



January 10, 2017

**Mr. Chris Veinot**  
**Natural Forces Wind Inc.**  
#1205 - 1801 Hollis Street  
Halifax, NS B3J 3N4

Dear Mr. Veinot,

**Re: 2016 Post-Construction Bird and Bat Monitoring Program**  
**Gaetz Brook Community Wind Farm**

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## **INTRODUCTION**

Natural Forces Wind Inc. has developed a 2.3 MW wind power facility (the Project) in the community of Gaetz Brook in Halifax County, approximately 34 km east of Halifax, Nova Scotia. The Environmental Assessment (EA) for the Project was approved on November 15, 2013 in accordance with Section 13(1)b of the Environmental Assessment Regulations, pursuant to Part IV of the *Environment Act*. As a condition of the EA approval, the Proponent is required to develop and implement a post-construction monitoring plan for birds and bats. In accordance with this condition, a post-construction monitoring plan for birds and bats (the Plan) was developed and implemented following the commencement of operations in late fall 2014. Following the completion of each year of monitoring, a report must be provided to Canadian Wildlife Services (CWS), Nova Scotia Environment (NSE), and Nova Scotia Department of Natural Resources (NSDNR) detailing the methodology and findings of the monitoring program and providing recommendations for future monitoring and/or mitigation, as required.

The purpose of this report is to present the methodology and results for the post-construction bird and bat monitoring program after the second year of the post-construction bird and bat monitoring program.

### **Site Description**

The Project site is located within Halifax Regional Municipality, approximately 34 km east of Halifax, and is centered at 4958367 N and 5602559 E (UTM Zone 20T). The Project site encompasses a variety of habitats including recently clear-cut areas, regenerating softwood forests, mature coniferous forests, as well as treed swamp, and treed bog wetlands.

Engineering • Surveying • Environmental

Head Office  
Railside, 1355 Bedford Hwy.  
Bedford, NS B4A 1C5  
t. 902.835.5560 (24/7)  
f. 902.835.5574

Antigonish Office  
3-A Vincent's Way  
Antigonish, NS B2G 2X3  
t. 902.863.1465 (24/7)  
f. 902.863.1389

Moncton Office  
45 Price Street  
Moncton, NB E1A 3R1  
t. 1.855.770.5560 (24/7)  
f. 902.835.5574

Deer Lake Office  
101 Nicholsville Road  
Deer Lake, NL A8A 1V5  
t. 1.855.770.5560 (24/7)  
f. 902.835.5574

Although the Project site consists of approximately 110 ha of privately owned land; the Project footprint is only 1.75 ha, and includes a cleared turbine pad and access road that extends from the north, via Marine Drive.

## POST-CONSTRUCTION BIRD AND BAT MONITORING PROGRAM

As a condition of the EA approval, a post-construction monitoring program for birds and bats must be implemented to document mortalities and evaluate any changes in the diversity or abundance of the breeding bird community at the Project site as a result of Project operation and associated activities.

### Breeding Bird Monitoring Methodology

The Program was designed to capture changes in the diversity and abundance of the breeding bird community at the Project site, relative to the community observed during the pre-construction breeding season surveys. The monitoring survey was completed in a manner that is consistent with the pre-construction survey methodology, which was designed in consultation with officials from NSDNR and CWS, and conformed to protocols outlined in the document *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (CWS 2007). The point count survey locations were updated to reflect the developed Project footprint. Surveys were conducted on days when weather conditions met or exceeded the criteria outlined in the document *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (CWS 2007).

Breeding surveys were completed by an expert birder on June 7 and June 15, 2015, and May 28 and June, 2016. The following information was recorded at each survey location:

- Weather conditions (temperature, wind speed, cloud cover, and presence of precipitation).
- Date and time of day.
- Habitat description.
- GPS coordinates of the survey location.

Methodology for breeding bird monitoring involved the following elements:

- Surveys were four hours in duration, conducted during the first four hours after sunrise to encompass peak singing times for breeding passerines.
- Breeding bird surveys were conducted in the spring of 2015 and 2016, following the commencement of turbine operation (late fall 2014).
- Species presence and abundance was recorded based on visual and acoustic observations.
- Approximate distance to each bird was recorded using a scale of 0-50 m, 50-100 m and further than 100 m.
- Survey locations during each survey were separated by a minimum distance of 300 m, whenever possible, to account for all habitat types present at the Project site and to minimize the chances of double-counting birds with loud vocalizations.

