



**WOLFE ISLAND WIND PLANT
POST-CONSTRUCTION FOLLOW-
UP PLAN**

BIRD AND BAT RESOURCES

**MONITORING REPORT NO. 4
JULY - DECEMBER 2010**

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Prepared For:

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owned subsidiary
Canadian Renewable Energy
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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 Wind Plant for the period between July 1 and December 31, 2010 (the "Reporting Period"). The Wolfe Island Wind Plant 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 fourth in a series, contains the results of the post-construction monitoring program for the period between July 1 and December 31, 2010. The Wind Plant 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 54 carcasses of 22 bird species were collected during the Reporting Period. 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). Two mallard and one Canada Goose waterfowl fatalities were observed during the Reporting Period.

Two of the species have been identified as species of conservation priority by Ontario Partners in Flight (2006): Bank Swallow (one on August 12) and Bobolink (one fatality on each July 23 and August 12). Although not listed under the *Species at Risk Act* or *Endangered Species Act* at the time, Bobolink was identified as threatened by Committee of the Status of Endangered

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Wildlife in Canada (COSEWIC) in April of 2010 and by the Committee on the Status of Species at Risk in Ontario (COSSARO) in June of 2010.

Over the Reporting Period, a total of 13 Tree Swallow fatalities were recorded at 12 different WTGs. Fatalities were observed between July 12 and September 20. The majority of fatalities observed in July were juveniles while those observed later in the season were adults. Together with Bank Swallow (one fatality), Barn Swallow (two fatalities), and Purple Martin (five fatalities), swallows and martins represented 22 (41%) of the 54 recorded bird fatalities during the course of the Reporting Period. Two WTGs were each responsible for more than one swallow/martin fatality with two fatalities at each.

Two raptor and vulture fatalities were recorded over the course of this Reporting Period: one Turkey Vulture and one Red-tailed Hawk. Correcting seasonally for searcher efficiency, scavenger and other removal rates, and the percent area searched, the 2 raptor/vulture and 52 other bird carcasses recovered represents an estimated total bird mortality for the Reporting Period of 8.27 birds/turbine (3.60 birds/MW). Bird mortality rates were much higher in the summer (July through September) than in the fall (October through December). The mortality rate for the six-month Reporting Period at the Wind Plant, at 3.60 birds per MW, is consistent with the results in nearby New York and other studies summarized by Arnett et al. (2007). The Reporting Period covered the entire period of concern, and so a comparison between sites is valid.

The 2 raptor/vulture carcasses recovered, when corrected for scavenger removal, represents an estimated total raptor/vulture mortality for the Reporting Period of 0.09 raptors and vultures/turbine (0.04 raptors and vultures/MW). Of the summary of raptor fatalities presented in Table 1 of Arnett et al., 2007, the calculated raptor mortality rate of 0.04 raptors per MW is at the mid-point of the range of observed facilities in North American (0 – 0.09 raptors per MW) and would rank 5th out of the 14 wind power facilities listed. 0.04 raptors/vultures per MW 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.

A total of 111 carcasses of four bat species were collected during the Reporting Period. The Hoary Bat (54 fatalities), Eastern Red Bat (21 fatalities), and Silver-haired Bat (19 fatalities), are classified as long-distance migratory tree bats and comprised 84.7% 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 111 recovered carcasses represent an estimated bat mortality for the Reporting Period of 21.84 bats/turbine (9.50 bats/MW).

The 2010 bat mortality rate at the Wind Plant, at 9.50 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 Wind Plant is consistent with

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the results in nearby New York and is roughly 25-40% 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, six species of waterfowl were observed foraging inland during the fall 2010 post-construction monitoring; all species were either geese or dabbling ducks. Species composition in 2010, dominated by Canada Geese, was very similar to that observed during the pre-construction monitoring in 2007 and post-construction monitoring in 2009. Overall, the total number of waterfowl days was higher during the 2009 and 2010 post-construction monitoring (311,774 and 236,583 respectively), compared to the 2007 pre-construction monitoring (117,838). There was no evidence to suggest that fluctuations in waterfowl abundance over the three years of monitoring would be attributed to changes of the conditions on the island (e.g. changes in crop type or foraging opportunity). Differences in Canada Goose abundance between 2007, 2009 and 2010 monitoring was likely the result of natural variability in migrant abundance.

During each year of monitoring (pre and post-construction), the area of highest waterfowl concentration occurred in the southern portion of the study area, between Pyke's Bay and Button Bay. In 2009 and 2010 several larger flocks were observed outside of this core area, contributing to the increase abundance observed in these years. Between years, flocks were often observed in the same general areas, with some localized shifting (e.g., using different fields within the same concession); likely attributed to changes in crop type or foraging opportunities.

Generally, major waterfowl movement routes were similar in 2007, 2009 and 2010. 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, 2009 and 2010 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.

Total waterfowl days recorded by the aerial waterfowl surveys were similar in 1999, 2008 and 2009 with a decrease in 2010. This decrease could be due to natural variability of migrant abundance and the uncertainty of sampling on a large scale. Overall, the 16% reduction in waterfowl days observed in 2010 is not considered significant and is well below the trigger of potentially significant decline as defined in the PCFP (i.e. 30%).

Maximum numbers observed during any one winter raptor survey in 2010 for each species were 32 Short-eared Owls, 31 Rough-legged Hawks, 16 Northern Harriers, 15 Red-tailed Hawks and 4 American Kestrels. Only single observations of Bald Eagle, Copper's Hawk and Merlin were made on any one survey. It is noted that no Snowy Owls were observed in November and

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December of 2010. Average raptor density, calculated as the number of raptors per kilometer of survey across the study area, was 0.8 raptors per kilometer on each survey, with the exception of November 25 which had 0.5 raptors per kilometer. During the evening surveys, Short-eared Owls density was 0.1 to 0.3 owls per kilometer on each survey, with the exception of the December 8 survey, which observed a density of 0.5 owls per kilometer.

Raptor numbers in 2010 were generally similar to those in 2006, and significantly higher than those observed in 2009. Compared to the 2006 pre-construction surveys, Rough-legged Hawk observations were significantly higher in 2010, which offset a decrease in Red-tailed Hawk and Northern Harrier observations. During the evening surveys, Short-eared Owl density was significantly higher than pre-construction surveys, with a greater than 100% increase in the number of observations. Trends observed through the 2006, 2009 and 2010 winter raptor monitoring generally correspond to results of the Kingston Christmas Bird Count in those years.

A more thorough discussion of raptor behavior, including an analysis of the complete winter season (November 2010-March 2011), will be provided in the subsequent Monitoring Report No. 5.

Mortality and disturbance effects monitoring should proceed in 2011 according to the February 2010 Follow-up Plan. Scavenger removal trials conducted in January, 2010 support the continued once-weekly carcass search frequency in the winter months (December, January and February).

Two years of fall monitoring have shown increased numbers of geese and dabbling ducks foraging inland, and unchanged movement patterns between foraging areas and offshore staging areas. It is recommended that the inland foraging and movement surveys be discontinued in fall. Aerial surveys of offshore staging should continue.

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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 wind turbine generators (“WTGs”) and ancillary facilities have been placed over the western portion of Wolfe Island (**Figure 1.0, 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.

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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 Wind Plant website at www.transalta.com/wolfeisland for stakeholder information. 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 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 was fully implemented upon commencement of commercial operations to 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 fourth in a series, contains the results of the post-construction monitoring program for the period between July 1 and December 31, 2010 (the “Reporting Period”).

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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

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 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. To reduce some imprecision arising from the alternating carcass search schedule, one recommendation of Monitoring Report No. 2 (Stantec Consulting Ltd., May 2010) was to change to a search schedule in which one half the WTGs are searched twice weekly (3.5 day search interval) and the other half are searched once weekly (7 day search interval) without rotation. Mortality estimates were calculated separately for each treatment. With agreement from the agencies, the latter approach was adopted starting at the beginning of May 2010.

Due to the very low levels of scavenger removal and mortality observed over the winter months, one recommendation of Monitoring Report No. 3 was to reduce the frequency of the winter carcass searches in December, January and February. With agreement from the agencies, in the Reporting Period, all WTGs were searched once weekly (7 day search interval) from December 20-31, 2011.

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 50 m radius area under each WTG, walking concentric transects spaced at approximately 7 m intervals starting at 2 m from the WTG 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.

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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 or scavenger 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.

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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 WTG
- 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 was estimated to be 1.0 for raptors and vultures. An estimate of Sc for raptors and vultures was determined through September, 2010 and January, 2011 scavenger trials using 10 raptor carcasses. Additionally, to account for the greater visibility of large birds such as raptors or vultures, separate estimation of Ps was undertaken (Section 2.1.2.3). 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 estimated 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

c₁ is the number of raptor or vulture carcasses found

c₂ is the number of other carcasses found

Se is the proportion of raptor/vulture carcasses (**Se₁**) or other carcasses (**Se₂**) expected to be found by searchers (searcher efficiency)

Sc is the proportion of raptor/vulture carcasses (**Sc₁**) or other carcasses (**Sc₂**) not removed by scavengers over the search period

Ps is the percent of the area searched for raptors/vultures (**Ps₁**) or other carcasses (**Ps₂**).

The total number of bird or bat fatalities was divided by the number of WTGs (i.e., 86) and the number of MW (i.e., 197.8) to obtain the estimated mortality rates by turbine and by MW for the Reporting Period. The mortality rate at the two MET towers would have been calculated separately, however no fatalities were observed at either MET towers throughout the Reporting Period.

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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 “testers” that placed carcasses under WTGs prior to the standard carcass searches over the period July 19 to December 30 to test each searcher’s detection rate. The trials involved between 36 and 39 test bird and bat carcasses for each of the three searchers that participated in the summer period (July-September) and between 10 and 20 test bird and bat carcasses for each of the four searchers that participated in the fall and early winter period (October-December).

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

$$Se_o = Se_1(n_1/T) + Se_2(n_2/T) + Se_3(n_3/T) + Se_4(n_4/T)$$

where: Se_o is the overall searcher efficiency;
 $Se_1 - Se_4$ are individual searcher efficiency ratings;
 $n_1 - n_4$ is quantity of search days completed by each searcher; and
 T is the total number of search days completed by all searchers.

2.1.2.2 Scavenger Trials

Scavenger trials are designed to correct for carcasses that are removed by scavenging animals 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.

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During the Reporting Period, three two-week scavenger trials were conducted during the months of July, August and September. Additionally, the results of a January, 2011 scavenger trial were applied to the results of the December, 2010 surveys. In July, two dead, dark-coloured chicks were placed in two locations within the 50 m search radius around one half of the WTGs, split equally between the two search interval treatments. In August, 6 native bird and 14 native bat carcasses were distributed among 10 WTGs, and in September, 24 native bird and 16 native bat carcasses were distributed among 20 WTGs, split equally between the two search interval treatments. UTM coordinates were taken at each trial carcass location and the distance and direction from the WTG were measured.

Trial carcasses were placed on July 18, August 15 and September 19, 2010, and January 16, 2011, with their presence or absence recorded during regularly-scheduled carcass searches over the subsequent two weeks. Proportions of carcasses remaining after each search interval were pooled to calculate the overall scavenger correction (Sc) factors as follows:

$$Sc = \frac{n_{visit1} + n_{visit2} + n_{visit3} + n_{visit4}}{n_{visit0} + n_{visit1} + n_{visit2} + n_{visit3}} \quad \text{where}$$

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

n_{visit0} is the total number of carcasses placed

$n_{visit1} - n_{visit4}$ are the numbers of carcasses remaining on visits 1 through 4

Sc is expected to vary with the length of the search interval, i.e., the proportion of carcasses not removed by scavengers over the search period is expected to be higher for shorter search intervals and lower for longer search intervals. Accordingly, Sc was calculated separately for the two WTG treatments (searched once weekly [7 day search interval] and searched twice weekly [3.5 day search interval]).

Two additional scavenger trials were conducted using eight raptor carcasses, placed at eight different WTGs on September 19, 2010, and two raptor carcasses, placed at two different WTGs on January 16, 2011. Their presence or absence was recorded during regularly-scheduled carcass searches over the subsequent two weeks, and Sc for raptors and vultures was calculated in the manner as described above.

2.1.2.3 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, MNR, 2010). Environment Canada (2007b) also specifies that for a WTG of the size as those on Wolfe Island, most bat carcasses fall within 50 m. Accordingly, and to be comparable to the results of post-construction monitoring reported for

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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 Reporting Period based on data collected during regularly-scheduled surveys between June 28 and July 2, September 6 and September 20, October 20 and October 29, 2010 and January 6 and January 15, 2011 (to be applied to December, 2010). In each season, searchers filled out a 50 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. In October, 2010 and January 2011, searchers also identified areas that were not clear enough to be searched for small carcasses, but in which large carcasses (such as those of raptors and vultures) would be detectable during regular searches. 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 WTG (Ps_x, where x is the WTG 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:

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

Ps for small carcasses was calculated separately for the two WTG treatments (searched once weekly [7 day search interval] and searched twice weekly [3.5 day search interval]) for each trial period. Ps for large carcasses was assumed to be the same as that for small carcasses in July through September, but following the collection of specific information related to the visibility of large carcasses, was calculated separately for the two WTG treatments (searched once weekly [7 day search interval] and searched twice weekly [3.5 day search interval]) in October through December.

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.

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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 21, 2010. 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 from September 2 and December 21, 2010. It was noted that bays and marshes were frozen over by December 14, 2010; however the river remained open through the end of December.

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.

The same two locations were used for each survey in the 2007 pre-construction and the 2009 and 2010 post-construction 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 dates, 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.

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Aerial surveys were conducted using Canadian Wildlife Services (“CWS”) methodologies as outlined in Ross (1989). The same methods were used in CWS’s 1999 waterfowl surveys, the pre-construction monitoring in 2008 and the post-construction monitoring in 2009 and 2010.

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 current monitoring period, Stantec conducted the aerial waterfowl surveys between September 7, 2010 and January 10, 2011. Survey dates, times and weather conditions are summarized in **Appendix D**. Although outside of the Reporting Period (i.e. July to December), the January survey from each year has been included for completeness.

Marshes and inner bays were frozen over by the December 18 survey in 2008 and December 15 survey in 2010. The outskirts of the bays and the St. Lawrence River north and south of Wolfe Island remained open through to the early January survey each year.

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 m 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 digital audio recorders 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

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.

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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. Survey dates, times and weather conditions 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, 2010 through March, 2011. 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, 2010). Results of the full 2010-2011 winter raptor survey (November 2010 to March 2011) will be provided and discussed in the subsequent bi-annual report, Monitoring Report No. 5. Monitoring Report No. 5 will also provide additional detailed analysis and discussion related to raptor abundance and behavior.

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 66.7% to 89.2% (**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 each month ranged from 0.770 in October to 0.815 in September (**Table 3.2, Appendix B**). These values were applied to assess bat and small bird mortality rates.

3.1.1.2 Searcher efficiency for raptors and vultures was assumed to be 100% in searchable areas where raptors and vultures were readily visible. In non-searchable areas, searcher efficiency was assumed to be 0%. Unsearched areas within the 50m radius were accounted for in the percent area searched correction factor when calculating the estimate of total mortality. Scavenger Removal

The proportion of carcasses not removed by scavengers was similar in July through September for the 3.5 day search interval (ranging from 0.506 to 0.579, **Table 3.3, Appendix B**). Over the 7 day search interval, the proportion of carcasses not removed by scavengers considerably less in July and August (0.231 to 0.245) but similar in September (0.531, **Table 3.3, Appendix B**). Analysis of the scavenger trial indicates that in the winter, 93.5% of trial carcasses were not removed by scavengers over the 7 day search interval (**Table 3.3, Appendix B**). These values were applied to assess bat and small bird mortality rates.

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 September, 2010 and January, 2011 scavenger trials using raptor carcasses, approximately 97.3% of raptor and vulture carcasses were not removed by scavengers over the average search interval (n=27) (**Table 3.4, Appendix B**).

3.1.1.3 Percent Area Searched

The average proportion of the 50 m radius search area that was physically searched during the Reporting Period ranged from 0.172 to 0.272 in the summer through late fall (July through November), but increased to 0.579 in December once vegetation was flattened by snow. These values were applied to assess bat and small bird mortality rates.

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Ps for raptors and vultures was assumed to be the same as that for bats and small birds in July through September, however, following the collection of specific information related to the visibility of large carcasses, was calculated as ranging from 0.464 to 0.594 in October through December.

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 54 carcasses of 22 bird species were collected during the Reporting Period. A summary is presented in **Table 3.5 (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). One species (i.e., European Starling) is not native to Ontario and has a provincial S-Rank of SNA (i.e., Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities). Four bird carcasses were not identifiable to genus or species, given their advanced state of decomposition.

Two of the species have been identified as species of conservation priority by Ontario Partners in Flight (2006). Based on the observation dates, both were likely breeding within or near the Wind Plant: Bank Swallow (one on August 12) and Bobolink (one fatality on each of July 23 and August 12). Both Bobolinks were in non-breeding plumage, and therefore were likely young of the year. Although not listed or protected under the federal *Species at Risk Act* or provincial *Endangered Species Act* during the Reporting Period, this species was identified as threatened by Committee of the Status of Endangered Wildlife in Canada (COSEWIC) in April of 2010 and by the Committee on the Status of Species at Risk in Ontario (COSSARO) in June of 2010.

Over the Reporting Period, a total of 13 Tree Swallow fatalities were recorded at 12 different WTGs. Together with Bank Swallow (one fatality), Barn Swallow (two fatalities), and Purple Martin (five fatalities), swallows and martins represented 22 (41%) of the 54 recorded bird fatalities during the course of the Reporting Period. Two WTGs (T41, T77) were responsible for more than one swallow/martin fatality, with two fatalities at each.

Tree Swallow fatalities were observed between July 12 and September 20. The majority of fatalities occurring in July were juveniles, and the majority of fatalities observed later in the season were adults. All five Purple Martin fatalities were juvenile birds and occurred between mid-August and the first week of September.

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Two Bobolink fatalities were recorded in late July and mid August. 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.

One Red-tailed Hawk fatality (October 28) and one Turkey Vulture fatality (September 2) were recorded during the course of regular searches in this Reporting Period. Based on the dates of recovery, these individuals were presumed to be staging in or moving through the wind plant during fall migration.

Bird fatalities were distributed quite uniformly through the summer and early fall period. Fewer fatalities were recorded in late fall (**Figure 3.0, Appendix A**). The highest number of bird fatalities over the course of the Reporting Period occurred at T37 and T41 (four fatalities each) and T29 (five fatalities), both of which are located in the southwestern portion of the wind plant (**Figure 4.0, Appendix A**). Four WTGs, scattered throughout the study area, had three recorded fatalities each (T36, T61, T67, T77).

Correcting seasonally for searcher efficiency, scavenger removal rates, and the percent area searched, the 2 raptor/vulture and 52 other bird carcasses recovered represent an estimated bird mortality rate for the Reporting Period of 8.27 birds/turbine (3.60 birds/MW) (**Tables 3.6 and 3.7, Appendix B**). Bird mortality rates were much higher in summer (July through September) than in fall (October through December) (**Table 3.7, Appendix B**).

The 2 raptor/vulture carcasses recovered, when corrected for scavenger removal, represent an estimated total raptor/vulture mortality rate of 0.09 raptors and vultures/turbine (0.04 raptors and vultures/MW) for the Reporting Period (**Table 3.6, Appendix B**).

Although the actual number of bird carcasses found during the July to December Reporting Period in 2010 was significantly lower (54) compared to the number of carcasses found during the July to December Reporting Period in 2009 (100), the calculated estimate of total mortality is higher for 2010 due to the influence of various correction factors.

Unlike the previous year, when no waterfowl fatalities were observed despite the large number of waterfowl staging and foraging in the area, two Mallard fatalities and one Canada Goose fatality were observed during the Reporting Period.

3.1.3 Direct Effects - Bats

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

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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 111 carcasses of four bat species were collected during the Reporting Period. A summary is provided in **Table 3.8 (Appendix B)**. The Big Brown Bat (15 fatalities), comprising 13.5% of all bat fatalities, has a provincial S-Rank of S5 (i.e., Secure – common, widespread and abundant in Ontario). The Hoary Bat (54 fatalities), Eastern Red Bat (21 fatalities), and Silver-haired Bat (19 fatalities), comprising 84.7% of all bat fatalities, are ranked S4 (i.e., Apparently Secure – uncommon, but not rare) and are classified as long-distance migratory tree bats. Two bat carcasses (1.8%) 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 3.0, Appendix A**). The highest number of bat fatalities over the course of the Reporting Period occurred at T38 (five fatalities). Five WTGs had four recorded fatalities each (T27, T29, T41, T70, T74) (**Figure 4.0, Appendix A**). As in 2009, three of the WTGs with higher numbers of recorded fatalities (i.e., T29, T38, T41) are located in the most southerly portion of the wind plant.

Correcting for searcher efficiency, scavenger and other removal rates, and percent area searched, the 111 recovered carcasses represent an estimated total bat mortality rate for the Reporting Period of 21.84 bats/turbine (9.50 bats/MW) (**Table 3.9, Appendix B**).

Although the actual number of bat carcasses found during the July to December Reporting Period in 2010 was significantly lower (111) compared to the number of carcasses found during the July to December Reporting Period in 2009 (180), the calculated estimate of total mortality for bats is higher for 2010 due to the profound influence of various correction factors.

3.2 DISTURBANCE EFFECTS MONITORING

3.2.1 Foraging Waterfowl Surveys

In total, six species of waterfowl were observed foraging inland during the fall 2010 post-construction monitoring; all species were either geese or dabbling ducks. Canada Goose was the most abundant species, representing 97% of all observations. Mallard represented 2% of all observations with only very small numbers of the remaining four species (Cackling Goose, Snow Goose, American Black Duck, Northern Pintail) observed. Species composition in 2010, dominated by Canada Goose, was very similar to that observed during the 2007 pre-construction monitoring as well as the 2009 post-construction monitoring. **Table 3.10, Appendix B** compares the species composition in 2007, 2009 and 2010.

The number of waterfowl days at inland foraging areas in fall 2007, 2009 and 2010 are shown in **Figure 5.0, Appendix A**. Overall, the total number of waterfowl days was higher during the 2009 and 2010 post-construction monitoring (311,774 and 236,583 respectively), compared to the 2007 pre-construction monitoring (117,838). This increase appears to be attributed largely to an increase in the number of Canada Goose observations.

In the fall of 2010, areas of highest waterfowl concentrations occurred in the southern portion of Wolfe Island in an area bordered by Concession 4, Stevenson Rd, Concession 7 and Reed's Bay Rd. When comparing 2007, 2009 and 2010 results, the areas of waterfowl concentration were generally similar with some localized shifting (e.g., using different fields within the same concession), although in 2009 and 2010 larger flocks were occasionally observed outside of this core area, scattered throughout the study area.

3.2.2 Overland Waterfowl Movement Surveys

Summaries of the fall 2010 morning and evening waterfowl movement surveys are provided in **Tables 3.11 and 3.12 (Appendix B)**, respectively. **Appendix F** provides the summaries of fall 2009 morning and evening waterfowl movement surveys. **Figures 6.0 and 7.0 (Appendix A)** compares the major routes used by waterfowl in fall during the pre-construction in 2007 to the post-construction surveys in 2009 and 2010.

Generally, major movement routes were similar in 2007, 2009 and 2010. 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. Routes used by waterfowl were typically similar during morning and evening movement, with the directions reversed.

During the 2009 and 2010 post-construction monitoring, waterfowl were observed flying between, and often in close proximity to, WTG's. In many instances, flocks of Canada Geese appeared to alter their course as they approached WTGs. In most cases, these were minor adjustments to avoid individual WTGs.

Canada Geese represented the majority of movement observations in 2007, 2009 and 2010 representing 82%, 84% and 91% of observations respectively. Dabblers represented 13%, 9% and 8% of observations and diving ducks 2%, 7% and <1% of observations in 2007, 2009 and 2010 respectively. Other species observed during the two years, including Common Merganser, Hooded Merganser, Snow Goose and Tundra Swan, represented a very small number of observations.

The results of the 2010 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 53,164 observations during morning and evening movement monitoring, 39,517 (74%) were observed at blade sweep height for at least a portion of their flight. Nonetheless, just three waterfowl fatalities were recorded at WTGs during the September-December migration period.

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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, 2009 and 2010 aerial surveys were grouped into guilds and waterfowl days were calculated for each sector. **Appendix G** presents the waterfowl days by guild for each sector for fall 1999, 2008, 2009 and 2010. 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 G**; data specific to each major staging area were not collected in 1999.

Table 3.13, Appendix B compares the number of waterfowl days in each sector in 1999, 2008, 2009 and 2010 inclusive of major staging areas. Overall, there was a high amount of fluctuation in waterfowl days within each sector over the four years of monitoring. An overall 16% decrease in waterfowl days was observed between 2008 pre-construction (2,234,702) and 2010 post-construction monitoring (1,886,494), compared to a 6% increase in 2009 (2,360,965) over pre-construction conditions. In 2010, the largest decrease in waterfowl days was observed in Sector 9 with a 34% decrease; other Sectors had decreases of 14 to 18%. Decreases in Sector 9 were largely attributed to small dabblers and bay duck observations. Sectors 10 and 11 experienced decreases in geese and large dabbler observations. Sectors 7 and 8, along the northern portion of the study area, experienced observed increase in waterfowl days of 51% and 20%, respectively, compared to pre-construction surveys. The increase was mostly attributed to an increase in bay ducks, with smaller increases in waterfowl days for goldeneye and mergansers.

Table 3.14, Appendix B compares the waterfowl days in each of the major staging areas in 2008, 2009 and 2010. As above, there was a high amount of fluctuation within each major staging area among the 3 years of monitoring. When comparing 2008 pre-construction to 2010 post-construction, waterfowl days in Reed's Bay were relatively similar; however, decreases of 19 to 28% were observed in the other major staging areas. Bayfield Bay experienced a decrease in small dabbler and bay duck waterfowl days, whereas large dabbler observations increased. Button Bay experienced decreases in observations of geese and bay ducks. Pyke's Bay had fewer large dabblers, but an increase in goldeneyes, as measured through waterfowl days.

Table 3.15, Appendix B, compares the waterfowl days for each guild in 1999, 2008, 2009 and 2010. The swan guild generally showed an increasing trend between each year of monitoring, with a slight decrease in waterfowl days between 2009 and 2010. Of the swan observations that were identified to species, all were Tundra Swan. Waterfowl days for geese and large dabblers were relatively similar in 2008 and 2009, with a decrease in 2010. The geese guild was comprised entirely of Canada Geese. Of those large dabblers identified to species, 90%

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were Mallards, 10% American Black Duck and less than 1% were Gadwall. Small dabblers, comprised almost entirely of American Wigeon (97%), had particular high waterfowl days in 2008, but similar numbers among the other years of monitoring. Bay duck observations were similar in 1999 and 2008, with an increase in 2009 and a decrease in 2010. Of the bay duck observations identified to species, the majority were Greater or Lesser Scaup (96%) with some Redhead (3%) and small numbers of other species. Sea ducks, including Long-tailed Ducks (71%), White-wing Scoter (17%) and Black Scoter (12%), were particularly numerous in 2009 and 2010. Both goldeneye and mergansers were observed in much higher numbers during the 2010 surveys compared to earlier surveys (**Table 3.15, Appendix B**). Goldeneye guild was comprised of 83% Common Goldeneye and 17% Bufflehead. Of the Mergansers identified to species, 95% were Red-breasted Merganser, with the remainder being Common Merganser.

3.2.4 Winter Raptor Surveys

A complete summary of raptors and owls recorded during each survey in November and December 2010 is provided in **Tables 3.16 and 3.17 (Appendix B)**. Rough-legged Hawk (94 observations) was the most abundant raptor observed during the afternoon surveys, followed by Northern Harrier (58 observations) and Red-tailed Hawk (34 observations). Numbers of Short-eared Owl (68 observations) in November and December 2010 were more than double that of the same period in 2006 (**Table 3.17, Appendix B**), with a correspondingly increased density (0.3 vs. 0.2 owls per kilometer).

Maximum numbers observed during any one survey in 2010 for each species were 32 Short-eared Owls, 31 Rough-legged Hawks, 16 Northern Harriers, 15 Red-tailed Hawks and 4 American Kestrels. Only single observations of Bald Eagle, Cooper's Hawk and Merlin were made on any one survey. No Snowy Owls were observed in November and December of 2010.

Average raptor density, calculated as the number of raptors per kilometer of survey across the study area, was 0.8 raptors per kilometer on each survey, with the exception of November 25 which had 0.5 raptors per kilometer. During the evening surveys, Short-eared Owls density was 0.1 to 0.3 owls per kilometer on each survey, with the exception of the December 8 survey, which observed a density of 0.5 owls per kilometer.

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) were mapped. Areas of high raptor and owl density, as defined above, are shown in **Figures 8.0 and 9.0, Appendix A**. Generally, higher concentrations of raptor activity were most commonly observed centrally within the study area, between Baseline Rd. and Bennett Rd. During the November to December 2009 winter raptor monitoring, no areas of raptor concentration were observed.

For comparison, results from November and December 2006 pre-construction winter raptor monitoring are also provided in **Tables 3.16 and 3.17, Appendix B**. Total raptor numbers were

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similar between pre-construction and post-construction conditions; raptor densities in 2006 and 2010 were similar (0.8 and 0.7 raptors per kilometer respectively). Rough-legged Hawk observations were significantly higher in 2010, which offset a decrease in Red-tailed Hawk and Northern Harrier observations. During the evening surveys, Short-eared Owl density was significantly higher in 2010, with a greater than 100% increase in the number of observations.

