# Baron Winds Project Bird and Bat Survey Report, 2013–2015

Steuben County, New York

Prepared for:

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October 2015 REV June 2016

# Executive Summary

EverPower Wind Holdings, Inc. (EverPower) is considering the construction of the Baron Winds Project (Project) located in Steuben County, New York. The proposed Project would include wind turbines located west of Interstate 390 and north of Route 86 in the towns of Cohocton, Howard, and Fremont. The Project is in the early phase of development and the approximate size of the area of interest is 38,000 acres. The locations of turbines, access roads, and electrical corridors are preliminary, but the Project will consist of up to 120 turbines. The Project lies between 2 operational wind projects, the Cohocton and Dutch Hill Wind Project and the Howard Wind Project.

As part of the planning phases of this Project, EverPower contracted Stantec Consulting Services Inc. (Stantec) to conduct a habitat assessment, September migratory bird surveys, breeding bird surveys, meteorological (met) tower acoustic bat surveys, and eagle use surveys. Stantec detailed the methods for the eagle surveys in the Project's Work Plan for Pre-Construction Avian and Bat Surveys (Work Plan; June 2013 REV September 2013) which was presented to biologists at the New York Regional Field Office of the U.S. Fish and Wildlife Service (USFWS) in Cortland, New York on 18 June 2013 and to the New York State Department of Environmental Conservation (NYSDEC) via conference call on 27 June 2013. EverPower and Stantec met with USFWS a second time on 3 September 2013 via conference call to discuss the proposed eagle point count locations. The Work Plan was subsequently revised based on agency feedback and a preliminary Project layout[1]. Since conducting field surveys, the Project area has been substantially reduced in size. This report presents results of surveys conducted in the revised Project area as depicted in Figure 1.

Surveys conducted constitute EverPower's good faith efforts to follow USFWS's voluntary Land-based Wind Energy Guidelines (2012) and NYSDEC's Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects (2009).

Results of the habitat assessment are included in a separate memo report (*Baron Winds Project – Habitat Assessment*; 11 February 2014).

### Fall Migration Surveys

Stantec conducted migratory point count surveys at 18 survey locations once each week in September 2013 to assess species composition of songbird or waterfowl stopping over during

[1] During the meeting with USFWS on 3 September, EverPower and Stantec recommended moving 2 points from the northern portion of the Project area just outside the Project area to attempt to obtain movement data (i.e., seasonal and direction) for the nearby nesting eagle pair. USFWS said they agreed with this approach; data would not be used in a risk assessment, but USFWS would look closely at this qualitative data when assessing risk level at the Project. USFWS noted that they agreed with this approach so long as surveys adequately cover the Project footprint. Sarah Nystrom recommended moving a point between proposed points 3 and 6 as there appeared to be a gap in coverage. Stantec revised the point count locations accordingly.

migration. The 18 survey locations were the same points sampled during eagle point count surveys in the Project area. Survey points were grouped into 5 habitat categories based on dominant vegetation cover and general habitat characteristics: crop field, fallow field, forest edge, hardwood forest, and mixed forest. A Stantec biologist conducted a 5-minute survey at each point count location from sunrise until 11:30 a.m. The biologist detected 41 species (excluding unidentified birds that could only be identified to genus) and 1,198 individual birds.

Mixed forest habitat had the most individuals observed (n = 453). Mixed forest, forest edge, and crop field (for points visited 4 times) had the greatest species richness (SR = 23). Crop field habitat (for points visited 3 times) had the greatest relative abundance (RA = 48.33), and crop field habitat (for points visited 4 times) had the highest diversity index (SDI = 2.50).

In crop field habitat, Canada goose (*Branta canadensis*) had the greatest relative abundance among points surveyed 3 times (RA = 37.33), and American crow (*Corvus brachyrhynchos*) had the greatest relative abundance among points surveyed 4 times (RA = 2.00). In forest edge habitat, black-capped chickadee (*Poecile atricapillus*) had the greatest relative abundance among points surveyed 3 times (RA = 2.33), and European starling (*Sturnus vulgaris*) had the greatest relative abundance among points among points surveyed 4 times (RA = 2.63). American goldfinch (*Spinus tristis*) had the greatest relative abundance among points in fallow field habitat (RA = 6.63), European starling had the greatest relative abundance among points in mixed forest habitat, (RA = 20.83), and American goldfinch and blue jay (*Cyanocitta cristata*) had the greatest relative abundance among points in hardwood forest habitat (RA = 1.75). Diversity indexes among all 3 5 habitat types were similar, and ranged from 0.96–2.50.