## Bird and Bat Mortalities

Although the number of birds killed by collisions with wind energy infrastructure has been demonstrated to be low (EC *et al.* 2012), particularly relative to other anthropogenic infrastructure (Erickson *et al.* 2005), the potential does exist for bird mortality as a result of the Project. Bat mortalities at wind energy facilities typically exceed those for birds (EC *et al.* 2014). Mortality surveys were completed to validate the predicted mortality effects of the Project on the resident and migrant bird community as well as the bat population, as outlined in the approved EA.

Mortality surveys must be conducted for a period of two years following the commencement of turbine operation (late fall 2014). Bat carcass searches will coincide with bird mortality surveys and will employ the same search protocol. Mortality surveys consist of three main components:

- Carcass searches.
- Scavenger removal trials.
- Searcher efficiency trials.

### Carcass Searches

Carcass searches were completed during the periods of peak bird migration, namely during the spring and fall migration period. The schedule of these carcass searches consisted of the following:

- Three times per week for 4 weeks, beginning mid-May 2015/16.
- Three times per week for 8 weeks, beginning in late August 2015/16.

Carcass searches began at first light, to ensure minimal loss of carcasses due to diurnal scavengers. Data collection methods were in compliance with the recommendations outlined in the Wind Energy Bird and Bat Monitoring Database maintained by NatureCounts (2012). The search effort was focused on the turbine base and extended out 100 m in each direction to encompass an area of 3.14 ha (the search area). Carcass searches, including scavenged carcasses, were completed along linear transects, spaced less than 10 m apart and walked at a pace of 1.8 km/hr. Special attention was given to tall grass clumps, shrubs, and openings to animal burrows. Any evidence of actual or scavenged carcasses was noted including species, condition of the carcass, estimated time of death, and the probable cause of death (including justification to why this cause of death was chosen). In addition, the location of the carcass was recorded with a GPS.

If the carcass could not be identified, photos were taken for identification through consultation with an expert birder. Carcasses were removed to avoid replication; this was completed in accordance with federal, provincial, and municipal laws and permits. A salvage permit under the *Migratory Birds Convention Act* (1994) was acquired, as were the necessary permit(s) required under the *Species at Risk Act* (SARA) for salvage of any designated species at risk recovered during the carcass searches. An additional permit was obtained from NSDNR for the collection of carcasses of those bird species under provincial jurisdiction, including but not limited to game birds and raptors.

Any injured birds and/or bats were to be captured, if possible, and taken to a wildlife rehabilitation centre or vet clinic for treatment or for euthanization.

#### Scavenger Removal Trials

Scavenger removal trials are necessary to assess the scavenger removal rate at the Project site. These trials involved placing carcasses at various georeferenced locations within the search radius of the turbine and determining how many were removed within a 48 hour period (which corresponds to the time that elapses between carcass searches during the monitoring period). Planted carcasses were marked to distinguish from actual turbine-related fatalities, while not attracting/repelling potential scavengers. Juvenile quail and chicken carcasses were obtained from local hatcheries, and used for these trials. All carcasses were removed from the Project site and disposed of after the trials were completed.

#### Searcher Efficiency Trial

Searcher efficiency trials are necessary to assess the searcher's ability to find and recover carcasses. These trials involved placing carcasses at random, georeferenced locations undisclosed to the search team early in the morning prior to a scheduled carcass search, and counting the number of carcasses recovered by the search team. Extra care was taken to ensure minimal health effects to field surveyors. Persons handling carcasses took the proper precautions by having an updated rabies pre-exposure vaccination, and donning the proper personal protective equipment. All carcasses, unless removed by scavengers, were removed from the Project site and disposed of after the trials were completed.

### **BIRD AND BAT MONITORING PROGRAM RESULTS (2015/16)**

#### **Permitting Requirements**

A salvage permit (No. SS2794) under the *Migratory Birds Convention Act* (1994) was acquired from CWS to salvage dead migratory birds recovered during the carcass searches. A Scientific Permit was also obtained from NSDNR for the collection of bat and non-migratory bird carcasses pursuant to subsection 14(1) (a) of the *Endangered Species Act* (1998) and Section 62 (2) of the *Wildlife Act* (1989).