Table 3.18, Appendix B provides a summary the result of the Kingston Christmas Bird Count (“CBC”) from 2000 to 2010, which 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 showed similar trends to the Wolfe Island winter raptor monitoring, with peak numbers of Northern Harriers observed in 2006 and peaks in Rough-legged Hawks and Short-eared Owls observed in 2010.

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 related to mortality of bats or birds and one notification related to disturbance to staging waterfowl (**Table 3.19, Appendix B**)

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

3.3.1 High Annual Mortality Rates – Bats

The threshold for high annual mortality rates – bats as outlined in the Follow-up Plan is 144 bat fatalities noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency. Six notifications were related to bat fatalities, and were submitted between July 27 and September 15 (**Table 3.19, Appendix B**).

3.3.2 High Annual Mortality Rates – Birds

The threshold for high annual mortality rates – birds as outlined in the Follow-up Plan is 134 bird fatalities noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency. One notification was related to bird fatalities, and was submitted on July 27 (**Table 3.19, Appendix B**).

3.3.3 Disturbance of Staging Waterfowl

The threshold for disturbance to staging waterfowl as outlined in the Follow-up Plan is a 30% decline in the staging numbers of any of the listed waterfowl guilds over a period of more than

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one month. The measure of abundance is “waterfowl days” per guild, compared between the average of 2008/2009 pre-construction surveys and the 2010 post-construction surveys.

Over the period September 7 to November 1, 2010, waterfowl days for the geese guild (all Canada Geese) was 120,662, which represented a 54% decline from the same period in 2008 (September 9 to November 6, 2008). Over the same period, waterfowl days for the goldeneye guild (including Common Goldeneye and Bufflehead) was 24,194 in 2010, which represents a 42% decline from 2008. However, by the end of the Reporting Period, the geese guild showed an overall decline of 21% that was less than the notification threshold, and the goldeneye guild reflected an overall increase of 54%. The differences in waterfowl days between the two years appears to be mostly attributable to differences in timing of migration events.

4.0 Discussion and Recommendations

4.1 DIRECT EFFECTS – MORTALITY

Despite finding far fewer bird and bat carcasses between July and December, 2010 compared to the same period the previous year, the calculated estimate of mortality expressed per turbine and per MW are similar to those estimated for 2009 due to differences in the correction factors applied. Higher overall searcher efficiency was offset by a large decrease in the area searched due to vegetative cover, as agricultural lands were reclaimed. The proportion of carcasses removed by scavengers was comparable between the two years. During the Reporting Period of July 1 and December 31 2009, 100 bird carcasses were found compared to 54 bird carcasses in the same Reporting Period in 2010. Similarly, during the July to December Reporting Period in 2009, 180 bat carcasses were found, compared to 111 in 2010.

4.1.1 Over the Reporting Period, no fatalities were observed at either of the two MET towers, suggesting mortality rates at the towers were very low to nil. The very low mortality rate can possibly be attributed to the absence of guy wires on the MET towers, which can be associated with bird mortality at other similar structures (e.g. communication towers). Birds

A review of bird 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 bird mortality rates ranging from 0.95 to 11.67 birds per MW per year. A recent summary of available mortality rates for birds, raptors and bats has been prepared by the National Wind Coordinating Committee (“NWCC”) (2010), who reports bird mortality rates of up to 14 birds per MW per year.

The estimated mortality rate for the six-month Reporting Period at the Wolfe Island Wind Plant, at 3.60 birds per MW (8.27 birds/turbine) is higher than that observed during the same period in 2009 (3.04 birds/turbine or 6.99 birds/MW) although far fewer carcasses were found in 2010. The mortality rate for the six month Reporting Period is consistent with the results in nearby New York and other studies summarized by Arnett et al. (2007). The Reporting Period covered the entire period of concern, and so a comparison between sites is valid. When the results of the Reporting Period (July-December) are combined with the estimated mortality rate for the period January to June 2010 (2.78 birds per MW), the resultant estimated mortality rate is 6.38 birds per MW. This estimated annual mortality rate is below the adaptive management threshold of 11.7 birds/MW identified in the Follow-Up Plan.

The estimated raptor and vulture mortality rate of 0.04 raptors per MW is similar to that observed in 2009, and is in the middle of the mortality range observed at other facilities in North

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America (0 – 0.09 raptors per MW; Arnett et al., 2007). It is consistent with rates observed elsewhere in Ontario (Stantec, unpublished data) and is well below the threshold for notification of 0.09 raptors per MW, as identified in the Follow-Up Plan. The raptor and vulture fatalities appeared to be of individuals migrating through the study area.

Tree Swallows, other swallows and Purple Martins comprised 41% of the recorded fatalities. In 2009, this group of species comprised 38% of recorded fatalities. Timing of fatalities and the lack of apparent clustering at one or more WTGs was remarkably consistent over the two years of observation. 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 22 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. Although not listed or protected under the federal *Species at Risk Act* or provincial *Endangered Species Act* during the Reporting Period, this species was identified as threatened by Committee of the Status of Endangered Wildlife in Canada (COSEWIC) in April of 2010 and by the Committee on the Status of Species at Risk in Ontario (COSSARO) in June of 2010. The two Bobolink fatalities recorded between July and September 2010, when considered with the single Bobolink fatality in the period January to June 2010, 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).

Only one other species of conservation priority (Bank Swallow) was on the list of fatalities, with one individual recorded. This level of mortality is not considered to be an indication of significant impact to this 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. A recent summary of available mortality rates for birds, raptors and bats has been

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prepared by the National Wind Coordinating Committee (“NWCC”) (2010), who reports bat mortality rates of between less than one and approximately 39 bats per MW per year.

The estimated mortality rate for the Reporting Period at the Wolfe Island Wind Plant at 9.50 bats per MW (21.84 bats per turbine), is higher than the rate observed over the same period in 2009 (6.42 bats per MW) although significantly fewer bat carcasses were found in 2010. When the results of the Reporting Period (July-December) are combined with the estimated mortality rate for the period January to June 2010 (2.27 bats per MW), the resultant estimated mortality rate of 11.77 bats per MW is within the range of rates observed reported by NWCC (2010) and Arnett et al., (2007).

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 and in 2010, the peak of bat mortality occurred at the wind plant in the late August. Long-distance migratory tree bats comprised nearly 85% of identified fatalities in 2010. WTGs responsible for larger number of fatalities varied between the two years of observation, however, in both years, WTGs at the southern end of the project were identified as resulting in more bat fatalities than elsewhere within the project area.

The annual bat mortality rate is below the adaptive management threshold of 12.5 bats/MW as identified in the Follow-Up Plan. Although the bat mortality rate is below the threshold, TransAlta is committed to complete additional research in 2011 to evaluate practical measures to reduce the effects of operating wind turbines on bats at Wolfe Island. TransAlta will complete testing of potential mitigation measures during the fall migration period in 2011 to determine the feasibility and effectiveness of implementing such mitigation measures at Wolfe Island.

4.2 INDIRECT EFFECTS – DISTURBANCE

4.2.1 Migratory Waterfowl

Results of the inland foraging surveys suggest an increase in waterfowl abundance in 2010 over 2007, although lower than in 2009. An increase Canada Goose observations was responsible for the majority of this increase. It is noted that, during both pre and post-construction monitoring, the highest area of Canada Goose concentration was in the southern portion of the study area between Pyke’s Bay and Button Bay. The number of waterfowl days recorded in this area was similar between 2007, 2009 and 2010. The increase in Canada Goose abundance in 2009 and 2010 appears to be attributed to observations of larger flocks scattered throughout other portions of the study area.

There is no evidence to suggest that fluctuations in waterfowl abundance over the three years of monitoring would be attributed to changes of the conditions on the island (e.g. changes in crop type or foraging opportunity). Differences in Canada Goose abundance, as measured in waterfowl days, between 2007, 2009 and 2010 monitoring was likely the result of natural

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variability in migrant abundance. Survey interval may also result in some variability between years; although weekly surveys capture the majority of waterfowl that forage on the island, flocks that remain on the island for only brief periods of time have the potential to be captured by weekly surveys in some years and overlooked in others.

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, 2009 and 2010. Although waterfowl were not observed directly adjacent to WTGs (i.e., within 100 m) during the post-construction monitoring, flocks were often foraging in the vicinity of (i.e., within 500 m) and between strings of WTGs. This result suggests the proximity to WTGs 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 2007, 2009 and 2010. 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. Slight changes in routes between years were likely attributed 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. Flight height, however, appeared to be affected by wind conditions with lower flight heights being more prevalent during periods of stronger winds. Although they commonly flew at blade sweep height, waterfowl appear to adjust their flight route to avoid flying in close proximity to WTG. In many cases, obvious avoidance behavior was observed, as flocks of waterfowl adjusted their flight course as they approached a WTG.

Total waterfowl days recorded by the aerial waterfowl surveys were similar in 1999, 2008 and 2009, but a decrease was observed in 2010. The largest decrease in waterfowl days in 2010 was observed in Sector 9, which includes Bayfield Bay. Sector 7, along the north side of the study area, experienced an increase in waterfowl days in 2010. The decrease in waterfowl days between 2007 and 2010 could be due in part to natural variability and the uncertainty related to sampling on this scale. In addition, waterfowl day calculations can be influenced by survey interval which can be affected by weather and survey scheduling. As such, the 16% decrease in waterfowl days observed between 2007 and 2010 is not considered significant and is well below the trigger of potentially significant decline as defined in the Follow-Up Plan (i.e. 30%).

Within individual sectors, the aerial waterfowl surveys found notable fluctuations in the number of waterfowl days between years. Such fluctuations are not necessarily an indication that importance of sectors to staging waterfowl varied from year to year. Fluctuations between sectors were most likely a result of flock movement and the location of large flocks at the time of surveys.

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Waterfowl days of the swan guild were variable between the 2008, 2009 and 2010 surveys, but generally appeared to be more abundant than in 1999. During each year of surveys, Sectors 9 and 10, along the south shore of the island, appear to be the most important staging area for swans. The Ontario Breeding Bird Atlas (Cadman et al., 2007) suggests Tundra Swan 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 observed.

Waterfowl days recorded by aerial surveys for geese and large dabblers were relatively similar in 2008 and 2009, with a decrease in 2010. However, aerial observations within the bays and along the shoreline may have been dependent on the numbers of geese and large dabblers foraging inland during the survey. It is noted that ground-based surveys recorded an increase in geese and large dabblers waterfowl days between 2008 pre-construction and 2010 post-construction surveys, suggesting no decline in abundance of species in these guilds.

The small dabbler guild showed a notable decrease between 2008 and 2010. However, waterfowl days for small dabblers in 2010 were similar to 1999 and 2009, suggesting abundance in 2010 was a relatively average. Small dabbler observations in 2008 appear to be an outlier, representing much higher than average abundance.

Waterfowl days for sea ducks were higher in 2009 and 2010, compared to the 2008 pre-construction surveys. It is noted however, that the % change calculation (6106%) is exaggerated due to the relatively small number of observations in this guild.

Waterfowl days for goldeneye and merganser guilds were highly variable between the years, with an apparent increase in 2010. Bay duck observations were similar in 1999 and 2008, with an increase in 2009 and a decrease in 2010. The fluctuations in goldeneye, mergansers and bay ducks can likely be attributed to natural variability 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 dependent 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 3.18, Appendix B**), which include observations throughout the Kingston count circle, generally correlate to the observations in the 2006 pre-construction and 2010 post-construction monitoring on Wolfe Island. Both surveys recorded peaks of Northern Harriers and Red-tailed Hawks in 2006 and peaks of Short-eared Owls and Rough-legged Hawks in 2010. Overall, the results of the November/December 2010 Wolfe

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Island winter raptor monitoring and CBC suggest the winter of 2010/2011 represents a relatively high year for winter raptor abundance.

Due to the overall low raptor density in 2009, areas of particularly high raptor density (more than five raptors per kilometer) were not observed. However, in 2010, several areas of high raptor concentration were observed, concentrated in the southern portion of the island (**Figure 9.0, Appendix A**). In all three years of monitoring, areas of high Short-eared Owl concentration (**Figure 8.0, Appendix A**) occurred in the southern and western portions of the island.

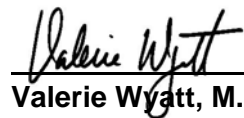
A more thorough discussion of raptor behavior, including an analysis of the complete season (November through March), will be provided in the subsequent Monitoring Report No. 5.

4.3 RECOMMENDATIONS

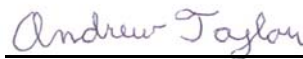
Mortality and disturbance effects monitoring should proceed in 2011 according to the February 2010 Follow-up Plan and as amended through discussions with the parties to the Plan. Scavenger removal trials conducted in January, 2010 support the continued once-weekly carcass search frequency in the winter months (December, January and February).

Two years of fall monitoring have shown increased numbers of geese and dabbling ducks foraging inland, and unchanged movement patterns between foraging areas and offshore staging areas. It is recommended that the inland foraging and movement surveys be discontinued in fall. Aerial surveys of offshore staging should continue.

STANTEC CONSULTING LTD.



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References

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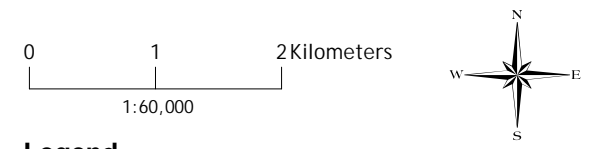
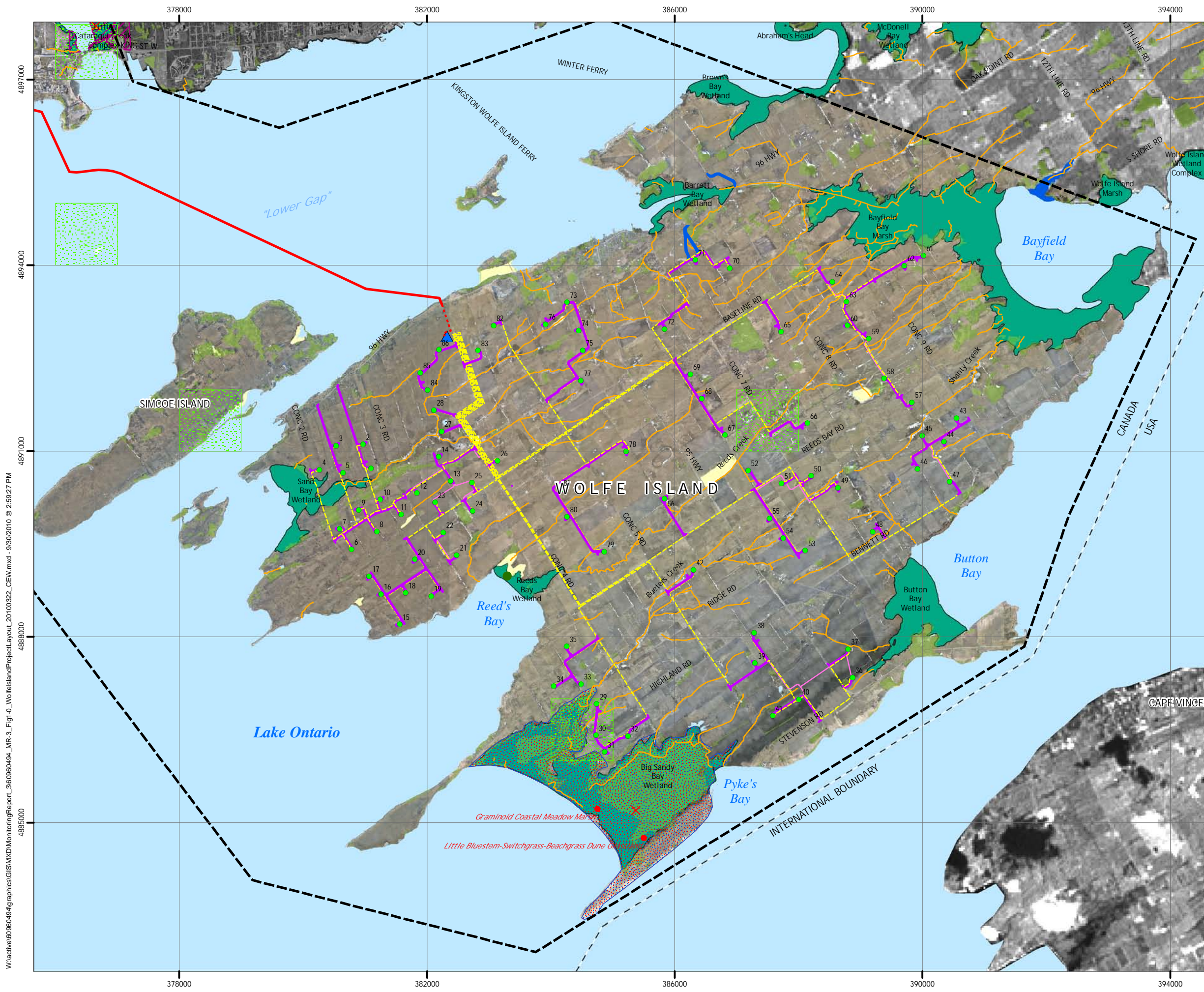
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Appendix A

Figures

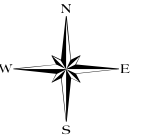
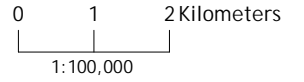
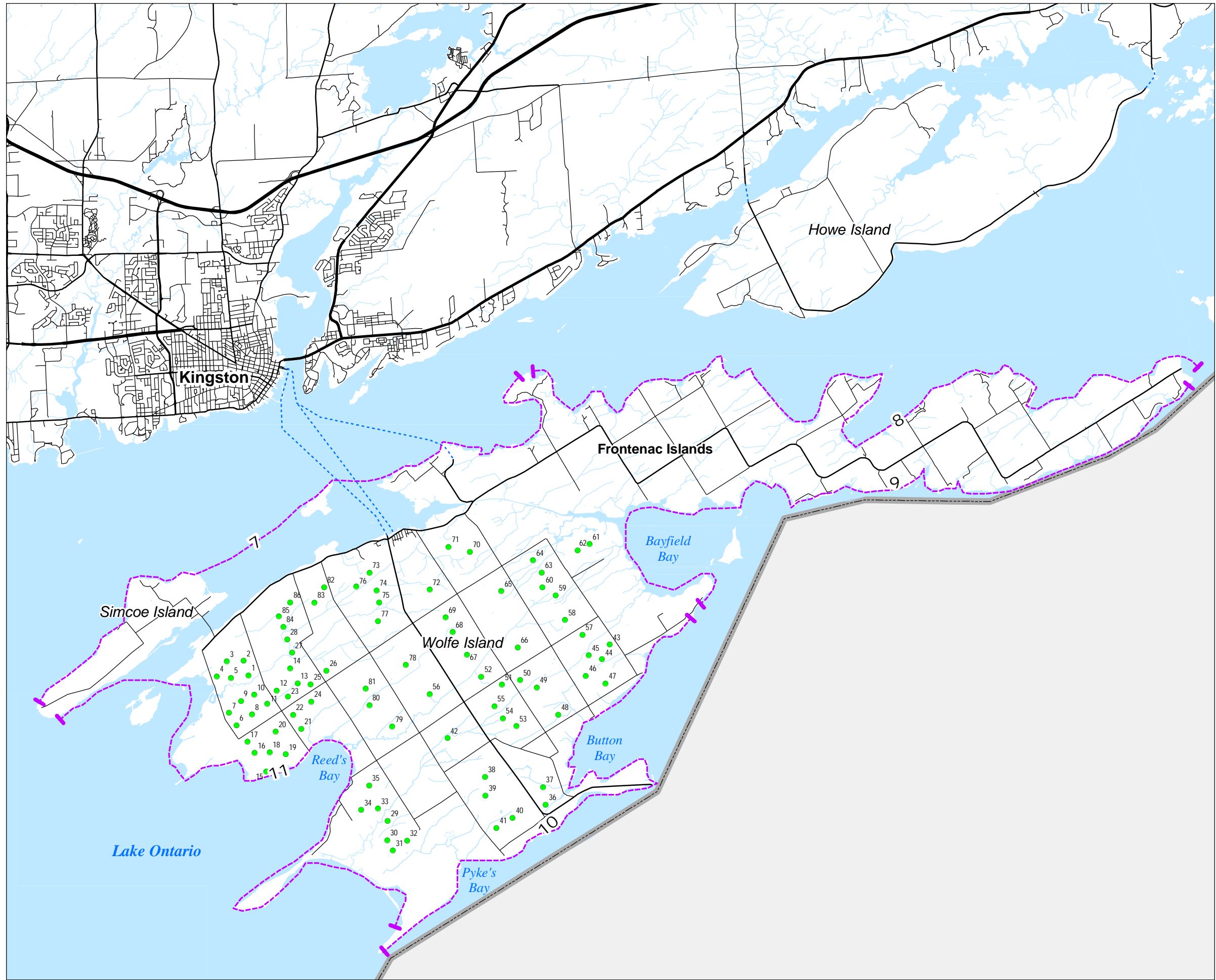


- Legend**
- Study Area
 - Gardiners Transformer Station
 - Turbine Layout
 - 230 kV Submarine Cable
 - 230 kV Transmission Line - Underground
 - Access Roads
 - 34.5 kV Collector Lines
 - 230 kV Substation / Operation & Maintenance Building
 - Temporary Road
 - Crane Walk Path
- Area of Natural or Scientific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

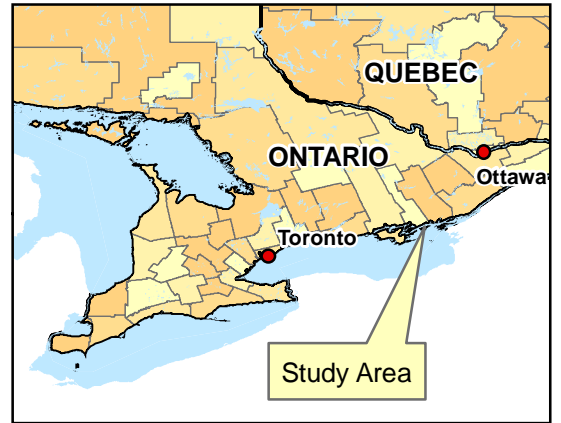
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Legend

- 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.

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Client/Project
WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 3

Figure No.
2.0

Title
**Wolfe Island Waterfowl
Survey Sectors**

Figure 3.0: Wolfe Island Wind Farm: Numbers of Bird and Bat Fatalities by Survey Date

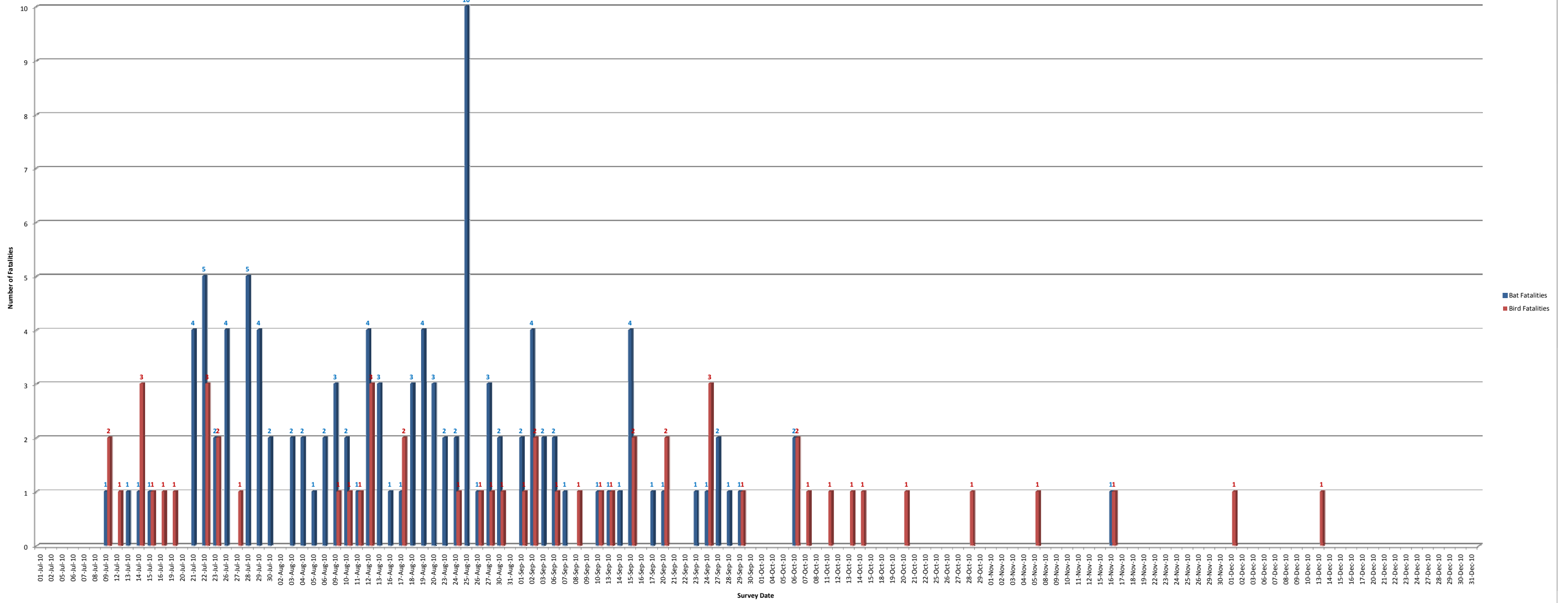
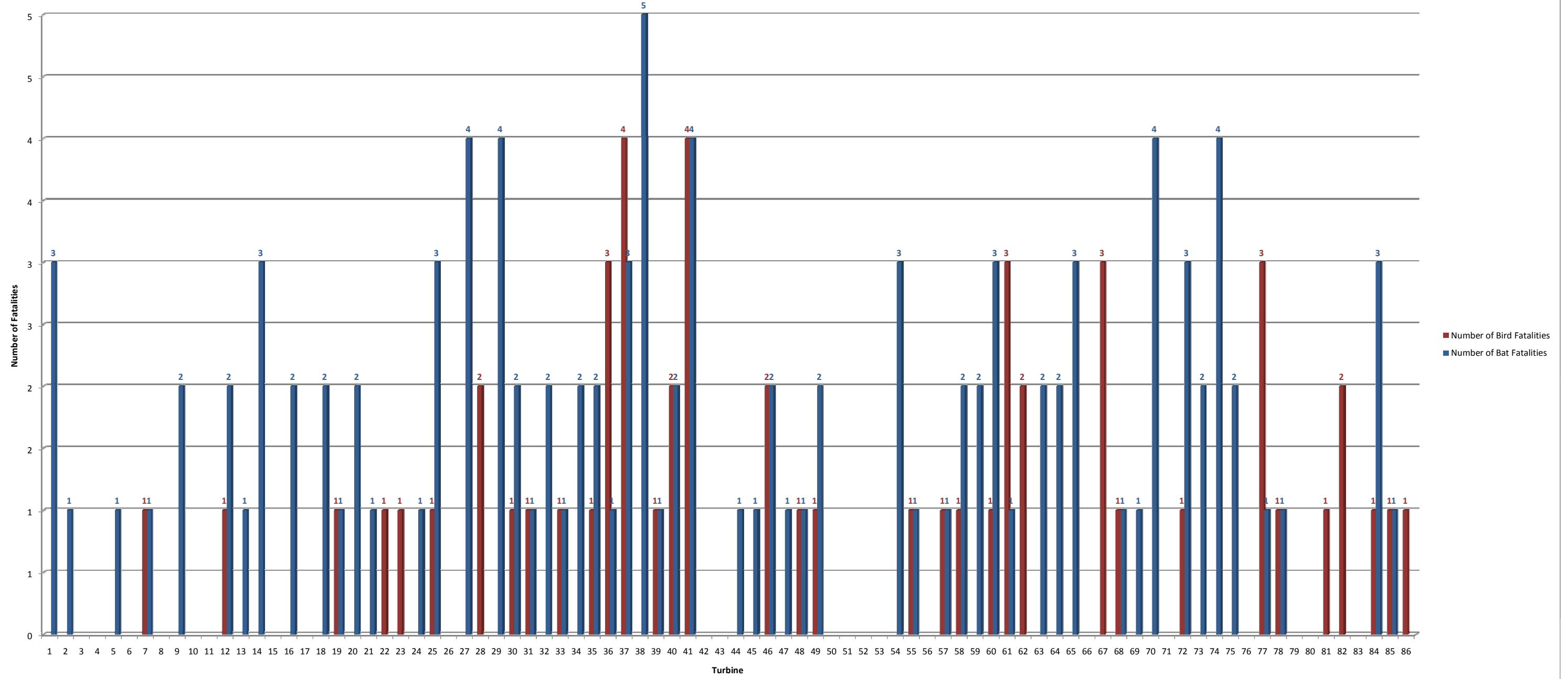
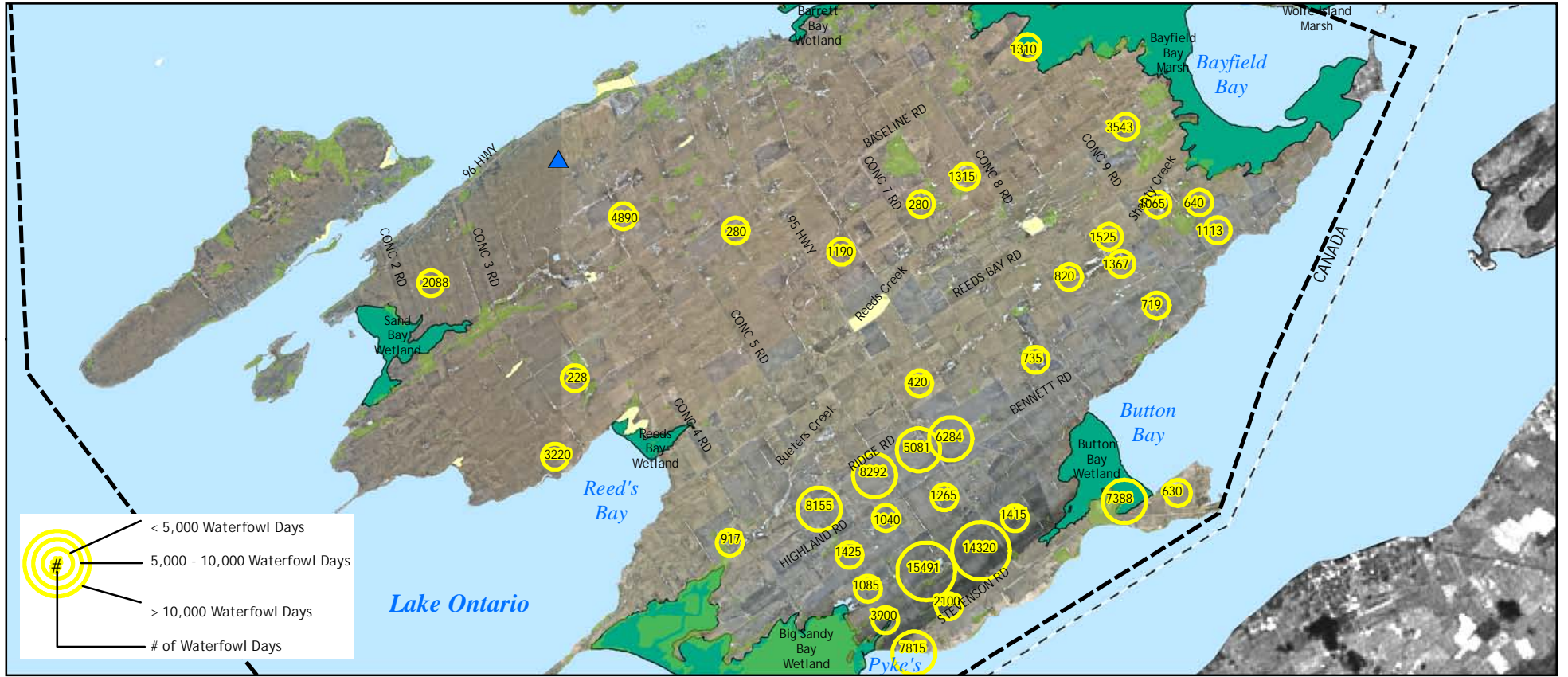


