



January 12, 2018

Mr. Chris Veinot
Natural Forces Wind Inc.
#1205 - 1801 Hollis Street
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Dear Mr. Veinot,

**Re: 2017 Post-Construction Bird and Bat Monitoring Program
Amherst Community Wind Farm**

INTRODUCTION

The Amherst Community Wind Farm (the Project) is a two-turbine, 6 mega-watt (MW) project. The Project is located approximately 5.5 km east of Amherst in the Municipality of the County of Cumberland, Nova Scotia. The Project was developed by Mi'kmaq Wind4All Communities L.P. The Project received Environmental Assessment (EA) approval from the Minister of Environment on February 17, 2015 in accordance with Section 13(1)b of the Environmental Assessment Regulations, pursuant to Part IV of the *Environment Act*. The turbines were constructed in the summer of 2016 and were energized on November 22, 2016.

As a condition of the EA approval, a post-construction monitoring plan for birds and bats (the Plan) was developed and implemented following the commencement of operations in the fall of 2016. After the completion of each year of monitoring, a report must be provided to the Canadian Wildlife Services (CWS), the Nova Scotia Environment (NSE), and the 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 first year of the post-construction bird and bat monitoring program at the Project.

Site Description

The Project is located on privately owned land and much of it is mixed coniferous forest maintained for silviculture. Within the Project site, there are several recent clear-cuts in varying phases of re-growth, as well as numerous smaller wetlands distributed throughout.

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METHODOLOGY

Breeding Bird Monitoring Methodology

Pre- and post-construction bird and bat monitoring programs typically involve a suite of breeding bird surveys to assess changes (if any) in the breeding community at the Project site as a result of habitat changes that have occurred during the construction process and subsequent operation. The monitoring surveys were 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 same survey locations were used in the pre-construction and post-construction programs for continuity and to ensure comparability of the results between timeframes (*i.e.*, before/after construction). Surveys were conducted on days when weather conditions met or exceeded criteria outlined in the document “*Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds*” (CWS 2007).

Post-construction breeding surveys was completed by an expert birder on July 2 and 21, 2017. 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:

- The surveys were four hours in duration, conducted during the first four hours after sunrise to encompass peak singing times for breeding passerines.
- 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 following the commencement of turbine operation. 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 for carcass searches was as follows:

- Three times per week for 4 weeks, beginning mid-May 2017.
- Three times per week for 8 weeks, beginning in late August 2017.

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, extending out 50 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).

Carcasses were photographed, removed, and frozen to allow for future identification through consultation with an expert birder and to avoid replication. Carcass removal was completed in accordance with federal, provincial, and municipal laws and permits. Refer to the section on Permitting Requirements for additional information. 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 to be euthanized.

Scavenger Removal Trials

Scavenger removal (SR) trials were 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 corresponded to the time that elapsed 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 (SE) trials were necessary to assess the searcher's ability to find and recover carcasses. These trials involved placing carcasses at random, undisclosed, georeferenced locations 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.

Permitting Requirements

A salvage permit (No. SS2794) under the *Migratory Birds Convention Act* (1994) was acquired from CWS to salvage dead migratory birds found during the carcass searches. A Scientific Permit was obtained from NSDNR for the collection of bat and non-migratory bird carcasses including but not limited to game birds and raptors, pursuant to subsection 14(1) (a) of the *Endangered Species Act* (1998) and Section 62 (2) of the *Wildlife Act* (1989). As necessary, permit(s) required under the *Species at Risk Act* (SARA) for salvage of any species designated as at risk found during the carcass searches were also obtained.

RESULTS

Breeding Bird Surveys

Post-Construction Breeding Bird Surveys (2017)

Two breeding bird surveys were completed at the Project site on July 2, 2017 and July 21, 2017. A total of 391 individual birds comprised of 39 species were observed (Table A1, 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 behavioural details are included in Table A1 (attached):

- A total of 36 species were considered 'possible breeders' based on their presence in suitable breeding habitat or their singing behaviour during the breeding season.
- One species was considered a 'probable breeder' based on observations of mated pairs, or permanent territory.
- Two species are considered "confirmed breeders" based on the presence of a used nest or egg shell(s) found.