#### **Breeding Bird Surveys**

##### Post-Construction Breeding Bird Surveys (2016)

Two breeding bird surveys were completed on the Project site on May 28 and June 13, 2016. A total of 461 individual birds comprised of 44 species were observed (Table 1, attached). Breeding evidence was assessed based on the guidelines provided in the *Maritime Breeding Bird Atlas - Guide for Atlases* (MBBA 2006). A summary of breeding bird activity on and near the Project site is provided below, and species specific behavioural details are included in Table 1 (attached):

- A total of 38 species are considered 'possible breeders' based on their presence in suitable breeding habitat during the breeding season.

- Four species are considered 'probable breeders' as mated pairs of these birds were observed.
- Two species are considered 'confirmed breeders' based on observations of fledged young and/or adults carrying food.

Six species of conservation interest (SOCI) were identified during the surveys. SOCI are species that are legally protected under the federal SARA, or the provincial *Endangered Species Act*, listed as 'Special Concern', 'Threatened' or 'Endangered' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or listed as 'Sensitive', 'May Be At Risk' or 'At Risk' by NSDNR. These six species are listed in Table A below.

**Table A: SOCI Observed during 2016 Post Construction Breeding Surveys**

| Common Name               | Scientific Name               | SARA Status <sup>1</sup> | NSESA Status <sup>2</sup> | COSWIC Status <sup>3</sup> | NSDNR Status <sup>4</sup> |
|---------------------------|-------------------------------|--------------------------|---------------------------|----------------------------|---------------------------|
| Golden-crowned Kinglet    | <i>Regulus satrapa</i>        | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |
| Magnolia Warbler          | <i>Dendroica magnolia</i>     | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |
| Northern Parula           | <i>Parula Americana</i>       | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |
| Pileated Woodpecker       | <i>Dryocopus pileatus</i>     | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |
| Ruby-crowned Kinglet      | <i>Regulus calendula</i>      | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |
| Yellow-Bellied Flycatcher | <i>Empidonax flaviventris</i> | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |

<sup>1</sup>Government of Canada 2012; <sup>2</sup>NS ESA 2013; <sup>3</sup>COSEWIC 2012; <sup>4</sup>NSDNR 2010

#### Post-Construction Breeding Bird Surveys (2015)

Two breeding bird surveys were completed on the Project site on June 7 and June 15, 2015. A total of 437 individual birds comprised of 50 species were observed (Table 1, attached). Breeding evidence was assessed based on the guidelines provided in the *Maritime Breeding Bird Atlas - Guide for Atlases* (MBBA 2006). A summary of breeding bird activity on and near the Project site is provided below, and species specific behavioural details are included in Table 1 (attached):

- A total of 43 species are considered 'possible breeders' based on their presence in suitable breeding habitat during the breeding season.
- One species is considered a 'probable breeder' as a mated pair was observed.
- Four species are considered 'confirmed breeders' based on observations of fledged young and/or adults carrying food.
- Three species were observed on the Project site during the breeding season, but were not considered likely to have bred on-site as suitable habitat for these species is not present.

Five SOCI were identified during the surveys. These five species are listed in Table B below.

**Table B: SOCI Observed during 2015 Post Construction Breeding Surveys**

| Common Name               | Scientific Name               | SARA Status <sup>1</sup> | NSESA Status <sup>2</sup> | COSWIC Status <sup>3</sup> | NSDNR Status <sup>4</sup> |
|---------------------------|-------------------------------|--------------------------|---------------------------|----------------------------|---------------------------|
| Boreal Chickadee          | <i>Poecile hudsonicus</i>     | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |
| Canada Warbler            | <i>Wilsonia canadensis</i>    | Threatened               | Endangered                | Threatened                 | At Risk                   |
| Common Loon               | <i>Gavia immer</i>            | Not Listed               | Not Listed                | Not Listed                 | May Be At Risk            |
| Tree Swallow              | <i>Tachycineta bicolor</i>    | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |
| Yellow-bellied Flycatcher | <i>Empidonax flaviventris</i> | Not Listed               | Not Listed                | Not Listed                 | Sensitive                 |

<sup>1</sup>Government of Canada 2012; <sup>2</sup>NS ESA 2013; <sup>3</sup>COSEWIC 2012; <sup>4</sup>NSDNR 2010

#### Pre-Construction Breeding Bird Surveys (2012)

Two breeding bird surveys were conducted as part of the EA for the Project on June 21 and July 11, 2012. Survey point-count locations nearest the Project footprint were compared to post-construction breeding bird survey results (Table 1, attached). A total of 400 individual birds comprised of 40 species were observed near the Project footprint in the pre-construction breeding bird surveys. Eight of these species were identified as probable breeders near the Project site, and another six were confirmed as breeding near the Project site (Table 1, attached).