Stantec did not observe any state- or federally listed endangered or threatened species. Stantec observed 2 species of special concern (NYSDEC 2015b): sharp-shinned hawk (*Accipiter striatus*) (n = 1), and yellow-breasted chat (*Icteria virens*) (n = 1).

**Spring Breeding Bird Surveys**

Stantec conducted breeding bird surveys along 18 transects in the Project area in May and June 2015. Each transect had 5 to 6 points spaced approximately 125 meters (m) apart. Of the 18 transects, 12 were centered on proposed turbine locations and extended outward linearly, and 6 linear transects were in control areas outside turbine areas where no impact is expected to occur. Survey points included 92 total points, 61 survey points proximal to proposed turbine locations and 31 control points. Three additional points, identified during the habitat assessment conducted in fall 2013 (*Baron Winds Project – Habitat Assessment*; 11 February 2014), were surveyed in suitable habitat for Henslow's sparrows (*Ammodramus henslowii*). Survey points were grouped into 5 habitat categories based on dominant vegetation cover and general habitat characteristics: agricultural, forest edge, hardwood forest, mixed (hardwood and conifer) forest, and over-grown field. A Stantec biologist conducted a 5-minute survey at each point count location from sunrise until 10:00 a.m.

Stantec detected 2,170 individual birds at all survey points combined, including flyovers and individuals greater than 100 m from the observer. Seventy-six species were detected, excluding unidentified birds that could be identified to genus only. Excluding flyovers and individuals

greater than 100 m from the observer, the biologist recorded 70 species and 1,542 individuals at all survey points, 57 species and 879 individuals within 100 m of the turbine points, and 52 species and 663 individuals within 100 m of the control points.

Turbine points and control points had similar relative abundances (RA = 7.20 and 10.69) and diversity indexes (SDI = 2.73 and 3.14). Agricultural habitat had the most individuals observed and the highest species richness for both the turbine points (n = 507, SR = 43) and control points (n = 353, SR = 39). Over-grown field habitat had the highest relative abundance among turbine points (RA = 13.25), and mixed forest habitat had the highest relative abundance among control points (RA = 15.50). Hardwood forest habitat had the highest diversity index among turbine points (SDI = 2.85), and forest edge habitat had the highest diversity index among control points (SDI = 3.11)

Among turbine points in agricultural habitat, American crow (*Corvus brachyrhynchos*) had the greatest relative abundance (RA = 1.19). Ovenbird had the greatest relative abundance in turbine points in forest-edge (RA = 1.69), hardwood (RA = 0.64), and mixed forest (RA = 1.33). Red-winged blackbird (*Agelaius phoeniceus*) had the greatest relative abundance in turbine points in over-grown field (RA = 4.08). Among control points, European starling had the greatest relative abundance (RA = 3.42) in agricultural habitat, American robin (*Turdus migratorius*) had the greatest relative abundance (RA = 1.29) in forest edge, and red-winged blackbird had the greatest relative abundance (RA = 5.50) in mixed forest.

No Henslow's sparrows were detected, therefore direct impacts to breeding Henslow's sparrow during site construction are not anticipated. Stantec did not detect any federally listed endangered or threatened species, or state-listed endangered species. Stantec detected 2 state-threatened species, bald eagle and northern harrier (*Circus cyaneus*), and 1 state species of special concern, sharp-shinned hawk (*Accipiter striatus*).

**Acoustic Bat Surveys**

Stantec conducted acoustic bat surveys to characterize activity, timing of activity, and when possible, species composition of bats in the Project area. As stated in the Work Plan, because bat activity levels during spring and fall migration periods already have been studied at the proximal Cohocton and Dutch Hill Wind Project and the Howard Wind Project, surveys were not repeated for the full period when bats are known to be active (spring, summer, and fall). Bat fatalities have peaked at other operational wind projects in the East during the summer residency and fall swarming periods. Consequently, Stantec conducted passive acoustic echolocation monitoring surveys at the Project from 1 June to 30 September 2015 to obtain site-specific data on species composition and activity levels of bats during these periods.

Stantec deployed 2 Anabat model SDI detectors (Titley Electronics Pty Ltd.) in the single on-site met tower at approximately 45 m above ground level (agl) (Tower High) and 3 m agl (Tower Low). Combined, detectors recorded 835 call sequences and had an overall detection rate of 3.4 bat call sequences per detector-night (calls/detector-night). Monthly activity was greatest at Tower High during August (n = 115 call sequences, 3.7 calls/detector-night), and at Tower Low during July (n = 236 call sequences, 7.6 calls/detector-night).