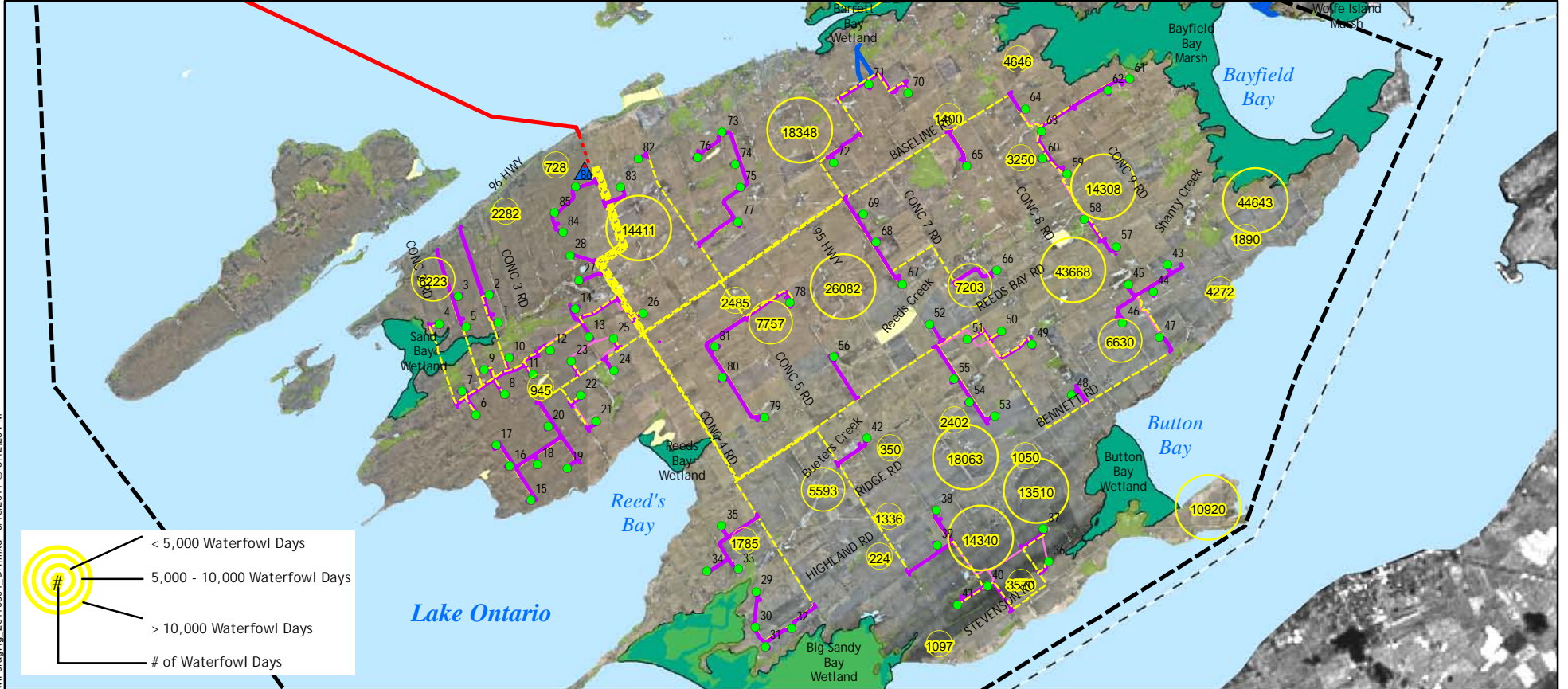
Figure 4: Wolfe Island Wind Farm: Bird and Bat Fatalities by Turbine
July 1 Through December 31, 2010



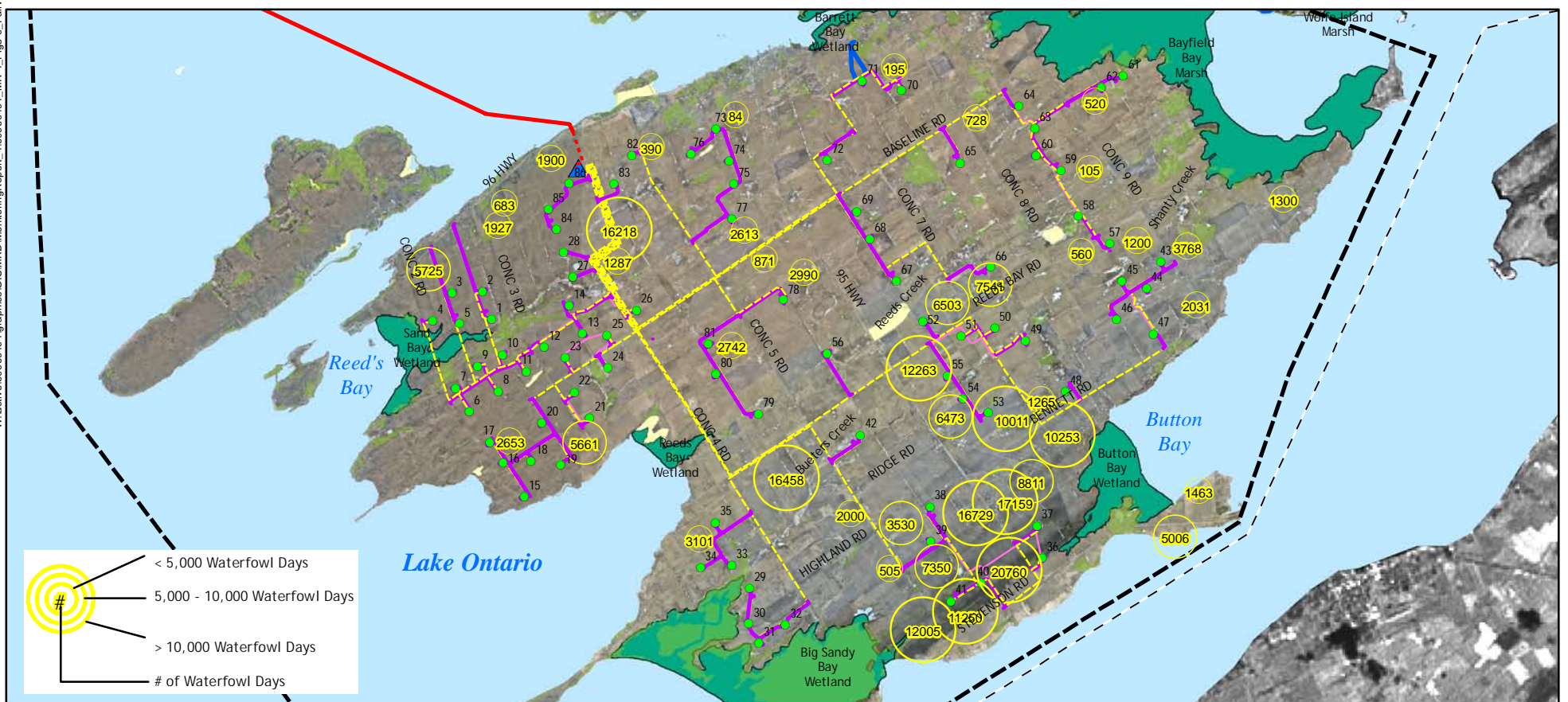
2007 Pre-Construction Results



2009 Post-Construction Results



2010 Post-Construction Results



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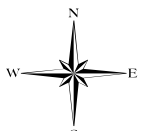
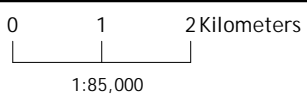
Legend

- 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

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Client/Project
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 MONITORING REPORT NO. 4**

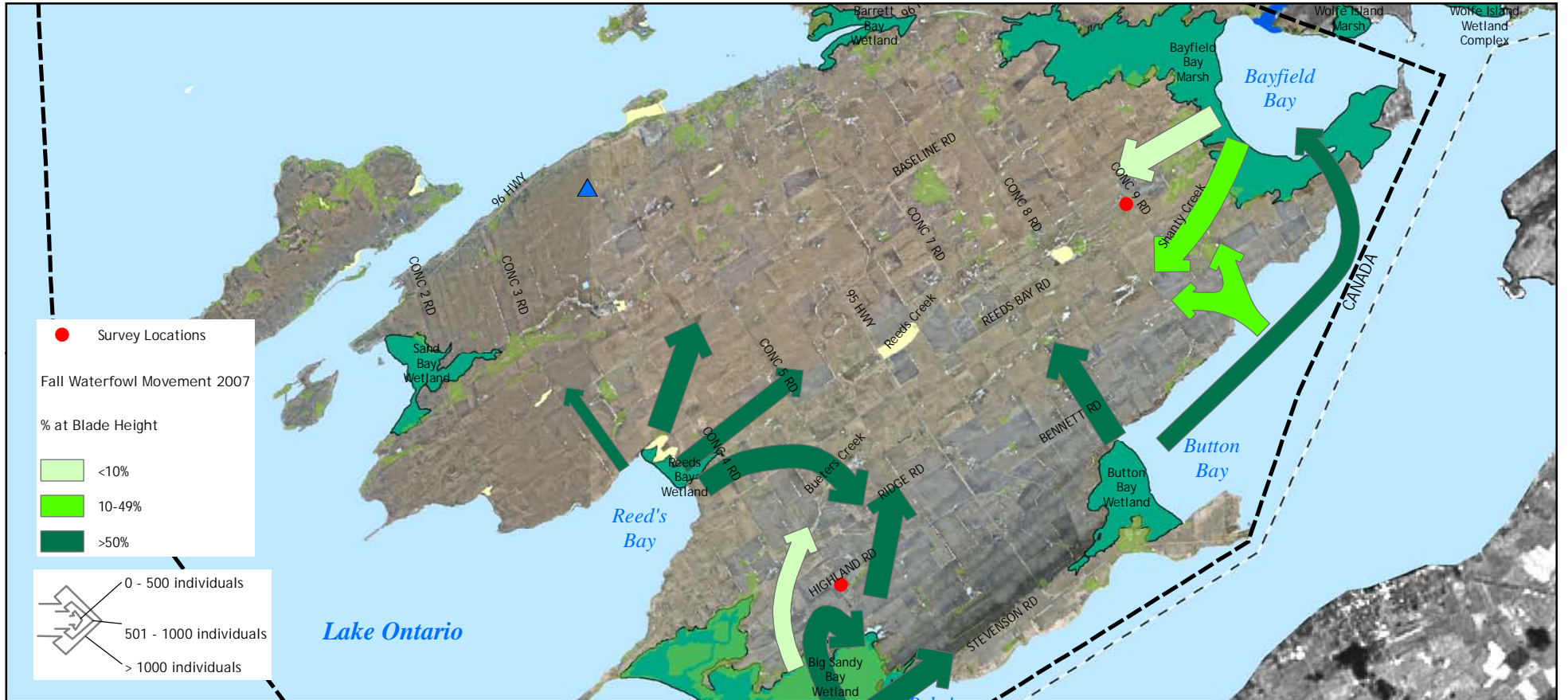
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5.0

Title
**Comparison of Fall
 Waterfowl Foraging
 in 2007, 2009 and 2010**

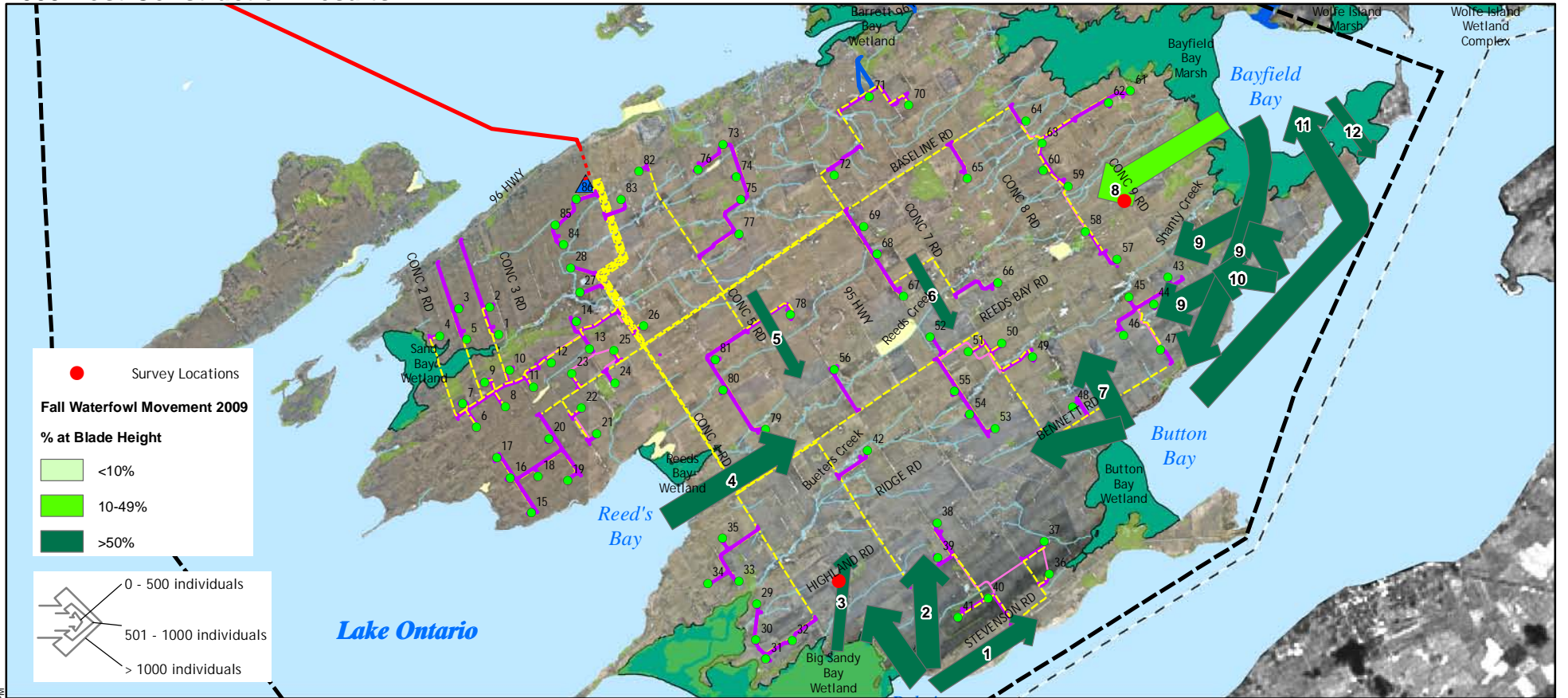


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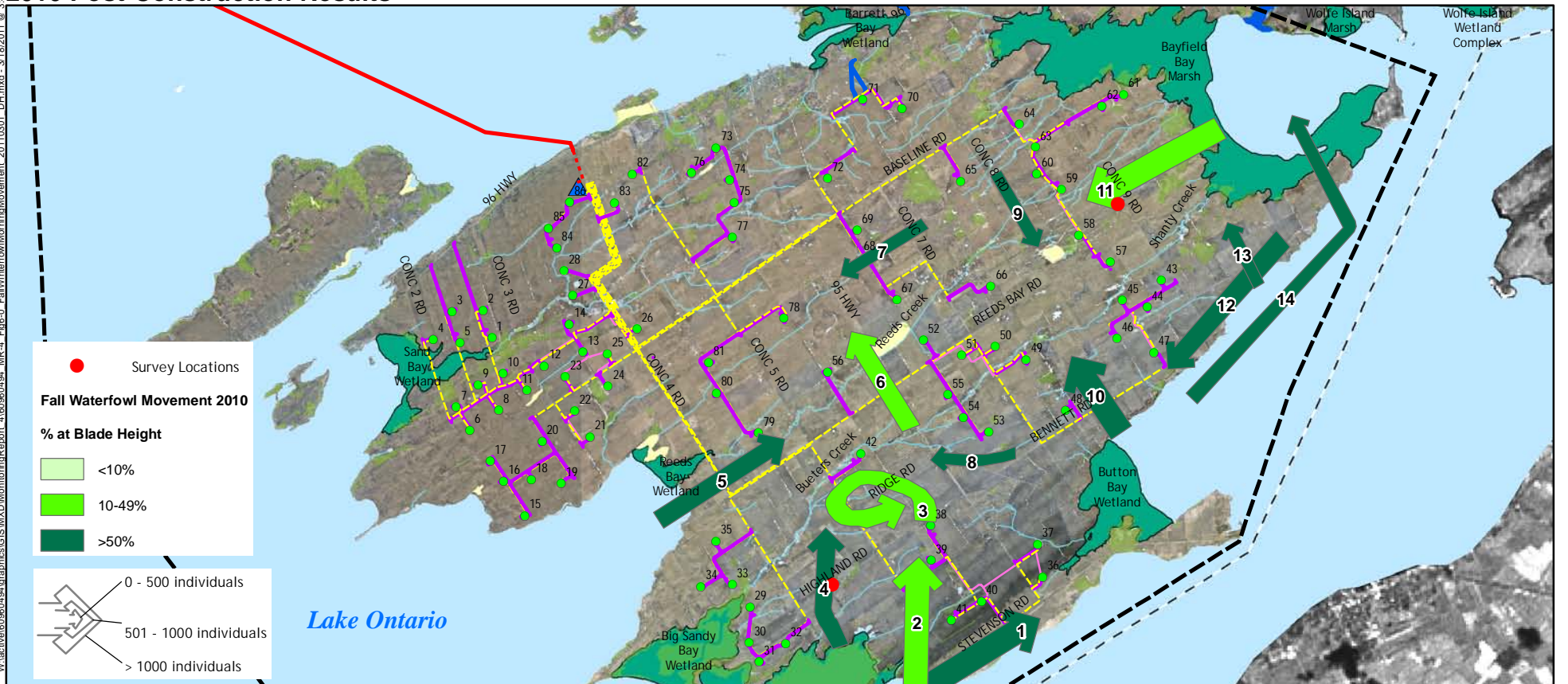
2007 Pre-Construction Results



2009 Post-Construction Results



2010 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

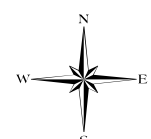
- Temporary Road
- Crane Walk Path
- Woodlot
- Wetlands
- Provincially Significant Wetland
- Non-Provincially Significant Wetland
- Unevaluated Wetland

Notes

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Client/Project

WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 4

Figure No.

6.0

Title

**Comparison of
Fall Waterfowl
Morning Movement
2007, 2009 and 2010**

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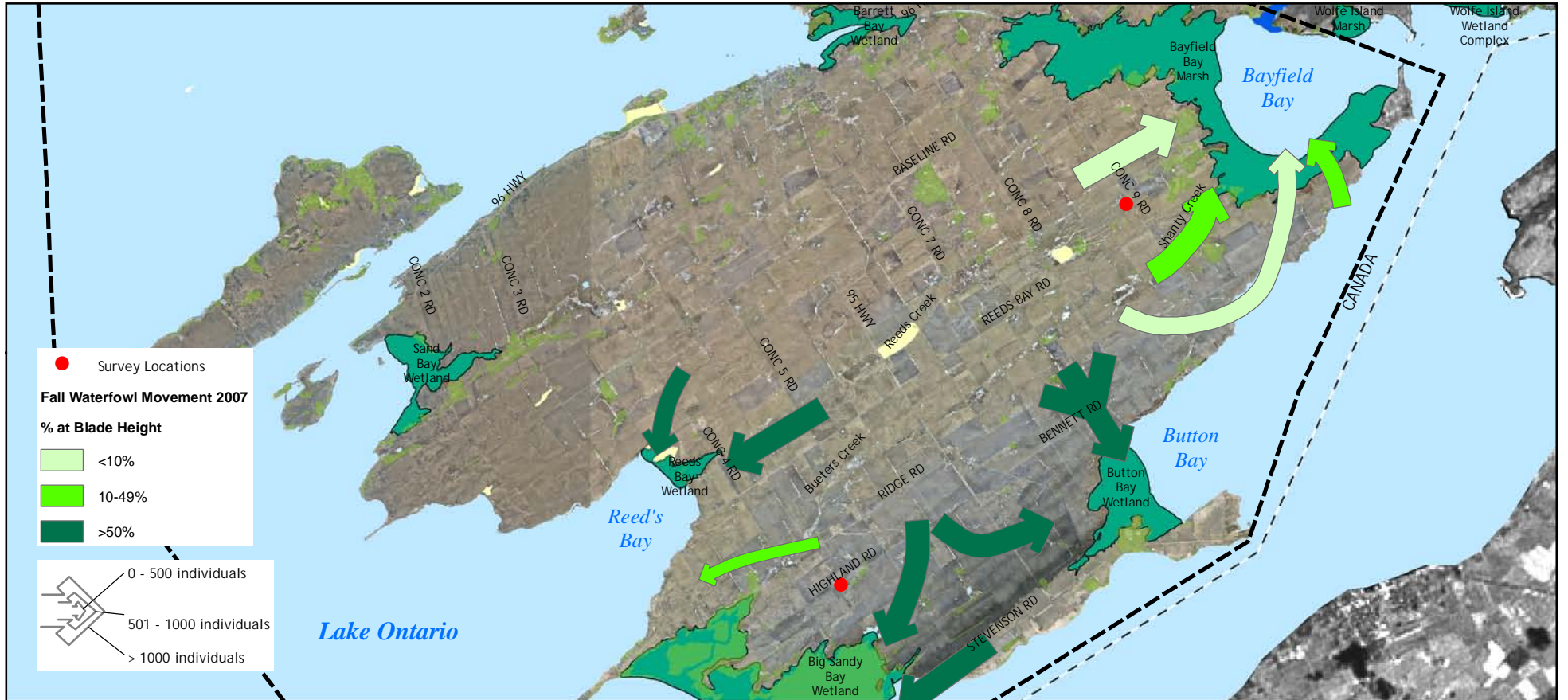


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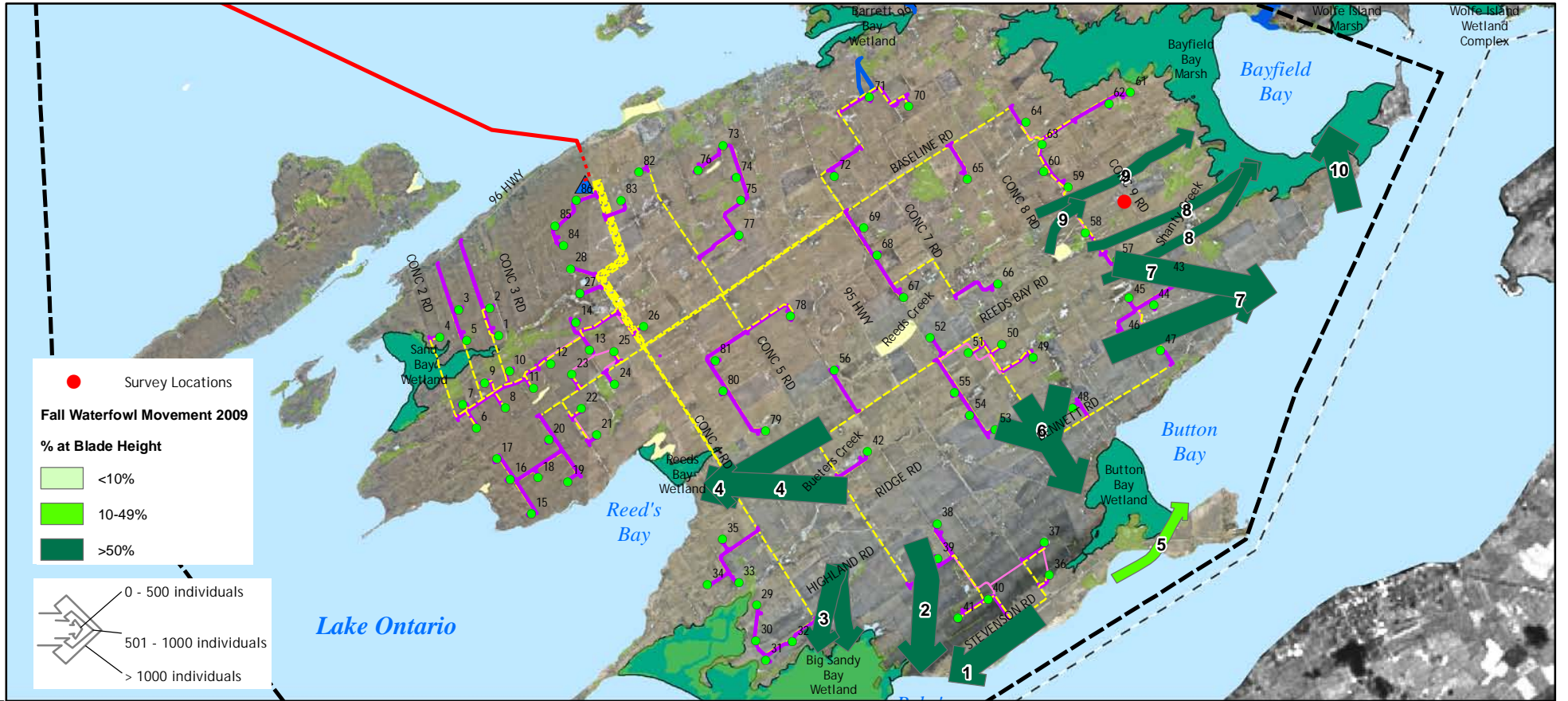


March, 2011
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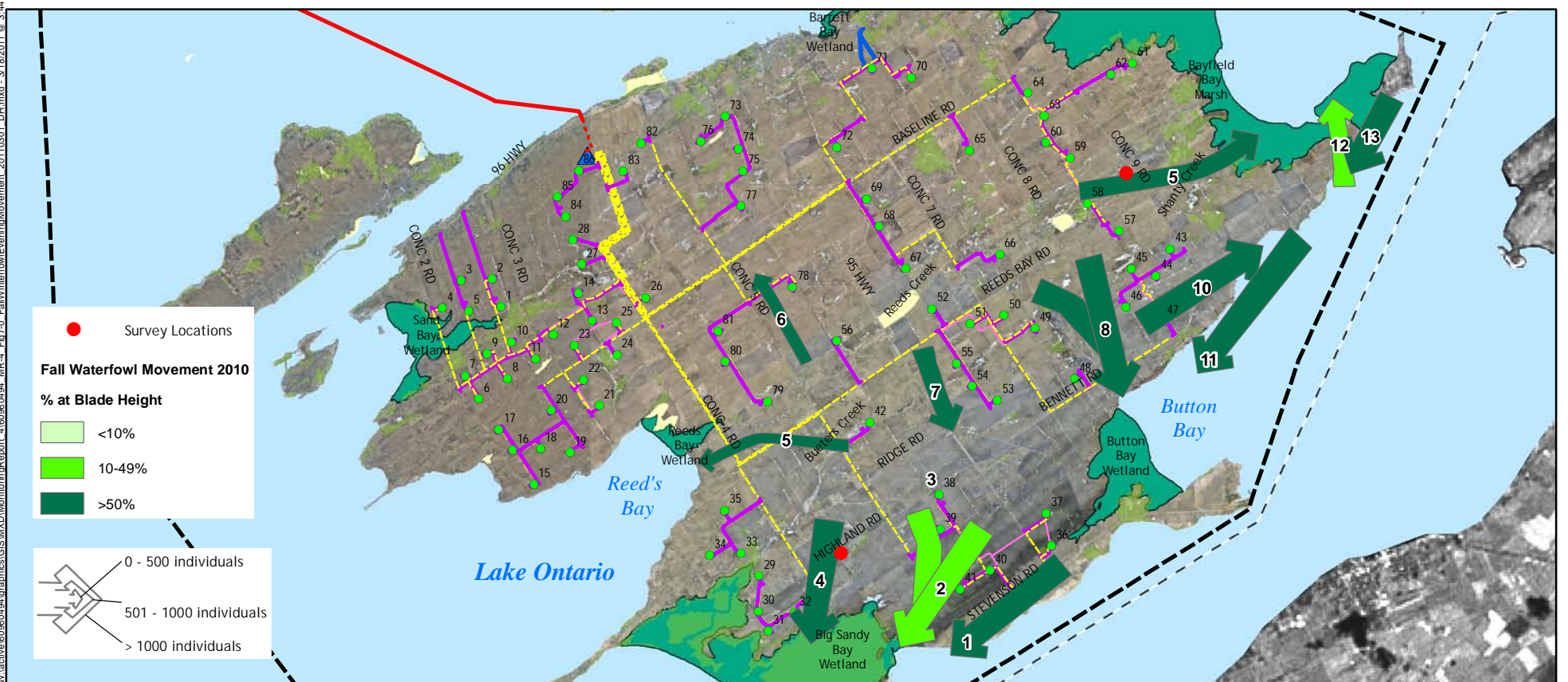
2007 Pre-Construction Results



2009 Post-Construction Results



2010 Post-Construction Results



Legend

- Study Area
- Gardiners Transformer Station
- Turbine Layout
- 230 kV Submarine Cable
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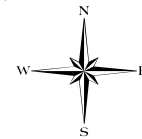
Notes

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WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 4

Figure No.