#### **Bird and Bat Mortality Surveys**

##### Carcass Searches

Carcass searches were completed by a Strum staff member (the searcher). Carcass searches for the spring 2015 monitoring period began on May 11, 2015 and concluded on June 12, 2015. Carcass searches for the fall 2015 monitoring period began on August 24, 2015 and concluded on October 15, 2015. A second set of monitoring was completed the following year from May 15, 2016 to June 11, 2016 and from August 22, 2016 to October 14, 2016.

One carcass was recovered in 2016, a female Common Yellowthroat during the spring survey (Table C). No bird or bat carcasses were recovered during the fall 2016 or the 2015 surveys.

**Table C: Carcasses Recovered at the Project Site**

| Date         | Species             |                           | Location | In Situ Substrate |
|--------------|---------------------|---------------------------|----------|-------------------|
|              | Common Name         | Scientific Name           |          |                   |
| June 5, 2016 | Common Yellowthroat | <i>Geothlypis trichas</i> | GB1      | Dirt              |

##### Scavenger Removal Trials

Scavenger Removal (SR) trials were also conducted in the spring and fall monitoring periods. The spring SR trials were conducted June 8, 2015 and June 7, 2016, and the fall SR trials were conducted October 9, 2015 and August 26, 2016. The SR rate was relatively high overall; however the 2016 SR rates were very high. The spring 2016 SR trial saw a 100% removal rate. In both years, the spring SR rate was higher than the fall rate. The SR trial results are presented in Table 2 (attached).

### Searcher Efficiency Trials

Searcher efficiency (SE) trials were conducted in the spring and fall monitoring periods. The spring SE trial was conducted June 8, 2015 and June 1, 2016, and the fall SE trials were conducted October 9, 2015 and August 26, 2016. The results of the SE trials indicate that in 2016 the searcher was 50% effective at recovering carcasses (in both spring and fall), compared to 2015 when the searcher was 36% effective at recovering carcasses (38% in the spring, 33% in the fall). The searcher was effective at recovering carcasses in dirt, gravel, and grassy substrates. The SE trial results are presented in Table 3 (attached).

## **DISCUSSION**

### **Breeding Bird Surveys**

In comparing the post-construction breeding bird survey data (2015 and 2016) with the pre-construction breeding bird survey data (2012), there is no evidence that the Project has resulted in a significant change in the breeding bird community. In fact, both the diversity and abundance of bird species in the Project site area during the breeding season was observed to be slightly higher during post-construction surveys than pre-construction surveys (437 individual birds comprised of 50 species observed in 2015, and 461 individual birds comprised of 44 species observed in 2016 vs. the 400 individual birds comprised of 40 species that were observed during the pre-construction breeding bird surveys). Despite the higher abundance observed during the post-construction breeding bird surveys, the Project does not appear to have attracted invasive species to the area. The species observed that could be considered mildly invasive is the American Robin (*Turdus migratorius*), and these were observed in greater abundance during the pre-construction breeding bird surveys (52 birds observed in 2012) than in the post-construction surveys (14 birds observed in 2015 and 15 observed in 2016). These results indicate that the Project has not resulted in a significant change in the breeding habitat availability for birds in the area.

### **Bird and Bat Mortality Surveys**

#### Scavenger Removal Trial

The SR trial results indicate a high level of scavenging in the area of the turbine, particularly in spring 2016 when all carcasses laid out were scavenged. This is supported by anecdotal evidence of predation and numerous observations of tracks/scat on the Project site reported by the searcher. There was also an active osprey nest observed on the powerlines near the turbine. While these birds are not known to scavenge terrestrially, it is possible that they removed trial carcasses from the area as well. In 2015, the searcher discovered dead Porcupine (*Erethizon dorsatum*) that appeared to have been killed by a predator, likely a Coyote (*Canis latrans*), during the fall carcass searches. Coyote scat was observed during pre-construction environmental surveys on the Project site, showing that these animals were present in the area before the Project was constructed.

In 2015, all of the carcasses that were scavenged were placed in the woods. The fact that this discrepancy was not observed in the 2016 surveys may suggest that animals have become

accustomed to the presence of the turbine or that revegetation on site has made the area attractive once again to wildlife.

