turbine Layout
- Expressway / Highway
- Primary Road
- Secondary Road
- Ferry
- International Boundary
- Watercourse
- Waterbody



Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009.

March 22, 2010
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Client/Project
WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 2

Figure No.
2.0

Title
**Wolfe Island Waterfowl
Survey Sectors**

Figure 3: Fatalities by Date

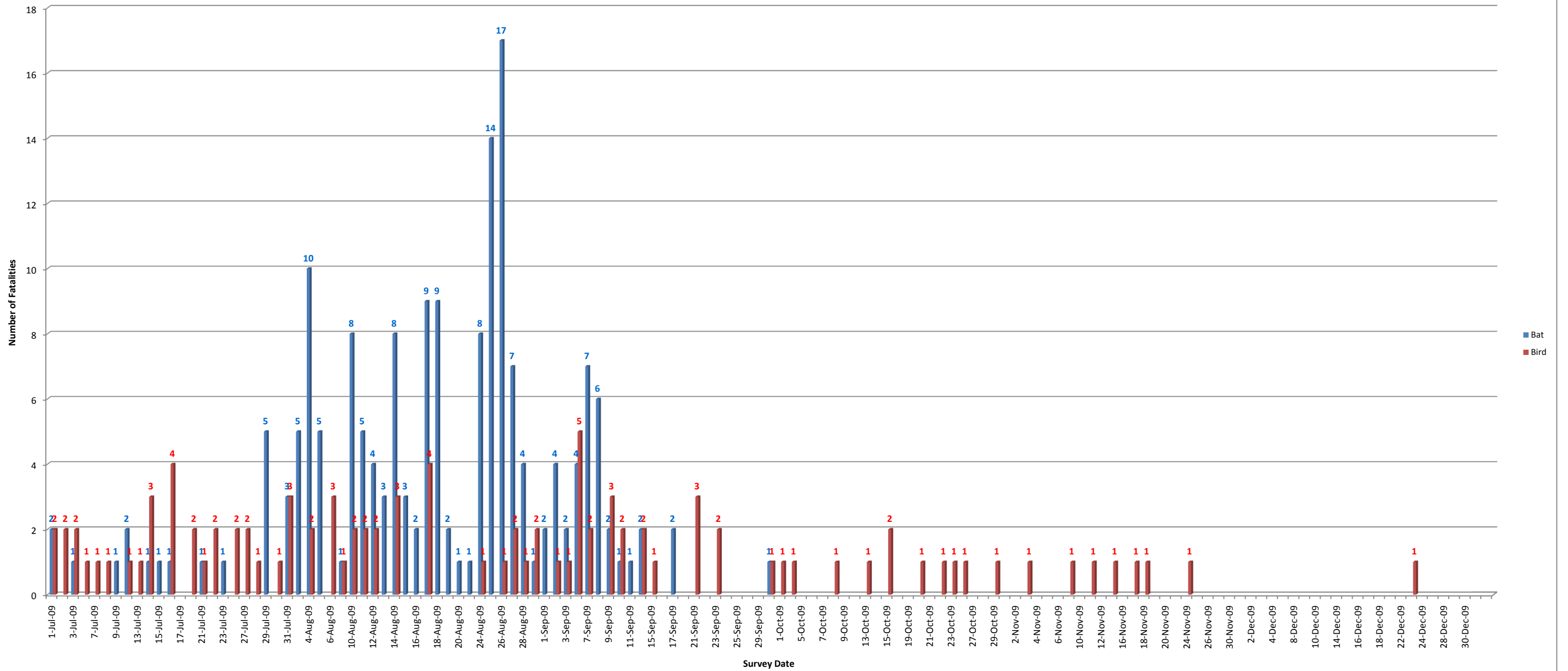


Figure 4: Fatalities at Each Turbine

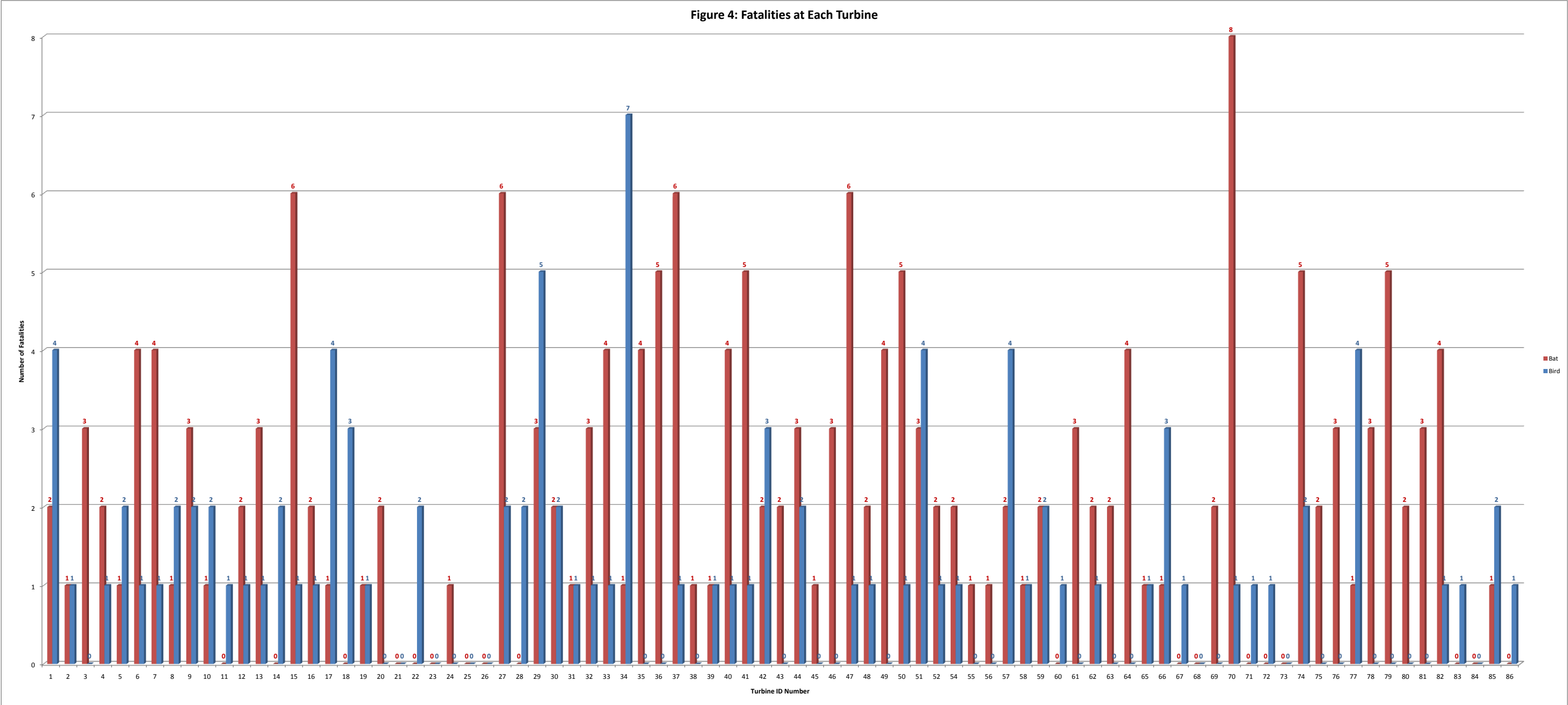
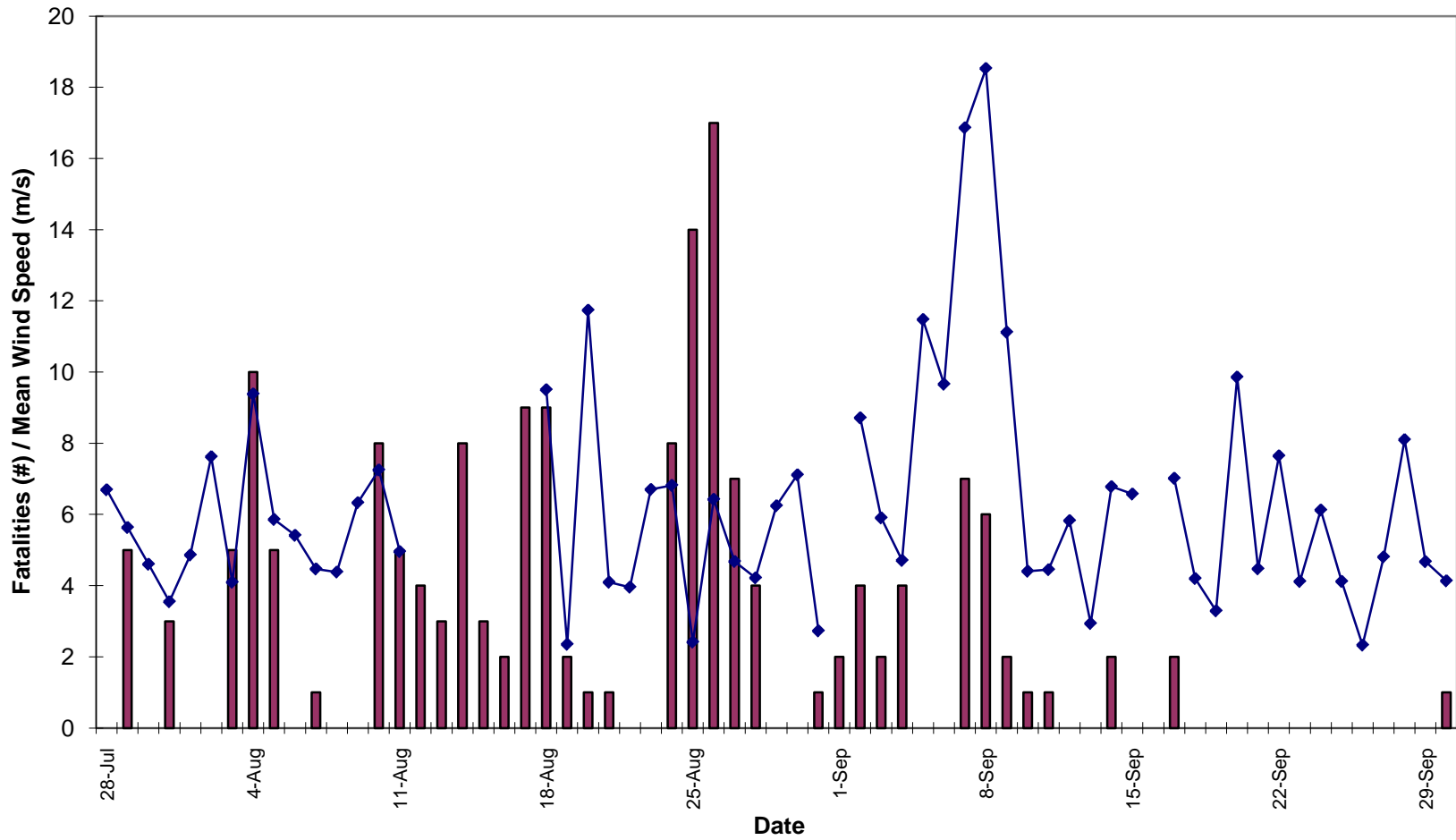
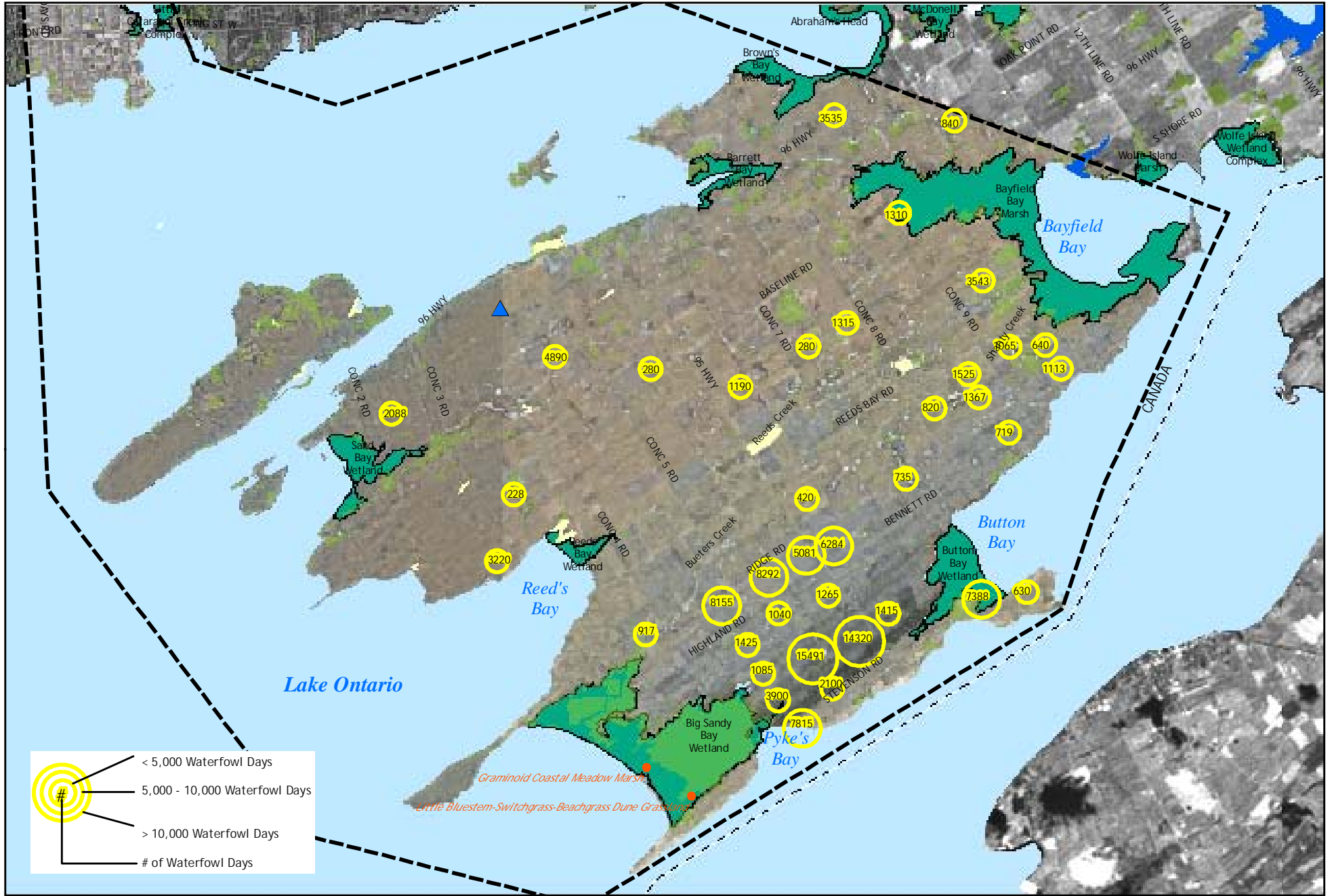


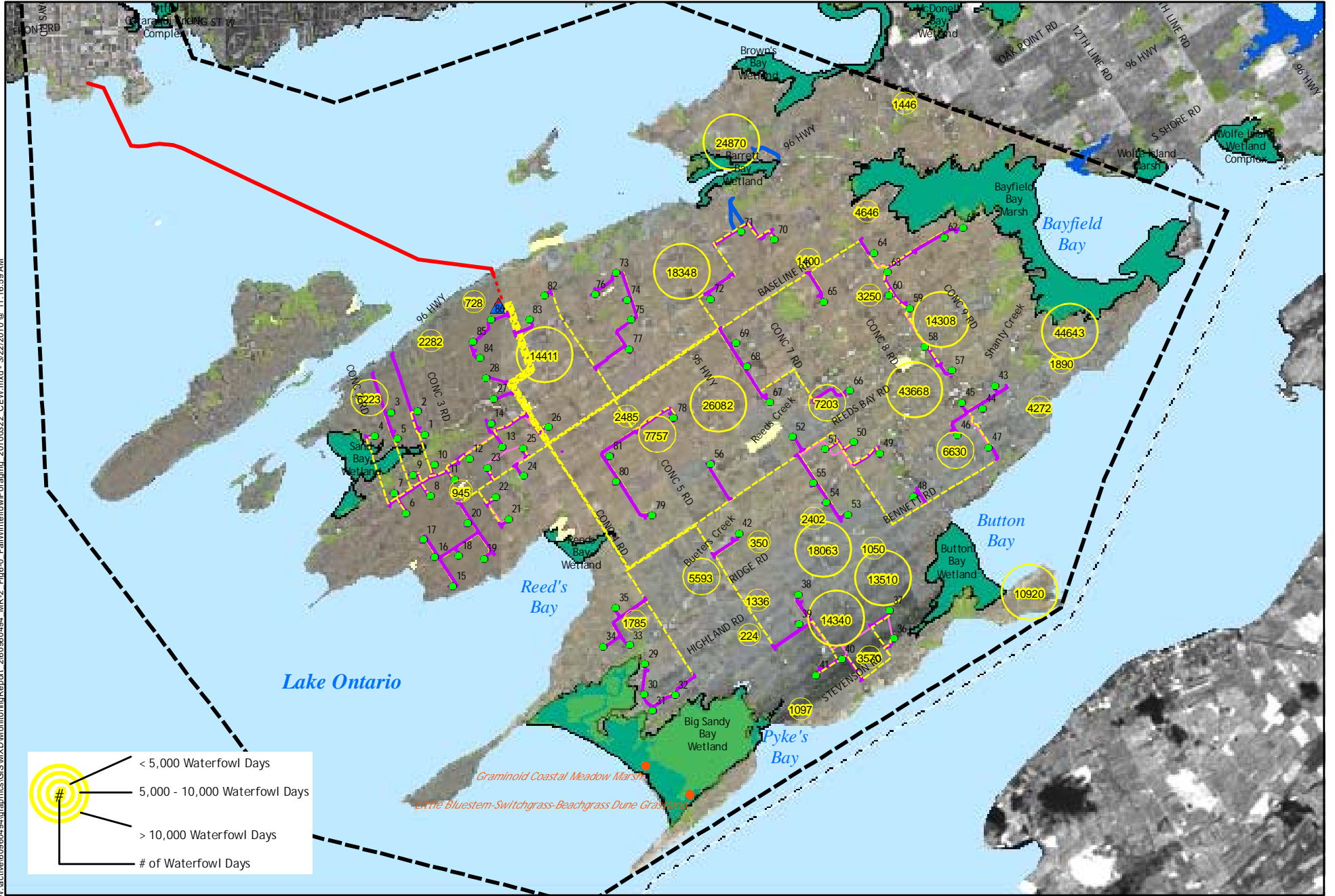
Figure 5. Comparison of bat fatalities (purple bars) and mean overnight wind speed in m/s (blue line) through the period of highest bat mortality



2007 Pre-Construction Results



2009 Post-Construction Results



Legend

- Study Area
- Gardiners Transformer Station
- Turbine Layout
- 230 kV Submarine Cable
- 230 kV Transmission Line - Underground
- Access Roads
- 34.5 kV Collector Lines
- ▲ 230 kV Substation / Operation & Maintenance Building

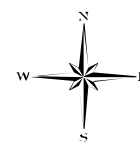
- Temporary Road
- Crane Walk Path
- Woodlot
- Provincially Significant Wetland
- Non-Provincially Significant Wetland
- Unevaluated Wetland

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009.
3. Image Sources: © LIDAR (study area coverage), January 2006; © LANDSAT7 (U.S. coverage), 1999; © City of Kingston (city coverage), 2005.

Natural environmental features and hydrological data is from the Ministry of Natural Resources Peterborough District NRVIS 2006 and the Cataraqui Region Conservation Authority, 2006.