7.0

Title

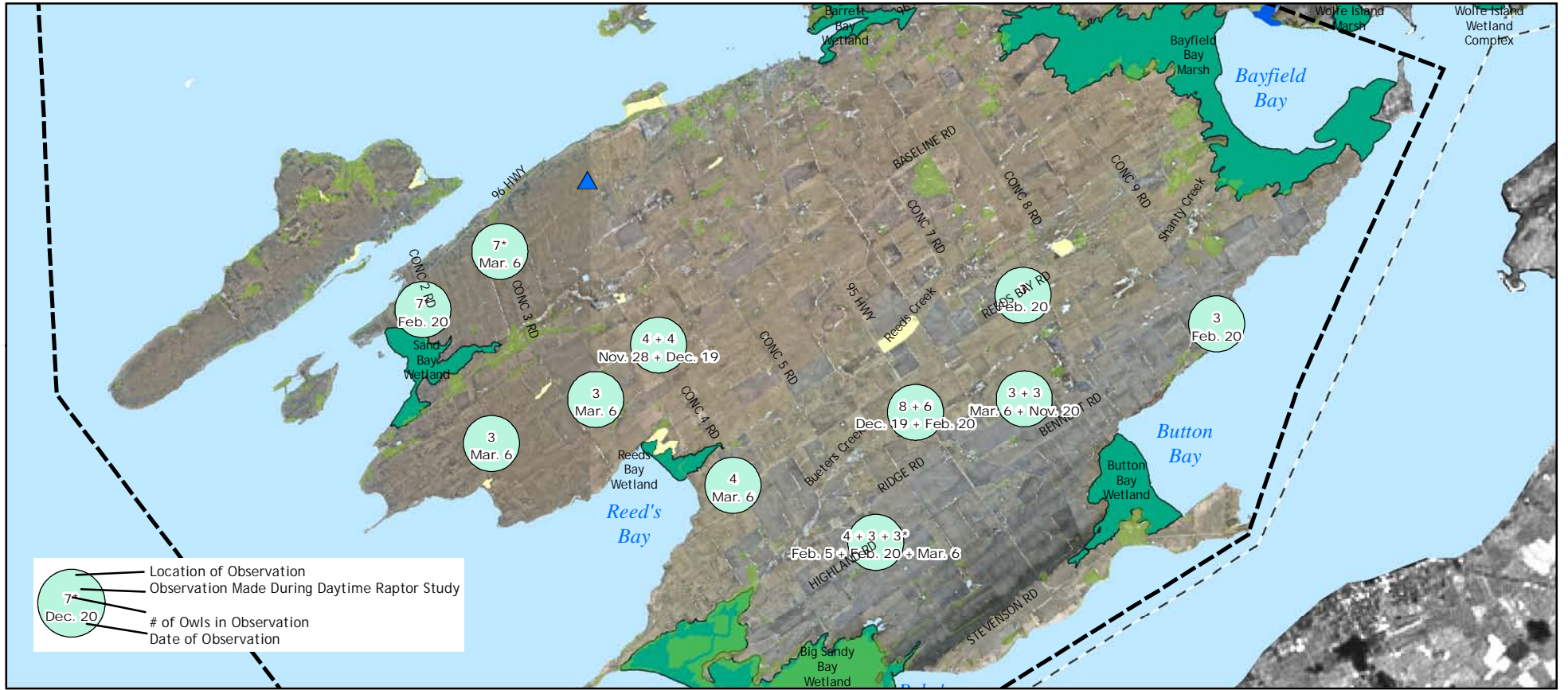
**Comparison of
Fall Waterfowl
Evening Movement
2007, 2009 and 2010**

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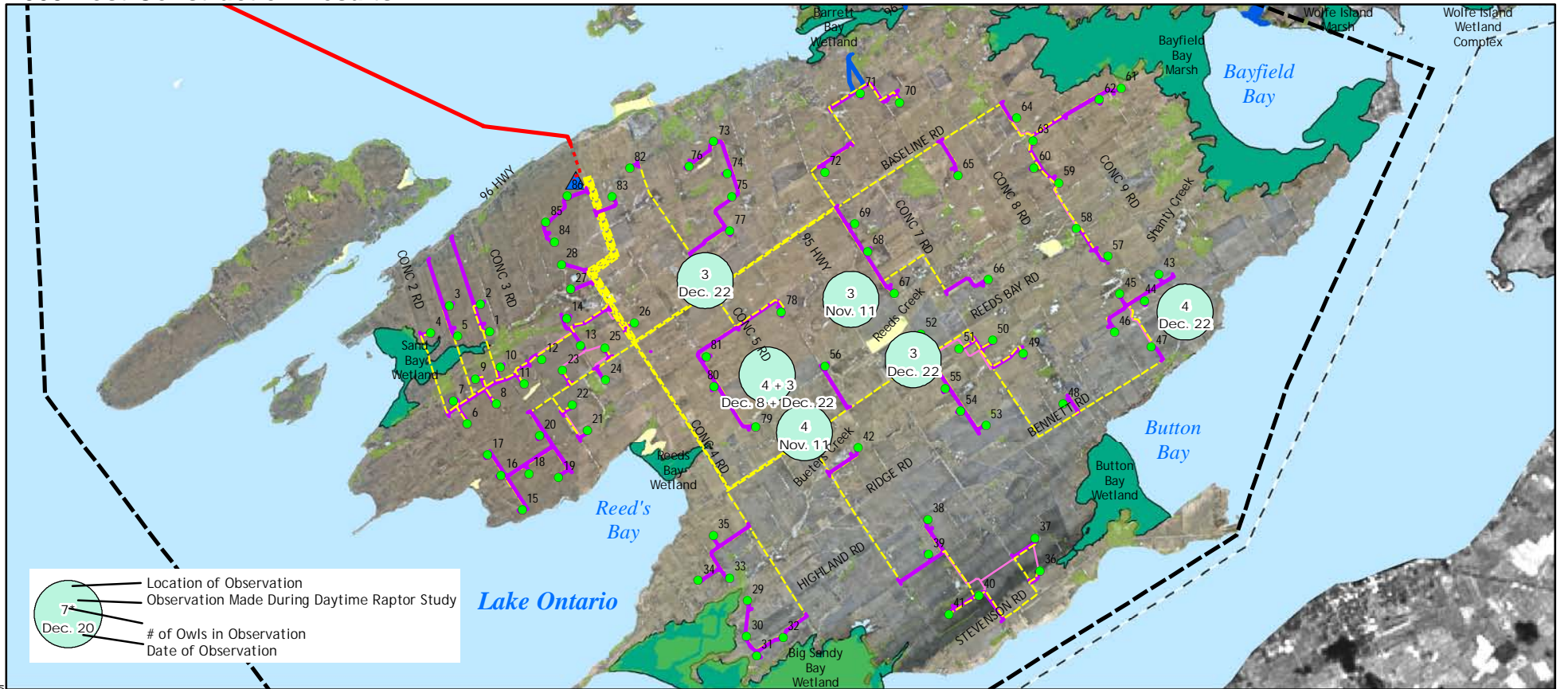


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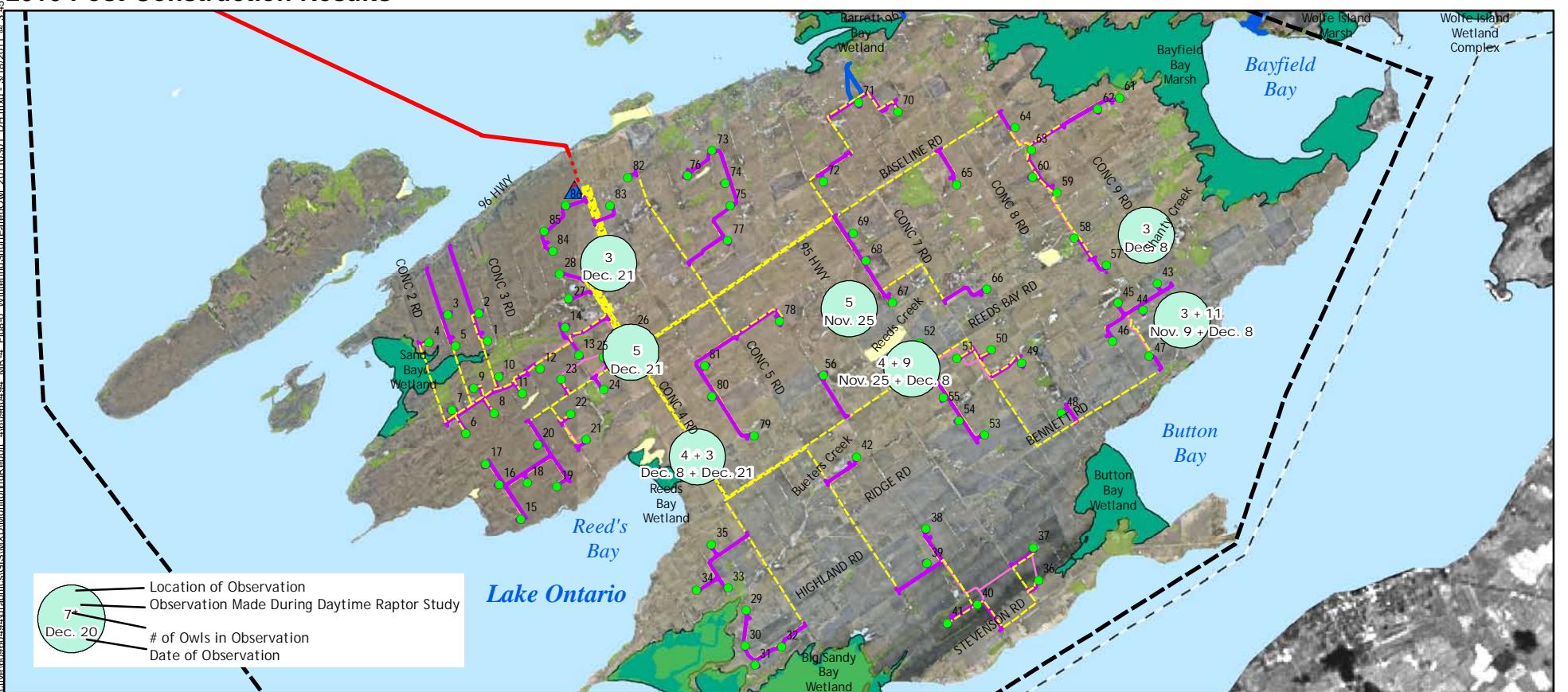
2006 Pre-Construction Results



2009 Post-Construction Results



2010 Post-Construction Results



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Legend

- Study Area
- Gardiners Transformer Station
- Turbine Layout
- 230 kV Submarine Cable
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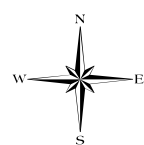
Notes

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 MONITORING REPORT NO. 4

Figure No.

8.0

Title

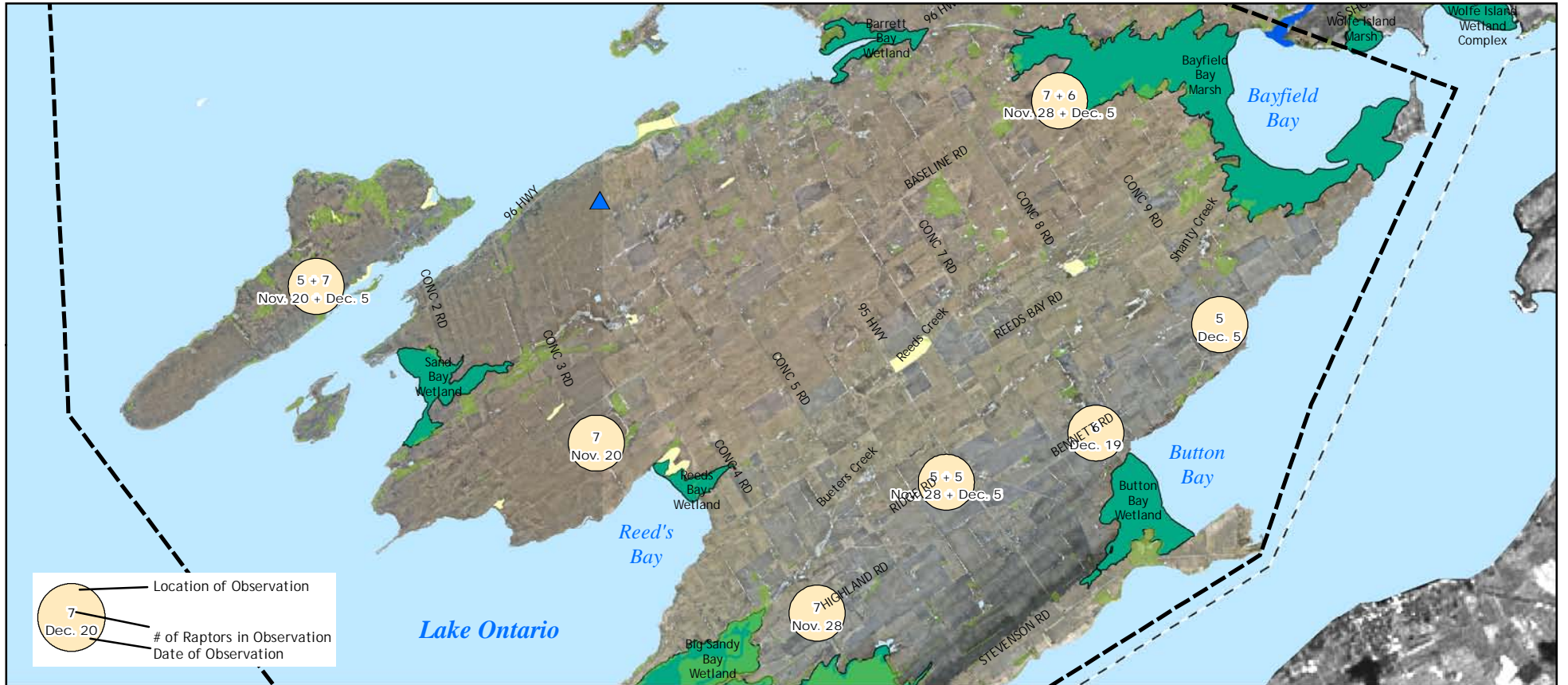
Comparison of Wintering Short-eared Owl Concentrations Nov-Dec 2006, 2009 and 2010



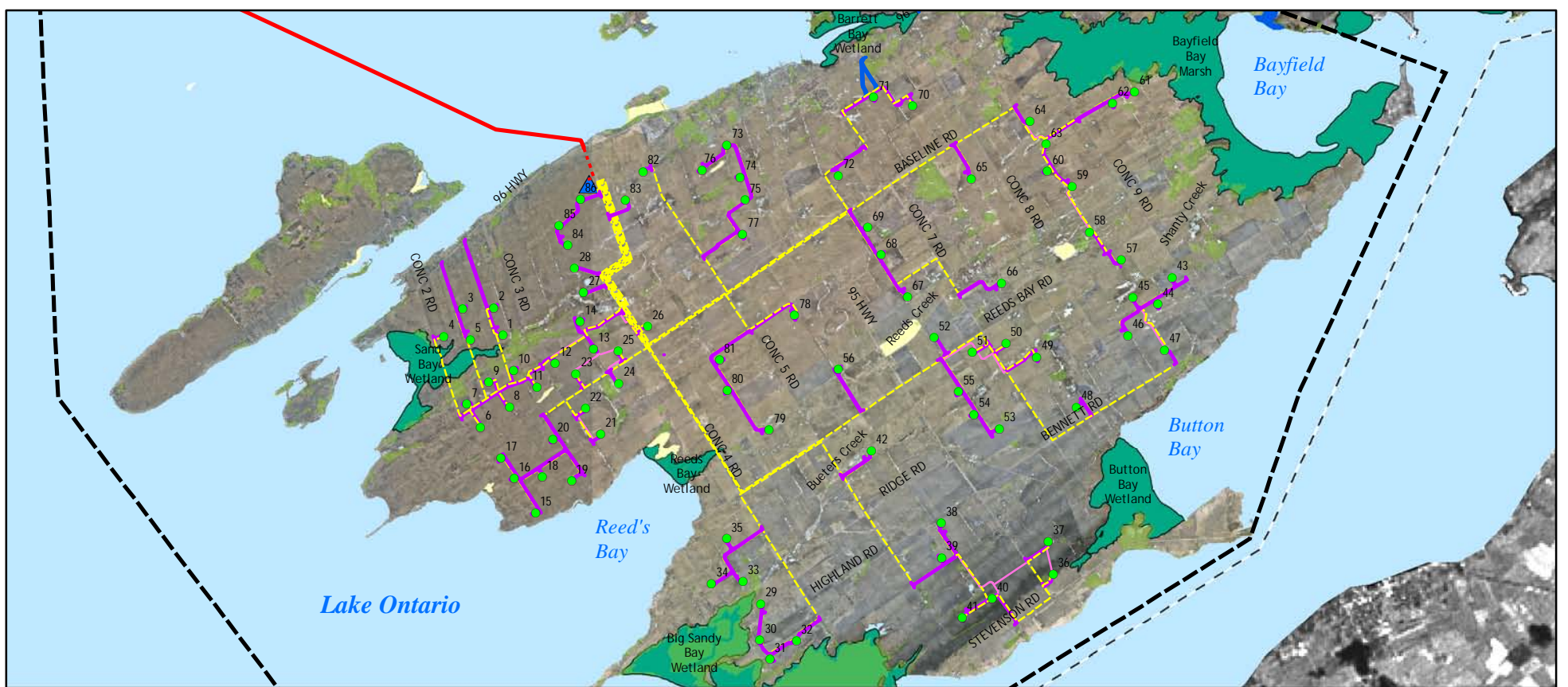
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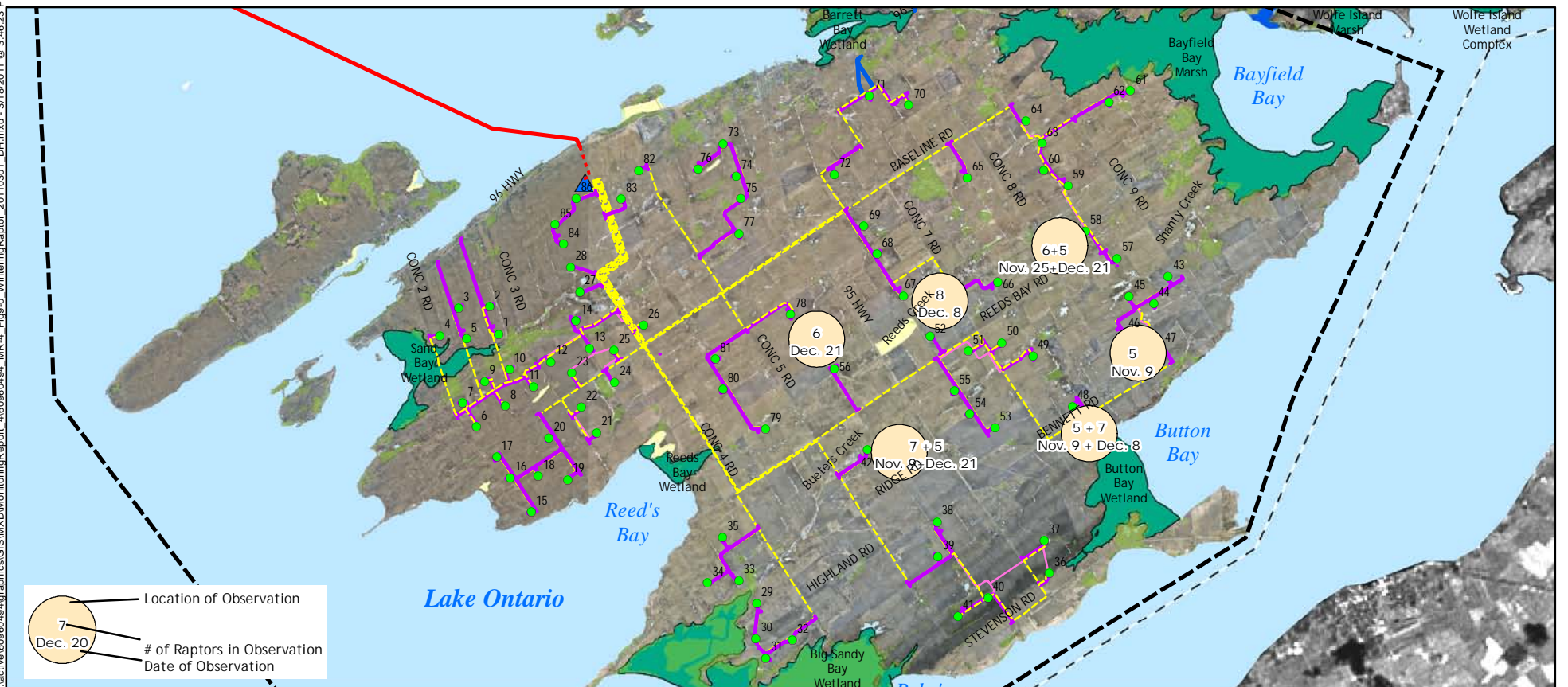
2006 Pre-Construction Results



2009 Post-Construction Results



2010 Post-Construction Results



Legend

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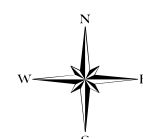
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WOLFE ISLAND ECOPOWER CENTRE
MONITORING REPORT NO. 4

Figure No.

9.0

Title

**Comparison of Wintering
Raptor Concentrations
Nov- Dec 2006, 2009 and 2010**

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Appendix B

Tables

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES**

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July 2011

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>)

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July 2011

Table 3.1: Results of Searcher Efficiency Trials July-December 2010

Surveyor	Search Period	Number of Carcasses Placed	Number of Carcasses Scavenged	Number of Carcasses Found	Individual Se
1	July-Sept	36	1	28	0.800
2	July-Sept	39	5	25	0.735
3	July-Sept	38	1	33	0.892
4	July-Sept	-	-	-	-
1	Dec	15	0	13	0.867
2	Dec	10	1	6	0.667
3	Dec	20	0	16	0.800
4	Dec	15	0	13	0.867

Table 3.2: Proportion of Turbines Searched (Weighted Searcher Efficiency) by Month

Surveyor	Individual Se (July-Sept)	July	August	September	Individual Se (Oct-Dec)	October	November	December
1	0.800	30.4% (0.243)	20.4% (0.163)	25.0% (0.200)	0.867	20.5% (0.177)	28.9% (0.250)	31.1% (0.270)
2	0.735	47.8% (0.352)	44.9% (0.330)	34.6% (0.255)	0.667	34.1% (0.227)	17.8% (0.119)	20.0% (0.133)
3	0.892	21.7% (0.194)	34.7% (0.309)	40.4% (0.360)	0.800	40.9% (0.327)	44.4% (0.356)	40.0% (0.320)
4	-	0% (0.000)	0% (0.000)	0% (0.000)	0.867	4.5% (0.039)	8.9% (0.077)	8.9% (0.077)
		100% (0.789)	100% (0.802)	100% (0.815)		100% (0.770)	100% (0.802)	100% (0.800)

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
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MONITORING REPORT NO. 4, JULY - DECEMBER 2010

Appendix B - Tables

July 2011

Table 3.3: Results of Scavenger Trials by Month

	Number of Test Carcasses Placed	Number Remaining - Visit 1	Number Remaining - Visit 2	Number Remaining - Visit 3	Number Remaining - Visit 4	Sc
July - 3.5d interval	44	24	10	5	3	0.506
July - 7d interval	44	9	4	-	-	0.245
August - 3.5d interval	10	6	3	1	1	0.550
August - 7d interval	10	3	0	-	-	0.231
September - 3.5d interval	20	9	5	4	4	0.579
September - 7d interval	20	12	5	-	-	0.531
January - 7d interval	23	23	20			0.935

Table 3.4: Results of Raptor Scavenger Trials

	Number of Test Carcasses Placed	Number Remaining - Visit 1	Number Remaining - Visit 2	Number Remaining - Visit 3	Number Remaining - Visit 4	Sc
September - 3.5d interval	4	4	4	3	3	0.933
September - 7d interval	4	4	4	-	-	1.000
January - 7d interval	2	2	2	-	-	1.000

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES**

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Appendix B - Tables

July 2011

Table 3.5: Summary of Bird Fatalities, Reporting Period

Species	Dates Observed	Turbines
American Robin	17-Aug-10	67
Bank Swallow	12-Aug-10	55
Barn Swallow	23-Jul-10	39, 40
	11-Aug-10	
Bird Sp.	17-Aug-10	12, 19, 41, 81
	15-Sep-10	
	29-Sep-10	
	16-Nov-10	
Bobolink	23-Jul-10	82, 84
	12-Aug-10	
Brown-headed Cowbird	13-Oct-10	41
Canada Goose	13-Dec-10	33
Cedar Waxwing	22-Jul-10	36, 46
	09-Aug-10	
European Starling	06-Oct-10	40
Golden-crowned Kinglet	15-Sep-10	22, 30
	06-Oct-10	
Gull Sp.	14-Oct-10	37, 62
	05-Nov-10	
Horned Lark	11-Oct-10	78
Mallard	09-Jul-10	25, 37
	07-Oct-10	
Mourning Dove	30-Aug-10	35, 37, 61
	20-Sep-10	
	24-Sep-10	
Purple Martin	10-Aug-10	37, 57, 67, 77
	26-Aug-10	
	27-Aug-10	
	02-Sep-10	
	10-Sep-10	
Red-breasted Nuthatch	13-Sep-10	28
Red-tailed Hawk	28-Oct-10	77
Ring-billed Gull	09-Jul-10	62
Ruby-crowned Kinglet	20-Oct-10	31

WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN

BIRD AND BAT RESOURCES

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July 2011

Table 3.5: Summary of Bird Fatalities, Reporting Period

Species	Dates Observed	Turbines
Swallow sp.	12-Aug-10	86
Tree Swallow	12-Jul-10	28, 36, 41, 46, 48, 49, 60, 68, 72, 77, 82, 85
	14-Jul-10	
	15-Jul-10	
	16-Jul-10	
	19-Jul-10	
	22-Jul-10	
	24-Aug-10	
	01-Sep-10	
	06-Sep-10	
	08-Sep-10	
20-Sep-10		
Turkey Vulture	02-Sep-10	23
Wilson's Snipe	01-Dec-10	58
Yellow Warbler	27-Jul-10	7

Table 3.6: Calculation of Raptor and Vulture Mortality Rates

Month (Search Interval)	c -raptors and vultures	Ps	Sc	Se	C -raptors and vultures
July (2x weekly)	0	0.252	0.973	1.000	0.00
July (1x weekly)	0	0.272	0.973	1.000	0.00
August (2x weekly)	0	0.179	0.973	1.000	0.00
August (1x weekly)	0	0.172	0.973	1.000	0.00
September (2x weekly)	1	0.179	0.973	1.000	5.74
September (1x weekly)	0	0.172	0.973	1.000	0.00
October (2x weekly)	0	0.564	0.973	1.000	0.00
October (1x weekly)	1	0.464	0.973	1.000	2.21
November (2x weekly)	0	0.564	0.973	1.000	0.00
November (1x weekly)	0	0.464	0.973	1.000	0.00
December (2x weekly)	0	0.594	0.973	1.000	0.00
December (1x weekly)	0	0.594	0.973	1.000	0.00
Total	2				7.96
Per Turbine					0.093
Per MW					0.040

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES**

MONITORING REPORT NO. 4, JULY - DECEMBER 2010

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July 2011

Table 3.7: Calculation of Bird Mortality Rates (Other Than Raptors and Vultures)