#### Searcher Efficiency Trials

The SE trials indicate that the searcher was effective at recovering carcasses in a variety of substrates, including gravel and dirt, as well as wooded areas. The 2016 SE rate was higher than the 2015 SE rate, and in both cases the SE rates were within the ranges observed in other studies (Bernardino et al. 2012, Jacques Whitford 2009).

#### Bird Mortalities

During the two-year program, only one bird carcass was recovered under the operating turbine. However, due to the high scavenging rate at the Project site, it is possible that scavengers may have removed carcasses before searchers were able to recover them. Despite these limitations the low number of observed bird mortalities throughout the two years of monitoring suggests that the propensity for the operating turbine to result in bird mortalities is low.

#### Bat Mortalities

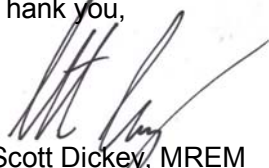
No bat carcasses were found during the carcass surveys. The abundance of bats in Nova Scotia has been in decline for several years due to other biological factors. Bat mortality rates as a result of operating wind turbines are typically higher than bird mortality rates (EC et al. 2014). As there were no bird mortalities observed in 2015 or 2016 as a result of the Project, these results suggest that the bat population in the area of the Project site is low.

### **RECOMMENDATIONS AND FUTURE MONITORING REQUIREMENTS**

The results of the two-year post-construction bird and bat monitoring program at the Gaetz Brook Community Wind Farm show that the operation of the one wind turbine has not resulted in any significant mortality rates to birds or bats on the Project site. While the results of the breeding bird surveys do indicate a change in the breeding bird community on the Project site since construction, the majority of this change is likely attributable to the significant forestry activity that has occurred in the area more so than the Project itself. As such, we do not recommend additional monitoring for effects on the bird and bat populations as a result of the Project.

If you have any questions, please contact us.

Thank you,

  
Scott Dickey, MREM  
Environmental Specialist  
[sdickey@strum.com](mailto:sdickey@strum.com)

  
Shawn Duncan, BSc.  
Vice President  
[sduncan@strum.com](mailto:sduncan@strum.com)



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Table 1: Gaetz Brook Community Wind Farm - Species Observed During Pre-Construction and Post Construction Breeding Bird Surveys