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WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 2

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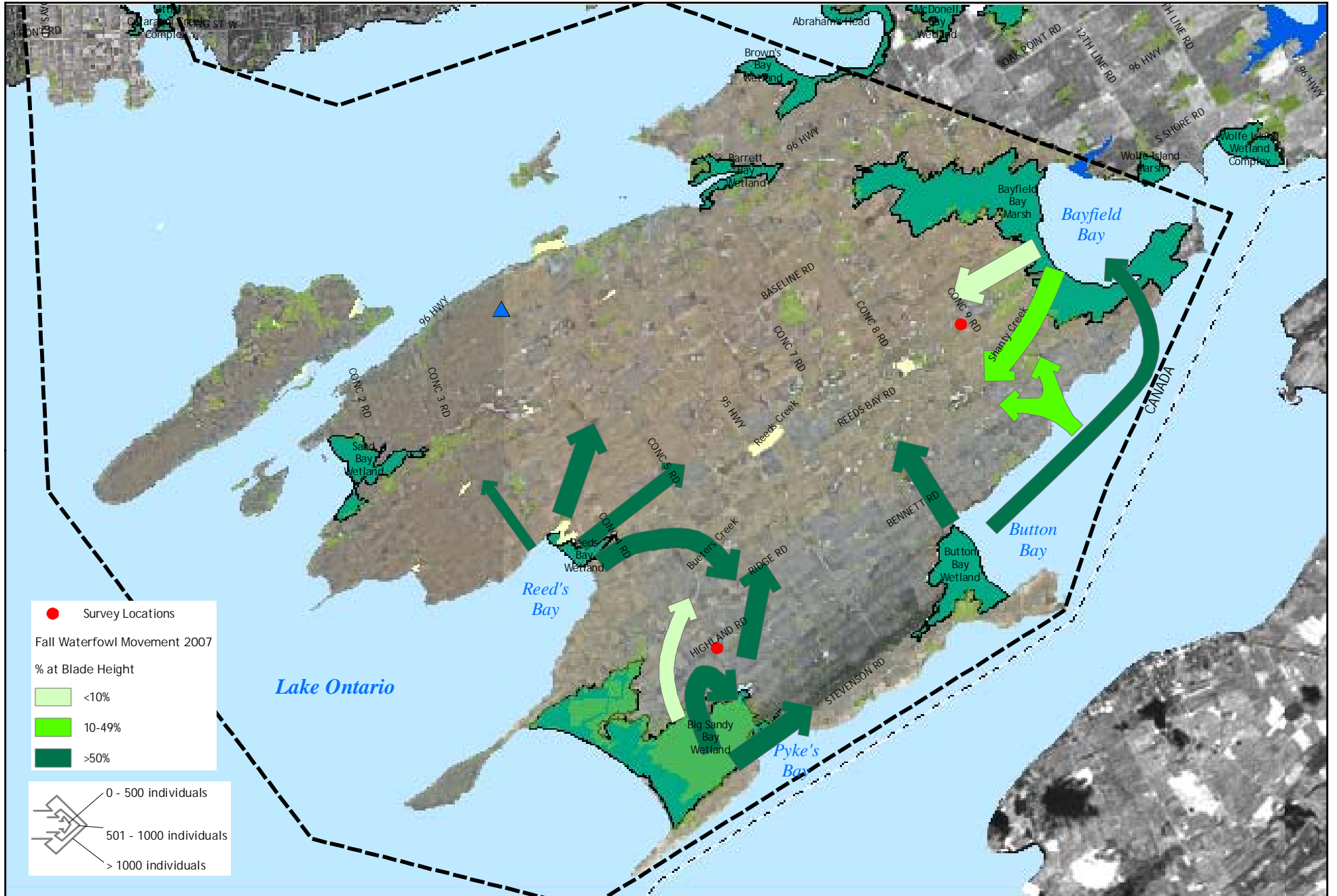
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Waterfowl Foraging
in 2007 and 2009**

March 22, 2010
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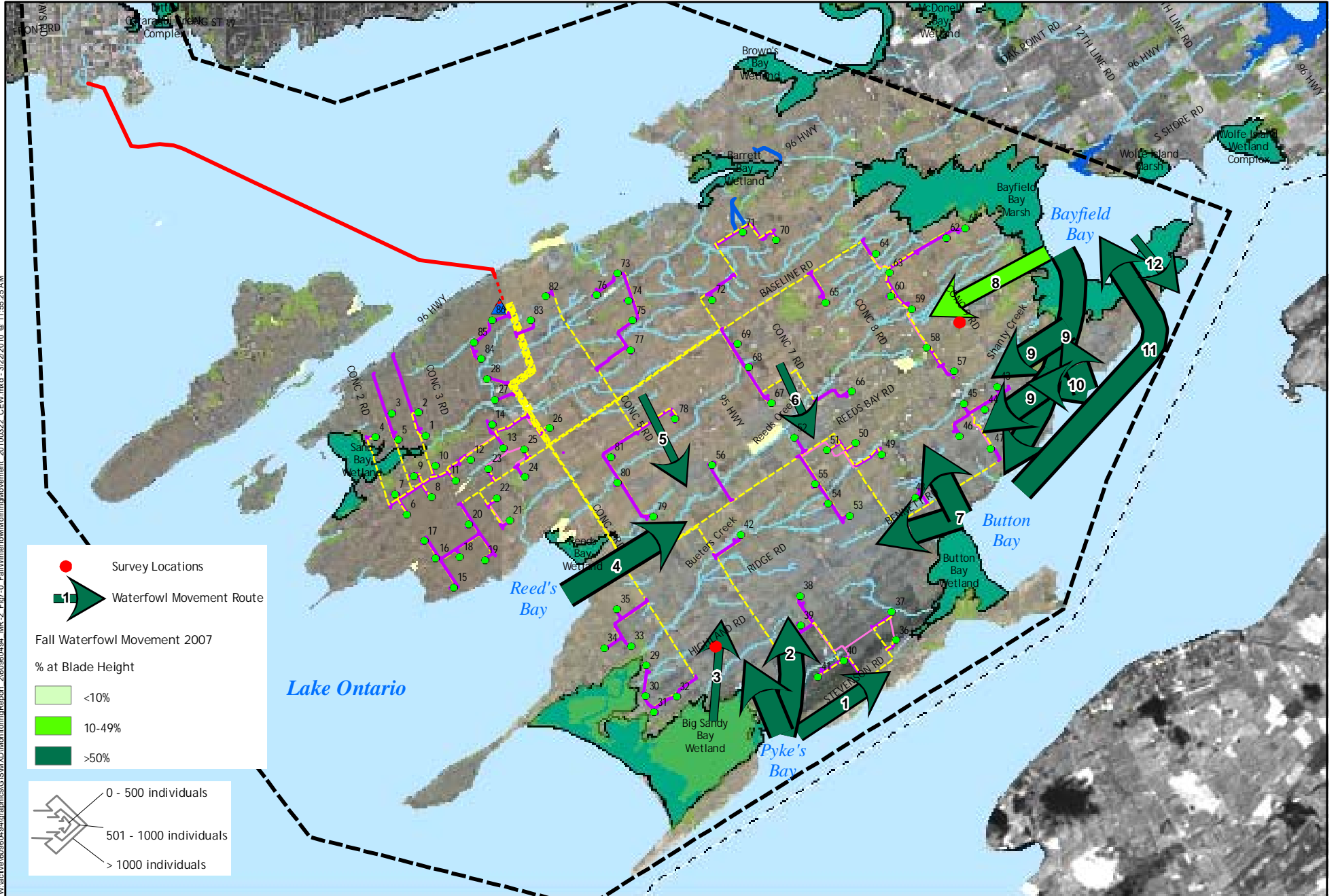
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2007 Pre-Construction Results



2009 Post-Construction Results



Legend

- Study Area
- Gardiners Transformer Station
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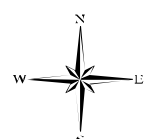
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Client/Project

WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 2

Figure No.

7.0

Title

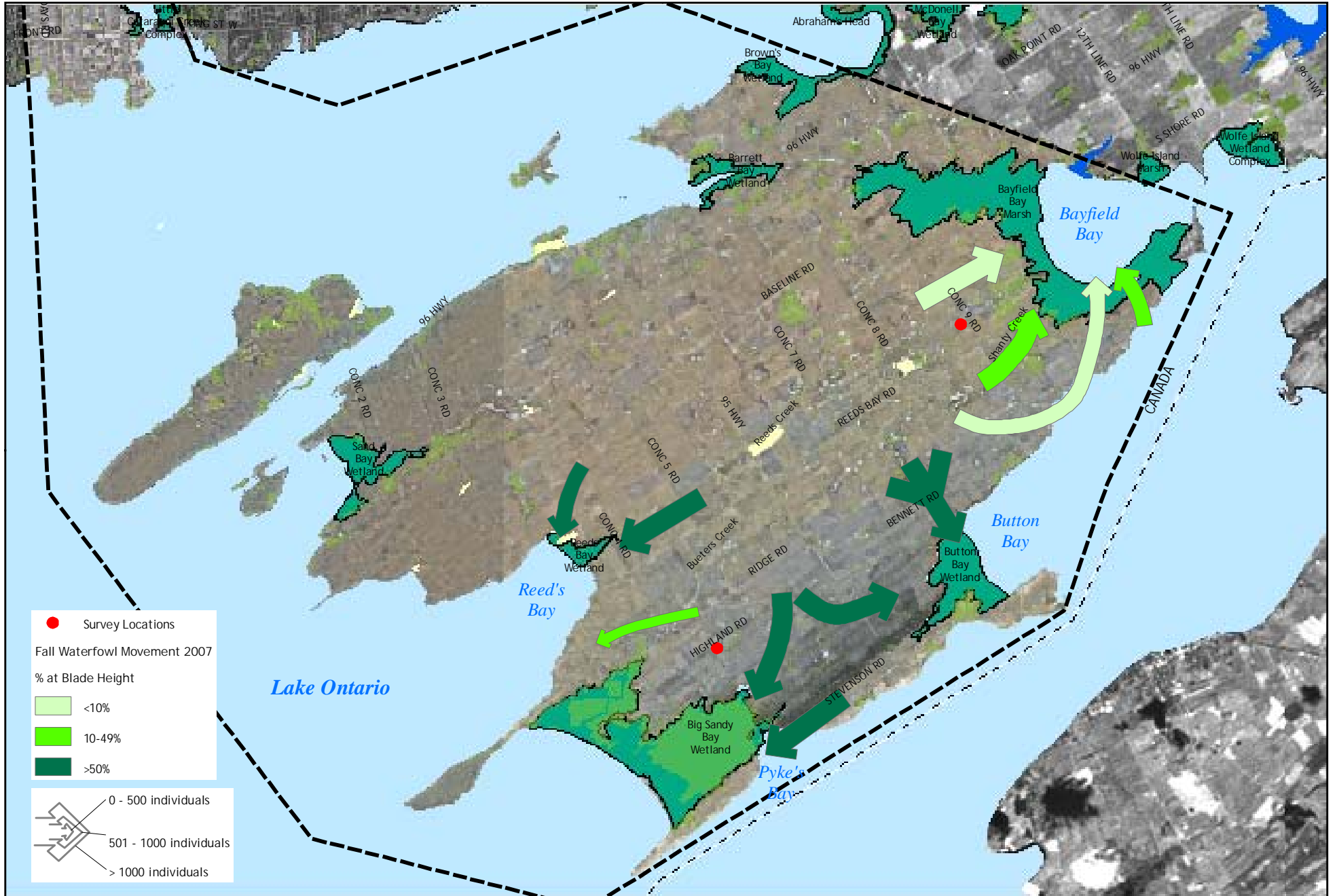
**Comparison of
Fall Waterfowl
Morning Movement
2007 and 2009**



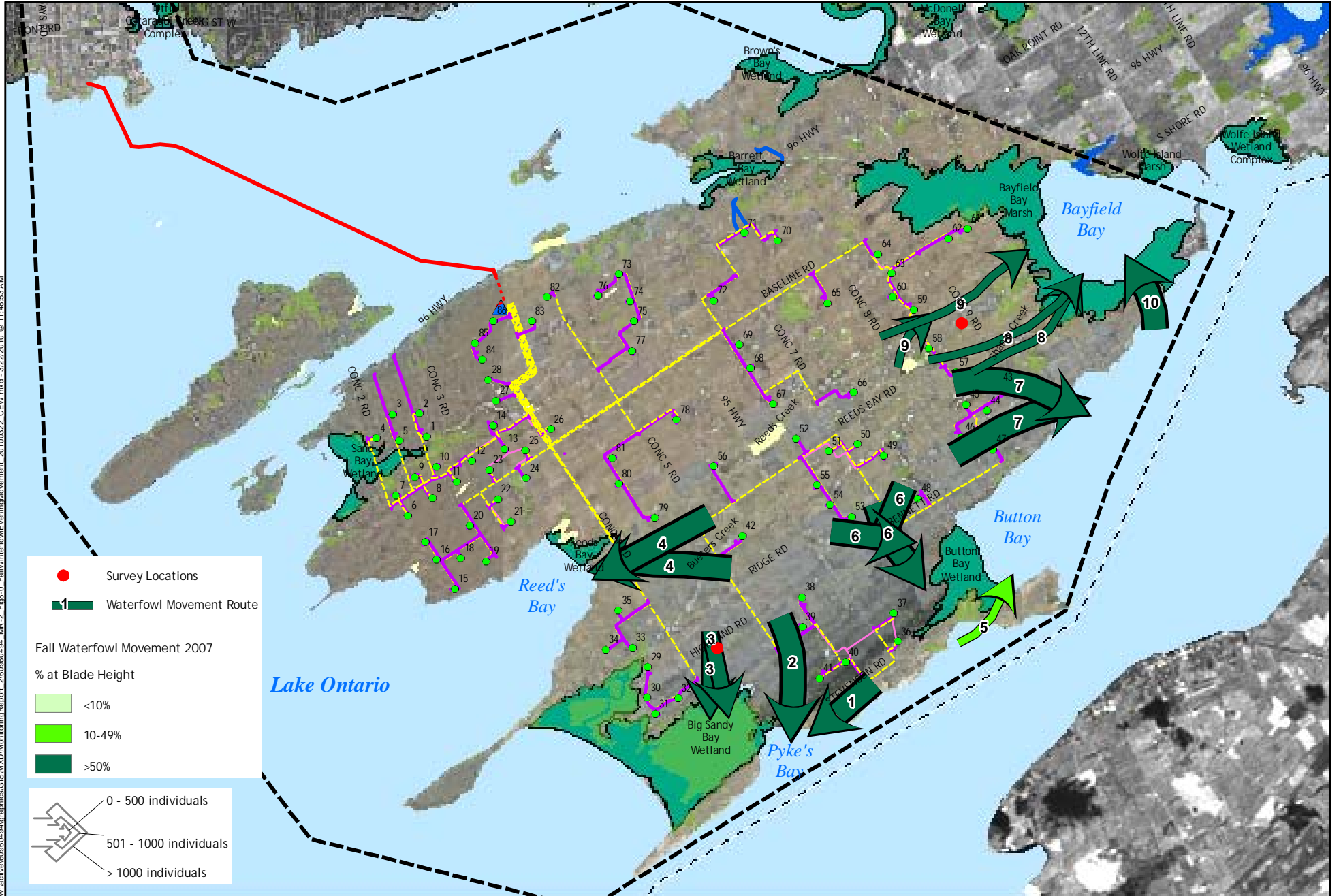
Stantec



2007 Pre-Construction Results



2009 Post-Construction Results



Legend

- Study Area
- Gardiners Transformer Station
- Turbine Layout
- 230 kV Submarine Cable
- 230 kV Transmission Line - Underground
- Access Roads
- 34.5 kV Collector Lines
- 230 kV Substation / Operation & Maintenance Building

- Temporary Road
- Crane Walk Path
- Woodlot
- Wetlands
- Provincially Significant Wetland
- Non-Provincially Significant Wetland
- Unevaluated Wetland

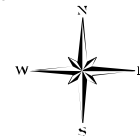
Notes

- Coordinate System: UTM NAD 83 - Zone 18 (N).
- Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009.
- Image Sources: © LIDAR (study area coverage), January 2006; © LANDSAT7 (U.S. coverage), 1999; © City of Kingston (city coverage), 2005.

Natural environmental features and hydrological data is from the Ministry of Natural Resources Peterborough District NRVIS 2006 and the Cataraqui Region Conservation Authority, 2006.

0 1 2 Kilometers

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WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 2

Figure No.

8.0

Title

**Comparison of
Fall Waterfowl
Evening Movement
2007 and 2009**

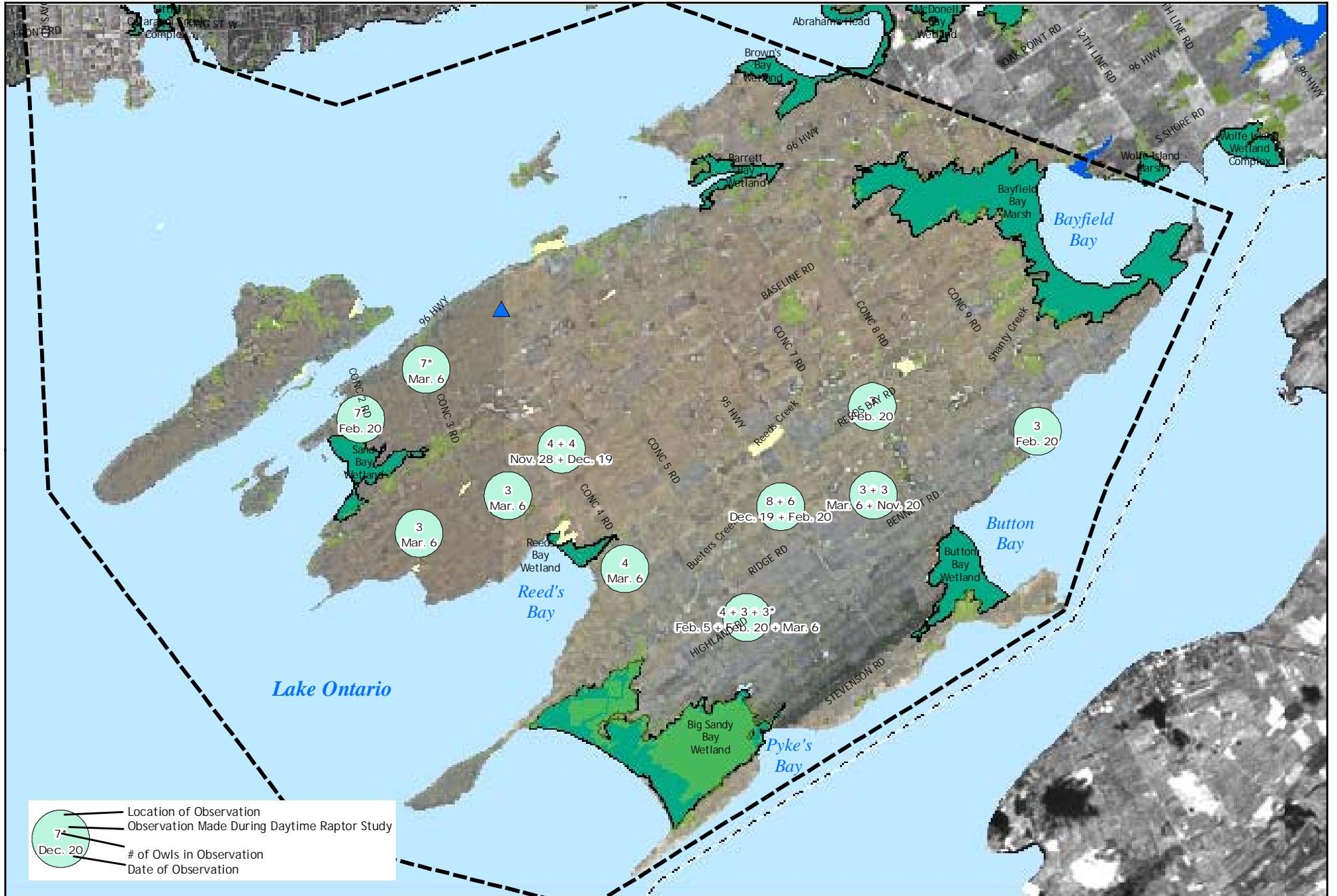
March 22, 2010
160960494



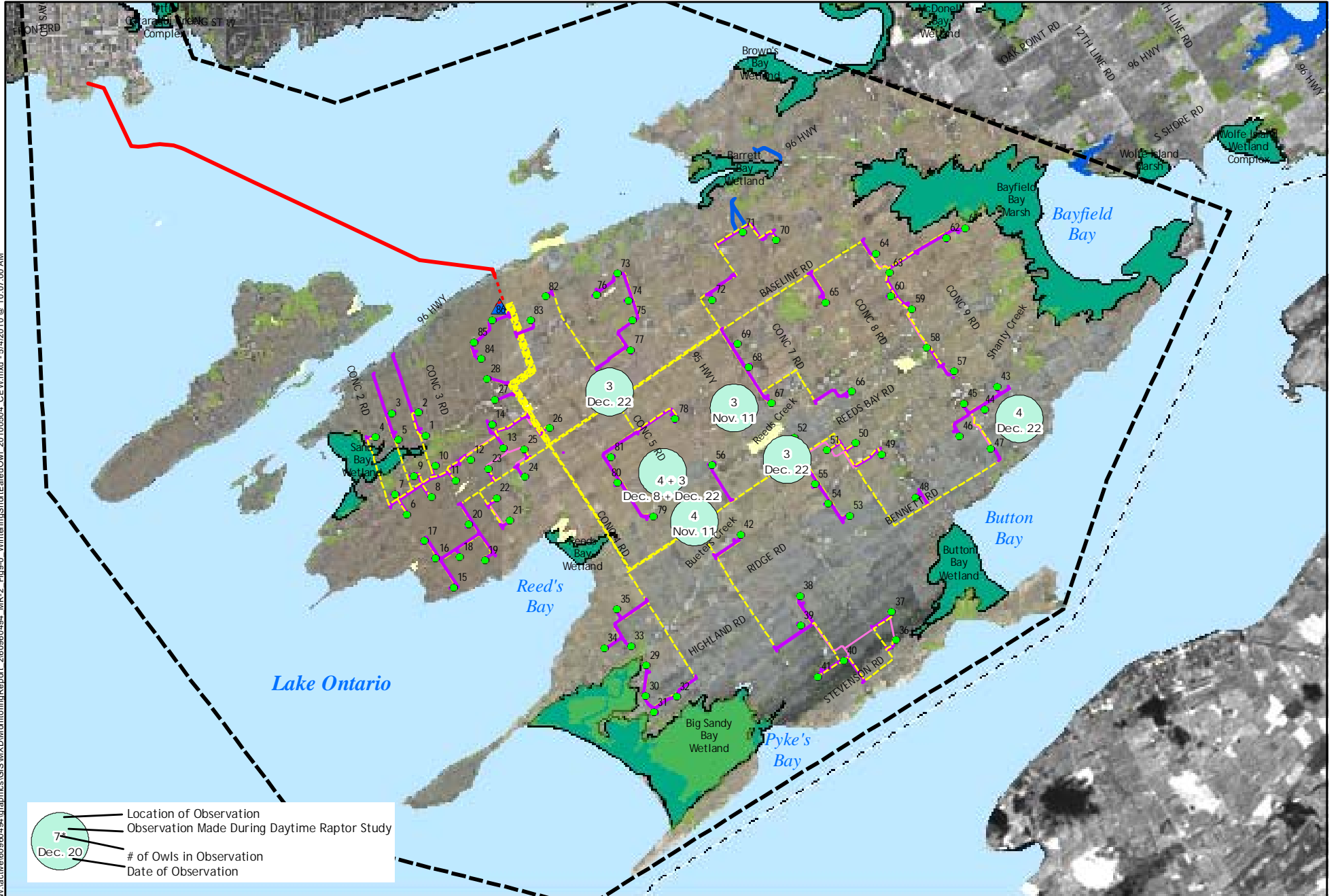
Stantec



2007 Pre-Construction Results



2009 Post-Construction Results



W:\active\60960494\images\GIS\MXD\Monitor\Share\Owl_20100504_CEW.mxd_5/14/2010 @ 10:07:00 AM

Legend

- Study Area
- Gardiners Transformer Station
- Turbine Layout
- 230 kV Submarine Cable
- 230 kV Transmission Line - Underground
- Access Roads
- 34.5 kV Collector Lines
- 230 kV Substation / Operation & Maintenance Building

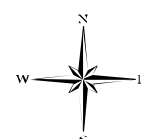
- Temporary Road
- Crane Walk Path
- Woodlot
- Wetlands
- Provincially Significant Wetland
- Non-Provincially Significant Wetland
- Unevaluated Wetland

Notes

- Coordinate System: UTM NAD 83 - Zone 18 (N).
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Natural environmental features and hydrological data is from the Ministry of Natural Resources Peterborough District NRVIS 2006 and the Cataraqui Region Conservation Authority, 2006.