Three species of conservation interest (SOCl) were identified during the 2017 surveys (Table 1). SOCl are species that are legally protected under the federal *Species at Risk Act*, the provincial *Endangered Species Act*, by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and listed as 'Special Concern', 'Threatened' or 'Endangered', and/or by NSDNR and listed as 'Sensitive', 'May be at Risk' or 'At Risk' by the NSDNR.

Table 1: SOCI Observed during 2017 Post-Construction Breeding Surveys

Common Name	Scientific Name	SARA Status ¹	NSESA Status ²	COSWIC Status ³	NSDNR Status ⁴
Golden-crowned Kinglet	Regulus satrapa	Not Listed	Not Listed	Not Listed	Sensitive
Olive-sided Flycatcher	Contopus cooper	Threatened	Threatened	Threatened	At Risk
Ruby-crowned Kinglet	Regulus calendula	Not Listed	Not Listed	Not Listed	Sensitive

¹Government of Canada 2012; ²NS ESA 2013; ³COSEWIC 2012; ⁴NSDNR 2010

Bird and Bat Mortality Surveys

Mortality Monitoring

In 2017, one Red-eyed Vireo was recovered during the spring monitoring program, and two Red-eyed Vireos and three Hoary bats were recovered during the fall mortality monitoring program (Table 2).

Table 2: Carcasses Recovered from the Project Site in 2017

Date	Species		Bird or Bat	Notes
	Common Name	Scientific Name		
05-Jun-17	Red-eyed Vireo	<i>Vireo olivaceus</i>	Bird	Fresh carcass, blunt-force trauma
01-Sep-17	Hoary bat	<i>Lasiurus cinereus</i>	Bat	Blunt-force head trauma
01-Sep-17	Hoary bat	<i>Lasiurus cinereus</i>	Bat	Blunt-force trauma, fresh carcass
06-Sep-17	Hoary bat	<i>Lasiurus cinereus</i>	Bat	Blunt-force trauma, fresh carcass
18-Sep-17	Red-eyed Vireo	<i>Vireo olivaceus</i>	Bird	Blunt-force trauma, fresh carcass
18-Sep-17	Red-eyed Vireo	<i>Vireo olivaceus</i>	Bird	Blunt-force trauma, fresh carcass

Scavenger Removal Trials

SR trials were conducted during the spring and fall monitoring periods on June 7, 2017 and September 3, 2017. The detailed results of the SR trials are presented in Table A2 (attached). The results of these trials show that overall the SR rate was 0%, as no carcasses were removed by scavengers.

Searcher Efficiency Trials

SE trials were conducted in the spring and fall monitoring periods. The spring SE trial was conducted on June 22, 2017, and the fall SE trial was conducted on September 19, 2017. Detailed results of the SE trials are presented in Table A3 (attached). The results of these trials show that overall the

searcher was 69% effective at recovering carcasses (50% in spring, 88% in fall), and that the searcher was most efficient at recovering carcasses in gravel and dirt substrate.

DISCUSSION

Breeding Bird Surveys

The breeding bird community within the Project site was typical of a woodland area that has been heavily managed for silviculture activity. For example, the particularly high abundance of American Robins observed at the Project site is not surprising given the recent Project construction and forestry activities in the immediate area. The Project site hosts a fairly diverse avian community, including a variety of warblers and sparrows, as well as other small songbirds. Raptor species, including the Shape-shinned Hawk and the Red-tailed Hawk were also observed to frequent the area, likely because of the extent of open ground that is suitable for hunting small rodents.

Three SOCI were observed during the breeding bird surveys (Table 1). The presence of the two Kinglet species suggests the availability of mature forest interior habitats, but these areas are becoming highly fragmented in the area of the Project site, primarily due to on-going forestry activities. The presence of the Olive-sided Flycatcher is indicative of wetland habitat with a dense shrubby understory; habitat which has not been impacted by the Project.

Overall, the Project site hosts a fairly robust breeding bird community, but the composition of the community does indicate that the landscape has been stressed by recent anthropogenic activities, the most notable of which is heavy silviculture activity.