| Common Name                             | Scientific Name                   | Pre-Construction Breeding Bird Surveys (2012) |                    | Post-Construction Breeding Bird Surveys (2015) |                    | Post-Construction Breeding Bird Surveys (2016) |                    | SARA Status | NSESA Status | COSEWIC Status | NSDNR Status   |
|---|-----------------------------------|---|--------------------|--|--------------------|--|--------------------|-------------|--------------|----------------|----------------|
|   |                                   | Number Observed                               | Breeding Evidence* | Number Observed                                | Breeding Evidence* | Number Observed                                | Breeding Evidence* |             |              |                |                |
| Alder Flycatcher                        | <i>Empidonax alnorum</i>          | 15  | H, Possible        | 31   | H, Possible        | 16   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| American Black Duck                     | <i>Anas rubripes</i>              | 0   | N/A                | 3  | FY, Confirmed      | 11   | FY - Confirmed     | Not Listed  | Not Listed   | Not Listed     | Secure         |
| American Crow                           | <i>Corvus brachyrhynchos</i>      | 5   | H, Possible        | 13   | H, Possible        | 4  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| American Goldfinch                      | <i>Spinus tristis</i>             | 9   | P, Probable        | 12   | H, Possible        | 7  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| American Redstart                       | <i>Setophaga ruticilla</i>        | 4   | H, Possible        | 24   | P, Probable        | 11   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| American Robin                          | <i>Turdus migratorius</i>         | 52  | CF, Confirmed      | 14   | CF, Confirmed      | 15   | CF - Confirmed     | Not Listed  | Not Listed   | Not Listed     | Secure         |
| American Woodcock                       | <i>Scolopax minor</i>             | 0   | N/A                | 1  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Black-and-white Warbler                 | <i>Mniotilta varia</i>            | 17  | P, Probable        | 17   | H, Possible        | 25   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Blackburnian Warbler                    | <i>Dendroica fusca</i>            | 0   | N/A                | 1  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Black-capped Chickadee                  | <i>Poecile atricapillus</i>       | 12  | FY, Confirmed      | 6  | H, Possible        | 7  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Black-throated Green Warbler            | <i>Dendroica virens</i>           | 16  | P, Probable        | 30   | H, Possible        | 47   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Blackpoll Warbler                       | <i>Dendroica striata</i>          | 0   | N/A                | 0  | N/A                | 4  | P - Probable       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Blue Jay                                | <i>Cyanocitta cristata</i>        | 13  | H, Possible        | 22   | H, Possible        | 10   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Blue-headed Vireo                       | <i>Vireo solitarius</i>           | 7   | H, Possible        | 4  | H, Possible        | 1  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Boreal Chickadee                        | <i>Poecile hudsonicus</i>         | 0   | N/A                | 2  | H, Possible        | 2  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Broad-winged Hawk                       | <i>Buteo platypterus</i>          | 0   | N/A                | 1  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Canada Goose                            | <i>Branta canadensis</i>          | 0   | N/A                | 2  | X, Observed        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Canada Warbler                          | <i>Wilsonia canadensis</i>        | 0   | N/A                | 1  | H, Possible        | 3  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Cedar Waxwing                           | <i>Bombus cedrorum</i>            | 8   | P, Probable        | 1  | H, Possible        | 4  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Chestnut-sided Warbler                  | <i>Dendroica pensylvanica</i>     | 3   | H, Possible        | 0  | N/A                | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Common Grackle                          | <i>Quiscalus quiscula</i>         | 0   | N/A                | 1  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Common Loon                             | <i>Gavia immer</i>                | 1   | X, Observed        | 1  | X, Observed        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Common Raven                            | <i>Corvus corax</i>               | 4   | H, Possible        | 3  | H, Possible        | 2  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Common Yellowthroat                     | <i>Geothlypis trichas</i>         | 31  | FY, Confirmed      | 26   | H, Possible        | 44   | A - Probable       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Dark-eyed Junco                         | <i>Junco hyemalis</i>             | 16  | FY, Confirmed      | 12   | FY, Confirmed      | 13   | P, A - Probable    | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Double-crested Cormorant                | <i>Phalacrocorax auritus</i>      | 0   | N/A                | 1  | H, Possible        | 1  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Evening Grosbeak                        | <i>Coccothraustes vespertinus</i> | 1   | H, Possible        | 0  | N/A                | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Fox Sparrow                             | <i>Passerella iliaca</i>          | 0   | N/A                | 0  | N/A                | 6  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Golden-Crowned Kinglet                  | <i>Regulus satrapa</i>            | 0   | N/A                | 0  | N/A                | 7  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Great Black-Backed Gull                 | <i>Larus marinus</i>              | 0   | N/A                | 0  | N/A                | 1  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Great Blue Heron                        | <i>Ardea herodias</i>             | 0   | N/A                | 1  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Hairy Woodpecker                        | <i>Picoides villosus</i>          | 1   | H, Possible        | 4  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Hermit Thrush                           | <i>Catharus guttatus</i>          | 27  | P, Probable        | 10   | H, Possible        | 18   | H - Possible       | Not Listed  | Not Listed   | Not at Risk    | Secure         |