0 1 2 Kilometers
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WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 2

Figure No.

9.0

Title

**Comparison of Wintering
Short-eared Owl
Concentrations
Nov-Dec 2007 and 2009**



Stantec



March 22, 2010
160960494

Appendix B

Tables

Table 2.1 Aerial Waterfowl Survey Sectors

Sector	Description
C7	Nine Mile Point to 10th Line near Brophy Point
C8	10th Line near Brophy Point to the tip of the island north of Port Metcalf
C9	Tip of the island north of Port Metcalf to Carpenter Point including Bayfield Bay
C10	Carpenter Point to Bear Point
C11	Bear Point to Nine Mile Point

Table 2.2 Species Composition of Waterfowl Guilds

Guild	Species
Swans	Tundra Swan (<i>Cygnus columbianus</i>), Trumpeter Swan (<i>Cygnus buccinator</i>), Mute Swan (<i>Cygnus olor</i>).
Geese	Snow Goose (<i>Anser caerulescens</i>), Brant (<i>Branta bernicula</i>), Canada Goose (<i>Branta Canadensis</i>)
Large Dabblers	American Black Duck (<i>Anas rubripes</i>), Mallard (<i>Anas platyrhynchos</i>), Northern Pintail (<i>Anas acuta</i>), Gadwall (<i>Anas strepera</i>)
Small Dabblers	Wood Duck (<i>Aix sponsa</i>), Green-winged Teal (<i>Anas crecca</i>), Blue-winged Teal (<i>Anas discors</i>), American Wigeon (<i>Anas Americana</i>), Northern Shoveler (<i>Anas clypeata</i>)
Bay Ducks	Canvasback (<i>Aythya valisineria</i>), Redhead (<i>Aythya americana</i>), Ring-necked Duck (<i>Aythya collaris</i>), Greater Scaup (<i>Aythya marila</i>), Lesser Scaup (<i>Aythya affinis</i>), Ruddy Duck (<i>Oxyura jamaicensis</i>)
Sea Ducks	Long-tailed Duck (<i>Clangula hyemalis</i>), Black Scoter (<i>Melanitta nigra</i>), Surf Scoter (<i>Melanitta perspicillata</i>), White-winged Scoter (<i>Melanitta fusca</i>), Common Eider (<i>Somateria mollissi</i>), King Eider (<i>Somateria spectabilis</i>)
Goldeneye	Bufflehead (<i>Bucephala albeola</i>), Common Goldeneye (<i>Bucephala clangula</i>)
Merganser	Hooded Merganser (<i>Lophodytes cucullatus</i>), Common Merganser (<i>Mergus merganser</i>), Red-breasted Merganser (<i>Mergus serrator</i>)

Table 3.1 Results of Searcher Efficiency Trials

Surveyor	number of carcasses placed	number of carcasses scavenged	number of carcasses found	Individual Se	number of turbine searches - Summer	Proportion of Turbine Searches - Summer	Weighted Se - Summer	number of turbine searches - Fall	Proportion of Turbine Searches - Fall	Weighted Se - Fall
1	20	0	14	0.700	526	0.326	0.228	446	0.282	0.197
2	20	0	11	0.550	722	0.448	0.246	654	0.413	0.227
3	20	1	13	0.684	365	0.226	0.155	484	0.306	0.209
					1613	1.000	0.629	1584	1.000	0.633

Table 3.2 Results of Scavenger Trials – Number of Carcasses Remaining Each Visit

July	Placed	Visit 1	Visit 2	Visit 3	Sc July
Number	121	87	12	7	0.481
August	Placed	Visit 1	Visit 2	Visit 3	Sc August
Number	82	40	4	3	0.373
September	Placed	Visit 1	Visit 2	Visit 3	Sc Sept
Number	80	35	2	1	0.325
AVERAGE					0.393

Table 3.3 Summary of Bird Fatalities, Reporting Period

Species	Number of Fatalities - Summer	Turbine Number	Number of Fatalities - Fall	Turbine Number
American Kestrel	2	28, 34		
American Robin	2	29, 51		
Bank Swallow	1	27		
Barn Swallow	2	51, 72		
Bird sp.	1	8	3	7,57,60
Black-billed Cuckoo	1	32		
Blue-headed Vireo			1	44
Bobolink	8	4, 9, 10, 14, 15, 19, 29, 77		
Brown Creeper			1	6
Brown-headed Cowbird	2	1, 22	1	83
<i>Calidris</i> sp.	1	18		
Cedar Waxwing	2	5, 37		
Chestnut-sided Warbler	1	66		
Domestic Pigeon	1	40		
Eastern Kingbird	2	29, 34		
European Starling	2	66, 85		
Golden-crowned Kinglet			1	9
Horned Lark	1	12		
House Finch - juvenile	1	18		
Killdeer	1	82	1	39
Merlin	1	28		
Mourning Dove	1	57	4	34
Northern Flicker			1	11
Purple Finch	1	34		
Purple Martin	7	33, 44, 51, 57, 65, 70, 71		
Red-eyed Vireo	1	42	1	74
Red-tailed Hawk	1	1	2	54,58
Ring-billed Gull	1	5		
Savannah Sparrow	1	41		
Swallow sp.	2	8, 17		
Tennessee Warbler	1	42		

Table 3.3 Summary of Bird Fatalities, Reporting Period

Species	Number of Fatalities - Summer	Turbine Number	Number of Fatalities - Fall	Turbine Number
Tree Swallow	28	1, 2, 10, 13, 14, 16, 17, 18, 29, 30, 31, 42, 47, 50, 51, 52, 57, 59, 62, 67, 74, 77		
Turkey Vulture	3	22, 27, 66	3	77,85,86
Upland Sandpiper	1	1		
Yellow Warbler	1	48		
Total	81		19	
GRAND TOTAL	100			

Table 3.4 Calculation of Bird Mortality Rates

Period	Type	c	Se	Sc	Ps	C	Per Turbine	Per MW
Raptors/ Vultures	Summer	7	1.000	0.940	1.000	7.45	0.09	0.04
	Fall	5	1.000	0.940	1.000	5.32	0.06	0.03
	Total	12				12.77		
Other Birds	Summer	74	0.629	0.393	0.573	522.20	6.07	2.64
	Fall	14	0.633	0.393	0.845	66.57	0.77	0.34
	Total	88				588.77		
Total		100				601.54	6.99	3.04

Sc: Scavenger Impact Trial Results

Se: Searcher Efficiency Trial Results

Ps: Percent Area Searched

C: Corrected Number of Fatalities

Per Turbine: C Divided by Total Number of Turbines

Per MW: C Divided by Total Number of MW

¹Summer = July, August and September

²Fall = October, November and December

Species	Number of Fatalities	Turbine Number
Bat sp.	20	6, 24, 30, 35, 36, 37, 41, 44, 45, 46, 47, 50, 59, 61, 62, 70, 81
Big Brown Bat	13	2, 27, 35, 36, 52, 54, 57, 63, 64, 69, 74
Eastern Red Bat	44	4, 5, 6, 7, 9, 20, 29, 30, 32, 33, 37, 39, 41, 42, 43, 49, 50, 65, 70, 74, 75, 76, 77, 78, 79, 80, 81, 82
Hoary Bat	54	1, 3, 6, 8, 9, 13, 15, 16, 27, 31, 32, 34, 36, 37, 38, 40, 41, 46, 47, 48, 49, 51, 58, 59, 61, 62, 64, 66, 70, 74, 75, 76, 79, 82, 85
Little Brown Bat	13	4, 7, 10, 12, 15, 17, 40, 48, 50, 52, 63, 78
Silver-haired Bat	36	3, 6, 7, 9, 12, 13, 19, 27, 29, 32, 35, 36, 37, 41, 42, 44, 47, 50, 51, 54, 55, 56, 70, 79, 81,
GRAND TOTAL	180	

Period	Type	c	SE	Sc	Ps	C	Per Turbine	Per MW
Bat	Summer ¹	180	0.629	0.393	0.573	1270.22	14.77	6.42
	Fall ²	0	0.633	0.393	0.845	0.00	0.00	0.00

Sc Scavenger Impact Trial Results

Se Searcher Efficiency Trial Results

Ps Percent Area Searched

C Corrected Number of Fatalities

Per Turbine C Divided by Total Number of Turbines

Per MW C Divided by Total Number of MW

¹Summer = July, August and September

²Fall = October, November and December

**WOLFE ISLAND ECOPOWER® CENTRE, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES, MONITORING REPORT NO. 2, JULY - DECEMBER 2009**

Appendix B - Tables

May 2010

Table 3.7 Summary of Notifications - Reporting Period

Notification No.	Date	Period	Notification	Status
1	July 17	June 23 - July 14	High Annual Mortality - Raptors (2)	
2	August 18	July 27 - August 14	High Annual Mortality - Bats (57)	
3	August 18	July 27 - August 14	High Annual Mortality - Raptors (2)	
4	August 28	August 17 - August 26	High Annual Mortality - Bats (61)	
5	September 8	August 27 - September 4	High Annual Mortality - Raptors (2)	
6	November 10	September 30 - November 3	High Annual Mortality - Raptors (2)	
7	November 23	November 17 - November 18	High Annual Mortality - Raptors (2)	
	July 17	June 23 - July 14	High Annual Mortality - Birds (15)	Withdrawn
	July 31	July 8 - July 29	High Annual Mortality - Bats (13)	Withdrawn
	August 18	July 27 - August 14	High Annual Mortality - Birds (18)	Withdrawn
	September 8	August 27 - September 4	High Annual Mortality - Bats (22)	Withdrawn

Table 3.8 Comparison of Species Composition of Field Foraging Waterfowl: September-December 2007 and September-December 2009

	2007	2009
Canada Goose	16463	42323
Cackling Goose		7
Snow Goose	6	11
Brant		3
Mallard	115	2001
American Black Duck		282
Northern Pintail		8
Green-winged Teal		52
Dabbler sp.	450	
Total	17,034	44,687

Table 3.9 Comparison of Foraging Field Selection by Waterfowl: September-December 2007 and September-December 2009

	2007	2009
Corn Stubble	5,800	10,496
Corn Stubble / Hayfield	545	
Corn/Soy Stubble	654	
Fallow Field	40	308
Golf Course	8	264
Hayfield	1,337	5,759
Pasture	855	2,854
Plowed Field	203	3,516
Soy Stubble	7,367	19,248
Wheat Stubble	155	2,242
Winter Wheat	70	
Grand Total	17,034	44,687

**WOLFE ISLAND ECOPOWER® CENTRE, POST-CONSTRUCTION FOLLOW-UP PLAN
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Appendix B - Tables

May 2010

Table 3.10 Fall 2009 Waterfowl Morning Movement

Date	Route*												Other***	Grand Total
	1	2	3	4	5	6	7	8	9	10	11**	12		
2-Sep-08				40									60	100
10-Sep-08		4		30		100				21		15	36	206
16-Sep-08		35		12			5		11	3			55	121
23-Sep-08		400	50	33			42	6		26			44	601
30-Sep-08	50	6	9	4			123	59	48	239			71	609
7-Oct-09	219	67	24	162	185	28	94	31	471	25			57	1363
14-Oct-09	208		16		40			36	38	51			123	512
21-Oct-09	6	1114	4	149	8			64	171				48	1564
28-Oct-09		88	5	446	18	6		75	7	96			58	799
4-Nov-09		2996	63	235		145	2053	83	118	259		5	69	6026
11-Nov-09	94	248	116	42			331	1259	29	21			45	2185
18-Nov-09	32		19			53		48	98	34			1	285
25-Nov-09	80	832	39	907				13	123	124			16	2134
2-Dec-09	18	1422		310			363	117		92	3050	264	65	5701
8-Dec-09	40						13			4			8	65
16-Dec-09	24	360	39				70			166	2300		27	2986
24-Dec-09	80													80
Grand Total	851	7572	384	2370	251	332	3094	1791	1114	1161	5350	284	783	25337
% at Blade Height	87.4%	53.8%	75.0%	88.6%	93.2%	49.7%	87.1%	24.4%	69.0%	83.2%	100.0%	100.0%	83.1%	74.0%

Notes: Cells represent number of individuals.

*Routes depicted on Figure 7

**All individuals on this route are diving ducks not moving over land.

***Represents the sum of smaller flocks not following a major flight route

**WOLFE ISLAND ECOPOWER® CENTRE, POST-CONSTRUCTION FOLLOW-UP PLAN
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Table 3.11 Fall 2009 Waterfowl Evening Movement

Date	Route*											Grand Total
	1	2	3	4	5	6	7	8	9	10	Other**	
1-Sep-09								80			17	97
9-Sep-09											4	4
15-Sep-09											7	7
22-Sep-09				49				9			18	76
29-Sep-09	30		80	20			246	29	37	1107	25	1574
6-Oct-09	2	390		12		5594	178				46	6222
13-Oct-09	2797			11		250			14		82	3154
20-Oct-09		765			80	4	156		260		114	1379
28-Oct-09	510	1206	545				147	38		2000	33	4479
3-Nov-09	450	3546				244				33	35	4308
10-Nov-09	720	3640		4		130		73		40	24	4631
18-Nov-09	25	5320				221					128	5694
24-Nov-09		982		3590				3				4575
1-Dec-09		3503		741		3039	3				32	7318
7-Dec-09	857	3661	6	55			1000					5579
16-Dec-09	273	2005				51	13		19		40	2401
23-Dec-09				40	15	300					37	392
Grand Total	5664	25018	631	4522	95	9833	1743	232	330	3180	642	51890
% at Blade Height	80.3%	87.1%	100.0%	99.3%	21.1%	100.0%	100.0%	65.5%	88.8%	65.4%	81.9%	88.9%

Notes: Cells represent number of individuals.

*Routes depicted on Figure 8

**Represents the sum of smaller flocks not following a major flight route

**WOLFE ISLAND ECOPOWER® CENTRE, POST-CONSTRUCTION FOLLOW-UP PLAN
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Table 3.12 Comparison of Waterfowl Use by Sector

	1999	2008	2009	% Change 2008-2009
C7	162,950	218,493	362,157	66%
C8	121,671	138,282	268,080	94%
C9	1,516,131	972,487	1,124,403	16%
C10	385,273	661,222	361,809	-45%
C11	402,668	244,219	244,517	0%
Total	2,588,692	2,234,702	2,360,965	6%

Notes: Cells represent waterfowl days.

Table 3.13 Comparison of Waterfowl Use by Staging Area

	2008	2009	% Change 2008-2009
Bayfield	655,080	954,431	46%
Button	413,060	163,118	-61%
Pyke's	118,302	126,029	7%
Reed's	63,261	117,659	86%
Total	1,249,702	1,361,236	9%

Notes: Cells represent waterfowl days.

Table 3.14 Comparison of Waterfowl Use by Guild

	1999	2008	2009	% Change 2008-2009
Swans	9,484	20,960	30,338	45%
Geese	496,794	390,868	391,859	0%
Large dabblers	762,557	354,443	340,805	-4%
Small dabblers	47,190	132,761	25,988	-80%
Bay ducks	1,153,076	1,139,233	1,459,697	28%
Sea ducks	333	85	6,664	7786%
Goldeneye	75,595	137,951	69,564	-50%
Mergansers	43,665	58,403	36,052	-38%
Total	2,588,692	2,234,702	2,360,965	6%

Notes: Cells represent waterfowl days.

**WOLFE ISLAND ECOPOWER® CENTRE, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES, MONITORING REPORT NO. 2, JULY - DECEMBER 2009**

Appendix B - Tables

May 2010

Table 3.15 Winter Raptor Survey Results, November-December 2006 and 2009

Species	2006					2009				
	20-Nov-06	28-Nov-06	5-Dec-06	19-Dec-06	Total	11-Nov-09	25-Nov-09	8-Dec-09	23-Dec-09	Total
Snowy Owl		1	4	1	6			5	7	12
Short-eared Owl			3		3					0
Bald Eagle	1				1				1	1
Northern Harrier	10	21	25	31	87	4	3	4	8	19
Red-tailed Hawk	10	11	10	12	43	1		5	4	10
Rough-legged Hawk	1	21	6	6	34	1		2	2	5
American Kestrel	1	5	8	6	20	3	4	3	3	13
Merlin					0	1	2			3
Total Raptors	23	59	56	56	194	10	9	19	25	63
Total Kilometers	42.3	65.1	63.3	65.4	236.1	75	70.0	65.8	70.6	281.4
Density / Kilometer	0.5	0.9	0.9	0.9	0.8	0.1	0.1	0.3	0.4	0.2

Table 3.16 Short-eared Owl Survey Results, November-December 2006 and 2009

Species	2006					2009				
	20-Nov-06	28-Nov-06	5-Dec-06	19-Dec-06	Total	11-Nov-09	25-Nov-09	8-Dec-09	22-Dec-09	Total
Snowy Owl				1	1			2	8	10
Short-eared Owl	5	5	5	17	32	7	0	4	15	26
Total Short-eared Owls	5	5	5	17	32	7	0	4	15	26
Total Kilometers	36	52.7	52.7	55.2	196.6	36.2	53.9	47.4	50.7	188.2
Density / Kilometer	0.1	0.1	0.1	0.3	0.2	0.2	0.0	0.1	0.3	0.1

**WOLFE ISLAND ECOPOWER® CENTRE, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES, MONITORING REPORT NO. 2, JULY - DECEMBER 2009**

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May 2010

Table 3.17 Summary of Kingston Area Christmas Bird Count results from 2000-2009

Species	Number of Raptors per Party Hour									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Great Horned Owl	0.04	0.14	0.09	0.06	0.14	0.06	0.08	N/A	0.04	0.06
Snowy Owl	0.09	0.07	0.06	0.01	0.03	0.03	0.06	N/A	0.09	0.07
Short-eared Owl	0.03	0.00	0.03	0.03	0.03	0.00	0.04	N/A	0.01	0.00
Bald Eagle	0.20	0.10	0.04	0.08	0.08	0.13	0.02	N/A	0.29	0.70
Northern Harrier	0.01	0.13	0.04	0.29	0.18	0.02	0.60	N/A	0.18	0.18
Sharp-shinned Hawk	0.03	0.03	0.03	0.01	0.03	0.05	0.04	N/A	0.03	0.05
Cooper's Hawk	0.05	0.04	0.03	0.02	0.01	0.06	0.02	N/A	0.03	0.02
Red-tailed Hawk	0.40	0.40	0.42	0.27	0.27	0.23	0.51	N/A	0.49	0.22
Rough-legged Hawk	0.11	0.14	0.02	0.43	0.08	0.06	0.18	N/A	0.18	0.08
American Kestrel	0.15	0.16	0.11	0.01	0.03	0.08	0.10	N/A	0.13	0.05
Merlin	0.04	0.02	0.01	0.00	0.01	0.03	0.02	N/A	0.02	0.02

N/A – data not available.