Scavenger Removal Trial

The 2017 SR trial results from the post-construction monitoring program indicate no scavenging occurred in the area of the turbines. This indicates that the carcass search results were not skewed by the activity of scavengers to any significant extent.

Searcher Efficiency Trial

The SE trials indicate that the searcher was effective at recovering carcasses in gravel and dirt substrate. The overall SE efficiency rate was 69%, with the SE rate in the spring (50%) being lower than the SE rate in the fall (88%). These SE rates were considered above average when compared to similar studies (Bernardino *et al.* 2012; Jacques Whitford 2009).

Bird Mortalities

Due to their proximity to the turbines, the three carcasses found during the carcass search program were likely mortalities caused by the operating wind turbines. Due to the low SR and high SE in 2017, it can be assumed with relative certainty that the bird mortality results presented provide an accurate assessment of the impact the Project has on the local bird population, and that the propensity for operating turbines to result in bird mortalities is low.

Bat Mortalities

Three Hoary bat carcasses were retrieved during the fall observation period. Due to the proximity of the carcasses to the turbines, the mortalities were most likely caused by the operating wind turbines. The three carcasses were retrieved during the earliest segment of the fall surveys, corresponding to the migratory period for most bat species. The migratory Hoary bat generally does not take up residence in Nova Scotia and is not currently recognized as a SOCI. Their preference to hibernate in small numbers, as opposed to large, communal, hibernacula, has contributed to their resistance to white-nose syndrome (Klug, Goldsmith, and Barclay, 2012) and to their persistence throughout North America. These bat mortalities suggest that the Amherst Community Wind Farm may be within a migratory corridor for this species.

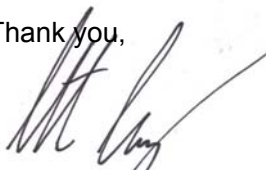
RECOMMENDATIONS AND FUTURE MONITORING REQUIREMENTS

The results of the 2017 post-construction bird and bat monitoring program at Amherst Community Wind Farm indicate that the Project has not resulted in any significant changes in habitat availability for breeding birds, nor are the operating turbines a substantial cause of bird or bat mortality. It is recommended that the post-construction bird and bat monitoring program be continued in 2018, and should consist of the following elements:


- Breeding bird surveys should be conducted by an expert birder in June / early July of 2018.
- Carcass searches should be carried out, along with searcher efficiency and scavenger removal trials, during the spring and fall migration. The schedule for carcass searches should be:
 - Three times per week for 4 weeks, beginning mid-May 2018.
 - Three times per week for 8 weeks, beginning in late August 2018
- Salvage and scientific permits should be obtained through CWS and NSDNR for 2018.

If you have any questions, please contact us.

Thank you,



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Table A1: Post-Construction Breeding Bird Survey Results Summary, Amherst Community Wind Farm