| Herring Gull                            | <i>Larus argentatus</i>           | 0   | X, Observed        | 1  | X, Observed        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Lincoln's Sparrow                       | <i>Melospiza lincolni</i>         | 0   | H, Possible        | 1  | H, Possible        | 2  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Exotic         |
| Magnolia Warbler                        | <i>Dendroica magnolia</i>         | 46  | CF, Confirmed      | 39   | H, Possible        | 51   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Mourning Dove                           | <i>Zenaidura macroura</i>         | 4   | H, Possible        | 15   | H, Possible        | 10   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Mourning Warbler                        | <i>Oporornis philadelphia</i>     | 0   | N/A                | 1  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Nashville Warbler                       | <i>Vermivora ruficapilla</i>      | 2   | H, Possible        | 13   | H, Possible        | 7  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Northern Flicker                        | <i>Colaptes auratus</i>           | 4   | FY, Confirmed      | 5  | H, Possible        | 5  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Northern Parula                         | <i>Parula americana</i>           | 3   | H, Possible        | 2  | H, Possible        | 3  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Northern Waterthrush                    | <i>Seiurus noveboracensis</i>     | 0   | N/A                | 0  | N/A                | 1  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Osprey                                  | <i>Pandion haliaetus</i>          | 0   | N/A                | 1  | H, Possible        | 4  | P - Probable       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Ovenbird                                | <i>Seiurus aurocapilla</i>        | 0   | N/A                | 1  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Palm Warbler                            | <i>Dendroica palmarum</i>         | 6   | P, Probable        | 17   | CF, Confirmed      | 17   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Pileated Woodpecker                     | <i>Dryocopus pileatus</i>         | 0   | N/A                | 0  | N/A                | 2  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Pine Siskin                             | <i>Spinus pinus</i>               | 2   | P, Probable        | 0  | N/A                | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Purple Finch                            | <i>Carpodacus purpureus</i>       | 0   | N/A                | 8  | H, Possible        | 4  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Red-breasted Nuthatch                   | <i>Sitta canadensis</i>           | 1   | H, Possible        | 0  | N/A                | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Red-eyed Vireo                          | <i>Vireo olivaceus</i>            | 8   | H, Possible        | 8  | H, Possible        | 9  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Red-tailed Hawk                         | <i>Buteo jamaicensis</i>          | 1   | H, Possible        | 0  | N/A                | 0  | N/A                | Not Listed  | Not Listed   | Not at Risk    | Secure         |
| Red-winged Blackbird                    | <i>Agelaius phoeniceus</i>        | 0   | N/A                | 1  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Ring-necked Pheasant                    | <i>Phasianus colchicus</i>        | 0   | N/A                | 4  | H, Possible        | 3  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Exotic         |
| Ruby-crowned Kinglet                    | <i>Regulus calendula</i>          | 2   | H, Possible        | 0  | N/A                | 4  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Ruby-throated Hummingbird               | <i>Archilochus colubris</i>       | 2   | H, Possible        | 0  | N/A                | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Ruffed Grouse                           | <i>Bonasa umbellus</i>            | 0   | N/A                | 3  | H, Possible        | 2  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Song Sparrow                            | <i>Melospiza melodia</i>          | 4   | H, Possible        | 13   | H, Possible        | 6  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Swainson's Thrush                       | <i>Catharus ustulatus</i>         | 22  | H, Possible        | 10   | H, Possible        | 12   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Tree Swallow                            | <i>Tachycineta bicolor</i>        | 2   | H, Possible        | 4  | H, Possible        | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| White-throated Sparrow                  | <i>Zonotrichia albicollis</i>     | 33  | P, Probable        | 28   | H, Possible        | 42   | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Willet                                  | #N/A                              | 1   | X, Observed        | 0  | N/A                | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | May Be At Risk |
| Wilson's Warbler                        | <i>Wilsonia pusilla</i>           | 1   | H, Possible        | 0  | N/A                | 0  | N/A                | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Winter Wren                             | <i>Troglodytes troglodytes</i>    | 5   | H, Possible        | 3  | H, Possible        | 5  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| Yellow-bellied Flycatcher               | <i>Empidonax flaviventris</i>     | 3   | H, Possible        | 5  | H, Possible        | 7  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Sensitive      |
| Yellow-rumped Warbler                   | <i>Dendroica coronata</i>         | 6   | H, Possible        | 10   | H, Possible        | 6  | H - Possible       | Not Listed  | Not Listed   | Not Listed     | Secure         |
| <b>Total Number of Birds Observed</b>   |                                   | <b>400</b>                                    |                    | <b>437</b>                                     |                    | <b>461</b>                                     |                    |             |              |                |                |
| <b>Total Number of Species Observed</b> |                                   | <b>40</b>                                     |                    | <b>50</b>                                      |                    | <b>44</b>                                      |                    |             |              |                |                |