Appendix C

Mortality Monitoring Schedule

WEEK	SUBSET	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Subset A	4, (6, 7, 8, 9, 10, 11), 12, (13, 14), 21, 22, 26, (40, 41), 48, 52, (59, 60, 63), 66, 72, (79, 80, 81), 83, MET 1	(3, 5), (29, 30, 31, 32), 47, (53, 54, 55) 56, 58, (73, 74, 75, 76, 77).		4, (6, 7, 8, 9, 10, 11), 12, 21, 22, 26, (40, 41), 48, 52, (59, 60, 63)	(3, 5), (13, 14), (29, 30, 31, 32), 47, (53, 54, 55), 56, 58, 66, 72, (73, 74, 75, 76, 77), (79, 80, 81), 83, MET 1
	Subset B		(1, 2), 23, 27, 28, (43, 44, 45, 46)	24, 25, (33, 34, 35), 36, 37, (38, 39), 42, 49, 50, 51, 57, 64, 65, (67, 68, 69), (70, 71), 78, 82, (84, 85, 86), MET 2	(15, 16, 17, 18, 19, 20), (61, 62)	

WEEK	SUBSET	Monday	Tuesday	Wednesday	Thursday	Friday
Week 2	Subset A		4, (6, 7, 8, 9, 10, 11), 12, 66	(3, 5), (13, 14), 21, 22, 26, (29, 30, 31, 32), (40, 41), 47, 48, 52, 56, 58, (59, 60, 63), 72, (79, 80, 81), 83, MET 1	(53, 54, 55), (73, 74, 75, 76, 77)	
	Subset B	(1, 2), 23, 24, 27, 28, (33, 34, 35), 36, 37, (38, 39), 42, (43, 44, 45, 46), 50, 64, 65, 78, 82, (84, 85, 86), MET 2	(15, 16, 17, 18, 19, 20), 25, 49, 51, 57, (61, 62), (67, 68, 69), (70, 71)		(1, 2), 23, 24, 27, 28, (33, 34, 35), 36, 37, (43, 44, 45, 46), (84, 85, 86)	(15, 16, 17, 18, 19, 20), 25, (38, 39), 42, 49, 50, 51, 57, (61, 62), 64, 65, (67, 68, 69), (70, 71), 78, 82, MET 2

Appendix D

Survey Conditions

Conditions Summary

Survey Date	Survey Type	Weather	Start Time	End Time
09-Sep-08	Waterfowl Aerial	Temp: 6°C Wind: 3 Cloud: 70% PPT: Overnight ppt or fog: Rain	1:15 PM	2:05 PM
24-Sep-08	Waterfowl Aerial	Temp: 22°C Wind: 1 Cloud: Hazy PPT: Overnight ppt or fog:	12:20 PM	1:35 PM
10-Oct-08	Waterfowl Aerial	Temp: 17°C Wind: 2 Cloud: 2% PPT: Overnight ppt or fog:	12:30 PM	1:55 PM
31-Oct-08	Waterfowl Aerial	Temp: 14°C Wind: 4 Cloud: 75% PPT: Overnight ppt or fog:	10:15 AM	12:23 PM
06-Nov-08	Waterfowl Aerial	Temp: 16°C Wind: 1-2 Cloud: 10% PPT: Overnight ppt or fog:	10:15 AM	12:45 PM
18-Nov-08	Waterfowl Aerial	Temp: -3°C Wind: 2-3 Cloud: 80% PPT: Isolated snow squalls Overnight ppt or fog: Trace of snow	11:45 AM	1:45 PM
12-Dec-08	Waterfowl Aerial	Temp: -2°C Wind: 2 Cloud: 100% PPT: Overnight ppt or fog:	11:30 AM	1:30 PM
18-Dec-08	Waterfowl Aerial	Temp: -5°C Wind: 2 Cloud: 95% PPT: Overnight ppt or fog:	10:40 AM	12:40 PM
09-Jan-09	Waterfowl Aerial	Temp: Wind: Cloud: PPT: Overnight ppt or fog:		
01-Jul-09	Mortality Survey	Temp: 20-30°C Wind: 2-3 Cloud: PPT: Overnight ppt or fog:	6:50 AM	6:00 PM
02-Jul-09	Mortality Survey	Temp: 20°C Wind: 2 Cloud: 100% PPT: Rain Overnight ppt or fog:	6:37 AM	4:11 PM
03-Jul-09	Mortality Survey	Temp: 17-22°C Wind: 3-4 Cloud: 100% PPT: Drizzle Overnight ppt or fog:	7:55 AM	2:33 PM
06-Jul-09	Mortality Survey	Temp: 21°C Wind: 2 Cloud: PPT: Overnight ppt or fog:	7:37 AM	4:40 PM
07-Jul-09	Mortality Survey	Temp: 15-16°C Wind: 1-3 Cloud: 100% PPT: Overnight ppt or fog:	10:27 AM	2:56 PM
08-Jul-09	Mortality Survey	Temp: 18-20°C Wind: 2-3 Cloud: PPT: Overnight ppt or fog:	10:30 AM	3:21 PM
09-Jul-09	Mortality Survey	Temp: 18-20°C Wind: 3 Cloud: PPT: Overnight ppt or fog:	9:13 AM	2:33 PM
10-Jul-09	Mortality Survey	Temp: 22-25°C Wind: 2 Cloud: PPT: Overnight ppt or fog:	6:27 AM	6:27 PM
13-Jul-09	Mortality Survey	Temp: 20-23°C Wind: 3-4 Cloud: 100% PPT: Light rain Overnight ppt or fog:	6:07 AM	5:35 PM
14-Jul-09	Mortality Survey	Temp: 20-22°C Wind: 2-3 Cloud: 100% PPT: Overnight ppt or fog:	10:30 AM	4:21 PM
15-Jul-09	Mortality Survey	Temp: 20-25°C Wind: 2-3 Cloud: Light and wispy PPT: Overnight ppt or fog:	11:40 AM	5:59 PM
16-Jul-09	Mortality Survey	Temp: 20-25°C Wind: 3-4 Cloud: Partly PPT: Overnight ppt or fog:	6:07 AM	6:59 PM
17-Jul-09	Mortality Survey	Temp: 20°C Wind: 2 Cloud: Light-100% PPT: Light rain Overnight ppt or fog:	7:47 AM	4:37 PM
20-Jul-09	Mortality Survey	Temp: 22°C Wind: 3 Cloud: Wispy and light PPT: Overnight ppt or fog:	6:45 AM	8:40 PM
21-Jul-09	Mortality Survey	Temp: 25°C Wind: 2 Cloud: 100% PPT: Overnight ppt or fog:	7:05 AM	5:50 PM
22-Jul-09	Mortality Survey	Temp: 24°C Wind: 2 Cloud: Partly PPT: Overnight ppt or fog:	7:30 AM	4:45 PM
23-Jul-09	Mortality Survey	Temp: Wind: Cloud: 100% PPT: Rainy Overnight ppt or fog:	6:28 AM	2:15 PM
24-Jul-09	Mortality Survey	Temp: 21°C Wind: 4 Cloud: Mostly cloudy PPT: Overnight ppt or fog:	6:43 AM	6:14 PM
27-Jul-09	Mortality Survey	Temp: 21-23°C Wind: 4 Cloud: Partly PPT: Overnight ppt or fog:	6:22 AM	8:10 PM
28-Jul-09	Mortality Survey	Temp: 23-30°C Wind: 3-4 Cloud: Light and wispy PPT: Overnight ppt or fog:	7:12 AM	3:36 PM
29-Jul-09	Mortality Survey	Temp: 23-30°C Wind: 3 Cloud: 100% PPT: Overnight ppt or fog:	10:30 AM	7:25 PM
30-Jul-09	Mortality Survey	Temp: 22-25°C Wind: 3 Cloud: Light and wispy PPT: Overnight ppt or fog:	10:18 AM	8:08 PM
31-Jul-09	Mortality Survey	Temp: 24°C Wind: 3-4 Cloud: Partly PPT: Overnight ppt or fog:	6:26 AM	8:23 PM

Conditions Summary

Survey Date	Survey Type	Weather	Start Time	End Time
03-Aug-09	Mortality Survey	Temp: 22-25°C Wind: 3 Cloud: Partly PPT: Overnight ppt or fog:	6:23 AM	4:39 PM
04-Aug-09	Mortality Survey	Temp: 14-28°C Wind: 4 Cloud: Partly PPT: Overnight ppt or fog:	6:10 AM	6:02 PM
05-Aug-09	Mortality Survey	Temp: 23-24°C Wind: 3 Cloud: Partly PPT: Overnight ppt or fog:	11:35 AM	5:09 PM
06-Aug-09	Mortality Survey	Temp: 22-30°C Wind: 2-3 Cloud: Partly PPT: Overnight ppt or fog:	6:42 AM	7:20 PM
07-Aug-09	Mortality Survey	Temp: 18°C Wind: Cloud: PPT: Overnight ppt or fog:	7:12 AM	3:37 PM
10-Aug-09	Mortality Survey	Temp: 21-26°C Wind: 2 Cloud: Partly PPT: Overnight ppt or fog:	6:07AM	2:38 PM
11-Aug-09	Mortality Survey	Temp: 22°C Wind: 2 Cloud: Partly PPT: Possible T-storm Overnight ppt or fog:	6:30 AM	2:22 PM
12-Aug-09	Mortality Survey	Temp: 22°C Wind: 2-3 Cloud: Overcast PPT: Overnight ppt or fog:	8:40 AM	1:26 PM
13-Aug-09	Mortality Survey	Temp: 25-30°C Wind: 2 Cloud: Few PPT: Overnight ppt or fog:	9:38 AM	4:05 PM
14-Aug-09	Mortality Survey	Temp: 27°C Wind: 2 Cloud: Partly PPT: Overnight ppt or fog:	6:20 AM	6:51 PM
15-Aug-09	Mortality Survey	Temp: 28°C Wind: 2 Cloud: Haze PPT: Overnight ppt or fog:	3:55 PM	7:30 PM
16-Aug-09	Mortality Survey	Temp: 30°C Wind: 3 Cloud: Hazy PPT: Overnight ppt or fog:	12:37 PM	2:14 PM
17-Aug-09	Mortality Survey	Temp: 25°C Wind: 3 Cloud: A few clouds PPT: Overnight ppt or fog:	7:02 AM	1:34 PM
18-Aug-09	Mortality Survey	Temp: 27°C Wind: 4 Cloud: Cloudy PPT: Overnight ppt or fog:	6:15 AM	4:09 PM
19-Aug-09	Mortality Survey	Temp: 26-28°C Wind: 3 Cloud: Partly PPT: Overnight ppt or fog:	10:34 AM	3:05 PM
20-Aug-09	Mortality Survey	Temp: 22-28°C Wind: 3 Cloud: Partly-Overcast PPT: Overnight ppt or fog:	11:10 AM	8:16 PM
21-Aug-09	Mortality Survey	Temp: 24-27°C Wind: 3 Cloud: Partly-Overcast PPT: Overnight ppt or fog:	12:10 PM	4:28 PM
24-Aug-09	Mortality Survey	Temp: 23°C Wind: Cloud: Partly cloudy PPT: Overnight ppt or fog:	6:23 AM	2:11 PM
25-Aug-09	Mortality Survey	Temp: 23°C Wind: 2-3 Cloud: Partly PPT: Overnight ppt or fog:	7:16 AM	4:42 PM
26-Aug-09	Mortality Survey	Temp: 25°C Wind: 3 Cloud: Partly PPT: Overnight ppt or fog:	6:34 AM	8:14 PM
27-Aug-09	Mortality Survey	Temp: 17°C Wind: 0-3 Cloud: Partly PPT: Overnight ppt or fog:	7:00 AM	7:56 PM
28-Aug-09	Mortality Survey	Temp: Wind: 3 Cloud: 100% PPT: Overnight ppt or fog:	7:12 AM	7:36PM
31-Aug-09	Mortality Survey	Temp: 21°C Wind: Cloud: PPT: Overnight ppt or fog:	7:09 AM	5:45 PM
01-Sep-09	Mortality Survey	Temp: Wind: Cloud: 0% PPT: Overnight ppt or fog:	7:22 AM	4:03 PM
01-Sep-09	Waterfowl Evening Movement	Temp: 17°C Wind: 2 Cloud: 10% PPT: Overnight ppt or fog:	7:20 PM	8:25 PM
02-Sep-09	Mortality Survey	Temp: 18°C Wind: 2 Cloud: 10% PPT: Overnight ppt or fog:	7:12 AM	3:08 PM
02-Sep-09	Waterfowl Morning Movement	Temp: 11°C Wind: 0 Cloud: 5% PPT: Overnight ppt or fog:	6:30 AM	7:30 AM
02-Sep-09	Waterfowl Foraging	Temp: 18°C Wind: 2 Cloud: 10% PPT: Overnight ppt or fog:	8:20 AM	11:30 AM
03-Sep-09	Mortality Survey	Temp: 27°C Wind: 2-3 Cloud: Clear-partly PPT: Overnight ppt or fog:	3:28 PM	6:27 PM
04-Sep-09	Mortality Survey	Temp: 25°C Wind: 2-3 Cloud: Clear-partly PPT: Overnight ppt or fog:	3:22 PM	7:15 PM
07-Sep-09	Mortality Survey	Temp: 24°C Wind: 2 Cloud: Partly PPT: Overnight ppt or fog:	7:06 AM	5:54 PM
08-Sep-09	Mortality Survey	Temp: 24-25°C Wind: 2-3 Cloud: Partly PPT: Overnight ppt or fog:	11:10 AM	7:10 PM
09-Sep-09	Mortality Survey	Temp: 18°C Wind: 4 Cloud: 30% PPT: Overnight ppt or fog:	7:08 AM	12:55 PM

Conditions Summary

Survey Date	Survey Type	Weather	Start Time	End Time
09-Sep-09	Waterfowl Foraging	Temp: 18°C Wind: 4 Cloud: 30% PPT: Overnight ppt or fog:	1:00 PM	6:00 PM
09-Sep-09	Waterfowl Aerial	Temp: 18°C Wind: 4 Cloud: 30% PPT: Overnight ppt or fog:		
09-Sep-09	Waterfowl Evening Movement	Temp: 14°C Wind: 3 Cloud: 10% PPT: Overnight ppt or fog:	7:00 PM	8:05 PM
10-Sep-09	Mortality Survey	Temp: 23°C Wind: 2-3 Cloud: Partly PPT: Overnight ppt or fog:	7:06 AM	3:45 PM
10-Sep-09	Waterfowl Morning Movement	Temp: 15°C Wind: 1-5 Cloud: 10% PPT: Overnight ppt or fog:	6:45 AM	8:00 AM
11-Sep-09	Mortality Survey	Temp: 20-23°C Wind: 2-3 Cloud: Clear-Partly PPT: Overnight ppt or fog:	10:15 AM	1:31 PM
14-Sep-09	Mortality Survey	Temp: 20°C Wind: 6 Cloud: 100% PPT: Overnight ppt or fog:	7:45 AM	4:52 PM
15-Sep-09	Mortality Survey	Temp: 16°C Wind: 6 Cloud: 100% PPT: Overnight ppt or fog:	7:38 AM	6:00 PM
15-Sep-09	Waterfowl Evening Movement	Temp: 12°C Wind: 4 Cloud: 85-25% PPT: Overnight ppt or fog:	7:00 PM	8:00 PM
16-Sep-09	Mortality Survey	Temp: 18°C Wind: 4 Cloud: 10% PPT: Overnight ppt or fog:	12:50 PM	4:26 PM
16-Sep-09	Waterfowl Morning Movement	Temp: 11°C Wind: 3 Cloud: 10% PPT: Overnight ppt or fog:	6:30 AM	8:00 AM
16-Sep-09	Waterfowl Foraging	Temp: 18°C Wind: 4 Cloud: 10% PPT: Overnight ppt or fog:	9:00 AM	1:30 PM
17-Sep-09	Mortality Survey	Temp: 20°C Wind: 3 Cloud: Partly PPT: Overnight ppt or fog:	7:08 AM	5:39 PM
18-Sep-09	Mortality Survey	Temp: Wind: Cloud: PPT: Overnight ppt or fog:	8:36 AM	7:00 PM
21-Sep-09	Mortality Survey	Temp: 20-21°C Wind: 4-5 Cloud: Partly PPT: Overnight ppt or fog:	8:06 AM	7:10 PM
22-Sep-09	Mortality Survey	Temp: 20°C Wind: 3 Cloud: 100% PPT: none Overnight ppt or fog: none	9:07 AM	12:56 PM
22-Sep-09	Waterfowl Evening Movement	Temp: 20°C Wind: 3 Cloud: 100% PPT: none Overnight ppt or fog: none	6:45 PM	7:45 PM
23-Sep-09	Mortality Survey	Temp: 22°C Wind: 3-4 Cloud: 100% PPT: none Overnight ppt or fog: none	8:04 AM	12:23 PM
23-Sep-09	Waterfowl Morning Movement	Temp: 17°C Wind: 2-3 Cloud: 100% PPT: none Overnight ppt or fog: showers	6:30 AM	8:00 AM
23-Sep-09	Waterfowl Foraging	Temp: 22°C Wind: 3-4 Cloud: 100% PPT: none Overnight ppt or fog: none	9:30 AM	3:00 PM
24-Sep-09	Mortality Survey	Temp: 22°C Wind: 3 Cloud: Partly PPT: Overnight ppt or fog:	3:20 PM	6:16 PM
25-Sep-09	Mortality Survey	Temp: 17°C Wind: 3 Cloud: Partly PPT: Overnight ppt or fog:	10:58 PM	2:15 PM
28-Sep-09	Mortality Survey	Temp: 14-16°C Wind: 6 Cloud: 100 PPT: Heavy rain/sideways Overnight ppt or fog:	11:20 AM	2:39 PM
29-Sep-09	Mortality Survey	Temp: 15°C Wind: 3 Cloud: 100 PPT: Rainy Overnight ppt or fog:	11:35 AM	4:51 PM
29-Sep-09	Waterfowl Evening Movement	Temp: 12°C Wind: 3 Cloud: 90 PPT: Light showers Overnight ppt or fog:	5:45 PM	7:30 PM
30-Sep-09	Mortality Survey	Temp: 10-11°C Wind: 4 Cloud: 75-100 PPT: Drizzle Overnight ppt or fog: Rain	8:05 AM	2:42 PM
30-Sep-09	Waterfowl Evening Movement	Temp: 8°C Wind: 4 Cloud: 60% PPT: Drizzle Overnight ppt or fog: Rain	6:35 AM	8:00 AM
30-Sep-09	Waterfowl Foraging	Temp: 10-11°C Wind: 4 Cloud: 75-100 PPT: Drizzle Overnight ppt or fog: Rain	9:30 AM	1:00 PM
01-Oct-09	Mortality Survey	Temp: 9°C Wind: 2 Cloud: 100 PPT: On/off rain Overnight ppt or fog:	8:24 AM	5:09 PM
02-Oct-09	Mortality Survey	Temp: 10°C Wind: 4-6 Cloud: 100 PPT: Rainy Overnight ppt or fog:	7:34 AM	5:12 PM
05-Oct-09	Mortality Survey	Temp: 15°C Wind: 4 Cloud: Partly PPT: Light rain Overnight ppt or fog:	12:18 PM	3:33 PM
06-Oct-09	Mortality Survey	Temp: 14°C Wind: 2 Cloud: 100% PPT: None Overnight ppt or fog:	8:26 AM	1:28 PM