Month (Search Interval)	c -birds	Ps	Sc	Se	C -birds
July (2x weekly)	10	0.252	0.506	0.789	99.40
July (1x weekly)	5	0.272	0.245	0.789	95.10
August (2x weekly)	9	0.179	0.550	0.802	113.99
August (1x weekly)	3	0.172	0.231	0.802	94.15
September (2x weekly)	8	0.179	0.579	0.815	94.71
September (1x weekly)	6	0.172	0.531	0.815	80.61
October (2x weekly)	3	0.164	0.579	0.770	41.03
October (1x weekly)	4	0.183	0.531	0.770	53.46
November (2x weekly)	2	0.164	0.579	0.802	26.26
November (1x weekly)	0	0.183	0.531	0.802	0.00
December (2x weekly)	1	0.579	0.935	0.800	2.31
December (1x weekly)	1	0.579	0.935	0.800	2.31
Total	52				703.31
Per Turbine					8.18
Per MW					3.56

Table 3.8: Summary of Bat Fatalities, Reporting Period

Species		Turbines
Bat Sp.	26-Jul-10	7, 65
	16-Nov-10	
Big Brown Bat	14-Jul-10	2, 9, 14, 35, 46, 54, 58, 60, 63, 73, 74
	21-Jul-10	
	22-Jul-10	
	26-Jul-10	
	28-Jul-10	
	29-Jul-10	
	19-Aug-10	
	02-Sep-10	
Brown Bat	12-Aug-10	36
Hoary Bat	12-Aug-10	1, 12, 14, 16, 18, 20, 24, 25, 27, 29, 30, 31, 32, 33, 34, 37, 38, 39, 40, 41, 44, 45, 47, 48, 54, 55, 57, 59, 61, 63, 69, 70, 72, 74, 75, 77, 78, 84
	09-Jul-10	
	15-Jul-10	

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES**

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July 2011

Table 3.8: Summary of Bat Fatalities, Reporting Period

Species		Turbines
	21-Jul-10	
	22-Jul-10	
	23-Jul-10	
	26-Jul-10	
	28-Jul-10	
	29-Jul-10	
	30-Jul-10	
	03-Aug-10	
	04-Aug-10	
	05-Aug-10	
	06-Aug-10	
	09-Aug-10	
	10-Aug-10	
	11-Aug-10	
	12-Aug-10	
	13-Aug-10	
	16-Aug-10	
	18-Aug-10	
	19-Aug-10	
	20-Aug-10	
	23-Aug-10	
	24-Aug-10	
	25-Aug-10	
	27-Aug-10	
	30-Aug-10	
	13-Sep-10	
	15-Sep-10	
	17-Sep-10	
	27-Sep-10	
	06-Oct-10	
Red Bat	21-Jul-10	
	23-Jul-10	
	28-Jul-10	5, 12, 14, 18, 19, 27, 29, 34, 37, 38, 40, 59,
	12-Aug-10	60, 65, 68, 73, 75, 85
	13-Aug-10	
	17-Aug-10	

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
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July 2011

Table 3.8: Summary of Bat Fatalities, Reporting Period

Species		Turbines
	18-Aug-10	
	19-Aug-10	
	20-Aug-10	
	23-Aug-10	
	24-Aug-10	
	25-Aug-10	
	01-Sep-10	
	02-Sep-10	
	03-Sep-10	
	06-Sep-10	
	15-Sep-10	
	20-Sep-10	
	06-Oct-10	
	30-Jul-10	
	25-Aug-10	
	25-Aug-10	
	26-Aug-10	
	27-Aug-10	
	01-Sep-10	
	02-Sep-10	
	03-Sep-10	
Silver-haired Bat	06-Sep-10	9, 13, 21, 25, 29, 30, 32, 35, 41, 46, 49, 54, 64, 70, 84
	07-Sep-10	
	10-Sep-10	
	14-Sep-10	
	15-Sep-10	
	23-Sep-10	
	24-Sep-10	
	28-Sep-10	
	29-Sep-10	

WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN

BIRD AND BAT RESOURCES

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July 2011

Table 3.9: Calculation of Bat Mortality Rates

Month (Search Interval)	c -bats	Ps	Sc	Se	C -bats
July (2x weekly)	12	0.252	0.506	0.789	119.28
July (1x weekly)	18	0.272	0.245	0.789	342.34
August (2x weekly)	31	0.179	0.550	0.802	392.62
August (1x weekly)	21	0.172	0.231	0.802	659.03
September (2x weekly)	15	0.179	0.579	0.815	177.58
September (1x weekly)	11	0.172	0.531	0.815	147.78
October (2x weekly)	0	0.164	0.579	0.770	0.00
October (1x weekly)	2	0.183	0.531	0.770	26.73
November (2x weekly)	0	0.164	0.579	0.802	0.00
November (1x weekly)	1	0.183	0.531	0.802	12.83
December (2x weekly)	0	0.579	0.935	0.800	0.00
December (1x weekly)	0	0.579	0.935	0.800	0.00
Total	111				1878.19
Per Turbine					21.84
Per MW					9.50

Table 3.10: Comparison of Species Composition of Field Foraging Waterfowl: September-December 2007, 2009 and 2010

	2007	2009	2010
Canada Goose	16,463	42,323	32,860
Cackling Goose		7	8
Snow Goose	6	11	2
Brant		3	
Mallard	115	2001	558
American Black Duck		282	207
Northern Pintail		8	14
Green-winged Teal		52	
Dabbler sp.	450		250
Total	17,034	44,687	33,899

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
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July 2011

Table 3.11: Fall 2010 Waterfowl Morning Movement

Date	Route*															Grand Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Other**	
3-Sep-10	90													56	1	147
8-Sep-10				30	45				172			53			4	304
14-Sep-10					2				60	100	35					197
21-Sep-10	50									309	7				9	375
28-Sep-10				25											10	35
5-Oct-10	645	265		400	16					46	10	52		10		1444
13-Oct-10	162	110		22	2	114				185			59		10	664
19-Oct-10	370				83	37				258		83	83		53	967
27-Oct-10	360	506	720	90	26		20		33	2974	7		20		129	4885
2-Nov-10	220	300		25	6			101		24	153	126		312	48	1315
9-Nov-10		20	20	21	37	488	200		100	5770	1340	415		40	4	8455
16-Nov-10	1303								50	162	349	20				1884
25-Nov-10	232	170			483					25			48	16		974
3-Dec-10		45			75					18	308	13	112			571
8-Dec-10										38					155	193
15-Dec-10																0
21-Dec-10		40														40
Grand Total	3432	1456	740	613	775	639	220	101	471	10161	1914	749	322	434	423	22450
% at Blade Height	82%	25%	16%	77%	80%	33%	91%	92%	52%	99%	35%	60%	100%	79%	42%	76%

Notes: Cells represent number of individuals.

*Routes depicted on Figure 7

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

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Table 3.12: Fall 2010 Waterfowl Evening Movement

Date	Route*													Other**	Grand Total
	1	2	3	4	5	6	7	8	9	10	11	12	13		
2-Sep-10										50					50
7-Sep-10				3				349		20	224			15	611
13-Sep-10														13	13
20-Sep-10					12			580			120			39	751
27-Sep-10					12										12
4-Oct-10		1375								170				15	1560
12-Oct-10		2436		70	24			104	9	343			500	19	3505
18-Oct-10			12		84			11		800	700	100		5	1712
26-Oct-10		834	36	197		20	120	1582	65						2854
1-Nov-10	1430	20	235	580	5			14	14	121			1500	125	4044
8-Nov-10	10		350	426	255			4180	195	50				22	5488
15-Nov-10		2365						2350	570	50		350			5685
24-Nov-10		762	25	130		444	710			40		68			2179
2-Dec-10		520			12		100		8	240				63	943
7-Dec-10		135			50			75		109					369
14-Dec-10		735								13			18		766
20-Dec-10		131			3					38					172
Grand Total	1440	9313	658	1406	457	464	930	9245	861	2044	1044	518	2018	316	30714
% at Blade Height	100%	22%	80%	94%	91%	96%	100%	100%	97%	87%	89%	32%	100%	82%	73%

Notes: Cells represent number of individuals.

*Routes depicted on Figure 8

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

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Table 3.13: Comparison of Waterfowl Use by Sector

	1999	2008	2009	2010	% Change Pre (2008) to Post (2010) Construction
C7	162,950	218,493	362,157	330,136	51%
C8	121,671	138,282	268,080	166,597	20%
C9	1,516,131	972,487	1,124,403	639,528	-34%
C10	385,273	661,222	361,809	539,631	-18%
C11	402,668	244,219	244,517	210,602	-14%
Total	2,588,692	2,234,702	2,360,965	1,886,494	-16%

Notes: Cells represent waterfowl days.

Table 3.14: Comparison of Waterfowl Use by Staging Area

	2008	2009	2010	% Change Pre (2008) to Post (2010) Construction
Bayfield	655,080	954,431	472,637	-28%
Button	413,060	163,118	296,770	-28%
Pyke's	118,302	126,029	96,376	-19%
Reed's	63,261	117,659	60,918	-4%
Total	1,249,702	1,361,236	926,700	-26%

Notes: Cells represent waterfowl days.

Table 3.15: Comparison of Waterfowl Use by Guild

	1999	2008	2009	2010	% Change Pre (2008) to Post (2010) Construction
Swans	9,484	20,960	30,338	26,180	25%
Geese	496,794	390,868	391,859	308,948	-21%
Large dabblers	762,557	354,443	340,805	292,984	-17%
Small dabblers	47,190	132,761	25,988	32,927	-75%
Bay ducks	1,153,076	1,139,233	1,459,697	854,554	-25%
Sea ducks	333	85	6,664	5,276	6106%
Goldeneye	75,595	137,951	69,564	211,813	54%
Mergansers	43,665	58,403	36,052	150,455	158%
Total	2,588,692	2,234,702	2,360,965	1,886,494	-16%

Notes: Cells represent waterfowl days.

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Table 3.16: Winter Raptor Survey Results, November-December 2006 and 2010

Species	2006					2010				
	20-Nov-06	28-Nov-06	5-Dec-06	19-Dec-06	Total	9-Nov-10	25-Nov-10	8-Dec-10	21-Dec-10	Total
Snowy Owl		1	4	1	6					0
Short-eared Owl			3		3			1		1
Bald Eagle	1				1	1			1	2
Northern Harrier	10	21	25	31	87	14	15	13	16	58
Copper's Hawk					0		1			
Red-tailed Hawk	10	11	10	12	43	15	4	6	9	34
Rough-legged Hawk	1	21	6	6	34	23	15	31	25	94
American Kestrel	1	5	8	6	20	4	1	2	1	8
Merlin					0				1	1
Total Raptors	23	59	56	56	194	57	36	53	53	199
Total Kilometers	42.3	65.1	63.3	65.4	236.1	68	67	68	68	276
Density / Kilometer	0.5	0.9	0.9	0.9	0.8	0.8	0.5	0.8	0.8	0.7

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Table 3.17: Short-eared Owl Survey Results, November-December 2006 and 2010

Species	2006					2010				
	20-Nov-06	28-Nov-06	5-Dec-06	19-Dec-06	Total	9-Nov-10	25-Nov-10	8-Dec-10	21-Dec-10	Total
Great Horned Owl					0				1	1
Snowy Owl				1	1					0
Short-eared Owl	5	5	5	17	32	7	13	32	16	68
Long-eared Owl					0				1	1
Total Short-eared Owls	5	5	5	17	32	7	13	32	16	68
Total Kilometers	36	52.7	52.7	55.2	196.6	62	62	61	61	269
Density / Kilometer	0.1	0.1	0.1	0.3	0.2	0.1	0.2	0.5	0.3	0.3

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Table 3.18: Summary of Kingston Area Christmas Bird Count results from 2000-2010

Species	Number of Raptors per Party Hour										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Great Horned Owl	0.04	0.14	0.09	0.06	0.14	0.06	0.08	N/A	0.04	0.06	0.06
Snowy Owl	0.09	0.07	0.06	0.01	0.03	0.03	0.06	N/A	0.09	0.07	0.01
Short-eared Owl	0.03	0.00	0.03	0.03	0.03	0.00	0.04	N/A	0.01	0.00	0.10
Bald Eagle	0.20	0.10	0.04	0.08	0.08	0.13	0.02	N/A	0.29	0.70	0.23
Northern Harrier	0.01	0.13	0.04	0.29	0.18	0.02	0.60	N/A	0.18	0.18	0.37
Sharp-shinned Hawk	0.03	0.03	0.03	0.01	0.03	0.05	0.04	N/A	0.03	0.05	0.03
Cooper's Hawk	0.05	0.04	0.03	0.02	0.01	0.06	0.02	N/A	0.03	0.02	0.01
Red-tailed Hawk	0.40	0.40	0.42	0.27	0.27	0.23	0.51	N/A	0.49	0.22	0.70
Rough-legged Hawk	0.11	0.14	0.02	0.43	0.08	0.06	0.18	N/A	0.18	0.08	0.71
American Kestrel	0.15	0.16	0.11	0.01	0.03	0.08	0.10	N/A	0.13	0.05	0.17
Merlin	0.04	0.02	0.01	0.00	0.01	0.03	0.02	N/A	0.02	0.02	0.02

N/A – data not available.

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Table 3.19: Summary of Notifications - Reporting Period

Notification No.	Date	Period	Notification	Status
1	July 27	July 9-23	High Annual Mortality - Birds	Later updated with current correction factors – still valid
2	July 27	July 9-26	High Annual Mortality - Bats	Later updated with current correction factors – still valid
3	August 4	July 26-29	High Annual Mortality - Bats	Later updated with current correction factors – valid when notifications 3 and 4 were combined
4	August 10	July 30-August 6	High Annual Mortality - Bats	Later updated with current correction factors – valid when notifications 3 and 4 were combined
5	August 23	August 9-18	High Annual Mortality - Bats	
6	August 31	August 19-25	High Annual Mortality - Bats	
7	September 15	August 27-September 7	High Annual Mortality - Bats	
8	November 30	September 7-November 1	Disturbance of Staging Waterfowl	

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Appendix C

Mortality Monitoring Schedule

WEEK	SUBSET	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	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

Disturbance Monitoring

Survey Date	Survey Type	Location	Weather	Wind direction	Start Time	End Time
03-Sep-10	Waterfowl Morning Movement	West	Temp: 20°C Wind: 4-5 Cloud: 30% PPT: None Overnight ppt or fog: Sprinkle	SW	6:20 AM	7:10 AM
03-Sep-10	Waterfowl Morning Movement	East	Temp: 14°C Wind: 4-5 Cloud: 30-40% PPT: None Overnight ppt or fog: None	SW	6:30 AM	7:10 AM
08-Sep-10	Waterfowl Morning Movement	East	Temp: 15°C Wind: 3 Cloud: 100% PPT: None Overnight ppt or fog: Thunderstorm	NW	6:20 AM	7:20 AM
08-Sep-10	Waterfowl Morning Movement	West	Temp: 16°C Wind: 4 Cloud: 100% PPT: None Overnight ppt or fog: Heavy thunderstorms	NW	6:20 AM	7:20 AM
14-Sep-10	Waterfowl Morning Movement	East	Temp: 14°C Wind: 4 Cloud: 10-20% PPT: None Overnight ppt or fog: Rain	NW	6:30 AM	7:00 AM
14-Sep-10	Waterfowl Morning Movement	West	Temp: 15°C Wind: 5 Cloud: 15% PPT: None Overnight ppt or fog: Thunderstorm	NW	6:20 AM	7:30 AM
21-Sep-10	Waterfowl Morning Movement	East	Temp: 13°C Wind: 3 Cloud: 50% PPT: None Overnight ppt or fog: None	SW	6:30 AM	7:30 AM
21-Sep-10	Waterfowl Morning Movement	West	Temp: 12°C Wind: 3 Cloud: 40% PPT: None Overnight ppt or fog: None	SW	6:30 AM	7:30 AM
28-Sep-10	Waterfowl Morning Movement	East	Temp: 19°C Wind: 3-4 Cloud: 100% PPT: None Overnight ppt or fog: Heavy rain	South	6:35 AM	7:35 AM
28-Sep-10	Waterfowl Morning Movement	West	Temp: 18°C Wind: 4 Cloud: 100% PPT: None Overnight ppt or fog: Heavy rain	SSW	6:30 AM	7:30 AM
05-Oct-10	Waterfowl Morning Movement	East	Temp: 9-10°C Wind: 3-4 Cloud: 90-95% PPT: None Overnight ppt or fog: Rain	NE	6:40 AM	7:40 AM
05-Oct-10	Waterfowl Morning Movement	West	Temp: 9°C Wind: 3 Cloud: 98% PPT: None Overnight ppt or fog: Rain	NE	6:39 AM	7:39 AM
13-Oct-10	Waterfowl Morning Movement	East	Temp: 2-5°C Wind: 1 Cloud: 1% PPT: None Overnight ppt or fog: None	SW	6:45 AM	7:50 AM
13-Oct-10	Waterfowl Morning Movement	West	Temp: 0°C Wind: 1 Cloud: 0% PPT: None Overnight ppt or fog: None	South	6:45 AM	7:45 AM
19-Oct-10	Waterfowl Morning Movement	West	Temp: 3°C Wind: 0 Cloud: 60% PPT: None Overnight ppt or fog: Scattered showers	n/a	7:25 AM	8:25 AM
19-Oct-10	Waterfowl Morning Movement	East	Temp: 3-4°C Wind: 1 Cloud: 90-95% PPT: None Overnight ppt or fog: Drizzle	WSW	7:00 AM	8:10 AM
27-Oct-10	Waterfowl Morning Movement	East	Temp: 13°C Wind: 1 Cloud: 5% PPT: None Overnight ppt or fog: Rain	South	7:00 AM	8:25 AM
27-Oct-10	Waterfowl Morning Movement	West	Temp: 10°C Wind: 4 Cloud: 5% PPT: None Overnight ppt or fog: Rain	WSW	7:00 AM	8:00 AM
02-Nov-10	Waterfowl Morning Movement	East	Temp: -2°C Wind: 1 Cloud: 1-2% PPT: None Overnight ppt or fog: None	NE	7:35 AM	8:45 AM
02-Nov-10	Waterfowl Morning Movement	West	Temp: 0°C Wind: 0 Cloud: 0% PPT: None Overnight ppt or fog: None	n/a	7:35 AM	8:55 AM
09-Nov-10	Waterfowl Morning Movement	East	Temp: 1°C Wind: 1 Cloud: 90% PPT: None Overnight ppt or fog: None		6:30 AM	8:10 AM

Disturbance Monitoring

Survey Date	Survey Type	Location	Weather	Wind direction	Start Time	End Time
09-Nov-10	Waterfowl Morning Movement	West	Temp: 1°C Wind: 4 Cloud: 100% PPT: None Overnight ppt or fog: None		7:00 AM	8:15 AM
16-Nov-10	Waterfowl Morning Movement	West	Temp: 4°C Wind: 0 Cloud: 20% PPT: None Overnight ppt or fog: None	n/a	7:10 AM	8:00 AM
16-Nov-10	Waterfowl Morning Movement	East	Temp: 8°C Wind: 0 Cloud: 70% PPT: Rolling fog/variable visibility Overnight ppt or fog: None	n/a	7:05 AM	8:00 AM
25-Nov-10	Waterfowl Morning Movement	West	Temp: -5°C Wind: 3 Cloud: 100% PPT: None Overnight ppt or fog: None	East	7:00 AM	8:00 AM
25-Nov-10	Waterfowl Morning Movement	East	Temp: -2 to -4°C Wind: 4 Cloud: 90-100% PPT: None Overnight ppt or fog: None	ESE	7:00 AM	8:00 AM
03-Dec-10	Waterfowl Morning Movement	East	Temp: 0°C Wind: 1 Cloud: 70-80% PPT: None Overnight ppt or fog: None	NW	7:20 AM	8:20 AM
03-Dec-10	Waterfowl Morning Movement	West	Temp: -1°C Wind: 1 Cloud: 70% PPT: None Overnight ppt or fog: None	West	7:15 AM	8:30 AM
08-Dec-10	Waterfowl Morning Movement	West	Temp: -10°C Wind: 4 Cloud: 70% PPT: None Overnight ppt or fog: Flurries	NW	7:30 AM	8:30 AM
08-Dec-10	Waterfowl Morning Movement	East	Temp: -8°C Wind: 3 Cloud: 50-80% PPT: None Overnight ppt or fog: Snow	NW	7:30 AM	8:30 AM
15-Dec-10	Waterfowl Morning Movement	East	Temp: -16°C Wind: 2-3 Cloud: 10-25% PPT: None Overnight ppt or fog: Snow	NW	7:15 AM	8:30 AM
15-Dec-10	Waterfowl Morning Movement	West	Temp: -15°C Wind: 2 Cloud: 15% PPT: None Overnight ppt or fog: 3 cm snow	NW	7:15 AM	8:30 AM
21-Dec-10	Waterfowl Morning Movement	East	Temp: -10°C Wind: 0 Cloud: 100% PPT: None Overnight ppt or fog: None	n/a	7:30 AM	8:45 AM
21-Dec-10	Waterfowl Morning Movement	West	Temp: -9°C Wind: 1 Cloud: 100% PPT: None Overnight ppt or fog: None	NW	7:30 AM	8:45 AM
02-Sep-10	Waterfowl Evening Movement	West	Temp: 22°C Wind: 3-4 Cloud: 20% PPT: None Overnight ppt or fog: Sprinkle in PM	West	7:15 PM	8:15 PM
02-Sep-10	Waterfowl Evening Movement	East	Temp: 24-26°C Wind: 3 Cloud: 40-60% PPT: None Overnight ppt or fog: None	West	7:15 PM	8:15 PM
07-Sep-10	Waterfowl Evening Movement	West	Temp: 22°C Wind: 5 Cloud: 40-95% PPT: None Overnight ppt or fog: None	South	6:20 PM	7:20 PM
07-Sep-10	Waterfowl Evening Movement	East	Temp: 22°C Wind: 5 Cloud: 20-40% PPT: None Overnight ppt or fog: None	SW	6:20 PM	7:20 PM
13-Sep-10	Waterfowl Evening Movement	East	Temp: 16-19°C Wind: 3-4 Cloud: 30-40% PPT: None Overnight ppt or fog: Thunderstorms	West	6:46 PM	7:46 PM
13-Sep-10	Waterfowl Evening Movement	West	Temp: 16°C Wind: 5 Cloud: 10% PPT: None Overnight ppt or fog: Recent thunderstorm before survey	West	6:46 PM	7:46 PM
20-Sep-10	Waterfowl Evening Movement	East	Temp: 12-17°C Wind: 1-2 Cloud: 0% PPT: None Overnight ppt or fog: None	West	6:30 PM	7:45 PM
20-Sep-10	Waterfowl Evening Movement	West	Temp: 18°C Wind: 1 Cloud: 0% PPT: None Overnight ppt or fog: None	West	6:35 PM	7:35 PM

Disturbance Monitoring

Survey Date	Survey Type	Location	Weather	Wind direction	Start Time	End Time
27-Sep-10	Waterfowl Evening Movement	West	Temp: 16°C Wind: 2 Cloud: 100% PPT: Steady rain Overnight ppt or fog: Rain	East	6:30 PM	7:30 PM
27-Sep-10	Waterfowl Evening Movement	East	Temp: 13°C Wind: 3-4 Cloud: 100% PPT: Heavy rain Overnight ppt or fog: Heavy rain	East	6:30 PM	7:30 PM
04-Oct-10	Waterfowl Evening Movement	East	Temp: 10°C Wind: 2-3 Cloud: 100% PPT: Rain Overnight ppt or fog: Rain	NE	6:10 PM	7:15 PM
04-Oct-10	Waterfowl Evening Movement	West	Temp: 12°C Wind: 3 Cloud: 100% PPT: Rain Overnight ppt or fog: Rain just started before survey	NE	6:11 PM	7:11 PM
12-Oct-10	Waterfowl Evening Movement	East	Temp: 8-12°C Wind: 1 Cloud: 0% PPT: None Overnight ppt or fog: None	NE	6:35 PM	7:25 PM
12-Oct-10	Waterfowl Evening Movement	West	Temp: 10°C Wind: 2 Cloud: 0% PPT: None Overnight ppt or fog: None	NE	6:35 PM	7:25 PM
18-Oct-10	Waterfowl Evening Movement	West	Temp: 4°C Wind: 2 Cloud: 5% PPT: None Overnight ppt or fog: None	NW	5:50 PM	6:50 PM
18-Oct-10	Waterfowl Evening Movement	East	Temp: 7-8°C Wind: 1-2 Cloud: 15-20% PPT: None Overnight ppt or fog: None	NW	5:50 AM	6:50 PM
26-Oct-10	Waterfowl Evening Movement	West	Temp: 17°C Wind: 4 Cloud: 100% PPT: None Overnight ppt or fog: None	SSW	5:40 PM	6:40 PM
26-Oct-10	Waterfowl Evening Movement	East	Temp: 18°C Wind: 4-5 Cloud: 90% PPT: None Overnight ppt or fog: None	SSW	5:40 PM	6:40 PM
01-Nov-10	Waterfowl Evening Movement	East	Temp: 10°C Wind: 2 Cloud: 20-40% PPT: None Overnight ppt or fog: None	North	5:35 PM	6:35 PM
01-Nov-10	Waterfowl Evening Movement	West	Temp: 3°C Wind: 0 Cloud: 100% PPT: None Overnight ppt or fog: Flurries	n/a	5:35 PM	6:30 PM
08-Nov-10	Waterfowl Evening Movement	West	Temp: 3°C Wind: 3-4 Cloud: 15% PPT: None Overnight ppt or fog: None	North	4:50 PM	5:40 PM
08-Nov-10	Waterfowl Evening Movement	East	Temp: 6°C Wind: 1 Cloud: 30% PPT: None Overnight ppt or fog: None	North	4:50 PM	5:40 PM
15-Nov-10	Waterfowl Evening Movement	West	Temp: 5°C Wind: 1 Cloud: 10% PPT: None Overnight ppt or fog: None		4:40 PM	5:30 PM
15-Nov-10	Waterfowl Evening Movement	East	Temp: 10°C Wind: 1 Cloud: 20% PPT: None Overnight ppt or fog: None		4:30 PM	5:30 PM
24-Nov-10	Waterfowl Evening Movement	West	Temp: 0°C Wind: 1 Cloud: 75% PPT: None Overnight ppt or fog: None	North	4:00 PM	5:00 PM
24-Nov-10	Waterfowl Evening Movement	East	Temp: 3°C Wind: 2 Cloud: 60-80% PPT: None Overnight ppt or fog: None	NNW	4:00 PM	5:00 PM
02-Dec-10	Waterfowl Evening Movement	West	Temp: -1°C Wind: 1 Cloud: 100% PPT: None Overnight ppt or fog: None	West	4:00 PM	5:00 PM
02-Dec-10	Waterfowl Evening Movement	East	Temp: 0°C Wind: 3-4 Cloud: 70-90% PPT: None Overnight ppt or fog: Possible rain	West	4:00 PM	5:00 PM
07-Dec-10	Waterfowl Evening Movement	West	Temp: -3°C Wind: 3 Cloud: 100% PPT: Flurries Overnight ppt or fog: 5 cm snow	NW	3:55 PM	5:00 PM

Disturbance Monitoring

Survey Date	Survey Type	Location	Weather	Wind direction	Start Time	End Time
07-Dec-10	Waterfowl Evening Movement	East	Temp: -3 to -7°C Wind: 3-4 Cloud: 100% PPT: Flurries Overnight ppt or fog: Snow	NW	3:55 PM	5:00 PM
14-Dec-10	Waterfowl Evening Movement	West	Temp: -12°C Wind: 3 Cloud: 100% PPT: Flurries Overnight ppt or fog: 3 cm snow	NW	3:50 PM	5:00 PM
14-Dec-10	Waterfowl Evening Movement	East	Temp: -10°C Wind: 3-4 Cloud: 100% PPT: Flurries Overnight ppt or fog: Snow	NW	3:50 PM	5:00 PM
28-Dec-10	Waterfowl Evening Movement	West	Temp: -7°C Wind: 2 Cloud: 90% PPT: None Overnight ppt or fog: None	NW	3:45 PM	5:00 PM
28-Dec-10	Waterfowl Evening Movement	East	Temp: -7°C Wind: 2 Cloud: 90% PPT: None Overnight ppt or fog: None	NW	3:45 PM	5:00 PM
09-Nov-10	Winter Raptor	East	Temp: 7°C Wind: 2-3 Cloud: 50% PPT: None Overnight ppt or fog: None Average snow depth: 0	East	2:30 PM	4:40 PM
09-Nov-10	Winter Raptor	West	Temp: 9°C Wind: 1 Cloud: 60% PPT: None Overnight ppt or fog: None Average snow depth: 0	East	2:30 PM	4:40 PM
25-Nov-10	Winter Raptor	West	Temp: -3°C Wind: 4-5 Cloud: 100% PPT: None Overnight ppt or fog: None Average snow depth: 0	East	2:40 PM	4:00 PM
25-Nov-10	Winter Raptor	East	Temp: -2°C Wind: 3 Cloud: 100% PPT: None Overnight ppt or fog: None Average snow depth: 0	East	2:30 PM	4:00 PM
08-Dec-10	Winter Raptor	East	Temp: -6 to -7°C Wind: 3 Cloud: 30-50% PPT: None Overnight ppt or fog: Flurries Average snow depth: 1-3 cm	WNW	2:30 PM	4:10 PM
08-Dec-10	Winter Raptor	West	Temp: -6 to -7°C Wind: 3 Cloud: 30-50% PPT: None Overnight ppt or fog: Flurries Average snow depth: 1-3 cm	WNW	2:30 PM	4:10 PM
21-Dec-10	Winter Raptor	West	Temp: -1°C Wind: 1 Cloud: 35% PPT: None Overnight ppt or fog: None Average snow depth: 3 cm	West	2:25 PM	3:55 PM
21-Dec-10	Winter Raptor	East	Temp: -4°C Wind: 2 Cloud: 80% PPT: None Overnight ppt or fog: None Average snow depth: 1 cm	North	2:25 PM	3:55 PM
09-Nov-10	Short-eared Owl	East	Temp: 5°C Wind: 2 Cloud: 95% PPT: None Overnight ppt or fog: None Average snow depth: 0		4:40 PM	5:20 PM
09-Nov-10	Short-eared Owl	West	Temp: 8°C Wind: 1 Cloud: 90% PPT: None Overnight ppt or fog: None Average snow depth: 0		4:30 PM	5:20 PM
25-Nov-10	Short-eared Owl	West	Temp: -3°C Wind: 1-2 Cloud: 100% PPT: None Overnight ppt or fog: None Average snow depth: 0	East	4:00 PM	5:30 PM
25-Nov-10	Short-eared Owl	East	Temp: -3°C Wind: 1 Cloud: 100% PPT: None Overnight ppt or fog: None Average snow depth: 0	East	4:00 PM	5:30 PM
08-Dec-10	Short-eared Owl	East	Temp: -5°C Wind: 2 Cloud: 30% PPT: None Overnight ppt or fog: None Average snow depth: 5 cm	NW	3:45 PM	5:00 PM
08-Dec-10	Short-eared Owl	West	Temp: -4 to -7°C Wind: 3 Cloud: 30-50% PPT: None Overnight ppt or fog: Flurries Average snow depth: 1-3 cm	NW	3:55 PM	5:15 PM
21-Dec-10	Short-eared Owl	East	Temp: -6°C Wind: 2 Cloud: 10% PPT: None Overnight ppt or fog: None Average snow depth: 0	North	4:30 PM	5:15 PM
21-Dec-10	Short-eared Owl	West	Temp: -3°C Wind: 0 Cloud: 25% PPT: None Overnight ppt or fog: None Average snow depth: 3 cm	n/a	4:00 PM	5:00 PM