\* Breeding codes from the Maritime Breeding Bird Atlas - Guide for Atlases were used to describe breeding evidence (MMBA, 2006)

2016 Post Construction Bird and Bat Monitoring Program - Scavenger Removal Trial Results

| 2015                                  |           |           |                       |
|---------------------------------------|-----------|-----------|-----------------------|
| Spring (June 8, 2015)                 |           |           |                       |
| Turbine                               | Carcass # | Substrate | Removed by Scavenger? |
| 1                                     | 1         | Dirt      | No                    |
| 1                                     | 2         | Grubbings | No                    |
| 1                                     | 3         | Forest    | Yes                   |
| 1                                     | 4         | Gravel    | No                    |
| 1                                     | 5         | Grubbings | No                    |
| 1                                     | 6         | Forest    | Yes                   |
| 1                                     | 7         | Dirt      | No                    |
| 1                                     | 8         | Forest    | Yes                   |
| Spring Scavenger Removal Rate         |           |           | 38%                   |
| Fall (October 9, 2015)                |           |           |                       |
| Turbine                               | Carcass # | Substrate | Removed by Scavenger? |
| 1                                     | 1         | Dirt      | No                    |
| 1                                     | 2         | Forest    | Yes                   |
| 1                                     | 3         | Gravel    | No                    |
| 1                                     | 4         | Forest    | No                    |
| 1                                     | 5         | Dirt      | No                    |
| 1                                     | 6         | Forest    | No                    |
| 1                                     | 7         | Forest    | Yes                   |
| 1                                     | 8         | Grass     | No                    |
| Fall Scavenger Removal Rate           |           |           | 25%                   |
| <b>Overall Scavenger Removal Rate</b> |           |           | <b>31%</b>            |

| 2016                                  |           |           |                       |
|---------------------------------------|-----------|-----------|-----------------------|
| Spring (June 7, 2016)                 |           |           |                       |
| Turbine                               | Carcass # | Substrate | Removed by Scavenger? |
| 1                                     | 1         | Dirt      | Y                     |
| 1                                     | 2         | Dirt      | Y                     |
| 1                                     | 3         | Gravel    | Y                     |
| 1                                     | 4         | Grass     | Y                     |
| Spring Scavenger Removal Rate         |           |           | 100%                  |
| Fall (August 26, 2016)                |           |           |                       |
| Turbine                               | Carcass # | Substrate | Removed by Scavenger? |
| 1                                     | 1         | Dirt      | Y                     |
| 1                                     | 2         | Grass     | Y                     |
| 1                                     | 3         | Grass     | N                     |
| 1                                     | 4         | Dirt      | N                     |
| 1                                     | 5         | Gravel    | Y                     |
| 1                                     | 6         | Gravel    | N                     |
| Fall Scavenger Removal Rate           |           |           | 50%                   |
| <b>Overall Scavenger Removal Rate</b> |           |           | <b>70%</b>            |

2016 Post Construction Bird and Bat Monitoring Program - Searcher Efficiency Trial Results

| 2015                         |           |           |                        |
|------------------------------|-----------|-----------|------------------------|
| Spring (June 8, 2015)        |           |           |                        |
| Turbine                      | Carcass # | Substrate | Recovered by Searcher? |
| 1                            | 1         | Grubbings | Yes                    |
| 1                            | 2         | Woods     | Yes                    |
| 1                            | 3         | Gravel    | No                     |
| 1                            | 4         | Grass     | No                     |
| 1                            | 5         | Woods     | No                     |
| 1                            | 6         | Woods     | Yes                    |
| 1                            | 7         | Grass     | No                     |
| 1                            | 8         | Woods     | No                     |
| Spring Recovery Rate         |           |           | 38%                    |
| Fall (October 9, 2015)       |           |           |                        |
| Turbine                      | Carcass # | Substrate | Recovered by Searcher? |
| 1                            | 1         | Grubbings | No                     |
| 1                            | 2         | Grass     | No                     |
| 1                            | 3         | Grass     | No                     |
| 1                            | 4         | Woods     | Yes                    |
| 1                            | 5         | Woods     | Yes                    |
| 1                            | 6         | Gravel    | No                     |
| Fall Recovery Rate           |           |           | 33%                    |
| <b>Overall Recovery Rate</b> |           |           | <b>36%</b>             |

| 2016                         |           |           |                        |
|------------------------------|-----------|-----------|------------------------|
| Spring (June 1, 2016)        |           |           |                        |
| Turbine                      | Carcass # | Substrate | Recovered by Searcher? |
| 1                            | 1         | Dirt      | N                      |
| 1                            | 2         | Dirt      | N                      |
| 1                            | 3         | Grass     | Y                      |
| 1                            | 4         | Gravel    | Y                      |
| Spring Recovery Rate         |           |           | 50%                    |
| Fall (August 26, 2016)       |           |           |                        |
| Turbine                      | Carcass # | Substrate | Recovered by Searcher? |
| 1                            | 1         | Gravel    | N                      |
| 1                            | 2         | Dirt      | Y                      |
| 1                            | 3         | Dirt      | N                      |
| 1                            | 4         | Dirt      | Y                      |
| Fall Recovery Rate           |           |           | 50%                    |
| <b>Overall Recovery Rate</b> |           |           | <b>50%</b>             |