Conditions Summary

Survey Date	Survey Type	Weather	Start Time	End Time
06-Oct-09	Waterfowl Evening Movement	Temp: 12°C Wind: 1 Cloud: 90% PPT: None Overnight ppt or fog:	5:55 PM	7:05 PM
07-Oct-09	Mortality Survey	Temp: 15°C Wind: 3 Cloud: 95% PPT: Periods of rain Overnight ppt or fog: Thunder storms overnight	11:15 AM	2:29 PM
07-Oct-09	Waterfowl Morning Movement	Temp: 12°C Wind: 2 Cloud: 80-100% PPT: Light rain Overnight ppt or fog: Thunder storms overnight	6:50 AM	8:00 AM
07-Oct-09	Waterfowl Foraging	Temp: 15°C Wind: 3 Cloud: 95% PPT: Periods of rain Overnight ppt or fog: Thunder storms overnight		
08-Oct-09	Mortality Survey	Temp: 14°C Wind: 3 Cloud: Partly PPT: Periods of rain Overnight ppt or fog:	8:05 AM	4:45 PM
09-Oct-09	Mortality Survey	Temp: 12°C Wind: 2 Cloud: 100% PPT: Rainy Overnight ppt or fog:	8:41 AM	5:17 PM
12-Oct-09	Mortality Survey	Temp: 10°C Wind: 2 Cloud: 100% PPT: Periods of light rain Overnight ppt or fog:	8:06 AM	5:06 PM
13-Oct-09	Mortality Survey	Temp: 6-10°C Wind: 2-3 Cloud: Partly-overcast PPT: Periods of rain Overnight ppt or fog:	3:30 PM	6:43 PM
13-Oct-09	Waterfowl Evening Movement	Temp: 4-5°C Wind: 2-3 Cloud: 90-30% PPT: Overnight ppt or fog: periods of rain	7:30 PM	7:00 PM
14-Oct-09	Mortality Survey	Temp: 6°C Wind: 2-3 Cloud: 25-100 PPT: Overnight ppt or fog: Rain	12:45 PM	3:55 PM
14-Oct-09	Waterfowl Morning Movement	Temp: -1°C Wind: 1 Cloud: 5% PPT: Overnight ppt or fog: Rain	7:05 AM	8:15 AM
14-Oct-09	Waterfowl Foraging	Temp: 6°C Wind: 2-3 Cloud: 25-100 PPT: Overnight ppt or fog: Rain		
15-Oct-09	Mortality Survey	Temp: 5°C Wind: 4 Cloud: Partly PPT: Overnight ppt or fog:	9:07 AM	5:35 PM
16-Oct-09	Mortality Survey	Temp: 6-8°C Wind: 2-4 Cloud: Partly PPT: Overnight ppt or fog:	10:07 AM	3:59 PM
19-Oct-09	Mortality Survey	Temp: 11°C Wind: 4-6 Cloud: Few-partly PPT: Overnight ppt or fog:	10:08 AM	6:00 PM
20-Oct-09	Mortality Survey	Temp: 16°C Wind: 4 Cloud: Partly-overcast PPT: Overnight ppt or fog:	10:06 AM	5:46 PM
20-Oct-09	Waterfowl Evening Movement	Temp: 14°C Wind: 3 Cloud: 80-100% PPT: Overnight ppt or fog:	5:45 PM	6:45 PM
21-Oct-09	Mortality Survey	Temp: 12°C Wind: 2-3 Cloud: Overcast PPT: Light/Drops Overnight ppt or fog:	8:03 AM	3:58 PM
21-Oct-09	Waterfowl Morning Movement	Temp: 5°C Wind: 2-3 Cloud: Overcast PPT: Overnight ppt or fog:	7:30 AM	8:45 AM
21-Oct-09	Waterfowl Foraging	Temp: 12°C Wind: 2-3 Cloud: Overcast PPT: Light/Drops Overnight ppt or fog:	10:00 AM	4:15 PM
22-Oct-09	Mortality Survey	Temp: 15°C Wind: 2-4 Cloud: Overcast PPT: Light rain Overnight ppt or fog:	1:01 PM	3:48 PM
23-Oct-09	Mortality Survey	Temp: 2-3°C Wind: 2-3 Cloud: Overcast PPT: 100% Overnight ppt or fog:	9:02 AM	11:49 AM
26-Oct-09	Mortality Survey	Temp: 10°C Wind: 2-3 Cloud: Partly PPT: Overnight ppt or fog:	9:09 AM	5:00 PM
26-Oct-09	Waterfowl Aerial	Temp: 2°C Wind: 2 Cloud: Overcast PPT: Overnight ppt or fog:		
27-Oct-09	Mortality Survey	Temp: 12-13°C Wind: 2-4 Cloud: Overcast PPT: None Overnight ppt or fog: None	9:37 AM	4:22 PM
28-Oct-09	Mortality Survey	Temp: 9°C Wind: 4 Cloud: Overcast PPT: Light rain Overnight ppt or fog: None	10:58 AM	3:54 PM
28-Oct-09	Waterfowl Morning Movement	Temp: 7°C Wind: 4 Cloud: Overcast PPT: Light rain Overnight ppt or fog: None	7:30 AM	8:30 AM
28-Oct-09	Waterfowl Foraging	Temp: 9°C Wind: 4 Cloud: Overcast PPT: Light rain Overnight ppt or fog: None	10:00 AM	4:30 PM
28-Oct-09	Waterfowl Evening Movement	Temp: 8°C Wind: 4 Cloud: Overcast PPT: Light rain Overnight ppt or fog: None	5:25 PM	6:30 PM
29-Oct-09	Mortality Survey	Temp: 8°C Wind: 2-3 Cloud: Overcast PPT: None Overnight ppt or fog: None	1:39 PM	4:17 PM
30-Oct-09	Mortality Survey	Temp: 13°C Wind: 3-4 Cloud: Overcast PPT: Periods of Light Rain Overnight ppt or fog: None	12:33 PM	3:12 PM

Conditions Summary

Survey Date	Survey Type	Weather	Start Time	End Time
02-Nov-09	Mortality Survey	Temp: 10°C Wind:2 Cloud: Partly PPT: Overnight ppt or fog: 60%	9:05 AM	5:13 PM
03-Nov-09	Mortality Survey	Temp: 11°C Wind: 4 Cloud: Partly PPT: Overnight ppt or fog:	8:24 AM	1:34 PM
03-Nov-09	Waterfowl Evening Movement	Temp: 8°C Wind: 4 Cloud: 10% PPT: Overnight ppt or fog:	4:20 PM	5:30 PM
04-Nov-09	Mortality Survey	Temp: 6°C Wind: 1-3 Cloud: Partly/Low Overcast PPT: Overnight ppt or fog:	10:45 AM	3:23 PM
04-Nov-09	Waterfowl Morning Movement	Temp: -1°C Wind: 1-3 Cloud: 5% PPT: Overnight ppt or fog:	6:15 AM	8:00 AM
04-Nov-09	Waterfowl Foraging	Temp: 6°C Wind: 1-3 Cloud: Partly/Low Overcast PPT: Overnight ppt or fog:	9:30 AM	4:45 PM
04-Nov-09	Waterfowl Aerial	Temp: 6°C Wind: 1 Cloud: Overcast PPT: Overnight ppt or fog:		
05-Nov-09	Mortality Survey	Temp: 6-7°C Wind: 3-4 Cloud: Overcast PPT: Light-Heavy Rain, 100% Overnight ppt or fog:	9:22 AM	1:40 PM
06-Nov-09	Mortality Survey	Temp: 2°C Wind: 3-4 Cloud: Partly PPT: Overnight ppt or fog:	9:07 AM	1:21 PM
09-Nov-09	Mortality Survey	Temp: 17°C Wind: 4 Cloud: Light PPT: Overnight ppt or fog:	9:04 AM	4:36 PM
10-Nov-09	Mortality Survey	Temp: 12-13°C Wind: 2-3 Cloud: Light/Partly PPT: Overnight ppt or fog:	8:34 AM	3:29 PM
10-Nov-09	Waterfowl Evening Movement	Temp: 8°C Wind: 1 Cloud: 60% PPT: Overnight ppt or fog:	4:30 PM	5:30 PM
11-Nov-09	Mortality Survey	Temp: 8°C Wind: 2 Cloud: 5% PPT: Overnight ppt or fog:	10:40 AM	3:23 PM
11-Nov-09	Waterfowl Morning Movement	Temp: 3°C Wind: 2 Cloud: 30% PPT: Overnight ppt or fog:	6:20 AM	8:05 AM
11-Nov-09	Waterfowl Foraging/Winter Raptor	Temp: 8°C Wind: 2 Cloud: 5% PPT: Overnight ppt or fog:	1:15 PM	4:15 PM
11-Nov-09	Short-eared Owl	Temp: 3°C Wind: 1 Cloud: 15% PPT: Overnight ppt or fog:	4:20 PM	5:30 PM
12-Nov-09	Mortality Survey	Temp: 6-7°C Wind: 1-3 Cloud: Partly PPT: Overnight ppt or fog:	10:05 AM	2:16 PM
13-Nov-09	Mortality Survey	Temp: 6-7°C Wind: 2-4 Cloud: Light/Partly PPT: Overnight ppt or fog:	10:15 AM	2:50 PM
16-Nov-09	Mortality Survey	Temp: 5°C Wind: 2 Cloud: PPT: Overnight ppt or fog:	10:00 AM	2:36 PM
17-Nov-09	Mortality Survey	Temp: 5°C Wind: 2-3 Cloud: PPT: Overnight ppt or fog:	8:36 AM	1:07 PM
18-Nov-09	Mortality Survey	Temp: 10°C Wind: 2 Cloud: Clear PPT: Overnight ppt or fog:	9:04 AM	3:21 PM
18-Nov-09	Waterfowl Morning Movement	Temp: -3°C Wind: 1-2 Cloud: Clear PPT: Overnight ppt or fog:	6:55 AM	8:15 AM
18-Nov-09	Waterfowl Foraging	Temp: 10°C Wind: 2 Cloud: Clear PPT: Overnight ppt or fog:	10:00 AM	3:30 PM
18-Nov-09	Waterfowl Aerial	Temp: 10°C Wind: 2 Cloud: Clear PPT: Overnight ppt or fog:		
18-Nov-09	Waterfowl Evening Movement	Temp: 5°C Wind: 2 Cloud: Clear PPT: Overnight ppt or fog:	4:10 PM	5:00 PM
19-Nov-09	Mortality Survey	Temp: 11°C Wind: 0-4 Cloud: Clear, then Overcast PPT: Rain Overnight ppt or fog:	9:42 AM	4:55 PM
20-Nov-09	Mortality Survey	Temp: 9°C Wind: 3-4 Cloud: Overcast PPT: Light Rain, Heavy @ times Overnight ppt or fog:	9:15 AM	4:16 PM
23-Nov-09	Mortality Survey	Temp: 4-7°C Wind: 2-3 Cloud: PPT: Overnight ppt or fog:	8:51 AM	3:00 PM
24-Nov-09	Mortality Survey	Temp: 4-5°C Wind: 2-3 Cloud: Overcast PPT: Light Rain / Rainy Overnight ppt or fog: 40%	8:06 AM	12:40 PM
24-Nov-09	Waterfowl Evening Movement	Temp: 3°C Wind: 1 Cloud: Overcast PPT: Overnight ppt or fog: Light rain	4:00 PM	5:00 PM
25-Nov-09	Mortality Survey	Temp: 7-8°C Wind: 2-3 Cloud: 100% PPT: Overnight ppt or fog:	8:07 AM	1:56 PM
25-Nov-09	Waterfowl Morning Movement	Temp: 12-14°C Wind: 3-4 Cloud: Partly/Overcast PPT: Overnight ppt or fog:	7:05 AM	8:30 AM

Conditions Summary

Survey Date	Survey Type	Weather	Start Time	End Time
25-Nov-09	Waterfowl Foraging/Winter Raptor	Temp: 12-14°C Wind: 3-4 Cloud: Partly/Overcast PPT: Overnight ppt or fog:	1:15 PM	3:45 PM
25-Nov-09	Short-eared Owl	Temp: 10°C Wind: 3 Cloud: Overcast PPT: Light Rain Overnight ppt or fog:	4:00 PM	5:30 PM
26-Nov-09	Mortality Survey	Temp: 9-11°C Wind: 2-4 Cloud: Overcast PPT: Overnight ppt or fog:	9:02 AM	4:00 PM
27-Nov-09	Mortality Survey	Temp: 5°C Wind: 3-4 Cloud: Partly PPT: Overnight ppt or fog:	9:15 AM	4:27 PM
30-Nov-09	Mortality Survey	Temp: 3-4°C Wind: 3-4 Cloud: Overcast PPT: Overnight ppt or fog:	9:06 AM	2:43 PM
01-Dec-09	Mortality Survey	Temp: 2-4°C Wind: 3-4 Cloud: Overcast PPT: Periods of Rain Overnight ppt or fog:	9:00 AM	4:26 PM
01-Dec-09	Waterfowl Evening Movement	Temp: 2°C Wind: 3-4 Cloud: 50% PPT: Overnight ppt or fog: Rain and snow	3:50 PM	5:00 PM
02-Dec-09	Mortality Survey	Temp: 5-7°C Wind: 3-4 Cloud: Overcast PPT: Periods of Rain Overnight ppt or fog:	8:17 AM	2:38 PM
02-Dec-09	Waterfowl Morning Movement	Temp: 3-4°C Wind: 3-4 Cloud: 5-60% PPT: Overnight ppt or fog:	6:45 AM	8:35 AM
02-Dec-09	Waterfowl Foraging	Temp: 5-7°C Wind: 3-4 Cloud: Overcast PPT: Overnight ppt or fog:	9:30 AM	4:00 PM
02-Dec-09	Waterfowl Aerial	Temp: 5°C Wind: 2 Cloud: Hazy PPT: Overnight ppt or fog:		
03-Dec-09	Mortality Survey	Temp: 9°C Wind: 4 Cloud: Overcast PPT: Periods of Rain/Light Overnight ppt or fog:	9:00 AM	4:25 PM
04-Dec-09	Mortality Survey	Temp: 2°C Wind: 4 Cloud: Overcast PPT: Rain & Wet Snow Overnight ppt or fog:	10:25 AM	2:25 PM
07-Dec-09	Mortality Survey	Temp: 0-4°C Wind: 2-4 Cloud: Overcast PPT: Snow, Light, Wet & Small Hail Overnight ppt or fog:	9:00 AM	2:19 PM
07-Dec-09	Waterfowl Evening Movement	Temp: 0°C Wind: 2-3 Cloud: 40-60 PPT: Light snow Overnight ppt or fog:	4:00 PM	5:00 PM
08-Dec-09	Mortality Survey	Temp: -1°C Wind: 1-2 Cloud: 5% PPT: Overnight ppt or fog: Light Snow	8:47 AM	3:22 PM
08-Dec-09	Waterfowl Morning Movement	Temp: -6°C Wind: 1-2 Cloud: 5% PPT: Overnight ppt or fog: Light Snow	7:00 AM	8:25 AM
08-Dec-09	Waterfowl Foraging/Winter Raptor	Temp: -1°C Wind: 1-2 Cloud: 5% PPT: Overnight ppt or fog: Light Snow	1:15 PM	3:15 PM
08-Dec-09	Short-eared Owl	Temp: -4°C Wind: 1 Cloud: 70% PPT: Overnight ppt or fog: Light Snow	4:00 PM	4:50 PM
09-Dec-09	Mortality Survey	Temp: -1-5°C Wind: 4-6+ Cloud: Overcast PPT: Rain & Snow, Sleet Overnight ppt or fog:	11:00 AM	3:57 PM
10-Dec-09	Mortality Survey	Temp: 0°C (WindChill -10°C) Wind: 6+ Cloud: Partly Cloudy PPT: Overnight ppt or fog:	9:15 AM	2:54 PM
11-Dec-09	Mortality Survey	Temp: -4°C (WindChill -20°C) Wind: 6+ Cloud: Partly PPT: Overnight ppt or fog:	9:49 AM	4:10 PM
14-Dec-09	Mortality Survey	Temp: 4°C Wind: 0-3 Cloud: Overcast PPT: Overnight ppt or fog:	9:18 AM	1:55 PM
15-Dec-09	Mortality Survey	Temp: -1-5°C Wind: 3-6 Cloud: Overcast PPT: Rain/Light Snow Overnight ppt or fog:	8:37 AM	1:08 PM
16-Dec-09	Mortality Survey	Temp: -2 to -5°C (windchill -16°C) Wind: 4-5 Cloud: Overcast PPT: Periods of Snow / Snowsqualls Overnight ppt or fog:	8:47 AM	1:51 PM
16-Dec-09	Waterfowl Morning Movement	Temp: -6°C Wind: 1-5 Cloud: Overcast PPT: Overnight ppt or fog:	7:15 AM	8:45 AM
16-Dec-09	Waterfowl Foraging	Temp: -2 to -5°C (windchill -16°C) Wind: 4-5 Cloud: Overcast PPT: Periods of Snow / Snowsqualls Overnight ppt or fog:	9:00 AM	3:00 PM
16-Dec-09	Waterfowl Aerial	Temp: -10 Wind: 1 Cloud: Overcast PPT: Overnight ppt or fog:		
16-Dec-09	Waterfowl Evening Movement	Temp: -5°C Wind: 4-5 Cloud: Overcast PPT: Periods of Snow / Rain Overnight ppt or fog:	3:40 PM	4:50 PM
17-Dec-09	Mortality Survey	Temp: -11 to -13°C (windchill -20°C) Wind: 2-4 Cloud: Partly PPT: Overnight ppt or fog:	10:04 AM	3:10 PM

Conditions Summary

Survey Date	Survey Type	Weather	Start Time	End Time
18-Dec-09	Mortality Survey	Temp: -12°C Wind: 4-6 Cloud: Partly/Overcast PPT: Overnight ppt or fog:	10:02 AM	2:40 PM
21-Dec-09	Mortality Survey	Temp: -3 to -4°C Wind: 1-3 Cloud: Partly PPT: Overnight ppt or fog:	11:20 AM	3:55 PM
22-Dec-09	Mortality Survey	Temp: -12 to -16°C (windchill -23°C) Wind: 3-4 Cloud: PPT: Overnight ppt or fog:	8:52 AM	12:52 PM
22-Dec-09	Short-eared Owl	Temp: -10 Wind: 3-4 Cloud: 5-10% PPT: Overnight ppt or fog:	3:25 PM	5:00 PM
23-Dec-09	Mortality Survey	Temp: -10°C to -4°C Wind: 1-3 Cloud: Partly PPT: Overnight ppt or fog:	9:07 AM	3:22 PM
23-Dec-09	Waterfowl Morning Movement	Temp: -10°C Wind: 1 Cloud: 10% PPT: Overnight ppt or fog:	7:20 AM	8:40 AM
23-Dec-09	Waterfowl Foraging/Winter Raptor	Temp: -10°C to -4°C Wind: 1-3 Cloud: Partly PPT: Overnight ppt or fog:	10:00 AM	12:45 PM
23-Dec-09	Waterfowl Evening Movement	Temp: -5°C Wind: 5 Cloud: 95% PPT: Overnight ppt or fog:	3:20 PM	4:50 PM
24-Dec-09	Mortality Survey	Temp: -4 to -2°C Wind: 2-4 Cloud: Partly PPT: Periods of Snow Overnight ppt or fog:	7:50 AM	1:04 PM
25-Dec-09	Mortality Survey	Temp: 0 to 1°C Wind: 3-4 Cloud: Overcast PPT: Overnight ppt or fog:	10:01 AM	12:54 PM
28-Dec-09	Mortality Survey	Temp: 0°C Wind: 3-4 Cloud: Overcast/Partly Cloudy PPT: Snow Overnight ppt or fog:	9:07 AM	3:05 PM
29-Dec-09	Mortality Survey	Temp: -13 to -17°C Wind: 2-4 Cloud: Partly PPT: Snow Overnight ppt or fog: Light Snow	9:02 AM	1:52 PM
30-Dec-09	Mortality Survey	Temp: -3°C Wind: 2-4 Cloud: Overcast PPT: Overnight ppt or fog:	11:29 AM	3:46 PM
31-Dec-09	Mortality Survey	Temp: 2°C Wind: 2-4 Cloud: Overcast PPT: Overnight ppt or fog:	9:09 AM	1:39 PM
07-Jan-10	Waterfowl Aerial	Temp: -10°C Wind: 2 Cloud: Overcast PPT: Overnight ppt or fog:		