Project # 17-6017

Common Name	Scientific Name	Number of Observations	Breeding Evidence	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
Alder Flycatcher	<i>Empidonax alnorum</i>	10	H- Possible	Not Listed	Not Listed	Not Listed	Secure
American Crow	<i>Corvus brachyrhynchos</i>	9	H- Possible	Not Listed	Not Listed	Not Listed	Secure
American Goldfinch	<i>Spinus tristis</i>	6	H- Possible	Not Listed	Not Listed	Not Listed	Secure
American Robin	<i>Turdus migratorius</i>	69	T, NU, P- Confirmed	Not Listed	Not Listed	Not Listed	Secure
Black-and-white Warbler	<i>Mniotilta varia</i>	5	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Blackburnian Warbler	<i>Dendroica fusca</i>	2	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Black-capped Chickadee	<i>Poecile atricapillus</i>	11	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	2	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Black-throated Green Warbler	<i>Dendroica virens</i>	14	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Blue Jay	<i>Cyanocitta cristata</i>	7	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Blue-headed Vireo	<i>Vireo solitarius</i>	19	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	2	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Common Raven	<i>Corvus corax</i>	1	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Common Yellowthroat	<i>Geothlypis trichas</i>	16	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Dark-eyed Junco	<i>Junco hyemalis</i>	20	P, T- Probable	Not Listed	Not Listed	Not Listed	Secure
Golden-crowned Kinglet	<i>Regulus satrapa</i>	4	H- Possible	Not Listed	Not Listed	Not Listed	Sensitive
Hermit Thrush	<i>Catharus guttatus</i>	9	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Least Flycatcher	<i>Empidonax minimus</i>	1	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Magnolia Warbler	<i>Dendroica magnolia</i>	7	NU- Confirmed	Not Listed	Not Listed	Not Listed	Secure
Mallard	<i>Anas platyrhynchos</i>	5	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Mourning Dove	<i>Zenaidura macroura</i>	2	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Northern Flicker	<i>Colaptes auratus</i>	5	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Northern Parula	<i>Parula americana</i>	5	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Olive-sided Flycatcher	<i>Contopus cooperi</i>	2	H- Possible	Threatened	Threatened	Threatened	At Risk
Ovenbird	<i>Seiurus aurocapilla</i>	4	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Palm Warbler	<i>Dendroica palmarum</i>	16	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Purple Finch	<i>Carpodacus purpureus</i>	6	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Red-eyed Vireo	<i>Vireo olivaceus</i>	25	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Red-tailed Hawk	<i>Buteo jamaicensis</i>	1	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Ring-necked Pheasant	<i>Phasianus colchicus</i>	4	H- Possible	Not Listed	Not Listed	Not Listed	Exotic
Ruby-crowned Kinglet	<i>Regulus calendula</i>	1	H- Possible	Not Listed	Not Listed	Not Listed	Sensitive
Sharp-shinned Hawk	<i>Accipiter striatus</i>	1	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Song Sparrow	<i>Melospiza melodia</i>	16	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Swainson's Thrush	<i>Catharus ustulatus</i>	2	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Swamp Sparrow	<i>Melospiza georgiana</i>	1	H- Possible	Not Listed	Not Listed	Not Listed	Secure
White-throated Sparrow	<i>Zonotrichia albicollis</i>	63	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Winter Wren	<i>Troglodytes troglodytes</i>	4	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Yellow Warbler	<i>Dendroica petechia</i>	1	H- Possible	Not Listed	Not Listed	Not Listed	Secure
Yellow-rumped Warbler	<i>Dendroica coronata</i>	13	H- Possible	Not Listed	Not Listed	Not Listed	Secure

Table A2: 2017 Scavenger Removal Trial Results - Amherst Community Wind Farm Project # 17-6017

Spring (June 22, 2017)			
Turbine	Carcass #	Substrate	Removed by Scavenger?
1	1	Gravel	N
1	2	Dirt	N
1	3	Gravel	N
1	4	Dirt	N
2	5	Gravel	N
2	6	Dirt	N
2	7	Grubbings	N
Spring Scavenger Removal Rate			0%
Fall (September 13, 2015)			
Turbine	Carcass #	Substrate	Removed by Scavenger?
1	1	Gravel	N
1	2	Dirt	N
1	3	Gravel	N
2	4	Gravel	N
2	5	Dirt	N
2	6	Grubbings	N
Fall Scavenger Removal Rate			0%
Overall Scavenger Removal Rate			0%

Table A3: 2017 Searcher Efficiency Trial Results - Amherst Community Wind Farm Project # 17-6017

Spring (June 22, 2017)			
Turbine	Carcass #	Substrate	Recovered by Searcher?
1	1	Gravel	N
1	2	Dirt	Y
1	3	Dirt	Y
1	4	Gravel	Y
2	5	Gravel	N
2	6	Dirt	N
2	7	Grubbings	Y
2	8	Grubbings	N
Spring Searcher Efficiency Rate			50%
Fall (September 19 , 2017)			
Turbine	Carcass #	Substrate	Recovered by Searcher?
1	1	Gravel	Y
1	2	Dirt	Y
1	3	Grass	N
1	4	Gravel	Y
2	5	Dirt	Y
2	6	Gravel	Y
2	7	Grubbings	Y
2	8	Woods	Y
Fall Searcher Efficiency Rate			88%
Overall Searcher Efficiency Rate			69%