Disturbance Monitoring

Survey Date	Survey Type	Location	Weather	Wind direction	Start Time	End Time
02-Sep-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 28°C Wind: 4 Cloud: 50% PPT: None Overnight ppt or fog: None	West	1:00 PM	4:00 PM
08-Sep-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 17°C Wind: 4 Cloud: 50% PPT: None Overnight ppt or fog: Thunderstorms	NW	8:40 AM	11:40 AM
14-Sep-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 16°C Wind: 5 Cloud: 5-95% PPT: None Overnight ppt or fog: Rain	NW	9:30 AM	12:30 AM
21-Sep-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 16°C Wind: 4 Cloud: 100% PPT: Showers and thundershowers Overnight ppt or fog: None	SW		
28-Sep-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 23°C Wind: Cloud: 100% PPT: Light showers Overnight ppt or fog: Heavy rain	South	9:30 AM	12:30 AM
05-Oct-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 10°C Wind: 4 Cloud: 100% PPT: None Overnight ppt or fog: Rain	NE	9:30 AM	12:30 AM
13-Oct-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 5°C Wind: 2 Cloud: 5% PPT: None Overnight ppt or fog: None	South	9:30 AM	12:30 AM
19-Oct-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 9°C Wind: 4 Cloud: 80% PPT: None Overnight ppt or fog: Scattered showers	NW	9:30 AM	12:30 AM
27-Oct-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 14°C Wind: 5 Cloud: 0% PPT: None Overnight ppt or fog: Rain	West	9:30 AM	12:30 AM
01-Nov-10	Waterfowl Foraging	All	Temp: 3°C Wind: 2 Cloud: 95% PPT: None Overnight ppt or fog: Flurries	North	9:00 AM	12:00 AM
09-Nov-10	Waterfowl Foraging	All	Temp: 7°C Wind: 3 Cloud: 95% PPT: None Overnight ppt or fog: None		9:00 AM	12:15 AM
16-Nov-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 8°C Wind: 1 Cloud: 30% PPT: None Overnight ppt or fog: None		9:00 AM	11:00 AM
25-Nov-10	Waterfowl Foraging/Migrating Raptor	All	Temp: -2°C Wind: 3 Cloud: 100% PPT: None Overnight ppt or fog: None	East	9:30 AM	12:30 AM
02-Dec-10	Waterfowl Foraging/Migrating Raptor	All	Temp: 1°C Wind: 2-3 Cloud: 100% PPT: None Overnight ppt or fog: 15 mm rain	West	9:30 AM	12:30 AM
08-Dec-10	Waterfowl Foraging/Migrating Raptor	All	Temp: -6°C Wind: 3 Cloud: 45% PPT: None Overnight ppt or fog: Trace snow	NW	9:25 AM	12:25 AM
14-Dec-10	Waterfowl Foraging/Migrating Raptor	All	Temp: -10°C Wind: 3 Cloud: 100% PPT: Flurries Overnight ppt or fog: 3 cm snow	North	1:20 PM	4:20 PM
21-Dec-10	Waterfowl Foraging/Migrating Raptor	All	Temp: -5°C Wind: 1 Cloud: 100% PPT: None Overnight ppt or fog: None	NW	10:00 AM	1:00 PM
07-Sep-10	Waterfowl Aerial	All	Temp: 23-26°C Wind: 4-5+ Cloud: 15-60% PPT: None Overnight ppt or fog: Light shower	SW	5:15 PM	6:05 PM
20-Sep-10	Waterfowl Aerial	All	Temp: 17°C Wind: 2 Cloud: 20% PPT: None Overnight ppt or fog: None		3:25 PM	4:15 PM
04-Oct-10	Waterfowl Aerial	All	Temp: 12°C Wind: 3 Cloud: 90% PPT: Very light rain Overnight ppt or fog: Rain		1:20 PM	2:10 PM
13-Oct-10	Waterfowl Aerial	All	Temp: 16°C Wind: 3-4 Cloud: 5% PPT: None Overnight ppt or fog: None		4:00 PM	4:55 PM

Disturbance Monitoring

Survey Date	Survey Type	Location	Weather	Wind direction	Start Time	End Time
01-Nov-10	Waterfowl Aerial	All	Temp: 5°C Wind: 1 Cloud: 30% PPT: None Overnight ppt or fog: Flurries		1:55 PM	2:40 PM
15-Nov-10	Waterfowl Aerial	All	Temp: 12°C Wind: 2-3 Cloud: 0-80% PPT: None Overnight ppt or fog: None		1:50 PM	2:45 PM
03-Dec-10	Waterfowl Aerial	All	Temp: 3°C Wind: 1 Cloud: 60% PPT: None Overnight ppt or fog: None		10:25 AM	11:20 AM
15-Dec-10	Waterfowl Aerial	All	Temp: -8°C Wind: 3-4 Cloud: 20% PPT: None Overnight ppt or fog: Flurries		1:20 PM	2:05 PM
10-Jan-11	Waterfowl Aerial	All	Temp: -7°C Wind: 1-2 Cloud: 5% PPT: None Overnight ppt or fog: None		1:15 PM	1:50 PM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
04-Jan-10	-11	3-4	Partly	None		10:06 AM	3:01 PM
04-Jan-10	-11	3-4	Partly	None		10:07 AM	3:03 PM
05-Jan-10	-6	3-4	Overcast	Snow		2:51 PM	4:25 PM
05-Jan-10	-6	3-4	Overcast	Snow		1:00 PM	4:25 PM
05-Jan-10	-6	3-4	Overcast	Snow	Snow	9:04 AM	1:34 PM
06-Jan-10	-7	2-3	Partly	None		11:45 AM	2:10 PM
06-Jan-10	-7	3-4	Overcast	None		11:44 AM	2:02 PM
06-Jan-10	-11	4		None		8:44 AM	2:57 PM
07-Jan-10	-5	2-4	Overcast	None		10:25 AM	2:27 PM
07-Jan-10	-5	2-3	Overcast	None		10:30 AM	2:30 PM
8-Jan-10	-8	4-6	Overcast	Snow		10:00 AM	11:43 AM
8-Jan-10	-8	4-6	Overcast	Snow		10:00 AM	11:52 AM
8-Jan-10	-12	4	Overcast	Snow		8:26 AM	12:00 PM
11-Jan-10	-6	3-4	Overcast	None		10:28 AM	12:26 PM
11-Jan-10	-3	2-4	Overcast	None		10:25 AM	12:25 PM
11-Jan-10	-6	3	Partly	None		8:47 AM	2:10 PM
12-Jan-10	-8	4	Partly	None		10:00 AM	2:05 PM
12-Jan-10	-9	4		Snow		10:24 AM	1:56 PM
13-Jan-10	-3	2-3	Overcast	None		11:00 AM	1:12 PM
13-Jan-10	-3	2-3	Overcast	Snow		11:14 AM	1:21 PM
13-Jan-10						8:45 AM	12:45 PM
14-Jan-10	2	2-4	Overcast	None		7:45 AM	11:40 AM
14-Jan-10	2	4	Overcast	None		7:51 AM	11:20 AM
15-Jan-10	2	3-4	None	None		7:45 AM	9:54 AM
15-Jan-10	2	2-4	None	None		8:10 AM	10:16 AM
15-Jan-10	2	2	Overcast	Drizzle		8:32 AM	1:00 PM
18-Jan-10	0	2-3	Overcast	None		12:02 PM	3:54 PM
18-Jan-10	0	2-3	Overcast	Fog		12:10 PM	4:03 PM
19-Jan-10	2	2-3	Partly	None		10:22 AM	12:21 PM
19-Jan-10	2					8:25 AM	12:06 PM
19-Jan-10	2	2-4	Overcast	None		10:21 AM	12:25 PM
20-Jan-10	-3	2-3	Overcast	None		9:03 AM	11:00 AM
20-Jan-10	-3	3	Overcast	None		8:39 AM	1:47 PM
20-Jan-10	-3	2-4	Overcast	None		9:01 AM	10:53 AM
21-Jan-10	-10	2-4	Overcast	None	Fog	7:50 AM	11:33 AM
21-Jan-10	-6	3-4	Overcast	Frost	Fog	7:58 AM	11:59 AM
22-Jan-10	-6	4	None	None		9:00 AM	11:03 AM
22-Jan-10	-9	3-4	None	None		8:57 AM	10:41 AM
22-Jan-10	-8	4	None	None		8:39 AM	12:17 PM
25-Jan-10	9	4	Overcast	Rain		9:08 AM	3:00 PM
25-Jan-10	9	4-6	Overcast	Light Rain		9:20 AM	11:21 AM
25-Jan-10	8	6	Overcast	Rain		9:15 AM	11:12 AM
26-Jan-10	0	5-6	Overcast	Flurries		7:50 AM	11:48 AM
26-Jan-10	0	6	Overcast	None		7:56 AM	11:56 AM
27-Jan-10	-1	3	Overcast	Light Snow		8:25 AM	1:32 PM
27-Jan-10	1	4	Overcast	Trace Snow		9:15 AM	11:27 AM
27-Jan-10	1	4	Overcast	None		9:16 AM	11:15 AM
28-Jan-10	-3	4-6	Overcast	Heavy Snow		7:50 AM	11:40 AM
28-Jan-10	-3	4-6	Overcast	Blowing Snow		7:50 AM	12:00 PM
29-Jan-10	-17	3	Partly	None		9:36 AM	11:44 AM
29-Jan-10	-16	3-4	Partly	None		9:35 AM	11:29 AM
29-Jan-10	-18	4	None	None		9:24 AM	1:15 PM
1-Feb-10	-12	4	Overcast	None		9:06 AM	11:45 AM
1-Feb-10	-4	4-6	Partly	None		2:35 PM	4:52 PM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
1-Feb-10	-4	5-6	Overcast	None		2:36 PM	4:20 PM
2-Feb-10	-3					9:20 AM	12:32 PM
2-Feb-10	-2	1-2	Overcast	None		9:37 AM	11:38 AM
2-Feb-10	-2	2	Partly	None		9:26 AM	11:28 AM
3-Feb-10	-6	2	Overcast	Flurries		7:58 AM	11:42 AM
3-Feb-10	-6	2-3	Overcast	Flurries		8:00 AM	12:25 PM
4-Feb-10	-4	2-3	Partly	None		10:31 AM	2:25 PM
4-Feb-10	-6	2	Partly	None		10:27 AM	2:27 AM
5-Feb-10	-4	3	Partly	None		9:03 AM	10:51 AM
5-Feb-10	-4	2-4	Partly	None		9:02 AM	10:49 AM
5-Feb-10	-8					9:10 AM	12:21 PM
8-Feb-10	-8	3-4	Partly	None		9:15 AM	11:03 AM
8-Feb-10	-8	3-4	Partly	None		9:15 AM	11:13 AM
8-Feb-10	12	3	None	None		9:18 AM	1:45 PM
9-Feb-10	-5	2	Overcast	None		2:32 PM	4:21 PM
9-Feb-10	-4	1-3	Partly	None		2:35 PM	4:40 PM
9-Feb-10						9:03 AM	12:45 PM
10-Feb-10	-3	3-4	Overcast	None		7:46 AM	11:44 AM
10-Feb-10	-4	4	Overcast	None		7:50 AM	11:29 AM
11-Feb-10	-2	3-4	None	None		12:23 PM	4:00 PM
11-Feb-10	-4	4-6	None	None		12:15 PM	3:55 PM
12-Feb-10	-8	1	None	None		9:03 AM	12:40 PM
12-Feb-10	-12	3-4	None	None		2:45 PM	4:10 PM
12-Feb-10	-3	2-3	None	None		2:47 PM	4:09 PM
15-Feb-10	-2	4	Overcast	None		8:37 AM	11:03 AM
15-Feb-10	-3	4-6	Overcast	None		7:45 AM	10:28 AM
15-Feb-10	-3	6	Overcast	None		7:58 AM	10:34 AM
16-Feb-10	-2	4	Overcast	None		9:06 AM	12:38 PM
16-Feb-10	2	1-3	Overcast	None		12:10 PM	2:10 PM
16-Feb-10	3	2-3	Overcast	None		2:44 PM	4:25 PM
17-Feb-10	-3	3-4	Overcast	Flurries		8:19 AM	10:03 AM
17-Feb-10	-3	3-4	Overcast	Flurries		8:15 AM	10:04 AM
17-Feb-10	-1					9:09 AM	1:35 PM
18-Feb-10	-1	4	Overcast	None		8:00 AM	4:44 PM
18-Feb-10	0	3-4	Overcast	None		7:44 AM	10:40 AM
19-Feb-10	-1	4	Overcast	None		7:54 AM	10:45 AM
19-Feb-10	-1	4	Overcast	None		8:00 AM	10:36 AM
22-Feb-10	-8	3-4	None	None		6:53 AM	9:15 AM
22-Feb-10	-2	3-4	Partly	None		10:24 AM	2:02 PM
23-Feb-10	1	3-4	Overcast	None		8:13 AM	11:31 AM
23-Feb-10	2	4	Overcast	Light Rain		8:12 AM	8:28 PM
24-Feb-10	0	2-3	Overcast	Light Wet Snow		9:12 AM	11:50 AM
25-Feb-10	1	2-3	Overcast	Heavy Wet Snow		8:22 AM	9:29 AM
25-Feb-10	1	2-4	Overcast	Light Wet Snow	Light Snow	8:16 AM	9:35 AM
24-Feb-10	-1	3	Overcast	Snow	Snow	8:03 AM	11:35 AM
25-Feb-10	0	1		None	Snow	8:10 AM	12:15 PM
26-Feb-10	2	6+	Partly	None		10:18 AM	1:05 PM
26-Feb-10	2	5		None	Snow	7:46 AM	11:19 AM
1-Mar-10	3	3	Overcast	None		2:53 PM	5:22 PM
1-Mar-10	3	2-4	Partly	None		9:10 AM	11:48 AM
2-Mar-10	0	0-2	Partly	None		8:06 AM	10:33 AM
2-Mar-10	-1	1-3	Partly	None		8:05 AM	10:29 AM
3-Mar-10	1	6	Partly	None		8:00 AM	10:34 AM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
3-Mar-10						8:03 AM	1:32 PM
4-Mar-10	-1	4	Light	None		7:50 AM	10:26 AM
4-Mar-10	-2	4		None		8:07 AM	11:32 AM
5-Mar-10	7	2-4		None		12:23 PM	1:53 PM
5-Mar-10	4	2-3		None		3:45 PM	5:05 PM
5-Mar-10	-2	4		None		7:37 AM	10:47 AM
8-Mar-10	4	2-4	Partly	None		6:54 AM	9:35 AM
8-Mar-10	2	3-4		None		6:50 AM	9:30 AM
9-Mar-10	6	1-2		None		2:51 PM	5:27 PM
9-Mar-10	4	3		None		8:36 AM	12:00 PM
10-Mar-10	5	2-3		None		9:10 AM	10:30 AM
10-Mar-10						7:34 AM	11:45 AM
10-Mar-10	11	2-4		None		11:13 AM	12:49 PM
11-Mar-10	4	3-4	Overcast	None		7:16 AM	9:47 AM
11-Mar-10	4	2-3	Overcast	None		7:10 AM	9:45 AM
12-Mar-10	8	4	Overcast	Light Rain		2:42 PM	5:21 PM
12-Mar-10	9	4	Overcast	Light Rain		10:13 AM	12:46 PM
15-Mar-10	10	4	Partly	None		2:50 PM	5:33 PM
15-Mar-10	7	4	Partly	None		9:21 AM	1:30 PM
16-Mar-10	4	2-4		None		9:16 AM	10:43 AM
16-Mar-10						8:50 AM	12:28 PM
16-Mar-10	9	3-4	Partly	None		2:49 PM	4:07 PM
17-Mar-10	10	1-3		None		9:47 AM	1:50 PM
17-Mar-10	10					11:18 AM	2:00 PM
18-Mar-10	12	4	Light	None		2:39 PM	5:09 PM
18-Mar-10						8:11 AM	10:40 AM
18-Mar-10						6:09 PM	7:29 PM
19-Mar-10	9	4-6	Partly	None		11:11 AM	2:10 PM
19-Mar-10	11			None		10:30 AM	1:01 PM
22-Mar-10	6	4	Overcast	Light Rain		1:05 PM	3:44 PM
23-Mar-10	3	4-6	Overcast	Rain		2:42 PM	5:34 PM
23-Mar-10						8:36 AM	12:31 PM
24-Mar-10	6	1-3	None	None		10:05 AM	11:36 AM
24-Mar-10	2	4	Overcast	Rain		7:38 AM	10:42 AM
24-Mar-10	1	4	None	None		7:53 AM	9:21 AM
25-Mar-10	5	3-4	Partly	None		7:11 AM	9:46 AM
25-Mar-10	2	4	Partly	None		7:10 AM	9:46 AM
25-Mar-10	4	3	None	None		8:24 AM	12:25 PM
26-Mar-10	-7	4-6	None	None		9:13 AM	11:49 AM
26-Mar-10	-1	4	None	None		2:35 PM	5:30 PM
29-Mar-10	5	2-4	Overcast	None		10:36 AM	2:10 PM
29-Mar-10	4	4-5	Overcast	Light Rain		10:36 AM	2:12 PM
30-Mar-10	5	4-5	Partly	None		10:18 AM	2:15 PM
30-Mar-10	4	4-6	Partly	None		10:20 AM	1:58 PM
31-Mar-10	11	1-3	Partly	None		10:34 AM	2:17 PM
31-Mar-10	10	3-4	Partly	None		10:40 AM	2:15 PM
1-Apr-10	15	1-3	Partly	None		11:15 AM	3:09 PM
1-Apr-10	16	2-3	Light	None		11:18 AM	3:00 PM
2-Apr-10	15	4		None		8:00 AM	11:00 AM
2-Apr-10	16	3-4		None		7:46 AM	11:35 AM
5-Apr-10	11	4	Overcast	Light Rain		8:35 AM	11:35 AM
5-Apr-10	12					8:53 AM	1:17 PM
6-Apr-10	12	2	Partly	Light Rain		11:15 AM	2:43 PM
6-Apr-10						7:07 AM	12:33 PM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
7-Apr-10	12	4-5	Overcast	Rain		11:11 AM	1:46 PM
7-Apr-10	9	4-6	Overcast	Rain		9:47 AM	1:43 PM
8-Apr-10	9	4-6	Overcast	None		9:11 AM	10:51 AM
8-Apr-10	9	4-5	Overcast	Rain	Rain	9:15 AM	10:52 AM
8-Apr-10						8:32 AM	1:55 PM
9-Apr-10	5	4-6	Partly	None		10:58 AM	2:21 PM
9-Apr-10	7	6	Partly	None		11:29 AM	3:01 PM
12-Apr-10	11	3-4	Partly	None		1:21 PM	4:38 PM
12-Apr-10						10:59 AM	3:33 PM
13-Apr-10						8:34 AM	1:15 PM
13-Apr-10	12	3-4	Partly	None		1:04 PM	4:10 PM
14-Apr-10						8:39 AM	2:05 PM
14-Apr-10	11	2-3	None	None		11:14 AM	1:03 PM
14-Apr-10	13	1-3	None	None		11:09 AM	1:03 PM
15-Apr-10	12	1-2	Overcast	Light Rain		11:25 AM	2:21 PM
15-Apr-10	13	1-3	Overcast	None		11:15 AM	2:43 PM
16-Apr-10	8	2-3	Overcast	Rain		8:04 AM	11:20 AM
16-Apr-10	8	3-4	Partly	Rain		10:08 AM	1:12 PM
19-Apr-10	14	2-4	Partly	None		2:42 PM	6:37 PM
19-Apr-10	14	4	Partly	None		2:40 PM	5:39 PM
20-Apr-10						8:55 AM	1:46 PM
20-Apr-10	16	4	Partly	None		3:00 PM	6:20 PM
21-Apr-10	16	3-4	Light	None		2:23 PM	5:54 PM
21-Apr-10	15	3-4	None	None		11:10 AM	2:38 PM
22-Apr-10		3-4	Overcast	Light Rain		7:58 AM	9:32 AM
22-Apr-10						9:06 AM	2:04 PM
23-Apr-10	7	2-3	None	None		8:05 AM	11:28 AM
26-Apr-10	14	4	Light	None		10:10 AM	2:19 PM
26-Apr-10						9:07 AM	2:48 PM
27-Apr-10	3	4-6	Overcast	Flurries		9:18 AM	10:32 AM
27-Apr-10						9:03 AM	1:50 PM
27-Apr-10	4	4-6	Overcast	Wet Snow		10:10 AM	11:38 AM
28-Apr-10	10	4-6	Partly	None		9:12 AM	1:00 PM
28-May-10	10	4-6		None		9:20 AM	12:39 PM
29-Apr-10						8:59 AM	1:56 PM
29-Apr-10	16	4-6	None	None		11:36 AM	3:18 PM
30-Apr-10	14	1-3	Overcast	None		9:20 AM	2:55 PM
30-Apr-10	9	2-3	Partly			6:30 AM	2:34 PM
3-May-10	20	4-5	Partly	None		12:10 PM	2:04 PM
3-May-10						9:46 AM	3:09 PM
3-May-10	20	4	Light	None		10:18 AM	11:43 AM
4-May-10	11	4-5	Overcast	None		6:20 AM	10:08 AM
5-May-10	11	2-4	Overcast	Light Rain		8:01 AM	11:35 AM
5-May-10	15	3-4	Partly	None		10:24 AM	2:18 PM
6-May-10						10:09 AM	3:28 PM
6-May-10	10	4-5	Partly	None		6:25 AM	9:28 AM
7-May-10	8	2-3	None	None		8:05 AM	11:35 AM
7-May-10	13	1-3	Partly	None		8:57 AM	12:48 PM
10-May-10	9	3-4	Light	None		10:35 AM	1:51 PM
10-May-10	13	1-3	Partly	None		10:26 AM	2:03 PM
11-May-10	11	3-4	Hazy	None		10:16 AM	11:43 AM
11-May-10	13	1-3		None		10:26 AM	11:38 AM
11-May-10						8:10 AM	12:10 PM
12-May-10	12	2-4	Overcast	None		10:24 AM	1:42 PM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
12-May-10	10	3-4	Overcast	None		7:15 AM	11:44 AM
13-May-10	11	2-4	Light	None		9:27 AM	1:52 PM
14-May-10						8:39 AM	12:28 PM
14-May-10	15	4-6	None	None		2:50 PM	5:45 PM
17-May-10	12	2-3	Light	None		8:01 AM	11:06 AM
17-May-10	17	1-3	None	None		10:23 AM	2:03 PM
18-May-10	15	2-4	Partly	None		8:15 AM	11:19 AM
18-May-10	17	1-3	Partly	None		10:18 AM	12:56 PM
19-May-10	21	1-3	Partly			3:25 PM	5:15 PM
19-May-10						8:08 AM	12:16 PM
19-May-10	19	2-3	Partly	None		8:10 AM	9:34 AM
20-May-10			None	None		7:49 AM	12:56 PM
20-May-10	19	2-3	Partly	None		1:15 PM	3:51 PM
21-May-10			None	None		7:13 AM	12:24 PM
21-May-10	27	2-3	Light	None		3:50 PM	6:40 PM
24-May-10	23	2-4	None	None		10:12 AM	11:50 AM
24-May-10	19	4	None	None		7:00 AM	8:47 AM
24-May-10			None	None		6:34 AM	11:47 AM
25-May-10			None	None		7:13 AM	10:51 AM
25-May-10	15	2-3	None	None		6:15 AM	9:42 AM
26-May-10	30	2-4	Partly	None		11:00 AM	2:18 PM
26-May-10	24	2-3	None	None		10:55 AM	1:56 PM
27-May-10			None	None		7:20 AM	12:31 PM
27-May-10	24	2-3	Overcast	None		5:40 AM	8:27 AM
28-May-10	21	2-4	Overcast	None		11:20 AM	2:25 PM
28-May-10	16	2-3	Partly	None		6:00 AM	9:53 AM
31-May-10	22	2-3	Light	None		9:55 AM	12:40 PM
31-May-10			None	None		7:20 AM	12:17 PM
1-Jun-10			None	None		10:04 AM	1:45 PM
1-Jun-10	22	3-4	Partly	None		10:15 AM	11:29 AM
1-Jun-10	22	1-3	Overcast	None		10:15 AM	11:43 AM
2-Jun-10	21	3-5	None	None		10:30 AM	1:14 PM
2-Jun-10			None	None		6:35 AM	12:54 PM
3-Jun-10	20	2-3	Overcast	None		9:40 AM	12:32 PM
3-Jun-10	21	1-3	Overcast	None		11:26 AM	3:09 PM
4-Jun-10	16	1-2	Light	None		6:15 AM	10:00 AM
4-Jun-10	22	1-3	Partly	None		10:14 AM	1:00 PM
7-Jun-10	15	2-3	None	None		7:45 AM	10:50 AM
7-Jun-10			None	None		8:09 AM	12:03 PM
8-Jun-10			None	None		7:25 AM	11:10 AM
8-Jun-10	21	2-4	Partly	None		4:05 PM	6:03 PM
9-Jun-10	17	2-4	Overcast	Light Rain		10:30 AM	2:05 PM
9-Jun-10	14	4-6	Overcast	Rain		10:30 AM	1:40 PM
10-Jun-10	17	3-4	Overcast	Light Rain		10:27 AM	1:41 PM
10-Jun-10	15	2-3	Overcast	Rain		10:19 AM	1:11 PM
11-Jun-10	16	2-3	Partly	None		7:19 AM	10:31 AM
11-Jun-10			None	None		8:12 AM	12:43 PM
14-Jun-10			None	None		7:47 AM	11:14 AM
14-Jun-10			Overcast	Rain		2:45 PM	5:58 PM
15-Jun-10			None	None		8:10 AM	12:33 PM
15-Jun-10	19	1-3	None	None		10:13 AM	11:43 AM
15-Jun-10	19	2-3	None	None		10:12 AM	11:45 AM
16-Jun-10	17	2-3	Overcast	Light Rain		7:10 AM	10:22 AM
16-Jun-10	15	1-3	Overcast	None		7:11 AM	10:43 AM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
17-Jun-10	15	2-4	Overcast	None		7:50 AM	11:02 AM
17-Jun-10	14	3-4	Overcast	Light Rain		8:00 AM	11:24 AM
18-Jun-10			None	None		7:24 AM	12:38 PM
18-Jun-10	22	3-4	None	None		9:17 AM	12:40 PM
21-Jun-10	24	3-4	None	None		2:45 PM	6:01 PM
21-Jun-10			None	None		7:34 AM	12:09 PM
22-Jun-10	20					8:05 AM	9:37 AM
22-Jun-10	23	2-4	Partly	None		10:26 AM	11:53 AM
22-Jun-10			None	None		6:55 AM	10:55 AM
23-Jun-10	20		Overcast	None		7:05 AM	9:54 PM
23-Jun-10			None	None		7:58 AM	12:55 PM
24-Jun-10	25	3-4	Partly	None		3:35 PM	6:40 PM
24-Jun-10	25	3-5	Partly	None		3:35 PM	6:33 PM
25-Jun-10	21	1-3	Partly	None		8:05 AM	11:12 AM
25-Jun-10	21	1-3	Partly	None		7:57 AM	10:55 AM
28-Jun-10	22	3-4	Partly	None		8:18 AM	10:08 AM
28-Jun-10	22	3-4	Overcast	None		8:35 AM	10:27 AM
28-Jun-10			None	None		8:08 AM	12:09 PM
29-Jun-10			None	None		7:33 AM	11:30 AM
29-Jun-10	20		Overcast	Rain		11:25 AM	2:23 PM
30-Jun-10	18	4	Partly	None		9:44 AM	12:53 PM
30-Jun-10	14	4	None	None		6:40 AM	9:50 AM
1-Jul-10	19	4	Partly	None		10:35 AM	12:35 PM
1-Jul-10			None	None		8:15 AM	10:21 AM
2-Jul-10	18	2-3	None	None		8:00 AM	10:58 AM
2-Jul-10	20	2-4	None	None		7:55 AM	10:53 AM
5-Jul-10			None	None		6:26 AM	9:57 AM
5-Jul-10	24	3-4	None	None		10:10 AM	12:13 PM
6-Jul-10			None	None		7:25 AM	9:30 AM
6-Jul-10			None	None		7:36 PM	8:36 PM
6-Jul-10	28	3-4	Hazy	None		11:08 AM	12:18 PM
6-Jul-10	27	3-4	Hazy	None		11:10 AM	12:05 PM
7-Jul-10	24	3-4	None	None		7:30 AM	1:03 PM
7-Jul-10			None	None		6:37 AM	9:30 AM
8-Jul-10	24	2-3	None	None		5:52 AM	7:52 AM
8-Jul-10	29	2-3	Hazy	None		11:00 AM	2:21 PM
9-Jul-10	28	4	Hazy	None		9:24 AM	11:12 AM
9-Jul-10	28	4	Hazy	100%		9:16 AM	11:40 AM
12-Jul-10			None	None		6:36 AM	11:04 AM
12-Jul-10	32	4	Hazy	None		3:10 PM	5:16 PM
13-Jul-10	26	4	Overcast	Yes		10:18 AM	11:22 AM
13-Jul-10	26	3-4	Overcast	None		10:20 AM	11:21 AM
13-Jul-10			None	None		11:23 AM	2:02 PM
14-Jul-10	23	4	Overcast	Light Rain		7:00 AM	9:21 AM
14-Jul-10	29	2-4	Partly	None		4:55 PM	7:28 PM
15-Jul-10	21	2-3	None	None		6:50 AM	8:53 AM
16-Jul-10	28	4	None	None		2:35 PM	4:52 PM
16-Jul-10			None	None		6:14 AM	1:21 PM
19-Jul-10	23	4	Overcast	None		9:42 AM	12:13 PM
19-Jul-10			None	None		7:37 AM	12:53 PM
20-Jul-10			None	None		7:00 AM	9:45 AM
20-Jul-10	24	2-3	Overcast	Rain Periods		10:36 AM	12:26 PM
21-Jul-10	26	3-4	Partly	None		8:50 AM	11:22 AM
21-Jul-10			None	None		6:47 AM	10:04 AM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
22-Jul-10	21	2-3	None	None		8:00 AM	10:18 AM
22-Jul-10			None	None		6:24 AM	10:59 AM
23-Jul-10			None	None		6:29 AM	9:34 AM
23-Jul-10	20	4	Overcast	None		8:05 AM	10:14 AM
26-Jul-10	21	2-4	None	None		7:05 AM	9:33 AM
26-Jul-10	19	2-3	None	None		7:08 AM	9:26 AM
27-Jul-10	22	3-4	None	None		8:00 AM	10:07 AM
27-Jul-10	22	2-3	None	None		8:00 AM	9:44 AM
28-Jul-10	21	2-4	Light	None		5:40 AM	7:41 AM
28-Jul-10			None	None		6:34 AM	10:47 AM
29-Jul-10	20	3-4	None	None		7:10 AM	11:04 AM
29-Jul-10	21	2-4	None	None		9:21 AM	1:05 PM
30-Jul-10	18	2-3	None	None		6:10 AM	9:41 AM
30-Jul-10	20	3-4	Partly	None		9:20 AM	12:54 PM
2-Aug-10	23	3-4	Partly	None		6:48 AM	9:58 AM
2-Aug-10						6:32 AM	11:03 AM
3-Aug-10	25	4	Overcast	None		7:50 AM	10:52 AM
3-Aug-10						6:36 AM	10:33 AM
4-Aug-10	30	3-4	Partly	None		10:28 AM	2:07 PM
4-Aug-10	24	3-4	Partly	None		7:02 AM	9:54 AM
5-Aug-10	23	3-4	Partly	None		8:17 AM	12:19 PM
5-Aug-10	23	2-3	Partly	None		5:34 AM	9:22 AM
6-Aug-10	18	4	Light	None		7:02 AM	10:19 AM
6-Aug-10						6:29 AM	11:05 AM
9-Aug-10						6:49 AM	11:38 AM
9-Aug-10	28	3-4	Hazy	Light Rain		2:49 PM	6:32 PM
10-Aug-10	25	2-3	Overcast	None		10:25 AM	2:04 PM
10-Aug-10	28	2-4	Overcast	None		10:35 AM	2:40 PM
11-Aug-10	23	2-3	Light	None		5:50 AM	9:32 AM
11-Aug-10	27	3-4	None	None		10:35 AM	3:27 PM
12-Aug-10	22	3-4	Overcast	None		8:30 AM	11:52 AM
12-Aug-10	22	2-3	Overcast	None		5:55 AM	9:33 AM
12-Aug-10						7:12 AM	11:47 AM
13-Aug-10						7:49 AM	11:18 AM
13-Aug-10	23	2-3	Overcast	None		8:01 AM	10:46 AM
16-Aug-10	23	4	Partly	None		6:52 AM	10:03 AM
16-Aug-10	24	4	Partly	None		6:51 AM	9:54 AM
17-Aug-10	19	1-2	Light	None		7:00 AM	9:51 AM
17-Aug-10						6:56 AM	10:21 AM
18-Aug-10	21	2-4	Partly	None		11:20 AM	3:02 PM
18-Aug-10	18	2-3	Overcast	None		7:30 AM	5:30 PM
19-Aug-10	19	2-3	Partly	40%		7:06 AM	10:26 AM
19-Aug-10	28	4	Partly	None		12:40 PM	3:55 PM
20-Aug-10	21	3-4	None	None		10:14 AM	11:30 AM
20-Aug-10						7:09 AM	10:14 AM
20-Aug-10	14	4	None	None		6:58 AM	8:23 AM
23-Aug-10	17	4-5	Overcast	None		7:55 AM	11:21 AM
23-Aug-10	19	4-5	Overcast	None		1:15 PM	4:53 PM
24-Aug-10	23	2-4	Partly	None		11:21 AM	2:19 PM
24-Aug-10	20	2-3	None	None		7:55 AM	10:38 AM
25-Aug-10						7:51 AM	11:31 AM
25-Aug-10	23	2-4	Overcast	None		12:14 PM	2:12 PM
25-Aug-10	21	2-3	Partly	None		7:50 AM	9:41 AM
26-Aug-10	17	4	Overcast	None		6:50 AM	10:13 AM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
26-Aug-10	21	3-4	Partly	Light		12:12 PM	8:11 PM
27-Aug-10	12	1-2	None	None		6:35 AM	9:39 AM
27-Aug-10	23	3-4	Partly	None		11:30 AM	2:45 PM
30-Aug-10	26	3-4	Hazy	None		8:22 AM	11:30 AM
30-Aug-10	29	4	None	None		5:41 PM	7:54 PM
30-Aug-10						7:34 AM	11:00 AM
30-Aug-10	26	3-4	Partly	None		6:40 AM	7:38 AM
31-Aug-10	28	3-4	None	None		2:37 PM	5:28 PM
31-Aug-10	29	4	None	None		2:44 PM	5:42 PM
1-Sep-10						7:04 AM	10:30 AM
1-Sep-10	23	3-4	Hazy	None		7:12 AM	2:13 PM
1-Sep-10	24	3-4	Hazy	None		7:10 AM	2:11 PM
2-Sep-10	27	4-5	Overcast	None		9:14 AM	12:02 PM
2-Sep-10	26	3-4	Overcast	None		12:22 PM	3:46 PM
3-Sep-10	24	4	Partly	None		7:55 AM	10:50 AM
3-Sep-10	25	4-5	None	None		7:55 AM	10:51 AM
6-Sep-10	19	4	Partly	None		8:00 AM	10:06 AM
6-Sep-10						8:48 AM	11:04 AM
6-Sep-10	20	3-4	Overcast	None		2:40 PM	5:13 PM
7-Sep-10	28	4	Partly	Light		4:35 PM	7:31 PM
7-Sep-10	22	4	Partly	None		10:27 AM	1:44 PM
8-Sep-10	18	4-6	Partly	None		4:45 PM	7:48 PM
8-Sep-10	19	4-6	Partly	None		2:55 PM	7:19 PM
9-Sep-10	15	4	Overcast	None		9:37 AM	1:10 PM
9-Sep-10						7:07 AM	3:38 PM
10-Sep-10						8:38 AM	11:35 AM
10-Sep-10	22	2-4	Partly	None		9:22 AM	12:40 PM
13-Sep-10						8:16 AM	1:00 PM
13-Sep-10	21	1-3	Partly	None		10:07 AM	11:58 AM
13-Sep-10	21	4	Partly	Brief Rain		5:33 PM	7:02 PM
14-Sep-10	21	4	Partly	None		6:22 AM	7:02 AM
14-Sep-10	18	3-4	Partly	None		10:11 AM	11:39 AM
14-Sep-10						8:05 AM	11:10 AM
15-Sep-10	15	3-4	Partly	None		10:19 AM	12:05 PM
15-Sep-10						8:06 AM	11:42 AM
15-Sep-10	17	3-4	Partly	None		5:30 PM	7:01 PM
16-Sep-10	15	3-4	Overcast	Light		11:19 AM	2:35 PM
16-Sep-10	13		Overcast	Rain		4:36 PM	5:52 PM
17-Sep-10	14	3-4	Partly	None		10:22 AM	1:33 PM
17-Sep-10	17	2-4	Partly	None		4:50 PM	7:29 PM
20-Sep-10	17	2-4	Partly	None		10:35 AM	4:45 PM
20-Sep-10	17	2-3				5:31 PM	7:37 PM
21-Sep-10	21	4-6	Partly	None		5:40 PM	7:23 PM
21-Sep-10	14	4-6	Overcast	Light Rain		10:38 AM	12:07 PM
21-Sep-10						7:58 AM	10:46 AM
22-Sep-10	22	2-3	Partly	None		5:46 PM	7:25 PM
22-Sep-10						9:35 AM	2:28 PM
22-Sep-10	22	4	Overcast	None		11:25 AM	12:54 PM
23-Sep-10	18	4	Overcast	None		5:40 PM	7:11 PM
23-Sep-10						8:09 AM	11:12 AM
23-Sep-10	18	3-4	Overcast	None		6:31 PM	7:30 PM
24-Sep-10	27	4-6	Overcast	Periodically		5:38 PM	7:13 PM
24-Sep-10	25	4-6	Partly	None		11:15 AM	3:01 PM
24-Sep-10	28	4-6	Overcast	Rain		5:42 PM	6:54 PM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
27-Sep-10						8:09 AM	12:03 PM
27-Sep-10	13	2-4	Overcast	Light Rain		10:28 AM	12:13 PM
27-Sep-10	14	2-4	Overcast	None		9:25 AM	10:44 AM
28-Sep-10	24	4-6	Partly	None		2:55 PM	5:50 PM
28-Sep-10	23	4-6	Overcast	Rain		10:40 AM	2:15 PM
29-Sep-10	18	3-4	Overcast	None		10:20 AM	1:56 PM
29-Sep-10						8:11 AM	11:54 AM
30-Sep-10	17	1-3	Overcast	Rain		10:16 AM	1:01 PM
30-Sep-10						8:02 AM	11:10 AM
1-Oct-10	17	3-4	Partly	None		10:30 AM	1:36 PM
1-Oct-10	13	3-4	Partly	None		7:00 AM	10:04 AM
4-Oct-10	8	4	Partly	None		7:00 AM	8:34 AM
4-Oct-10						8:15 AM	11:23 AM
4-Oct-10	10	3-4	Partly	None		10:30 AM	12:13 PM
5-Oct-10	13	3-4	Overcast	Periodically		10:28 AM	1:46 PM
5-Oct-10	12	3-4	Overcast			9:20 AM	12:15 PM
6-Oct-10	14	4	Overcast	Rain		2:39 PM	6:10 PM
6-Oct-10	14	4-6	Partly	Periodically		10:21 AM	1:50 PM
7-Oct-10	13	4-5	None	None		10:13 AM	1:00 PM
7-Oct-10	19	4-6	Partly	None		2:56 PM	6:05 PM
8-Oct-10	21	4-6	None	None		4:30 PM	7:00 PM
8-Oct-10	17	6+	Partly	None		10:30 AM	2:15 PM
11-Oct-10	10	2-4	Light	None		8:45 AM	10:48 AM
11-Oct-10						8:23 AM	10:36 AM
11-Oct-10	13	1-3	Partly	None		10:45 AM	1:00 PM
12-Oct-10	14	2	None	None		3:15 PM	6:09 PM
12-Oct-10						9:00 AM	12:58 PM
13-Oct-10	10	1-2				9:20 AM	10:46 AM
13-Oct-10	14	2-4	Partly	None		10:21 AM	11:52 AM
13-Oct-10						7:16 AM	5:05 PM
14-Oct-10	13	1-3	Overcast	Periodically		12:14 PM	3:08 PM
14-Oct-10	10	4	Overcast	Light		10:30 AM	2:45 PM
15-Oct-10	10	2-4	Overcast	Light		12:36 PM	2:18 PM
15-Oct-10						9:34 AM	12:12 PM
15-Oct-10	9	3-4	Overcast	Rain		2:55 PM	4:13 PM
18-Oct-10						8:18 AM	11:32 AM
18-Oct-10	11	3-4	Partly	None		10:30 AM	2:00 PM
19-Oct-10	11	3-4	Partly			10:13 AM	1:09 PM
19-Oct-10						8:29 AM	11:36 AM
20-Oct-10						8:14 AM	11:27 AM
20-Oct-10	15	4-6+	Partly	None		3:00 PM	6:34 PM
21-Oct-10	8	4-5	Partly	None		2:47 PM	6:04 PM
21-Oct-10	8	4-6	Partly	None		12:16 PM	3:08 PM
22-Oct-10	5					10:10 AM	1:04 PM
22-Oct-10	4	3-4	Partly	None		10:16 AM	1:15 PM
25-Oct-10	16	4-5	Overcast	Periodically		2:56 PM	5:53 PM
25-Oct-10	15	6	Overcast	Rain		8:00 AM	12:22 PM
26-Oct-10	16	4-5	Overcast	None		7:58 AM	10:53 AM
26-Oct-10	15	4	Overcast	None		7:55 AM	10:53 AM
27-Oct-10						8:24 AM	12:22 PM
27-Oct-10	16	4-6+	None	None		10:28 AM	1:57 PM
28-Oct-10	13	4-6	Overcast	None		1:55 PM	5:08 PM
29-Oct-10	8	2-3	Overcast	Light Rain		9:37 AM	12:51 PM
29-Oct-10	8	2-4	Overcast	Light Rain		9:20 AM	12:20 PM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
1-Nov-10						9:15 AM	2:05 PM
1-Nov-10	5	1-2	Low Cloud	None		12:11 PM	2:08 PM
1-Nov-10	5	1-3	Partly	None		12:12 PM	2:00 PM
2-Nov-10	4	1-3	None	None		10:55 AM	1:50 PM
2-Nov-10	10		None			7:45 AM	12:22 PM
3-Nov-10						9:17 AM	12:27 PM
3-Nov-10	8	2-4	Partly	None		9:10 AM	10:39 AM
3-Nov-10	7	2-4	Partly			9:19 AM	10:59 AM
4-Nov-10	8	2-4	Overcast	Light Rain		10:42 AM	2:01 PM
4-Nov-10	8	3-4	Overcast	Rain		11:30 AM	3:09 PM
5-Nov-10						9:12 AM	12:13 PM
5-Nov-10	4	2-4	Overcast	Light Rain		11:09 AM	2:08 PM
8-Nov-10	7	4	Partly	None		12:11 PM	1:53 PM
8-Nov-10						9:05 AM	12:05 PM
8-Nov-10	4	4	Partly	None		10:20 AM	11:38 AM
9-Nov-10	5	2-4	Overcast	None		10:23 AM	12:56 PM
10-Nov-10	7	4-6	None	None		10:27 AM	1:45 PM
10-Nov-10						8:29 AM	11:25 AM
11-Nov-10						8:38 AM	12:29 PM
11-Nov-10	6	2-4	None	None		10:13 AM	1:00 PM
12-Nov-10	12	1-3	None	None		11:20 AM	2:24 PM
12-Nov-10	5	1-2	None	None		9:14 AM	12:03 PM
15-Nov-10	10					8:00 AM	11:45 AM
15-Nov-10	10	4	None	None		10:15 AM	1:13 PM
16-Nov-10	10					8:05 AM	1:52 PM
16-Nov-10	11	2-4	Partly	None		10:12 AM	1:01 PM
17-Nov-10						9:18 AM	12:25 PM
17-Nov-10	10	4	Overcast	Rain		6:58 AM	8:54 AM
17-Nov-10	12	4	Overcast	Light Rain		10:13 AM	11:48 AM
18-Nov-10						9:02 AM	12:23 PM
19-Nov-10	2	1-3	Partly	None		10:15 AM	1:00 PM
19-Nov-10						8:02 AM	10:47 AM
22-Nov-10	10	4-6	Overcast	Light Rain		1:19 PM	4:10 PM
23-Nov-10	14	6+	Partly	None		12:22 PM	3:16 PM
23-Nov-10						12:48 PM	1:18 AM
24-Nov-10						9:20 AM	12:57 PM
24-Nov-10	1	1-3	None	None		10:30 AM	1:31 PM
25-Nov-10	-2	3-4	Overcast	None		11:11 AM	2:06 PM
25-Nov-10	-6		Overcast	None		7:15 AM	10:45 AM
26-Nov-10	2	6+	Partly	None		7:02 AM	9:57 AM
26-Nov-10	1	6+	Partly	None		1:06 PM	4:06 PM
29-Nov-10	8	4	Partly	None		11:05 AM	2:33 PM
29-Nov-10						8:15 AM	11:42 AM
30-Nov-10						7:45 AM	10:45 AM
30-Nov-10	8	4-6	Overcast	Light Rain		10:20 AM	1:23 PM
1-Dec-10						9:15 AM	12:48 PM
1-Dec-10	6	6+	Overcast	Rain		1:15 PM	4:35 PM
2-Dec-10	3	1-3	Overcast	None		8:02 AM	4:25 PM
2-Dec-10	3		Overcast			8:00 AM	10:40 AM
3-Dec-10	4	2-4	Partly	None		12:35 PM	3:30 PM
3-Dec-10	3		None	None		8:12 AM	11:22 AM
6-Dec-10	-3	4-6	Overcast	None		2:55 PM	4:10 PM
6-Dec-10	-5	4-6	Overcast	None		11:15 AM	12:45 PM
6-Dec-10						8:34 AM	11:22 AM