Appendix E

Mortality Monitoring Results

Appendix E - Mortality Monitoring Results

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Condition/Estimated Time Since Death	Injuries Sustained	Distance and Direction to Turbine	Ground Cover
1-Jul-09	34	18 T 0384043 4887203	2	American Kestrel	fresh	wing/neck	1.2m; 185°	Gravel
1-Jul-09	78	18 T 0385246 4891010	1	Little Brown Bat	decayed/ +4 days	none evident	32m; east	Gravel
1-Jul-09	51	18 T 0387751 4890484	1	Barn Swallow	Maggot infested/ 2+ days	massive trauma	31m; east	Gravel
1-Jul-09	57	18 T 0389812 4891762	1	Big Brown Bat	Fresh/<1 day	none evident	23m; southwest	Gravel
2-Jul-09	16	18 T 0381303 4888725	2	Tree Swallow	partly decayed/ 2-3 days		56m; 332°	Soil
2-Jul-09	18	18 T 0381633 4888731	2	Tree Swallow - juvenile	partly decayed/ 2-3 days		23m; 70°	Gravel
3-Jul-09	31	18 T 0384879 4886162	3	Tree Swallow - juvenile	fresh/ 1-2 days	neck	23m; south	Gravel
3-Jul-09	5	18 T 0380602 4890671	3	Ring-billed Gull	scavenged/ 3-7 days		40m; east	Gravel
3-Jul-09	54	18 T 0387787 4889624	2	Big Brown Bat	fresh/ 1 day		46m; 329°	Gravel
6-Jul-09	2	18 T 0380923 4891139	2	Tree Swallow	Fresh/<1 day		53m; 130°	Soil
7-Jul-09	18	18 T 0381651 4888713	3	House Finch - juvenile	fresh/ 1-2 days	neck	1m; north	Soil
8-Jul-09	30	18 T 0384704 4886433	2	Tree Swallow	Old/>3 days		27m; 146°	Gravel
9-Jul-09	1	18 T 0381093 4890717	3	Hoary Bat	Fresh/1-2 days		1m; northeast 60°	Soil
10-Jul-09	69	18 T 0386233 4892206	1	Big Brown Bat	Fresh/<1 day	No visible trauma	32m; west	Shrubs/grass
10-Jul-09	15	18 T 0381583 4888231	3	Hoary Bat	Fresh/1-2 days		20m; southwest 218°	Gravel
10-Jul-09	42	18 T 0386274 4889088	2	Tree Swallow - juvenile	Fresh/<1 day		25m; southeast 110°	Soil
13-Jul-09	13	18 T 0382405 4890512	1	Tree Swallow	Fresh/1-2 days	Broken left wing	29m; east	Soil
14-Jul-09	1	18 T 0381091 4890698	3	Red-tailed Hawk	Fresh/1-2 days	Neck/wing	20m; north 20°	Soil
14-Jul-09	3	18 T 0380522 4891078	3	Hoary Bat	50% decomposed/2-7 days		18m; east 70°	
14-Jul-09	32	18 T 0385220 4886436	3	Black-billed Cuckoo	50% decomposed/2-3 days		43m; southeast 145°	
14-Jul-09	47	18 T 0390453 4890505	2	Tree Swallow - juvenile	Fresh/1-2 days	Neck	15m; northwest 28°	Gravel
15-Jul-09	57	18 T 0389824 4891794	2	Big Brown Bat	Old and dry/+3 days		8m; southeast 166°	Soil
16-Jul-09	7	18 T 0380573 4889749	2	Little Brown Bat	Very good/1 day		13m; southeast 146°	Soil
16-Jul-09	10	18 T 0381228 4890178	2	Tree Swallow - juvenile	Poor/2-3 days		44m; north east 38°	Soil
16-Jul-09	62	18 T 0389695 4893996	1	Tree Swallow - juvenile	Dessicated/ >5 days	Chest/wing trauma	40m; north	Rock
16-Jul-09	59	18 T 0389125 4892814	1	Tree Swallow - juvenile	Dessicated/ >5 days	Chest/wing trauma	11m; west	Rock
16-Jul-09	17	18 T 0381077 4889007	1	Tree Swallow - juvenile	Fresh/2 days	Broken neck	29m; northeast	Soil
20-Jul-09	1	18 T 0381122 4890724	1	Tree Swallow - juvenile	Dessicated/ >5 days		25m; east	Soil
20-Jul-09	85	18 T 0381889 4892271	2	European Starling	Very very old/>1 week		<1m; south 196°	Gravel
21-Jul-09	17	18 T 0381081 4888955	2	Tree Swallow - juvenile	Old/2-3 days		26m; north 346°	Soil
21-Jul-09	49	18 T 0388631 4890418	1	Eastern Red Bat	Fresh/<1 day	No visible trauma	17m; north	Gravel
22-Jul-09	29	18 T 0384757 4886897	2	Tree Swallow	Very old/7 days		32m; southwest 226°	Soil
22-Jul-09	52	18 T 0385812 4890208	1	Tree Swallow - juvenile	Fresh/1-2 days	Left wing	30m; northeast	Gravel
23-Jul-09	2	18 T 0380958 4891108	1	Big Brown Bat	Fresh/1-2 days		7m; east 78°	Gravel
24-Jul-09	17	18 T 0381070 4889011	2	Swallow sp.	Old/4 days		30m; south 198°	Soil
24-Jul-09	50	18 T 0388177 4890580	2	Tree Swallow - juvenile	Old/3 days		28m; east 70°	Gravel
27-Jul-09	14	18 T 0382177 4890930	2	Bobolink	Good/2 days	Wing?	25m; south 170°	Soil
27-Jul-09	48	18 T 0389198 4889718	1	Yellow Warbler - Female	Fresh/1-2 days	Broken neck?	22m; south 197°	Gravel
28-Jul-09	29	18 T 0384740 4886872	1	Eastern Kingbird	Fresh/2-4 days	Broken neck?	1m; south 176°	Soil
29-Jul-09	50	18 T 0388211 4890583	3	Little Brown Bat	Fresh/1-2 days		15m; northwest 33°	Gravel
29-Jul-09	49	18 T 0388631 4890435	3	Hoary Bat	Fresh/1-2 days		30m; south 170°	Gravel
29-Jul-09	64	18 T 0388506 4893718	2	Big Brown Bat	Fresh/<1 day		16m; east 93°	Gravel
29-Jul-09	24	18 T 0382736 4890042	2	Bat sp.	Old/7 days	Under transformer	1m; northwest	Cement
29-Jul-09	35	18 T 0384237 4887869	2	Bat sp.	Fresh/<1 day		29 m south 168°	Soil
30-Jul-09	10	18 T 0381238 4890180	3	Bobolink	Fresh/1-2 days	Neck/wing	37m; north 10°	Soil
31-Jul-09	5	18 T 0380674 4890641	2	Cedar Waxwing	Old/>7 days		34m; northwest 296°	Soil/veg
31-Jul-09	29	18 T 0384760 4886883	2	Bobolink	Fresh/>2 days		24m; southwest 250°	Soil
31-Jul-09	30	18 T 0384710 4886446	2	Eastern Red Bat	Old/5 days		37m; south 170°	Dirt

Appendix E - Mortality Monitoring Results

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Condition/Estimated Time Since Death	Injuries Sustained	Distance and Direction to Turbine	Ground Cover
31-Jul-09	30	18 T 0384736 4886380	2	Tree Swallow	Old/3-4 days		29m; north 350°	Gravel
31-Jul-09	74	18 T 0384451 4892941	2	Big Brown Bat	Fresh/<1 day	Wing	7m; northwest 334°	Soil
31-Jul-09	76	18 T 0384458 4892176	2	Eastern Red Bat	Fresh/<1 day		44m; south 160°	Gravel
3-Aug-09	65	18 T 0387713 4892960	1	Eastern Red Bat	Fresh/1-2 days	No visible trauma	26m; south 197°	Gravel
3-Aug-09	64	18 T 0388530 4893722	1	Big Brown Bat	Fresh/1-2 days	No visible trauma	2m; southwest 224°	Soil
3-Aug-09	64	18 T 0388545 4893720	1	Big Brown Bat	Maggot-filled/3-5 days		22m; northwest 298°	Soil
3-Aug-09	44	18 T 0390355 4891168	1	Bat sp.	Dessicated/5+ days	No visible trauma	28m; southwest 198°	Soil
3-Aug-09	39	18 T 0387310 4887603	1	Eastern Red Bat	Putrefied/??		28m; southwest 230°	Soil
4-Aug-09	61	18 T 0390010 4894162	1	Hoary Bat	Dessicated/5+ days		8m; south 160°	Gravel
4-Aug-09	62	18 T 0386955 4893182	1	Hoary Bat	Fresh/1-3 days	Mashed	26m; south 200°	Gravel
4-Aug-09	70	18 T 0386877 4893980	1	Eastern Red Bat	Fresh/1-3 days	No visible trauma	27m; south 170°	Gravel
4-Aug-09	70	18 T 0386878 4893969	1	Hoary Bat	Fresh/1-3 days	Wing	17m; south 175°	Gravel
4-Aug-09	20	18 T 0381810 4889268	1	Eastern Red Bat	Fresh/1-3 days		17m; southwest 205°	Gravel
4-Aug-09	15	18 T 0381598 4888211	1	Bobolink	Decomposed/5+ days		27m; northwest 200°	Grass
4-Aug-09	16	18 T 0381262 4888699	1	Hoary Bat	Fresh/1-3 days	Broken wing	18m; southwest 230°	Gravel
4-Aug-09	16	18 T 0381262 4888690	1	Hoary Bat	Fresh/1-3 days		11m; west 280°	Gravel
4-Aug-09	8	18 T 0381183 4889718	2	Hoary Bat	Fresh/<1 day		20m; south 170°	Gravel
4-Aug-09	12	18 T 0381836 4890298	2	Little Brown Bat	Fresh/<1 day		22m; north 2°	Soil
4-Aug-09	51	18 T 0387745 4890464	2	Tree Swallow	Old/~5 days		23m; northwest 320°	Soil
4-Aug-09	51	18 T 0387756 4890487	2	Hoary Bat	Fresh/<1 day		31m; west 266°	Gravel
5-Aug-09	47	18 T 0390425 4890534	2	Hoary Bat	Fresh/<1 day		27m; south 174°	Soil/Old vegetation
5-Aug-09	59	18 T 0389101 4892843	2	Bat sp.	Old/>3 days	Just a wing	43m; southeast 140°	Gravel
5-Aug-09	63	18 T 0388744 4893420	2	Little Brown Bat	Fresh/<2 days		26m; east 127°	Gravel
5-Aug-09	63	18 T 0388748 4893419	2	Big Brown Bat	Fresh/<2 days		21m; east 111°	Gravel
5-Aug-09	13	18 T 0382379 4890534	3	Hoary Bat	Fresh/1-2 days		13m; south 180°	Gravel
6-Aug-09	1	18 T 0381086 4890717	2	Upland Sandpiper	Fresh/<12 hours	Neck/body	6m; east 82°	Soil
6-Aug-09	74	18 T 0384463 4892951	2	Tree Swallow	Fresh/<12 hours	Neck	13m; west 248°	Gravel
6-Aug-09	77	18 T 0384477 4892171	2	Tree Swallow	Old/>3 days	Wing	30m; south 188°	Soil
7-Aug-09	17	18 T 0381085 4888991	2	Tree Swallow	Fresh/1-2 days		23m; west 250°	Gravel
7-Aug-09	17	18 T 0381088 4888975	2	Little Brown Bat	Fresh/<1 day		20m; west 290°	Soil
10-Aug-09	66	18 T 0386955 4893210	3	Hoary Bat	Fresh/1-2 days	No visible trauma	18m; east 100°	Gravel
10-Aug-09	40	18 T 0388145 4891440	3	Hoary Bat	Fresh/1-2 days	Broken wing	36m; southwest 245°	Gravel
10-Aug-09	40	18 T 0388009 4886975	3	Hoary Bat	Decomposed/>5 days		15m; north 30°	Soil
10-Aug-09	41	18 T 0387572 4886698	3	Hoary Bat	Fresh/1-2 days	No visible trauma	22m; east 70°	Soil
10-Aug-09	41	18 T 0387598 4886694	3	Bat sp.	Maggot filled/3-5 days		33m; north 1°	Barley field - soil
10-Aug-09	52	18 T 0387188 4890652	3	Little Brown Bat	Dessicated/>7 days		26m; north 20°	Gravel
10-Aug-09	4	18 T 0380277 4890674	2	Little Brown Bat	Old/>2 days		25m; north 335°	Soil
10-Aug-09	6	18 T 0380768 4889454	2	Bat sp.	Very old/>4 days		40m; south 170°	Soil
10-Aug-09	8	18 T 0381183 4889668	2	Swallow sp.	Very old/>4 days		30m; north 36°	Soil
10-Aug-09	59	18 T 0389145 4892831	3	Tree Swallow	Fresh/1-3 days		2m; south 167°	Gravel
11-Aug-09	46	18 T 0389918 4890722	3	Bat sp.	Fresh/1-3 days		6m; south 160°	Gravel
11-Aug-09	45	18 T 0389916 4890730	3	Bat sp.	Maggot filled/3-5 days		26m; northwest 230°	Gravel
11-Aug-09	30	18 T 0390020 4891232	3	Bat sp.	Dessicated/>5 days		26m; south 175°	Soil
11-Aug-09	5	18 T 0380630 4890670	2	Eastern Red Bat	Old/>3 days		19m; south 160°	Gravel
11-Aug-09	27	18 T 0382284 4891345	2	Turkey Vulture	Old/>3 days		49m; west 246°	Soil/veg
11-Aug-09	27	18 T 0382263 4891334	2	Hoary Bat	New/<2 days		27m; west 241°	Gravel
11-Aug-09	77	18 T 0384458 4892139	2	Bobolink	Old/>4 days		27m; east 110°	Soil
12-Aug-09	33	18 T 0384495 4887253	2	Purple Martin	Old/>3 days		14m; west 226°	Soil

Appendix E - Mortality Monitoring Results

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Condition/Estimated Time Since Death	Injuries Sustained	Distance and Direction to Turbine	Ground Cover
12-Aug-09	33	18 T 0384495 4887243	2	Eastern Red Bat	Fresh/<1 day		9m; west 237°	Soil
12-Aug-09	36	18 T 0388886 4887332	3	Silver-haired Bat	Fresh/1-2 days	Wing/neck	16m; west northwest 295°	Soil
12-Aug-09	37	18 T 0388809 4887752	3	Hoary Bat	Fresh/1-2 days	Wing	46m; north 340°	Soil
12-Aug-09	51	18 T 0387744 4890503	3	Silver-haired Bat	Old/3-4 days		31m; south southwest 210°	Gravel
12-Aug-09	65	18 T 0387713 4892935	3	Purple Martin	Fresh/1-2 days	Wing	16m; south 180°	Gravel
13-Aug-09	10	18 T 0381259 4890211	2	Little Brown Bat	Fresh/<1 day		9m; north 303°	Soil/veg
13-Aug-09	6	18 T 0380782 4889408	2	Silver-haired Bat	New/<2 days		7m; north 43°	Soil
13-Aug-09	12	18 T 0381842 4890316	3	Silver-haired Bat	Fresh/1-2 days	Wing	7m; west northwest 300°	Soil
14-Aug-09	29	18 T 0384762 4886885	1	American Robin	Fresh/1-3 days		30m; southwest 220°	Soil
14-Aug-09	29	18 T 0384749 4886880	1	Silver-haired Bat	Fresh/1-3 days	Broken wing	14m; south 199°	Soil
14-Aug-09	66	18 T 0388168 4891497	1	Turkey Vulture	Dessicated/>5 days	Neck	50m; south 190°	Hedgerow
14-Aug-09	3	18 T 0380563 4891104	2	Silver-haired Bat	Fresh/<1 day		27m; southwest 223°	Veg/Soil
14-Aug-09	13	18 T 0382393 4890516	2	Silver-haired Bat	Fresh/<1 day		15m; west 274°	Soil
14-Aug-09	79	18 T 0384849 4889368	2	Silver-haired Bat	Fresh/<1 day		15m; northeast 61°	Gravel
14-Aug-09	76	18 T 0383915 4893022	2	Eastern Red Bat	New/<2 days		27m; north 6°	Soil
14-Aug-09	74	18 T 0384456 4892961	2	Eastern Red Bat	Fresh/<1 day		13m; southwest 212°	Gravel
14-Aug-09	77	18 T 0384495 4892124	2	Tree Swallow - juvenile	Fresh/<1 day		16m; north 337°	Soil
14-Aug-09	74	18 T 0384451 4892952	2	Hoary Bat	Old/<3 days		6m; 226°	Soil
14-Aug-09	79	18 T 0384839 4889371	2	Hoary Bat	Fresh/<1 day		18M; east 89°	Gravel
15-Aug-09	15	18 T 0381580 4888222	3	Little Brown Bat	Fresh/<1 day		8m; southwest 243°	Gravel
15-Aug-09	85	18 T 0381924 4892284	3	Hoary Bat	Fresh/<1 day		42m; west 261°	Soil
15-Aug-09	35	18 T 0384272 4887828	3	Big Brown Bat	Old/≥3 days		25m; north 332°	Gravel
16-Aug-09	69	18 T 0386251 4892235	3	Big Brown Bat	Old/at least 2-3 days		2-3m; north 359°	Gravel
16-Aug-09	46	18 T 0389923 4890719	3	Bat sp.	Old/>3 days	Just wings	9m; south 220°	Soil
17-Aug-09	36	18 T 0388874 4887348	1	Red bat	Still alive		5m; south 220°	Soil
17-Aug-09	36	18 T 0388896 4887350	1	Hoary Bat	Fresh/1-3 days		27m; west 270°	Soil
17-Aug-09	37	18 T 0388818 4887800	1	Cedar Waxwing	Fresh/1-3 days	Head trauma	1m; north 35°	Gravel
17-Aug-09	64	18 T 0388794 4887780	1	Hoary Bat	Fresh/1-3 days		17m; south 160°	Sand
17-Aug-09	44	18 T 0388510 4893736	1	Purple Martin - juvenile	Maggot filled/3-5 days		24m; south 200°	Soil
17-Aug-09	78	18 T 0386911 4893194	1	Little Brown Bat	Fresh/1-3 days		27m; west 310°	Soil
17-Aug-09	27	18 T 0382245 4891307	2	Silver-haired Bat	Old/>4 days		9m; north 350°	Soil
17-Aug-09	33	18 T 0384496 4887235	2	Eastern Red Bat	Fresh/<2 days		8m; west 263°	Soil
17-Aug-09	34	18 T 0384036 4887218	2	Hoary Bat	Fresh/<1 day		17m; south 154°	Soil
17-Aug-09	27	18 T 0382216 4891337	2	Silver-haired Bat	Old/>3 days		22m; south 159°	Soil
17-Aug-09	27	18 T 0382218 4891332	2	Big Brown Bat	Old/>3 days		25m; southeast 127°	Soil
17-Aug-09	27	18 T 0382224 4891332	2	Bank Swallow	Old/3-4 days		21m; southeast 141°	Soil
17-Aug-09	34	18 T 0384048 4887201	2	Eastern Kingbird	Fresh/1-2 days		5m; north 343°	Soil
18-Aug-09	49	18 T 0390341 4891158	1	Eastern Red Bat	Fresh/1-3 days		26m; south 160°	Gravel
18-Aug-09	61	18 T 0390341 4891158	1	Bat sp.	Fresh/1-3 days	Broken wing	8m; south 200°	Soil
18-Aug-09	61	18 T 0390041 4894154	1	Bat sp.	Fresh/1-3 days		18m; west 270°	Soil
18-Aug-09	62	18 T 0389728 4893961	1	Bat sp.	Dessicated/>5 days		1m; south 140°	Rock
18-Aug-09	70	18 T 0389704 4893986	1	Hoary Bat	Dessicated/>5 days	Broken wing	31m; south 190°	Gravel
18-Aug-09	70	18 T 0386876 4893972	1	Bat sp.	Dessicated/>5 days		12m; south 190°	Gravel
18-Aug-09	15	18 T 0381605 4888267	2	Hoary Bat	Old/>3 days		58m; southwest 235°	Soil
18-Aug-09	15	18 T 0381585 4888217	2	Hoary Bat	Very old/>4 days		13m; west 263°	"B" Gravel
18-Aug-09	15	18 T 0381622 4888232	2	Hoary Bat	New/1-2 days		50m; west 260°	Soil/Veg
19-Aug-09	47	18 T 0390445 4890491	3	Hoary Bat	Fresh/1-2 days		18m; northwest 320°	Soil
19-Aug-09	56	18 T 0385832 4890219	3	Silver-haired Bat	Old/3-5 days		14m; north 20°	Gravel

Appendix E - Mortality Monitoring Results

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Condition/Estimated Time Since Death	Injuries Sustained	Distance and Direction to Turbine	Ground Cover
20-Aug-09	75	18 T 0384539 4892615	2	Hoary Bat	Very old/>3 days		28m; west 300°	Soil
21-Aug-09	49	18 T 0388652 4890407	2	Hoary Bat	New/1-2 days		19m; west 284°	Soil
24-Aug-09	48	18 T 0386878 4893979	1	Hoary Bat	Fresh/1-3 days	Trauma to body	25m; east 90°	Grass
24-Aug-09	41	18 T 0387581 4886730	1	Hoary Bat	Fresh/1-3 days		1m; south 180°	Soil
24-Aug-09	41	18 T 0387568 4886698	1	Silver-haired Bat	Fresh/1-3 days	No visible trauma	33m; 70°	Soil
24-Aug-09	79	18 T 0387590 4886741	1	Silver-haired Bat	Fresh/1-3 days	No visible trauma	26m; 90°	Gravel
24-Aug-09	80	18 T 0384847 4889390	1	Eastern Red Bat	Fresh/1-3 days	Broken wing	21m; 290°	Soil
24-Aug-09	80	18 T 0384293 4889936	1	Eastern Red Bat	Fresh/1-3 days	No visible trauma	31m; 290°	Soil
24-Aug-09	9	18 T 0380934 4890053	2	Silver-haired Bat	Fresh/<1 day		36m; west 277°	Gravel
24-Aug-09	9	18 T 0380910 4890039	2	Hoary Bat	Old/>4 days		17m; northwest 305°	Gravel
24-Aug-09	12	18 T 0381813 4890326	2	Horned Lark	Old/>4 days		19m; east 107°	Soil/Veg
25-Aug-09	32	18 T 0385266 4886397	1	Silver-haired Bat	Decomposing/3-5 days	Broken wing	22m; west 290°	Grass
25-Aug-09	32	18 T 0385254 4886421	1	Hoary Bat	Fresh/1-3 days	No visible trauma	23m; south 220°	Soil
25-Aug-09	31	18 T 0385238 4886411	1	Hoary Bat	Fresh/1-3 days	No visible trauma	<1m; south 168°	Tower base
25-Aug-09	47	18 T 0384881 4886164	1	Bat sp.	Dessicated/>5 days		17m; south 170°	Soil
25-Aug-09	58	18 T 0390461 4890499	1	Hoary Bat	Maggoty/3-5 days		12m; south 200°	Soil
25-Aug-09	54	18 T 0389392 4892160	1	Silver-haired bat	Fresh/1-3 days	No visible trauma	29m; north 340°	Gravel
25-Aug-09	43	18 T 0390548 4891540	1	Eastern Red Bat	Fresh/1-3 days		9m; south 200°	Soil
25-Aug-09	43	18 T 0390550 4891514	1	Eastern Red Bat	Fresh/1-3 days	Broken wing	22m; east 64°	Soil
25-Aug-09	44	18 T 0390362 4891146	1	Silver-haired Bat	Fresh/1-3 days	No visible trauma	17m; north 300°	Soil
25-Aug-09	46	18 T 0389931 4890687	1	Hoary Bat	Fresh/1-3 days	No visible trauma	22m; north 346°	Soil
25-Aug-09	74	18 T 0384468 4892948	2	Eastern Red Bat	Old/2-3 days		18m; west 270°	Gravel
25-Aug-09	1	18 T 0381113 4890726	2	Hoary Bat	Very old/>4 days		16m; west 248°	Soil
25-Aug-09	3	18 T 0380524 4891078	2	Silver-haired Bat	Very old/>4 days		18m; east 90°	Gravel
25-Aug-09	74	18 T 0384450 4892951	2	Eastern Red Bat	Fresh/<1 day		3m; southwest 223°	Gravel
26-Aug-09	37	18 T 0389910 4890705	1	Eastern Red Bat	Maggot filled/3-5 days	No visible trauma	16m; east 60°	Soil
26-Aug-09	37	18 T 0388784 4887790	1	Silver-haired Bat	Decomposed/3-5 days	Broken wing	22m; east 90°	Soil
26-Aug-09	37	18 T 0388822 4887768	1	Bat sp.	Maggot filled/3-5 days	Broken wing	36m; north 330°	Soil
26-Aug-09	36	18 T 0388877 4887359	1	Hoary Bat	Fresh/1-3 days	No visible trauma	13m; southwest 220°	Soil
26-Aug-09	36	18 T 0388897 4887334	1	Bat sp.	Dessicated/>5 days		26m; north 270°	Soil
26-Aug-09	51	18 T 0387751 4890470	1	Hoary Bat	Fresh/1-3 days	Broken wing	25m; north 30°	Soil
26-Aug-09	50	18 T 0388227 4890579	1	Bat sp.	Decomposed/3-5 days	No visible trauma	29m; north 320°	Soil
26-Aug-09	50	18 T 0388191 4890588	1	Eastern Red Bat	Fresh/1-3 days	No visible trauma	17m; east 80°	Gravel
26-Aug-09	50	18 T 0388195 4890585	1	Silver-haired Bat	Fresh/1-3 days	Broken wing	17m; east 70°	Gravel
26-Aug-09	70	18 T 0386954 4893182	1	Hoary Bat	Maggot filled/3-5 days	Broken wing	22m; north 40°	Soil
26-Aug-09	33	18 T 0384485 4887230	2	Eastern Red Bat	Old/>3 days		5m; northeast 33°	Soil/veg
26-Aug-09	35	18 T 0384268 4887841	2	Silver-haired Bat	Newer/1-2 days		13m; west 272°	Soil
26-Aug-09	38	18 T 0387307 4888086	2	Hoary Bat	Old/2-3 days		31m; southwest 240°	Soil
26-Aug-09	42	18 T 0386299 4889075	2	Eastern Red Bat	New/<1 day		6m; north 30°	Soil
26-Aug-09	78	18 T 0385214 4891013	2	Eastern Red Bat	Newer/1-2 days		12m; south 188°	Gravel
26-Aug-09	82	18 T 0383110 4893047	2	Hoary Bat	Old/2-3 days		36m; west 250°	Gravel
26-Aug-09	82	18 T 0383092 4893023	2	Killdeer	Newer/1-2 days	Neck	14m; 302°	Gravel
26-Aug-09	82	18 T 0383079 4893031	2	Eastern Red Bat	Newer/1-2 days		2-3m; southwest 213°	Soil
27-Aug-09	4	18 T 0380277 4890667	2	Eastern Red Bat	New/<1 day		24m; northwest 337°	Soil
27-Aug-09	6	18 T 0380802 4889400	2	Hoary Bat	Old/2-3 days		22m; northwest 311°	Soil
27-Aug-09	7	18 T 0380616 4889721	2	Silver-haired Bat	Old/2-3 days		34m; northwest 320°	Soil/veg
27-Aug-09	9	18 T 0380897 4890053	2	Bobolink	Newer/1-2 days	Blindness/Neck	0m; south 160°	Concrete
27-Aug-09	15	18 T 0381589 4888231	2	Hoary Bat	Old/2-3 days		23m; southwest 223°	Gravel

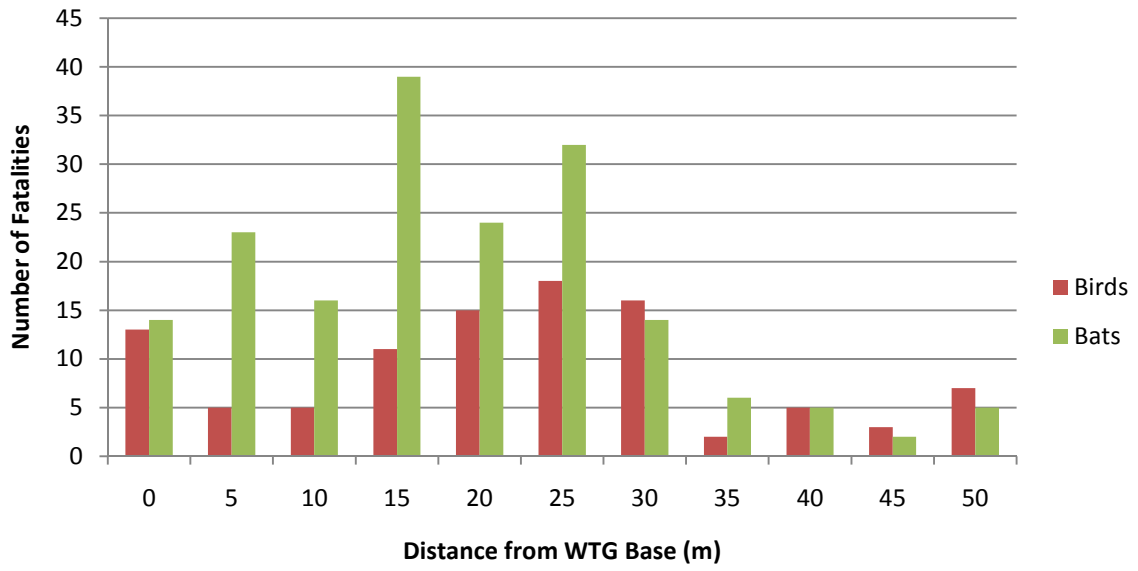
Appendix E - Mortality Monitoring Results

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Condition/Estimated Time Since Death	Injuries Sustained	Distance and Direction to Turbine	Ground Cover
27-Aug-09	19	18 T 0382095 4888664	2	Silver-haired Bat	New/<1 day		19m; west 255°	Gravel
27-Aug-09	19	18 T 0382091 4888660	2	Bobolink	Old/<4 days		18m; west 282°	Gravel
27-Aug-09	40	18 T 0386340 4894071	1	Little Brown Bat	Fresh/1-3 days	Broken wing	9m; north 285°	Soil
27-Aug-09	40	18 T 0388011 4886997	1	Hoary Bat	Fresh/1-3 days	Broken wing	9m; south 200°	Gravel
28-Aug-09	47	18 T 0388018 4886991	1	Hoary Bat	Decomposed/3-5 days	Broken wing	34m; west 350°	Soil
28-Aug-09	47	18 T 0388018	1	Silver-haired Bat	Fresh/1-3 days	No visible trauma	12m; east 128°	Soil
28-Aug-09	29	18 T 0390447 4890503	1	Tree Swallow	Dried/>5 days	Found head only	30m; east 130°	Soil
28-Aug-09	81	18 T 0384106 4890350	2	Silver-haired Bat	Old/2-3 days	Wing	50m; east 70°	Soil
28-Aug-09	76	18 T 0383903 4893022	2	Hoary Bat	Very old/>4 days		26m; north 25°	Soil/veg
31-Aug-09	27	18 T 0382278 4891318	3	Silver-haired Bat	Fresh/<1 day		39m; west 280°	Gravel
31-Aug-09	28	18 T 0382118 4891635	3	Merlin	Old/2-3 days		27m; west 346°	Veg/Soil
31-Aug-09	28	18 T 0382133 4891687	3	American Kestrel	Old/4-5 days	Neck	33m; north 25°	Veg/Soil
1-Sep-09	6	18 T 0380777 4889435	2	Eastern Red Bat	New/1-2 days		23m; south 180°	Gravel
1-Sep-09	7	18 T 0380608 4889734	2	Silver-haired Bat	Old/3-4 days		22m; northwest 307°	Soil
2-Sep-09	48	18 T 0389196 4889693	3	Little Brown Bat	Fresh/<1 day		3m; north 10°	Soil/Veg
2-Sep-09	79	18 T 0384852 4889359	3	Silver-haired Bat	Fresh/<1 day		20m; north 27°	Soil/Veg
2-Sep-09	81	18 T 0384153 4890410	3	Eastern Red Bat	Fresh/<1 day		40m; south 178°	Soil
2-Sep-09	72	18 T 0385864 4892983	1	Barn Swallow	Decomposed/3-5 days		32m; west 260°	Soil
2-Sep-09	29	18 T 0384729 4886853	1	Silver-haired Bat	Fresh/1-3 days		27m; west 264°	Soil
3-Sep-09	1	18 T 0381108 4890686	3	Brown-headed Cowbird	Fresh/1 day	Neck?	33m; north 340°	Soil
3-Sep-09	33	18 T 0384490 4887231	3	Eastern Red Bat	Fresh/1 day		5m; west 238°	Soil
3-Sep-09	77	18 T 0384474 4892170	2	Eastern Red Bat	Fresh/<1 day		34m; south 180°	Gravel
4-Sep-09	51	18 T 0387730 4890514	3	Purple Martin - juvenile	Fresh/1 day	Neck	39m; south 188°	Soil
4-Sep-09	50	18 T 0388213 4890574	3	Eastern Red Bat	Fresh/1 day		25m; north 335°	Soil
4-Sep-09	57	18 T 0389798 4891793	3	Purple Martin juvenile	Fresh/1 day	Wing	30m; east 105°	Soil
4-Sep-09	67	18 T 0386819 4891241	3	Tree Swallow - juvenile	Fresh/1 day	Neck	17m; north 330°	Soil
4-Sep-09	70	18 T 0386874 4893955	3	Hoary Bat	Old/>3-4 days		10m; east 89°	Soil
4-Sep-09	51	18 T 0387935 4890464	3	American Robin	Fresh/1 day	Neck	16m; northwest 315°	Soil
4-Sep-09	70	18 T 0386867 4893961	3	Hoary Bat	Old/>3-4 days		18m; east 108°	Gravel
4-Sep-09	18	18 T 0381644 4888742	2	Calidris sp.	Fresh/<1 day	Wing	28m; south 180°	Gravel/Veg
4-Sep-09	20	18 T 0381822 4889266	2	Eastern Red Bat	Fresh/<1 day		22m; southwest 235°	Gravel
7-Sep-09	79	18 T 0385826 4892977	1	Eastern Red Bat	Dessicated/>5 days	Broken wing	4m; west 220°	Soil
7-Sep-09	81	18 T 0384109 4890354	1	Bat sp.	Dessicated/>5 days		50m; east 92°	Soil
7-Sep-09	42	18 T 0386299 4889091	1	Silver-haired Bat	Fresh/1-3 days		4m; south 186°	Soil
7-Sep-09	41	18 T 0387581 4886714	1	Eastern Red Bat	Dessicated/>5 days		11m; north 20°	Soil
7-Sep-09	66	18 T 0388160 4891447	1	European Starling	Maggot-filled/3-5 days		19m; west 290°	Grass
7-Sep-09	59	18 T 0389120 4892826	1	Hoary Bat	Fresh/1-3 days	Broken wing	17m; south 150°	Gravel
7-Sep-09	14	18 T 0382173 4890935	2	Tree Swallow - juvenile	Fresh/<1 day		31m; south 163°	Soil
7-Sep-09	13	18 T 0382372 4890501	2	Silver-haired Bat	Fresh/<1 day		15m; north 25°	Soil/Veg
7-Sep-09	7	18 T 0380581 4889710	2	Eastern Red Bat	Fresh/<1 day		30m; north 13°	Soil/Veg
8-Sep-09	27	18 T 0382231 4891314	2	Silver-haired Bat	Old/2-3 days		9m; northeast 75°	Soil
8-Sep-09	75	18 T 0384506 4892644	2	Eastern Red Bat	Old/2-3 days		17m; south 167°	Soil/Veg
8-Sep-09	44	18 T 0390348 4891152	3	Silver-haired Bat	Fresh/1 day		1m; west 265°	Soil
8-Sep-09	47	18 T 0390431 4890524	3	Hoary Bat	Old/>3 days		17m; south 158°	Soil
8-Sep-09	55	18 T 0387543 4889926	3	Silver-haired Bat	Fresh/1 day		16m; west 235°	Gravel
8-Sep-09	32	18 T 0385257 4886395	3	Eastern Red Bat	Fresh/1 day		11m; west 275°	Soil
9-Sep-09	82	18 T 0383078 4893010	2	Eastern Red Bat	Old/2-3 days		18m; north 10°	Soil
9-Sep-09	57	18 T 0389829 4891813	1	Tree Swallow - juvenile	Fresh/1-3 days		16m; south 230°	Soil

Appendix E - Mortality Monitoring Results

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Condition/Estimated Time Since Death	Injuries Sustained	Distance and Direction to Turbine	Ground Cover
9-Sep-09	71	18 T 0386356 4894027	1	Purple Martin - juvenile	Fresh/1-3 days		23m; west 300°	Soil
9-Sep-09	70	18 T 0386872 4893933	1	Purple Martin - juvenile	Decomposed/3-5 days	Broken neck	26m; north 60°	Grass
9-Sep-09	70	18 T 0386870 4893968	1	Silver-haired Bat	Fresh/1-3 days		16m; east 140°	Gravel
10-Sep-09	41	18 T 0387568 4886750	2	Savannah Sparrow	Old/2-3 days		28m; south 175°	Soil
10-Sep-09	9	18 T 0386957 4893182	1	Eastern Red Bat	Dessicated/>5 days		52m; north 350°	Gravel
10-Sep-09	4	18 T 0386957 4893182	1	Bobolink	Dessicated/>5 days		20m; south 230°	Soil
11-Sep-09	29	18 T 0384756 4886866	2	Eastern Red Bat	Old/3 days		18m; west 271°	Soil
14-Sep-09	35	18 T 0384237 4887847	2	Silver-haired Bat	Very old/3-4 days		19m; southeast 118°	Soil
14-Sep-09	42	18 T 0386294 4889082	2	Tennessee Warbler	Old/2-3 days	Neck?	1-2m; north 20°	Gravel
14-Sep-09	42	18 T 0386315 4889079	2	Red-eyed Vireo	Fresh/<1 day		16m; west 300°	Soil
14-Sep-09	82	18 T 0383373 4893918	1	Eastern Red Bat	Fresh/1-3 days		26m; north 310°	Soil
15-Sep-09	66	18 T 0383046 4893048	1	Chestnut-sided Warbler	Fresh/1-3 days		26m; east 68°	Gravel
17-Sep-09	37	18 T 0383046 4893048	1	Eastern Red Bat	Fresh/1-3 days	Broken wing	21m; south 136°	Soil
17-Sep-09	37	18 T 0388804 4887797	1	Bat sp.	Dessicated/>5 days		25m; west 266°	Soil
21-Sep-09	8	18 T 0381180 4889687	2	Bird sp.	Old/2-3 days		13m; northeast 65°	Soil/Veg
21-Sep-09	22	18 T 0382307 4892841	3	Brown-headed Cowbird	Fresh/1 day	Wing?	9m; east 110°	Gravel
21-Sep-09	40	18 T 0388771 4887788	1	Domestic Pigeon	Fresh/1-3 days		21m; north 320°	Soil
23-Sep-09	57	18 T 0388020 4887013	1	Mourning Dove	Dessicated/>5 days		20m; north 10°	Grass
23-Sep-09	34	18 T 0384064 4887219	3	Purple Finch	Fresh/1-2 days	Neck?	21m; southwest 240°	Gravel
30-Sep-09	52	18 T 0387187 4890680	2	Red Bat	New/1-2 days		2m; north 344°	Metal stairs
30-Sep-09	22	18 T 0389813 4891788	1	Turkey Vulture	Decomposed/>7 days		40m; north 320°	Soybeans
1-Oct-09	74	18 T 0382250 4889680	1	Red-eyed Vireo	Cooler temps - reasonably fresh/3-5 days		9m; north 10°	Soil
2-Oct-09	39	18 T 0388462 4892950	1	Killdeer	Fresh/1-3 days	Neck trauma	6m; south 175°	Soil
8-Oct-09	11	18 T 0386978 4893229	1	Northern Flicker	Decomposed / >7 days		31m; north 325°	Tall grass
13-Oct-09	9	18 T 0380928 4890044	2	Golden-crowned Kinglet	Fresh/1-2 days	Neck?	29m; northwest 300°	Gravel
15-Oct-09	34	18 T 0381582 4889992	1	Mourning Dove	Fresh/1-3 days		1m; south 210°	Soil
15-Oct-09	34	18 T 0381582 4889992	1	Mourning Dove	Scavenged/>5 days		1m; south 210°	Soil
20-Oct-09	44	18 T 0390318 4891188	2	Blue-headed Vireo	Fresh/1-2 days		50m; south 160°	Gravel
22-Oct-09	6	18 T 0380770 4889420	2	Brown Creeper	Fresh/1-2 days		16m; southeast 128°	Gravel
23-Oct-09	83	18 T 0382823 4892624	2	Brown-headed Cowbird	Old/3 days		2m; north 340°	Gravel
26-Oct-09	34	18 T 0384044 4887209	2	Mourning Dove	Fresh/<1 day	Neck	<1m; southeast 140°	Soil/Veg
29-Oct-09	34	18 T 0384040 4887209	3	Mourning Dove	Fresh/1-2 days	Neck	1m; south 166°	Soil
3-Nov-09	77	18 T 0384524 4892143	3	Turkey Vulture	Fresh / 1-2 days		39m; west 278°	Grass
9-Nov-09	86	18 T 0384054 4887208	1	Turkey Vulture	Fully decomposed		59m; south 200°	Soybean crop/field
11-Nov-09	58	18 T 0389345 4892212	2	Red-tailed Hawk	Fresh / 2 days	Wing	50m; south 160°	Long grass
13-Nov-09	57	18 T 0389841 4891764	2	Bird sp.	Good / 1-2 days		22m; north 340°	Soil / Vegetation
17-Nov-09	54	18 T 0387662 4887600	3	Red-tailed Hawk	Fresh / 1-2 days	Neck	47m; east 112°	Vegetation
18-Nov-09	85	18 T 0381867 4892293	3	Turkey Vulture	Scavenged / at least 7 days		49m; south 160°	Grass
24-Nov-09	7	18 T 0380583 4889788	2	Bird sp.	Old / at least 4 days		54m; south 180°	Field/Vegetation
23-Dec-09	60	18 T 0388816 4893028	2	European Starling	Good / 2-3 days	Neck	30m; northwest 300°	Snow/dirt

Number of Fatalities Relative to Distance from WTG Base



Appendix F

Aerial Waterfowl Data

Aerial Waterfowl Survey Results by Sector

FALL 2009: Waterfowl Days by guild for each of 5 Wolfe Island survey sectors						
	C7	C8	C9	C10	C11	Total
Swans	3,856	3,973	8,664	11,198	2,648	30,338
Geese	86,328	7,489	42,433	161,464	94,146	391,859
Large dabblers	32,211	58,932	102,652	60,698	86,314	340,805
Small dabblers	92	0	24,555	188	1,154	25,988
Bay ducks	208,707	173,084	937,169	117,987	22,751	1,459,697
Sea ducks	6,496	0	121	11	36	6,664
Goldeneye	16,075	11,973	5,329	7,312	28,876	69,564
Mergansers	8,394	12,630	3,482	2,953	8,594	36,052
Total	362,157	268,080	1,124,403	361,809	244,517	2,360,965

FALL 2008: Waterfowl Days by guild for each of 5 Wolfe Island survey sectors						
	C7	C8	C9	C10	C11	Total
Swans	3,880	2,811	7,712	5,149	1,409	20,960
Geese	57,908	13,909	70,155	204,340	44,558	390,868
Large dabblers	24,206	54,148	89,837	92,804	93,449	354,443
Small dabblers	18	3,508	123,614	4,090	1,532	132,761
Bay ducks	88,611	44,682	663,450	305,338	37,154	1,139,233
Sea ducks	0	45	0	0	40	85
Goldeneye	39,137	9,929	5,815	24,662	58,410	137,951
Mergansers	4,734	9,251	11,907	24,841	7,670	58,403
Total	218,493	138,282	972,487	661,222	244,219	2,234,702

FALL 1999: Waterfowl Days by guild for each of 5 Wolfe Island survey sectors						
	C7	C8	C9	C10	C11	Total
Swans	0	29	60	4,326	5,070	9,484
Geese	32,257	11,086	178,610	123,667	151,176	496,794
Large dabblers	65,807	90,719	275,893	131,518	198,621	762,557
Small dabblers	615	80	46,115	0	380	47,190
Bay ducks	46,486	2,648	997,650	104,538	1,755	1,153,076
Sea ducks	304	0	0	0	29	333
Goldeneye	7,117	6,652	6,444	16,408	38,975	75,595
Mergansers	10,365	10,459	11,360	4,818	6,664	43,665
Total	162,950	121,671	1,516,131	385,273	402,668	2,588,692

Aerial Waterfowl Survey Results by Major Staging Area

FALL 2009: Waterfowl Days by guild for major staging areas on Wolfe Island					
	Bayfield	Button	Pyke's	Reed's	Total
Swans	6,390	5,658	0	316	12,363
Geese	10,961	22,743	95,084	75,954	204,741
Large dabblers	28,347	18,639	28,341	29,719	105,046
Small dabblers	24,437	0	0	56	24,493
Bay ducks	880,773	114,136	230	1,623	996,762
Sea ducks	55	0	11	36	102
Goldeneye	1,402	1,752	1,144	6,001	10,299
Mergansers	2,067	191	1,219	3,955	7,432
Total	954,431	163,118	126,029	117,659	1,361,236

FALL 2008: Waterfowl Days by guild for major staging areas on Wolfe Island					
	Bayfield	Button	Pyke's	Reed's	Total
Swans	6,293	2,525	0	359	9,177
Geese	5,944	44,745	83,388	16,586	150,662
Large dabblers	10,127	28,221	32,855	31,650	102,853
Small dabblers	112,209	3,555	400	0	116,164
Bay ducks	512,438	301,888	0	0	814,325
Sea ducks	0	0	0	40	40
Goldeneye	4,325	9,515	1,518	14,019	29,377
Mergansers	3,745	22,612	141	608	27,105
Total	655,080	413,060	118,302	63,261	1,249,702

Appendix G

Notifications and Agency Responses

Wyatt, Valerie

From: Garry Perfect [GPerfect@canhydro.com]
Sent: Friday, July 17, 2009 11:17 AM
To: Rob.Read@ec.gc.ca; Wyatt, Valerie; Rob.Dobos@ec.gc.ca; Harris, Julie; Durst, Ken (MNR)
Subject: Wolfe Island Wind Plant **NOTIFICATION #1**
Attachments: 2009 July 16 summary of fatalities.xls

Good morning all:

As a follow-up to our telephone conversations and voice mail messages, this email is intended to notify the Parties of the Post-Construction Follow-Up Plan for Bird and Bat Resources for the Wolfe Island Wind Plant (the "Plan") regarding two notification thresholds that have been met.

| High Annual Mortality Rates - Raptors

The Plan states that NRCan, EC and MNR will be contacted if two raptor fatalities are noted over a six week period.