Mortality Monitoring

Survey Date	Temp (° C)	Wind Speed	Cloud	PPT	Overnight PPT	Start Time	End Time
7-Dec-10						8:17 AM	10:55 AM
7-Dec-10	4	6	Overcast	Snow		2:55 PM	4:21 PM
7-Dec-10	-5	4	Overcast	Snow		10:25 AM	11:48 AM
8-Dec-10	-8	2-3	Partly	None		10:22 AM	1:43 PM
8-Dec-10	-9	2-4	Partly	None		10:25 AM	1:26 PM
9-Dec-10	-10	3-4	Partly			10:18 AM	1:06 PM
9-Dec-10						8:34 AM	11:37 AM
10-Dec-10	-4	4-5	Overcast	None		11:25 AM	2:21 PM
10-Dec-10						8:48 AM	11:26 AM
13-Dec-10	-6	4	Overcast	Light Snow		11:20 AM	2:34 PM
13-Dec-10						9:16 AM	12:04 PM
14-Dec-10	-10	4	Overcast	Light Snow		10:38 AM	1:13 PM
14-Dec-10	-12		Overcast			8:30 AM	2:15 PM
15-Dec-10						10:17 AM	1:11 PM
15-Dec-10	-5	3-4	Partly	None		10:36 AM	12:34 PM
15-Dec-10	-9	4	None	None		10:40 AM	12:54 PM
16-Dec-10	-4	1-3	Overcast	None		12:20 PM	3:29 PM
16-Dec-10	-4	1-2	Overcast	None		1:20 PM	4:00 PM
17-Dec-10	-6	1-3	Overcast	None		9:45 AM	12:57 PM
20-Dec-10	-3	1-3	Overcast	None		11:15 AM	1:48 PM
20-Dec-10						9:20 AM	11:24 AM
21-Dec-10						8:29 AM	2:54 PM
21-Dec-11	-4	1-2	Partly	None		2:20 PM	4:30 PM
22-Dec-10	-4	2-4	Overcast	Light Snow		10:58 AM	1:31 PM
22-Dec-11	-6		Overcast	None		8:00 AM	12:24 PM
23-Dec-11	-2	2-4	Overcast	None		12:20 PM	4:00 PM
23-Dec-10						9:16 AM	11:32 AM
27-Dec-10	-7	4	None	None		9:20 AM	11:33 AM
27-Dec-10						9:48 AM	2:24 PM
28-Dec-10	1	1-3	Overcast	Trace Snow		12:20 PM	2:50 PM
28-Dec-10						9:08 AM	11:49 AM
29-Dec-10	3	3-4	Overcast	None		10:33 AM	12:52 PM
29-Dec-11	-2		Overcast	None		11:50 AM	2:44 PM
30-Dec-10	2	3-5	Partly	None		10:01 AM	12:39 PM
30-Dec-10						9:24 AM	11:54 AM

Stantec

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES
MONITORING REPORT NO. 4, JULY - DECEMBER 2010**

Appendix E

Mortality Monitoring Results

Detailed Results - Bats

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Guild	Condition/Estimated Time Since Death	Injuries Sustained	Distance (m)	Direction (°)	Direction (compass)	Ground Cover
09-Jul-10	20	0381813 4889253	CF	Hoary Bat	bat	Fresh, 1 day	none visible	9	214	SW	Gravel
13-Jul-10	9	0380913 4890058	JL	Big Brown Bat	bat	Old, 2-3 days	none visible	14	250	W	Gravel
14-Jul-10	14	0382177 4890892	CF	Big Brown Bat	bat	Old, decomposing, 5-7 days	none visible?	17	66	E	Gravel
15-Jul-10	55	0387550 4889931	JL	Hoary Bat	bat	Fresh, 1-2 days	none visible	28	250	W	Gravel
21-Jul-10	58	0389407 4892160	JL	Big Brown Bat	bat	Fresh, < 1 day	none visible	25	310	NW	Gravel
21-Jul-10	60	0388804 4893044	JL	Red Bat	bat	Old, 2-3 days	none visible	14	270	W	Gravel
21-Jul-10	63	0388751 4893415	JL	Big Brown Bat	bat	Fresh, < 1 day	none visible	16	95	E	Gravel
21-Jul-10	72	0385844 4892962	WS	Hoary Bat	bat	Fresh, < 5 days	Broken wing	13	330		Grass
22-Jul-10	1	0381083 4890738	JL	Hoary Bat	bat	Fresh, > 1 day	none visible	16	165	S	Hay / Veg
22-Jul-10	2	0380963 4891103	JL	Big Brown Bat	bat	Fresh, > 1 day	none visible	5	110	E	Gravel
22-Jul-10	34	0384064 4887212	WS	Hoary Bat	bat	Fresh, 3-5 days	Broken wing	22	285		Gravel
22-Jul-10	54	0387754 4889584	JL	Hoary Bat	bat	Fresh, > 1 day	none visible	9	345	N	Gravel
22-Jul-10	75	0384533 4892636	WS	Hoary Bat	bat	Fresh, 3-5 days		9	248		Gravel
23-Jul-10	61	0389992 4894163	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	22	130	SE	Gravel
23-Jul-10	65	0387708 4892929	JL	Red Bat	bat	Fresh, 2-3 days	none visible	9	180	S	Gravel
26-Jul-10	27	0382262 4891315	CF	Hoary Bat	bat	Old, 5-7 days	none visible	22	274	W	Gravel
26-Jul-10	35	0384272 4887827	JL	Big Brown Bat	bat	Fresh, < 1 day	none visible	14	33	N	Gravel
26-Jul-10	46	0389915 4890727	JL	Big Brown Bat	bat	Fresh, 1-2 days	none visible	11	160	S	Gravel
26-Jul-10	65	0387703 4892924	CF	Bat Sp.	bat	Old, 5-7 days	none visible	13	137	SE	Gravel
28-Jul-10	48	0389210 4889703	JL	Hoary Bat	bat	Old, 2-3 days	none visible	13	230	SW	Gravel
28-Jul-10	58	0389384 4892164	JL	Big Brown Bat	bat	Old, 2-3 days	none visible	9	320	N	Gravel
28-Jul-10	59	0389110 4892829	JL	Red Bat	bat	Old, 2-3 days	none visible	25	130	SE	Gravel
28-Jul-10	60	0388810 4893037	JL	Big Brown Bat	bat	Fresh, 1-2 days	none visible	23	260	W	Gravel
28-Jul-10	72	0385824 4892975	WS	Hoary Bat	bat	Old, > 5 days	Nothing visible	8	161		Gravel
29-Jul-10	54	0387757 4889564	JL	Big Brown Bat	bat	Fresh, 1-2 days	none visible	30	0	N	Soil / Gravel
29-Jul-10	74-A	0384475 4892953	CF	Hoary Bat	bat	Old, 3-4 days	none visible	26	274	W	Gravel
29-Jul-10	74-B	0384481 4892954	CF	Big Brown Bat	bat	Old, 3-4 days	none visible	31	278	W	Gravel
29-Jul-10	74-C	0384473 4892951	CF	Big Brown Bat	bat	Old, 3-4 days	none visible	24	270	W	Gravel
30-Jul-10	16	0380280 4888719	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	34	244	W	Gravel
30-Jul-10	25	0382793 4890490	CF	Silver-haired Bat	bat	Fresh, 1-2 days	none visible	17	300	NW	Gravel
03-Aug-10	12	0381809 4890345	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	32	160	S	Gravel
03-Aug-10	16	0381275 4888694	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	17	260	W	Gravel
04-Aug-10	32	0385241 4886402	CF	Hoary Bat	bat	Old, at least 7 days	none visible	1	208	S	Gravel
04-Aug-10	63	0388758 4893390	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	31	25	N	Gravel
05-Aug-10	27	0382244 4891306	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	10	220	SW	Gravel
06-Aug-10	20	0381815 4889251	WS	Hoary Bat	bat	Old, > 3 days	No visible trauma	9	234		Gravel
06-Aug-10	25	0382742 4890466	WS	Hoary Bat	bat	Fresh, < 5 days	No visible trauma	30	360		Gravel
09-Aug-10	1	0381051 4890731	WS	Hoary Bat	bat	Fresh, 3-5 days	No visible trauma	42	105		Gravel
09-Aug-10	33	0384469 4882749	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	21	147	SE	Gravel
09-Aug-10	38	0387290 4888051	JL	Hoary Bat	bat	Old, 2-3 days	none visible	13	357	N	Soil
10-Aug-10	70	0386862 4893998	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible?	49	159	S	Gravel
10-Aug-10	70	0386868 4893972	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible?	24	152	S	Gravel
11-Aug-10	47-B	0390457 4890499	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	18	297	NW	Gravel