Over the past three week period (23 June to 14 July) two raptor carcasses were discovered during the on-going mortality searches. These include one American Kestrel and one Red-tailed Hawk. Attached is a spreadsheet indicating the dates the carcasses were found and the turbine number. No specific turbine or date is associated with these mortalities.

High Annual Mortality Rates - Birds (WITHDRAWN) .

As stated in the Plan, NRCan, EC and MNR will be notified if 65 bird fatalities are noted over a consecutive three-week period. This threshold value (65 birds) is intended to represent the actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Fifteen bird fatalities have been noted during the past three week period (23 June to 14 July). Accounting for the percent of area searched and searcher efficiency (derived from Wolfe Island field trials) and scavenger removal (based on more complete data collected from the Melancthon EcoPower Centre) this translates to approximately 69 birds over this period. No species at risk were recorded and nine of the 15 birds are swallows, mostly young of this year.

As previously discussed, swallows are known to congregate on Wolfe Island in early to mid-July before their dispersal in late July or August. Based on discussions with Stantec, we do not expect this rate of swallow mortality to continue over the next three week period. As indicated in the attached spreadsheet, there is no apparent relationship between swallow mortality and turbine location or date.

It should be noted that this correction is based on a desired search area of 60 m radius. If the search area for 'percent of area searched' is 50 m in radius (as at the Melancthon EcoPower Centre), then the corrected level of mortality would not reach the notification threshold.

Although not in direct alignment with the Plan, and recognizing that not all turbines were operational, it should further be noted that the corrected projected annual mortality rate for birds since the initiation of carcass searches would also not reach the notification threshold.

We look forward to discussing this notification with you. Please contact me through email or on my cell at (519) 820-8204.

Best Regards,

Garry Perfect
 Environmental Coordinator
 Canadian Hydro Developers, Inc.

Wyatt, Valerie

From: Cotnam, Erin (MNR) [erin.cotnam@ontario.ca]
Sent: Tuesday, July 21, 2009 10:17 AM
To: Harris, Julie; Garry Perfect; Rob.Read@ec.gc.ca; Wyatt, Valerie; Rob.Dobos@ec.gc.ca; Durst, Ken (MNR)
Cc: Cotnam, Erin (MNR)
Subject: RE: Wolfe Island Wind Plant **RESPONSE TO NOTIFICATION #1**

Hi Julie,

As we discussed yesterday, MNR has reviewed the information provided. I spoke with Garry yesterday morning – based on the numbers reported for raptors, at this time MNR recommends that monitoring continue as per the Plan and request that Garry maintain frequent communication with our office. We appreciate the updates and reporting provided thus far.

Please let me know if you need anything further.

Thanks,

Erin Cotnam
Renewable Energy Planning Ecologist
Peterborough District MNR
705-755-3134

From: Harris, Julie [mailto:Julie.Harris@NRCan-RNCan.gc.ca]
Sent: July 20, 2009 4:48 PM
To: Garry Perfect; Rob.Read@ec.gc.ca; vwyatt@stantec.com; Rob.Dobos@ec.gc.ca; Durst, Ken (MNR)
Cc: Cotnam, Erin (MNR)
Subject: RE: Wolfe Island Wind Plant

Hello Ken, Rob,

As discussed today, I understand that MNR and EC are reviewing the information submitted by the proponent and a response to this notification will be provided by both EC and the MNR to summarise your assessment of the information below and provide a recommendation on whether any further actions are required.

Thanks,

Julie

From: Garry Perfect [mailto:GPerfect@canhydro.com]
Sent: Friday, July 17, 2009 11:17
To: Rob.Read@ec.gc.ca; vwyatt@stantec.com; Rob.Dobos@ec.gc.ca; Harris, Julie; Durst, Ken (MNR)
Subject: Wolfe Island Wind Plant

Good morning all:

As a follow-up to our telephone conversations and voice mail messages, this email is intended to notify the Parties of the Post-Construction Follow-Up Plan for Bird and Bat Resources for the Wolfe Island Wind Plant (the "Plan") regarding two notification thresholds that have been met.

High Annual Mortality Rates - Raptors

The Plan states that NRCan, EC and MNR will be contacted if two raptor fatalities are noted over a six week period.

Wyatt, Valerie

From: Read, Rob [Burlington] [Rob.Read@ec.gc.ca]
Sent: Wednesday, July 22, 2009 9:50 AM
To: Harris, Julie; Garry Perfect; Wyatt, Valerie; Dobos, Rob [Burlington]; Durst, Ken (MNR)
Cc: erin.cotnam@ontario.ca; Fischer, John [Burlington]; Friesen, Lyle [Ontario]
Subject: RE: Wolfe Island Wind Plant **RESPONSE TO NOTIFICATION #1**

Julie,

Environment Canada (EC) has reviewed the post-construction monitoring information that was provided. We understand the information was submitted due to the fact that the high annual mortality rate notification threshold for raptors and birds, as specified in the Post-Construction Follow-up Plan for the Wolfe Island Wind Plant ("the Plan"), had been reached. As the project has been partially operational for a short period of time and the sample size of results from post-construction monitoring is very small, EC does not feel that trends can be extrapolated from the data collected to date to suggest the need for specific management actions (e.g., adjustments to the studies and/or mitigation measures). EC recommends that monitoring continue as specified in Plan and request that the proponent maintain frequent communication with our office.

The data provided indicates that one turbine was responsible for at least two casualties, with the rest of the turbines producing just one. As a result, it does not appear that one particular turbine is responsible for higher rates of mortality.

At least 9 of the 15 bird victims (non-raptors) were swallows/martins; there may have been more given that 3 birds were not identified. These aerial foragers will likely continue to build in number and remain at Wolfe Island for at least another month. Continued vigilance in monitoring is necessary to see whether this group is indeed at heightened risk of collision.

We understand that the scavenging rate calculations from the Melancthon project were used to estimate mortality as more complete data was available. EC would like to confirm that scavenger trials are occurring as part of the Wolfe Island PCFP, and, if so, what the results of the trials have been thus far and when the data from the trials will be used to develop a scavenger rate for Wolfe Island. We suspect that the predator dynamics between the two sites will be quite different with Wolfe Island having higher rates of scavenger removal.

EC would like some clarification on the second last sentence provided in the notification. It appears that the projected annual mortality rate in birds/turbine/year has not been exceeded based on the number of turbines that are currently operational. We would like to know how many turbines were actually in operation during the time period, since this information would help us place the mortality numbers in a clearer context. EC would also like to know the proposed schedule for commissioning the remainder of the turbines.

EC is appreciative that we were immediately notified when the notification thresholds had been met. Please let us know if you have any questions or comments.

Regards,

Rob

Rob Read
 Environmental Assessment Officer
 Environmental Assessment Section
 Environmental Protection Operations Directorate -Ontario
 Box 5050, 867 Lakeshore Rd.
 Burlington, Ontario L7R 4A6

3/24/2010

Wyatt, Valerie

From: Garry Perfect [GPerfect@canhydro.com]
Sent: Tuesday, August 18, 2009 3:01 PM
To: Read, Rob [Burlington]; Dobos, Rob [Burlington]; Harris, Julie; Cotnam, Erin (MNR); Durst, Ken (MNR)
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Wind Plant - Notification #2 AND #3
Attachments: summary of fatalities - 27 July to 14 August 2009.xls

Good afternoon folks:

This email outlines the mortality monitoring results for the three-week period ending August 14. During this period, three notification thresholds as identified in the Post-Construction Follow-Up Plan for Bird and Bat Resources at the Wolfe Island Wind Plant (the "Plan") have been met:

High Annual Mortality Rates - Birds (WITHDRAWN)

As stated in the Plan, NRCan, EC and MNR will be notified if 65 bird fatalities are noted over a consecutive three-week period. This threshold value (65 birds) is intended to represent the actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Eighteen bird fatalities have been noted during the past three week period (July 27-August 14). Corrected for percent of area searched (82%, based on a 50 m-radius circle), searcher efficiency (63%), and scavenger removal (the July 2009 scavenger trial indicated that 53% of test carcasses are not removed by scavengers over the search interval), this translates to 65 bird fatalities over this period. No species at risk were recorded. A nineteenth fatality, that of a flightless juvenile Killdeer found on August 10, has not been included in this analysis as it was assumed not to be wind turbine related.

#2 High Annual Mortality Rates - Bats

As stated in the Plan, NRCan, EC and MNR will be notified if 49 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Fifty-seven bat fatalities have been noted during the past three week period (July 27-August 14). Corrected as above for percent of area searched, searcher efficiency, and scavenger removal, this translates to approximately 208 bat fatalities over this period.

#3 High Annual Mortality Rates - Raptors

The Plan states that NRCan, EC and MNR will be contacted if two raptor fatalities are noted over a six week period.

Two Turkey Vulture carcasses were discovered on August 11 and August 14 during the on-going mortality searches. (Turkey Vulture is identified as a "Specially Protected Bird (Raptor)" on Schedule 7 of the province's *Fish & Wildlife Conservation Act*.) Together with the Red-tailed Hawk recorded on July 14, a total of three raptors have been noted in the past six weeks (four have been recorded in the past seven weeks).

A list of the dates, turbines and species of the fatalities are provided in the attached spreadsheet. No species at risk fatalities have been documented. No particular turbine appears to contribute disproportionately to the observed mortality.

Please feel free to contact me directly to discuss this notification.

Best Regards,
 Garry Perfect
 Environmental Coordinator
 Canadian Hydro Developers, Inc.

Wyatt, Valerie

From: Cotnam, Erin (MNR) [erin.cotnam@ontario.ca]
Sent: Wednesday, August 26, 2009 1:23 PM
To: Garry Perfect
Cc: Rob.Read@ec.gc.ca; Rob.Dobos@ec.gc.ca; Harris, Julie; Durst, Ken (MNR); Wyatt, Valerie; Beal, Jim (MNR); Cotnam, Erin (MNR)
Subject: RE: Wolfe Island Wind Plant - Notification **RESPONSE TO NOTIFICATIONS #2 AND #3**

Hello Garry,

Thank you for the most recent notification regarding High Annual Mortality Rates for Bats and Raptors. Based on MNR's review of the information provided we note the following;

To date, mortalities have occurred at 47 turbines.

Carcasses of migratory species have been found at 29 turbines. Considering only the most recent notification, 35 of 57 bats were migratory (61%), possibly more as there were six carcasses identified as bat sp.

More than one carcass has been found at 16 turbines; two turbines (64, 74) have had 3 mortalities found, and 14 turbines have had 2 mortalities found.

Number	Common Name	Scientific Name	Srank	Month	Turbine
7	Big Brown Bat	<i>Eptesicus fuscus</i>	S5	July, Aug	2, 50, 63, 64, 74
7	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	S4	Aug	3, 6, 12, 13, 36, 51, 79
11	Eastern-red Bat	<i>Lasiurus borealis</i>	S4	July, Aug	5, 20, 30, 33, 39, 49, 65, 70, 74,
19	Hoary Bat	<i>Lasiurus cinereus</i>	S4	July, Aug	8, 13, 15, 16, 27, 37, 40, 41, 47,
0	Eastern Small-footed Bat	<i>Myotis leibii</i>	S2S3		
8	Little Brown Bat	<i>Myotis lucifugus</i>	S5	July, Aug	4, 10, 12, 17, 41, 52, 57, 63
0	Northern Long-eared Bat	<i>Myotis septentrionalis</i>	S3		
0	Eastern Pipistrelle	<i>Pipistrellus subfavus</i>	S3		

*table includes bat mortalities from notification 2 (withdrawn) and 3

At this time MNR recommends that bat monitoring continue as per the Plan and requests that the proponent maintain frequent communication with our office.

To date, MNR has been notified of four raptor mortalities, occurring at 4 different turbines. MNR recommends that monitoring continue as per the Plan.

We look forward to reviewing analysis of the data thus far in the biannual report.

Erin

From: Garry Perfect [mailto:GPerfect@canhydro.com]
Sent: August 18, 2009 3:01 PM
To: Read,Rob [Burlington]; Dobos,Rob [Burlington]; Harris, Julie; Cotnam, Erin (MNR); Durst, Ken (MNR)
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Wind Plant - Notification

Good afternoon folks:

This email outlines the mortality monitoring results for the three-week period ending August 14. During this period, three notification thresholds as identified in the Post-Construction Follow-Up Plan for Bird and Bat Resources at the Wolfe Island Wind Plant (the "Plan") have been met:

High Annual Mortality Rates - Birds

3/24/2010

Wyatt, Valerie

From: Garry Perfect [GPerfect@canhydro.com]
Sent: Friday, August 28, 2009 2:47 PM
To: Cotnam, Erin (MNR); Durst, Ken (MNR); Harris, Julie
Cc: Read, Rob [Burlington]; Dobos, Rob [Burlington]; Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Wind Plant - Notification #4
Attachments: summary of fatalities - 17 August to 26 August 2009.xls

Good afternoon all:

This email outlines the mortality monitoring results for the period between August 17 and August 26, 2009. During this period one notification threshold, as identified in the Post-Construction Follow-Up Plan for Bird and Bat Resources at the Wolfe Island Wind Plant (the "Plan"), has been met:

#4 High Annual Mortality Rates - Bats

As stated in the Plan, NRCan, EC and MNR will be notified if 49 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the actual number of carcasses recorded corrected for percent of area searched, projected scavenger removal and searcher efficiency.

Sixty-one bat carcasses have been recovered during the period between August 17 and August 26. Corrected for percent of area searched (82%, based on a 50 m-radius circle), searcher efficiency (63%), and scavenger removal (the July 2009 scavenger trial on Wolfe Island indicated that 53% of test carcasses are not removed by scavengers over the search interval), this translates to approximately 223 bat fatalities over this period.

A list of the dates, turbines and species of the fatalities are provided in the attached spreadsheet.

Update Regarding Birds and Raptors

The rate of bird mortality over the period between August 17 and August 26 is lower than the rate of mortality observed in the previous three-week period (July 27-August 14). Six bird carcasses have been recovered in this period. The observed bird mortality for the three-week period ending August 26 is below the notification threshold. No new raptor fatalities have occurred.

No species at risk fatalities have been documented. No particular turbine appears to contribute disproportionately to the observed bird or bat mortality.

Please feel free to contact me directly should you wish to discuss this notification.

Regards,
 Garry Perfect
 Environmental Coordinator
 Canadian Hydro Developers, Inc.
Building a Sustainable Future®
 Tel: 519.826.4645
 Cel: 519.820.8204
 Fax: 519.826.4745
 em: gperfect@canhydro.com
 web: www.canhydro.com

Wyatt, Valerie

From: Garry Perfect [GPerfect@canhydro.com]
Sent: Tuesday, September 08, 2009 1:04 PM
To: Cotnam, Erin (MNR); Durst, Ken (MNR); Harris, Julie; Read, Rob [Burlington]; Dobos, Rob [Burlington]
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Wind Plant - Notification #5
Attachments: 2009 September 4_ summary of fatalities.xls

Good afternoon all:

This email summarizes the results of the mortality monitoring for the period between August 27 and September 4 2009. During this period two notification thresholds, as identified in the Post-Construction Follow-Up Plan for Bird and Bat Resources at the Wolfe Island Wind Plant (the "Plan"), have been met:

High Annual Mortality Rates - Bats (WITHDRAWN)

As stated in the Plan, NRCan, EC and MNR will be notified if 49 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the actual number of fatalities recorded corrected for percent of area searched, projected scavenger removal, and searcher efficiency.

Twenty-two bat carcasses have been recovered during the period between August 27 and September 4. Corrected for percent of area searched (82%, based on a 50 m-radius circle), searcher efficiency (63%), and scavenger removal (the July 2009 scavenger trial indicated that 53% of test carcasses are not removed by scavengers over the search interval), this translates to approximately 80 bat fatalities over this period. A list of the dates, turbines and species of the fatalities are provided in the attached spreadsheet.

#5 High Annual Mortality Rates - Raptors

The Plan states that NRCan, EC and MNR will be contacted if two raptor fatalities are noted over a six week period.

On August 31, two raptor carcasses were discovered during the on-going mortality searches. These include one American Kestrel and one accipiter species (either a Sharp-shinned or Cooper's Hawk - to be confirmed), both at turbine 28.

Update Regarding Birds (other than raptors)

Ten bird carcasses have been recovered in the period between August 27 and September 4. The observed bird mortality for the three-week period between August 17 and September 4 is below the notification threshold.

No species at risk fatalities have been documented.

Please feel free to contact me directly should you wish to discuss this notification.

Garry Perfect
 Environmental Coordinator
 Canadian Hydro Developers, Inc.
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 Tel: 519.826.4645
 Cel: 519.820.8204
 Fax: 519.826.4745
 em: gperfect@canhydro.com
 web: www.canhydro.com

Wyatt, Valerie

From: Garry Perfect [GPerfect@canhydro.com]
Sent: Thursday, November 12, 2009 11:00 AM
To: Cotnam, Erin (MNR); Durst, Ken (MNR); Harris, Julie; Read,Rob [Burlington]; Dobos,Rob [Burlington]
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: RE: Addendum to Wolfe Island Wind Plant - Notification #6

Good morning all:

This email outlines an addendum to the November 10, 2009 notification (below) for 'High Annual Mortality Rates – Raptors' at Wolfe Island.

On November 11, 2009 a Red-tailed Hawk carcass was detected at turbine 58. Together with the Turkey Vulture fatalities recorded on September 30 and November 3, this results in a total of three raptor fatalities over a six week period.

Please feel free to contact me directly should you wish to discuss this notification.
 Regards,

Garry Perfect
 Environmental Coordinator
 Canadian Hydro Developers, Inc.
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 Tel: 519.826.4645
 Cel: 519.820.8204
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 em: gperfect@canhydro.com
 web: www.canhydro.com

From: Garry Perfect
Sent: November 10, 2009 2:33 PM
To: Cotnam, Erin (MNR); Durst, Ken (MNR); Harris, Julie; Read,Rob [Burlington]; Dobos,Rob [Burlington]
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Wind Plant - Notification #6 .

Good afternoon folks:

During the period from September 30 to November 3, 2009 one notification threshold, as identified in the Post-Construction Follow-Up Plan for Bird and Bat Resources at the Wolfe Island Wind Plant (the "Plan"), has been met.

#6 High Annual Mortality Rates – Raptors

As stated in the Plan, NRCan, EC, and MNR will be contacted if two raptor fatalities are noted over a six week period.

On September 30, one Turkey Vulture carcass was discovered at turbine 22 during the on-going mortality searches. A second Turkey Vulture carcass was discovered five weeks later, on November 3, at turbine 77.

Please feel free to contact me directly should you wish to discuss this notification.

Regards,
 Garry Perfect
 Environmental Coordinator
 Canadian Hydro Developers, Inc.
Building a Sustainable Future®
 Tel: 519.826.4645
 Cel: 519.820.8204
 Fax: 519.826.4745

Wyatt, Valerie

From: Garry Perfect [GPerfect@canhydro.com]
Sent: Monday, November 23, 2009 9:20 AM
To: Cotnam, Erin (MNR); Durst, Ken (MNR); Harris, Julie; Read, Rob [Burlington]; Dobos, Rob [Burlington]
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Wind Plant - Notification #7

Good morning all:

This email outlines the details of one notification threshold that has been met at the Wolfe Island Wind Plant during the period November 17 – 18, 2009.

#7 High Annual Mortality Rates – Raptors

The Post-Construction Follow-Up Plan for Bird and Bat Resources at the Wolfe Island Wind Plant states that NRCan, EC, and MNR will be contacted if two raptor fatalities are noted over a six week period.

On November 17, one Red-tailed Hawk carcass was discovered at turbine 54 during the on-going mortality searches. A Turkey Vulture carcass was discovered on November 18, at turbine 85. The Turkey Vulture was likely a late migrant, as the species generally does not overwinter in eastern Ontario. The Red-tailed Hawk may be a wintering bird.

Please feel free to contact me directly should you wish to discuss this notification.

Thank you,
Garry Perfect
Environmental Coordinator
Canadian Hydro Developers, Inc.
Building a Sustainable Future®
Tel: 519.826.4645
Cel: 519.820.8204
Fax: 519.826.4745
em: gperfect@canhydro.com
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