Detailed Results - Bats

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Guild	Condition/Estimated Time Since Death	Injuries Sustained	Distance (m)	Direction (°)	Direction (compass)	Ground Cover
12-Aug-10	34	0384053 4887216	WS	Red Bat	bat	Fresh, < 3 days	Wings outspread	9	100		Gravel
12-Aug-10	36	0388880 4887323	WS	Brown bat	bat	Fresh, < 3 days	No visible trauma	16	11		Gravel
12-Aug-10	77	0384475 4892154	WS	Hoary Bat	bat	Fresh, 3-5 days	No visible trauma	25	165		Gravel
12-Aug-10	84-A	0381999 4892012	CF	Hoary Bat	bat	Old, 5-7 days	none visible?	25	164	S	Soil
13-Aug-10	65	0387713 4892938	JL	Red Bat	bat	Fresh, 1-2 days	none visible	10	197	S	Gravel
13-Aug-10	38-A	(no coord's given)	WS	Hoary Bat	bat	Fresh, < 3 days	Entirely	32	60		Gravel
13-Aug-10	38-B	0387260 4888050	WS	Hoary Bat	bat	Old, > 5 days	Multiple pieces	2	230		Soil
16-Aug-10	84	0381989 4891998	JL	Hoary Bat	bat	Old, 2-3 days	none visible	27	143	SE	Soil
17-Aug-10	19	0382087 4888675	WS	Red Bat	bat	Fresh, < 3 days	Broken wing	25	241		Gravel
18-Aug-10	29	0384729 4886842	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	25	30	N	Gravel
18-Aug-10	40	0388043 4887010	CF	Red Bat	bat	Fresh, 1-2 days	Wing	41	250	W	Gravel
18-Aug-10	41	0387595 4886719	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	16	310	NW	Soil
19-Aug-10	24	0382732 4890054	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	17	190	S	Gravel
19-Aug-10	27	0382277 4891325	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	39	268	W	Gravel
19-Aug-10	73	0384264 4893406	JL	Red Bat	bat	Fresh, < 1 day	none visible	1	230	SW	Soil
19-Aug-10	74	0384496 4899259	JL	Big Brown Bat	bat	Fresh, < 1 day	none visible	40	270	W	Gravel
20-Aug-10	18	0381643 4888740	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	28	184	S	Gravel
20-Aug-10	68	0386418 4891823	WS	Red Bat	bat	Fresh, < 3 days	Trauma to the body	50	40		Gravel
20-Aug-10	78	0385229 4891013	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	23	223	SW	Gravel
23-Aug-10	38-A	0387269 4888065	JL	Red Bat	bat	Fresh, 1-2 days	none visible	14	93	E	Gravel
23-Aug-10	38-B	0387275 4888033	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	16	40	NE	Rock / Gravel
24-Aug-10	12	0381825 4890336	CF	Red Bat	bat	Fresh, 1-2 days	none visible	17	160	S	Gravel
24-Aug-10	69	0386244 4892225	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	17	34	NE	Gravel
25-Aug-10	5	0380625 4890666	JL	Red Bat	bat	Fresh, < 1 day	none visible	21	147	SE	Gravel
25-Aug-10	13	0382377 4890535	CF	Silver-haired Bat	bat	Fresh, 1-2 days	none visible	14	208	S	Gravel
25-Aug-10	14	0382161 4890903	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	25	108	E	Gravel
25-Aug-10	21	0382451 4889332	JL	Silver-haired Bat	bat	Fresh, < 1 day	none visible	16	83	E	Gravel
25-Aug-10	29	0384739 4886865	WS	Red Bat	bat	Old, > 5 days	unknown	6	152		Gravel
25-Aug-10	30	0384720 4886401	WS	Hoary Bat	bat	Fresh, 3-5 days	broken wing	16	46		Gravel
25-Aug-10	31	0384883 4886178	WS	Hoary Bat	bat	Old, > 5 days	unknown	31	190		Gravel
25-Aug-10	32	0385229 4886416	WS	Silver-haired Bat	bat	Fresh, 3-5 days	Nothing visible	24	163		Gravel
25-Aug-10	59	0389117 4892827	WS	Hoary Bat	bat	Old, 3-5 days	Entirely	22	133		Gravel
25-Aug-10	72	0385819 4892998	JL	Hoary Bat	bat	Fresh, < 1 day	none visible	30	165	S	Gravel
26-Aug-10	84	0381998 4891984	CF	Silver-haired Bat	bat	Old, 2-4 days	none visible	13	90	E	Gravel
27-Aug-10	57	0389823 4891786	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	2	158	S	Soil
27-Aug-10	64	0388494 4893730	CF	Silver-haired Bat	bat	Fresh, 1-2 days	none visible	30	112	E	Gravel
27-Aug-10	70	0386877 4893970	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	19	154	S	Gravel
30-Aug-10	37	0388784 4887789	WS	Hoary Bat	bat	Old, > 7 days		18	58		Gravel
30-Aug-10	44	0390331 4891177	WS	Hoary Bat	bat	Fresh, 3-5 days	No visible trauma	34	177		Gravel
01-Sep-10	29-A	0384742 4886849	CF	Silver-haired Bat	bat	Old, 3-5 days	none visible	13	18	N	Gravel
01-Sep-10	29-B	0384741 4886843	CF	Red Bat	bat	Old, 3-5 days	none visible	23	6	N	Gravel
02-Sep-10	27	0382277 4891336	JL	Red Bat	bat	Fresh, < 1 day	none visible	42	245	W	Gravel

Detailed Results - Bats

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Guild	Condition/Estimated Time Since Death	Injuries Sustained	Distance (m)	Direction (°)	Direction (compass)	Ground Cover
02-Sep-10	54	0387780 4889572	JL	Silver-haired Bat	bat	Fresh, < 1 day	none visible	35	321	NW	Soil / Rock / Veg
02-Sep-10	73	0384284 4893377	CF	Big Brown Bat	bat	Fresh, 1-2 days	none visible	36	328	N	Gravel
02-Sep-10	75	0384563 4892642	CF	Red Bat	bat	Old, 3-5 days	Wing	48	262	W	Gravel
03-Sep-10	18	0381633 4888752	CF	Red Bat	bat	Fresh, 1-2 days	Wing	40	156	S	Gravel
03-Sep-10	49	0388632 4890435	JL	Silver-haired Bat	bat	Fresh, < 1 day	none visible	25	180	S	Gravel
06-Sep-10	46	0389930 4890709	JL	Silver-haired Bat	bat	Fresh, 1-2 days	none visible	2	230	SW	Concrete
06-Sep-10	85-A	0381919 4892273	WS	Red Bat	bat	Fresh, < 5 days		23	277		Gravel
07-Sep-10	49	0388640 4890427	CF	Silver-haired Bat	bat	Old, 2-4 days	none visible	1	172	S	Gravel
10-Sep-10	25	0382720 4890464	WS	Silver-haired Bat	bat	Fresh, 3-5 days	Entirely	17	322		Gravel
13-Sep-10	45	0389973 4891233	WS	Hoary Bat	bat	Fresh, < 5 days	Broken wing	6	188		Grass
14-Sep-10	9	0380907 4890060	WS	Silver-haired Bat	bat	Fresh, < 5 days	No visible trauma	13	228		Gravel
15-Sep-10	14	0382155 4890901	JL	Red Bat	bat	Fresh, 1-2 days	none visible	32	93	E	Gravel
15-Sep-10	40	0388024 4887020	WS	Hoary Bat	bat	Fresh, < 5 days	Entirely	24	240		Gravel
15-Sep-10	41-A	0387586 4886723	WS	Silver-haired Bat	bat	Old, > 5 days	??	1	44		Mud
15-Sep-10	41-C	0387608 4886728	WS	Silver-haired Bat	bat	Fresh, < 5 days	Broken Wing	23	23		Mud
17-Sep-10	39	0387313 4887577	JL	Hoary Bat	bat	Fresh, 1-2 days	none visible	17		NW	Hay bale
20-Sep-10	37	0388805 4887786	CF	Red Bat	bat	Fresh, 1-2 days	none visible	13	354	N	Gravel
23-Sep-10	35	0384263 4887822	JL	Silver-haired Bat	bat	Fresh, < 1 day	none visible	23	10	N	Gravel
24-Sep-10	64	0388505 4893730	CF	Silver-haired Bat	bat	Fresh, 1-2 days	none visible	16	140	SE	Gravel
27-Sep-10	1	0380943 4891107	WS	Hoary Bat	bat	Fresh, < 3 days	Bleeding fr ear	23	101		Gravel
27-Sep-10	37	0388805 4887791	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	12	352	N	Gravel
28-Sep-10	70	0386874 4893979	JL	Silver-haired Bat	bat	Fresh, < 1 day	none visible	22	170	S	Gravel
29-Sep-10	30	0384724 4886376	WS	Silver-haired Bat	bat	Old, > 7 days		38	11		Gravel
06-Oct-10	41	0387605 4886731	CF	Hoary Bat	bat	Fresh, 1-2 days	none visible	22	264	W	Gravel
06-Oct-10	60	0388803 4893048	CF	Red Bat	bat	Fresh, 1-2 days	none visible	19	230	W	Gravel
16-Nov-10	7	0380590 4889730	RD	Bat Sp.	bat	Fresh, 3 days		2	190		Gravel

Detailed Results - Birds

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Gender	Condition/Estimated Time Since Death	Injuries Sustained	Distance (m)	Direction (°)	Direction (compass)	Ground Cover	ID checked
09-Jul-10	25	0382736 4890519	CF	Mallard ♀	bird	Old, at least 5 days		30	210	S	Vegetation	ART
09-Jul-10	62	0389747 4893988	JL	Ring-billed Gull	bird	Old, 6-7 days		45	240	SW	Vegetation	ART
12-Jul-10	82	0383106 4893042	WS	Tree Swallow	bird	Fresh, 3 days	Broken wing	33	260		Gravel	
14-Jul-10	41	0387616 4886730	JL	Tree Swallow	bird	Old, 5-7 days		35	270	W	Gravel	ART
14-Jul-10	41	0387565 4886706	JL	Tree Swallow	bird	Fresh, 1-2 days	Neck?	28	60	E	Soil	ART
14-Jul-10	72	0385818 4892985	CF	Tree Swallow	bird	Fresh, 1-2 days		21	158	S	Gravel	
15-Jul-10	28	0382121 4891656	JL	Tree Swallow	bird	Fresh, 1-2 days	Neck?	11	260	W	Gravel	ART
16-Jul-10	49	0388620 4890412	JL	Tree Swallow	bird	Old, 3-5 days		17	140	SE	Gravel	
19-Jul-10	46	0389907 4890732	JL	Tree Swallow	bird	Fresh, < 1 day	Neck	25	180	S	Gravel	ART
22-Jul-10	36	0388870 4887336	WS	Cedar Waxwing	bird	Fresh, < 3 days		3	166		Grass	ART
22-Jul-10	46	0389914 4890709	WS	Cedar Waxwing	bird	Unknown - head only found		8	160		Gravel	BH
22-Jul-10	77	0384480 4892160	WS	Tree Swallow	bird	Old, > 5 days	Dessicated	21	185		Gravel	BH
23-Jul-10	39	0387282 4888047	WS	Barn Swallow	bird							BH
23-Jul-10	82	0383096 4893026	WS	Bobolink	bird	Waterlogged, > 3 days		19	278		Gravel	ART
27-Jul-10	7	0380778 4889438	JL	Yellow Warbler	bird	Old, 3-4 days	?	25	160	S	Gravel	ART
09-Aug-10	36	0388878 4887335	JL	Cedar Waxwing	bird	Old, 3-4 days		1	310	NW	Soil	ART
10-Aug-10	57	0389865 4891791	CF	Purple Martin	bird	Fresh, 1-2 days	Neck	33	284	W	Vegetation	ART
11-Aug-10	40	0388008 4887004	JL	Barn Swallow	bird	Fresh, 1-2 days		10	188	S	Gravel	ART
12-Aug-10	55	0387549 4889923	JL	Bank Swallow	bird	Fresh, 1-2 days	Neck	21	240	SW	Gravel	ART
12-Aug-10	86	0382219 4892625	CF	Swallow sp.	bird	Fresh, 1-2 days	Head / Neck	25	312	NW	Gravel	ART
12-Aug-10	84-B	0381992 4892002	CF	Bobolink	bird	Fresh, 1-2 days	Neck	23	136	SE	Gravel	ART
17-Aug-10	12	0381841 4890343	WS	Bird Sp.	bird	Old, > days	Unknown, skeleton	16	208		Gravel	
17-Aug-10	67	0386791 4891287	JL	American Robin	bird	Old, 3-4 days		28	154	S	Soil	ART
24-Aug-10	68	0386425 4891837	JL	Tree Swallow	bird	Fresh, 1-2 days	Neck	18	54	NE	Gravel	ART
26-Aug-10	37	0388794 4887755	JL	Purple Martin	bird	Old, 3-5 days	Bodyless	39	15	N	Gravel	ART
27-Aug-10	67	0386788 4891261	CF	Purple Martin	bird	Fresh, 1-2 days	Wing	20	130	SE	Gravel	ART
30-Aug-10	37	0338799 4887798	WS	Mourning Dove	bird	Fresh, 3-5 days	Entirely	2	360		Grass	
01-Sep-10	60	0388813 4893075	WS	Tree Swallow	bird	Old, > 5 days	Entirely	32	261		Soil	
02-Sep-10	23	0382144 4890155	CF	Turkey Vulture	bird	Fresh, 1-2 days	Head / Neck	18	320	N	Gravel	ART
02-Sep-10	77	0384466 4892157	CF	Purple Martin	bird	Fresh, 1-2 days	Neck	28	148	S	Gravel	ART
06-Sep-10	85-B	0381941 4892276	WS	Tree Swallow	bird	Fresh, < 5 days	No visible trauma	45	280		Gravel	
08-Sep-10	48	0389400 4892154	JL	Tree Swallow	bird	Old, 3-4 days		49	242	W	Gravel	ART
10-Sep-10	67	0386802 4891247	CF	Purple Martin	bird	Fresh, 1-2 days	Lower abdomen severed	11	46	NE	Soil	ART
13-Sep-10	28	0382130 4891657	CF	Red-breasted Nuthatch	bird	Fresh, 2-3 days	Neck	16	318	NW	Gravel	ART
15-Sep-10	30	0384729 4886391	CF	Golden-crowned Kinglet	bird	Fresh, 1-2 days	Neck?	25	10	N	Gravel	ART
15-Sep-10	41-B	0387567 4886709	WS	Bird Sp.	bird	Fresh, < 5 days	Entirely	23	57		Mud	
20-Sep-10	35	0384269 4887832	CF	Mourning Dove	bird	Fresh, 1-2 days	Neck	17	305	NW	Gravel	ART
20-Sep-10	36	0388880 4887360	CF	Tree Swallow	bird	Fresh, 1-2 days	No visible trauma	18	202	S	Soil / Veg	ART
24-Sep-10	61-A	0390017 4894155	CF	Mourning Dove	bird	Fresh, 1-2 days	Neck / Head	1	320	N	Cement Base	ART
24-Sep-10	61-B	0390020 4894158	CF	Mourning Dove	bird	Fresh, 1-2 days	Neck / Head	1	162	S	Gravel	ART
24-Sep-10	61-C	0390017 4894164	CF	Mourning Dove	bird	Fresh, 1-2 days	Neck / Head	1	178	S	Gravel	ART
29-Sep-10	81	0384133 4890355	CF	Bird Sp.	bird	Old, 3-5 days	Only a wing found	32	58	E	Gravel	
06-Oct-10	22	0382241 4889666	JL	Golden-crowned Kinglet	bird	Fresh, 1-2 days	Neck?	30	50	NE	Gravel	ART
06-Oct-10	40	0388011 4886986	CF	European Starling	bird	Old, 3-5 days	Neck	5	356	N	Soil	ART
07-Oct-10	37	0388783 4887795	JL	Mallard	bird	Old, 5-6 days? Unknown	Found: Wing only!	13	102	E	Veg / Soil	ART
11-Oct-10	78	0385250 4891029	WS	Horned Lark	bird	Old, > 5 days		49	247		Gravel	
13-Oct-10	41	0387611 4886755	CF	Brown-headed Cowbird	bird	Fresh, 1-2 days	Neck	39	234	W	Gravel	ART
14-Oct-10	37	0382753 4890445	RD	Gull Sp.	bird	Old, > 7 days		23	147		Gravel & sand	

Detailed Results - Birds

Date	Turbine #	GPS Location Zone Easting Northing	Observer	Species	Guild	Condition/Estimated Time Since Death	Injuries Sustained	Distance (m)	Direction (°)	Direction (compass)	Ground Cover	ID checked
20-Oct-10	31	0384880 4886178	JL	Ruby-crowned Kinglet	bird	Fresh, 1-2 days	Neck	39	195	S	Gravel	ART
28-Oct-10	77	0384491 4892151	WS	Red-tailed Hawk	bird	Old, > 7 days	?	12	233		Grass/Weeds	
05-Nov-10	62	0389721 4893969	WS	Gull Sp.	bird	Fresh, < 3 days	?? (found wings only)	1	180		Grass	
16-Nov-10	19	0382125 4888665	RD	Bird Sp.	bird	Old, > 7 days		52	280		Field	
01-Dec-10	58	0389409 4892162	WS	Wilson's Snipe	bird	Old, > 7 days	Head & Feathers only	34	280		Grass	
13-Dec-10	33	0384457 4887238	WS	Canada Goose	bird	Fresh, < 3 days	body (scavenged?)	25	118		Grass	

Stantec

**WOLFE ISLAND WIND PLANT, POST-CONSTRUCTION FOLLOW-UP PLAN
BIRD AND BAT RESOURCES
MONITORING REPORT NO. 4, JULY - DECEMBER 2010**

Appendix F

2009 Waterfowl Movement Data

Table 1 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

Table 2 Fall 2009 Waterfowl Evening Movement

Date	Route*											
	1	2	3	4	5	6	7	8	9	10	Other**	Grand Total
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

Appendix G

Aerial Waterfowl Data

Aerial Waterfowl Survey Results by Sector

FALL 2010: Waterfowl Days by guild for each of 5 Wolfe Island survey sectors

	C7	C8	C9	C10	C11	Total
Swans	2,927	2,090	8,032	10,509	2,623	26,180
Geese	45,116	12,016	73,808	144,763	33,247	308,948
Large dabblers	25,797	26,969	130,887	53,994	55,338	292,984
Small dabblers	5,991	1,110	25,026	800	0	32,927
Bay ducks	141,190	48,898	374,865	254,726	34,875	854,554
Sea ducks	4,098	0	23	178	977	5,276
Goldeneye	56,938	29,821	15,741	60,064	49,250	211,813
Mergansers	45,681	45,695	10,188	14,599	34,293	150,455
Total	330,136	166,597	639,528	539,631	210,602	1,886,494

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 2010: Waterfowl Days by guild for major staging areas on Wolfe Island

	Bayfield	Button	Pyke's	Reed's	Total
Swans	2,972	6,036	364	165	9,536
Geese	2,908	26,538	70,695	22,837	122,977
Large dabblers	104,985	14,943	17,550	14,323	151,800
Small dabblers	23,723	800	0	0	24,523
Bay ducks	332,765	234,678	0	0	567,443
Sea ducks	546	0	0	13	559
Goldeneye	3,953	11,052	7,020	14,834	36,859
Mergansers	781	2725	747	8746	13,004
Total	472,637	296,770	96,376	60,918	926,700

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 H

Notifications and Agency Responses

From: Garry Perfect [Garry_Perfect@transalta.com]
Sent: Tuesday, July 27, 2010 9:02 AM
To: 'Cotnam, Erin (MNR)'; 'dave.richards@ontario.ca'; 'Read,Rob [Burlington]';
 'rob.dobos@ec.gc.ca'; Harris, Julie
Cc: Wyatt, Valerie *Notifications #1 and 2*

Good morning all:

This e-mail provides the details of two notification thresholds that have been met at the Wolfe Island Wind Plant during the period from July 9 to July 26, 2010.

High Annual Mortality Rate - Bats # 2

As stated in the Post-Construction Follow-Up Plan, MNR, EC and NRCAN will be notified if 144 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Eight bat carcasses have been recovered during the period of July 9-21 and nine bat carcasses were recovered during the period July 22-26, 2010. Corrected for percent area searched (Ps, 25%), searcher efficiency (Se, 44% - June value), and scavenger removal (Sc, 46% - June value), this translates to 158 and 178 bat fatalities over each period, respectively. A list of dates, wind turbines and species of the fatalities are provided in the attached spreadsheet.

High Annual Mortality Rate - Birds # 1

As stated in the Post-Construction Follow-Up Plan, MNR, EC and NRCAN will be notified if 134 bird fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Seven bird carcasses were recovered during the period July 9-15 and eight bird carcasses were recovered during the period July 16-23, 2010. Corrected for percent area searched (Ps, 25%), searcher efficiency (Se, 44% - June value), and scavenger removal (Sc, 46% - June value), this translates to 138 and 158 bird fatalities over this period. A list of dates, wind turbines and species of the fatalities are provided in the attached spreadsheet.

A Note About Correction Factors

For the purposes of correction, Sc and Se trial data collected in June was applied to the July data. The values of all three correction factors are lower than in 2009, resulting in a very high corrective multiplier (approximately 20 times). With respect to Se, July trials may result in higher values as the search area has been reduced substantially since late May, often covering only the gravel pad and access road. With respect to Sc, some irregularities have been noted in the June Sc trial and it is possible that some carcasses were overlooked; this number should be viewed with caution. The Sc trial will be repeated in July and the July Sc value will be applied to the July mortality data. As a result, the numbers presented above represent a very conservative estimation of mortality.

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

Garry Perfect
 Environmental Specialist

Ph: 519-826-4645 x225 Cell: 519-820-8204 Fax: 519-826-4745
 34 Harvard Road, Guelph, Ontario, N1G 4V8
Garry_Perfect@transalta.com

Taylor, Andrew

From: Garry Perfect [Garry_Perfect@transalta.com]
Sent: Wednesday, August 04, 2010 9:43 AM
To: 'Cotnam, Erin (MNR)'; 'dave.richards@ontario.ca'; 'Read,Rob [Burlington]';
'rob.dobos@ec.gc.ca'; Harris, Julie
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Wind Plant Notification #3
Attachments: WI bat Fatalities July 26-29 2010.xlsx

Good morning all:

This e-mail provides the details of a notification threshold that has been met at the Wolfe Island Wind Plant during the period from July 26 to 29, 2010.

High Annual Mortality Rate - Bats #3

As stated in the Post-Construction Follow-Up Plan, MNR, EC and NRCan will be notified if 144 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Eleven bat carcasses have been recovered during the period of July 26-29, 2010. Corrected for percent area searched (Ps, 25%), searcher efficiency (Se, 44% - June value), and scavenger removal (Sc, 46% - June value), this translates to 217 bat fatalities over this period. A list of dates, wind turbines and species of the fatalities are provided in the attached spreadsheet.

A Note About Correction Factors

For the purposes of correction, Sc and Se trial data collected in June was applied to the July data. The values of all three correction factors are lower than in 2009, resulting in a very high corrective multiplier (approximately 20 times). With respect to Se, July trials may result in higher values as the search area has been reduced substantially since late May, often covering only the gravel pad and access road. With respect to Sc, some irregularities have been noted in the June Sc trial and it is possible that some carcasses were overlooked; this number should be viewed with caution. The Sc trial will be repeated in July and the July Sc value will be applied to the July mortality data. As a result, the numbers presented above represent a very conservative estimation of mortality.

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

Best regards,

Garry Perfect
Environmental Specialist

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Taylor, Andrew

From: Garry Perfect [Garry_Perfect@transalta.com]
Sent: Tuesday, August 10, 2010 9:09 AM
To: 'Cotnam, Erin (MNR)'; 'eric.prevost@ontario.ca'; 'Read,Rob [Burlington]'; 'rob.dobos@ec.gc.ca'; Harris, Julie
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Notification # 4
Attachments: WI Fatalities July 30-Aug 6 2010.xlsx

Good morning all:

This e-mail provides the details of one notification threshold that has been met at the Wolfe Island Wind Plant during the period from July 30 to August 6, 2010.

High Annual Mortality Rate - Bats # 4

As stated in the Post-Construction Follow-Up Plan, MNR, EC and NRCAN will be notified if 144 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Nine bat carcasses have been recovered during the period of July 30 to August 6, 2010. Corrected for percent area searched (Ps, 25%), searcher efficiency (Se, 44% - June value), and scavenger removal (Sc, 46% - June value), this translates to 178 bat fatalities over this period. A list of dates, wind turbines and species of the fatalities are provided in the attached spreadsheet.

A Note About Correction Factors

For the purposes of correction, Sc and Se trial data collected in June was applied to the nine bats comprising this notification. The values of all three correction factors are lower than in 2009, resulting in a very high corrective multiplier (approximately 20 times). With respect to Se, August trials may result in higher values as the search area has been reduced substantially since late May, often covering only the gravel pad and access road. With respect to Sc, some irregularities have been noted in the June Sc trial and it is possible that some carcasses were overlooked; this number should be viewed with caution. The Sc trial will be repeated in August and the August Sc value will be applied to the August mortality data. As a result, the numbers presented above represent a very conservative estimation of mortality.

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

Best regards,

Garry Perfect
Environmental Specialist

Ph: 519-826-4645 x225 Cell:519-820-8204 Fax:519-826-4745
34 Harvard Road, Guelph, Ontario, N1G 4V8
Garry_Perfect@transalta.com

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Wyatt, Valerie

From: Garry Perfect [Garry_Perfect@transalta.com]
Sent: Monday, August 23, 2010 11:25 AM
To: 'eric.prevost@ontario.ca'; 'erin.cotnam@ontario.ca'; 'ken.durst@ontario.ca'; 'Read,Rob [Burlington]'; 'rob.dobos@ec.gc.ca'; Harris, Julie
Cc: Wyatt, Valerie
Subject: New Wolfe Island Notification #5
Attachments: WI Fatalities Aug 9 to 18 2010.xlsx; Summary of 2010 Notifications (1).doc

Good morning all:

Further to my previous e-mail, this e-mail provides the details of one new notification threshold that has been met at the Wolfe Island Wind Plant during the period from August 9 to 18, 2010. The Summary of 2010 Notifications table (attached) has been updated to include this notification as 9 (a).

High Annual Mortality Rate - Bats #5

As stated in the Post-Construction Follow-Up Plan, MNR, EC and NRCan will be notified if 144 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Seventeen bat carcasses have been recovered during the period August 9 to 18, 2010. Corrected for percent area searched (Ps, 26.2%), searcher efficiency (Se, 88.3% - August value), and scavenger removal (Sc, 42% - July value), this translates to 176 bat fatalities over this period. A list of dates, wind turbines and species of the fatalities are provided in the attached spreadsheet.

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

Best regards,

Garry Perfect
Environmental Specialist

Ph: 519-826-4645 x225 Cell:519-820-8204 Fax:519-826-4745
34 Harvard Road, Guelph, Ontario, N1G 4V8
Garry_Perfect@transalta.com

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From: Garry Perfect
Sent: Tuesday, August 31, 2010 4:13 PM
To: 'erin.cotnam@ontario.ca'; 'Prevost, Eric (MNR)'; 'rob.read@ec.gc.ca';
'rob.dobos@ec.gc.ca'; 'jharris@nrcan.gc.ca'
Cc: 'valerie.wyatt@stantec.com'
Subject: Wolfe Island Wind Plant Notification # 6
Attachments: WI Fatalities_August 19 to 25 2010.xlsx

Good afternoon all:

This e-mail provides the details of one notification threshold that has been met at the Wolfe Island Wind Plant during the period from August 19 to 25, 2010.

High Annual Mortality Rate - Bats # 6

As stated in the Post-Construction Follow-Up Plan, MNR, EC and NRCAN will be notified if 144 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

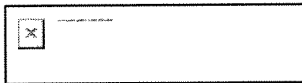
Twenty-one bat carcasses have been recovered during the period August 19 to 25, 2010. Corrected for percent area searched (Ps, 26.2%), searcher efficiency (Se, 88.3% - August value), and scavenger removal (Sc, 42% - July value), this translates to 216 bat fatalities over this period. A list of dates, wind turbines and species of the fatalities are provided in the attached spreadsheet.

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

Best regards,

Garry Perfect
Environmental Specialist

Ph:519-826-4645 x225 Cell:519-820-8204 Fax:519-826-4745
34 Harvard Road, Guelph, Ontario, N1G 4V8
Garry_Perfect@transalta.com



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From: Garry Perfect
Sent: Wednesday, September 15, 2010 8:44 AM
To: 'erin.cotnam@ontario.ca'; 'Prevost, Eric (MNR)'; 'rob.read@ec.gc.ca';
'rob.dobos@ec.gc.ca'; 'jharris@nrca.gc.ca'
Cc: 'valerie.wyatt@stantec.com'
Subject: Wolfe Island Wind Plant Notification #7
Attachments: WI Fatalities_August 26 - September 7 2010.xlsx; image001.gif

Good morning all:

This e-mail provides the details of one notification threshold that has been met at the Wolfe Island Wind Plant during the period from August 26 to September 7, 2010.

High Annual Mortality Rate - Bats #7


As stated in the Post-Construction Follow-Up Plan, MNR, EC and NRCAN will be notified if 144 bat fatalities are noted over a consecutive three-week period. This threshold value is intended to represent the estimated actual number of fatalities corrected for projected scavenger removal and searcher efficiency.

Seventeen bat carcasses have been recovered during the period August 26 – September 7, 2010. Corrected for percent area searched (Ps, 26.2%), searcher efficiency (Se, 88.3% - August value), and scavenger removal (Sc, 42.4% - August value), this translates to 173 bat fatalities over this period. A list of dates, wind turbines and species of the fatalities are provided in the attached spreadsheet.

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

Garry Perfect
Environmental Specialist

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 cid:image001.gif@01CA

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From: Garry Perfect [Garry_Perfect@transalta.com]
Sent: Tuesday, November 30, 2010 10:08 AM
To: Read,Rob [Burlington]; rob.dobos@ec.gc.ca; Prevost, Eric (MNR);
erin.cotnam@ontario.ca; mathieu.leblanc@nrcan-rncan.gc.ca
Cc: Wyatt, Valerie; Taylor, Andrew
Subject: Wolfe Island Wind Plant Notification #8

Good morning all:

This e-mail provides the details of one notification threshold that has been met at the Wolfe Island Wind Plant during the period from September 7 to November 1, 2010.

Disturbance to Staging Waterfowl #8

As stated in the Plan, NRCan, EC and MNR will be contacted in the event of a 30% decline in the staging numbers of any of the listed waterfowl guilds over a period of more than one month. The measure of abundance is "waterfowl days" per guild, compared between fall 2008 pre-construction surveys and the fall 2010 post-construction surveys.

Over the period of September 7, 2010 to November 1, 2010, waterfowl days for the geese guild (all Canada Geese) was 120,662, which represents a 54% decline from the same period in 2008 (September 9 to November 6, 2008). Over the same period, waterfowl days for the goldeneye guild (including Common Goldeneye and Bufflehead) was 24,194 in 2010, which represents a 42% decline from 2008.

Another survey was conducted on November 15, 2010. Following this survey, total waterfowl days for the goldeneye guild was 54,487; representing a 24% reduction from the same early September-mid November period in 2008, which is below the notification threshold. Total waterfowl days for Canada Geese were 156,915, a reduction of 52% over 2008.

It should be noted that the actual numbers of goldeneye observed were similar in 2008 and 2010, peaking at 2,845 and 2,375 during the November 6, 2008 and November 1, 2010 surveys respectively. The difference in waterfowl days between the two years appears to be mostly attributable to differences in the timing of migration events. In both years, Common Goldeneye and Bufflehead numbers were low during September and early October surveys. In 2008, larger numbers of staging Common Goldeneye and Bufflehead were first observed during the late October survey, whereas in 2010, larger numbers were not observed until the early November survey. This earlier survey with high goldeneye guild numbers in 2008 appears to be the major contributing factor differences in waterfowl days.

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

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