Species composition was similar between Tower High and Tower Low. The greatest percentage of call sequences recorded by both detectors combined was from the 'big brown bat (*Eptesicus fuscus*) silver-haired bat (*Lasionycteris noctivagans*) guild' (BBSH) (n = 383, 46%), followed by unknown (UNKN) call sequences that could not be identified to genus or species[2] (n = 333, 40%). Within the BBSH guild, 14% of calls sequences were identified as big brown bats (n = 55), and 13% of call sequences were identified as silver-haired bats (n = 49); the remaining call sequences within the BBSH guild (n = 279, 73%) lacked sufficient detail to be identified to species level. The majority of calls at Tower High belonged to the UNKN guild (n = 185, 55%), and the majority of calls at Tower Low belonged to the BBSH guild (n = 298, 59%). Detectors recorded only 3 *Myotis* calls sequences (< 1% of total call sequences recorded); all 3 call sequences were recorded by Tower Low.

For both detectors combined, 90% of call sequences (n = 751) were recorded when mean nightly wind speeds were 6 meters per second (m/s) or less, and 60% of call sequences (n = 498) were recorded when mean nightly temperatures were 18 degrees Celsius (°C; 64 degrees Fahrenheit [°F]) or higher.

**Eagle Use Point Count Surveys**

As part of assessing potential risk to eagles, Stantec requested from NYSDEC information regarding the nearest known bald eagle nests to the Project. NYSDEC provided known bald eagle nest locations on 9 August 2013 and 5 May 2016. There are no nests known to be present in the Project area.

Based on nest location data from 2013, the ½ mean inter-nest distance at the Project was 3.8 miles. Exercising avoidance and minimization measures during the Stage 1 assessment of risk and reducing the potential for disturbance and take of eagles from Nest NY132, the nearest nest, EverPower revised the Project layout by removing turbines within the ½ mean inter-nest distance of 3.8 miles. Therefore, turbines are outside the nest buffer within which adult and juvenile bald eagles are potentially susceptible to disturbance and collision during nesting and fledging periods, and are well outside the recommended buffers for activities including building construction and blasting. Currently, 1 active bald eagle nest is within 10 miles of the Project: Nest NY132 at approximately 4 miles from the nearest turbine location. The next closest nest is 11 miles from the nearest proposed turbine location.

Stantec conducted point count surveys for eagles for one full year (September 2013 to September 2014) consistent with the USFWS Eagle Conservation Plan Guidance (ECP Guidance). Point count surveys consisted of 1-hour visual surveys at 18 locations within the Project area and

[2] These call sequences could not be identified to genus or species because either 1) they contained fewer than 5 pulses or 2) were of poor quality.

2 points outside the Project area, each with an 800-meter radius and covering an area of 2 $km^2$. Stantec surveyed 20 points[3] each cycle (18 cycles, once approximately every 3 weeks).

Stantec documented 13 bald eagle observations during surveys. Eagles were observed inside the point count boundaries and inside the rotor-swept area (estimated as 50–150 m above ground level) for a total of 15 minutes. Stantec observed eagles in 2 seasons: fall, and spring. No courtship displays or territorial displays were observed. A single foraging behavior was observed on 19 May 2014.

The fact that there are no eagle nests within 4 miles of the nearest turbine location, use of the Project as assessed during a full year of point count surveys was relatively low, and the majority of behaviors observed were not behaviors that are thought to be associated with greater collision risk at wind projects (courtship, territorial displays, or foraging), risk to eagles at the Project is expected to be low.

[3] Per the ECP Guidance, the number of proposed point count locations was determined by calculating the entire turbine area including a 1-km buffer around turbines, calculating 30% of the area, and dividing by 2 (to account for the 2 $km^2$ plots).

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Appendix C Acoustic Bat Survey Results Tables

# 1.0 Introduction

## 1.1 PROJECT BACKGROUND

EverPower Wind Holdings, Inc. (EverPower) is considering the construction of the Baron Winds Project (Project) located in Steuben County, New York. The proposed Project would include up to 120 wind turbines located west of Interstate 390 and north of Route 86 in the towns of Cohocton Howard, and Fremont (Figure 1). The Project is in the early phase of development and the approximate size of the area of interest is 38,000 acres. The locations of turbines, access roads, and electrical corridors are preliminary. The Project lies between 2 operational wind projects, the Cohocton and Dutch Hill Wind Project and the Howard Wind Project.

As part of the planning phases of this Project, EverPower contracted Stantec Consulting Services Inc. (Stantec) to conduct September migratory bird surveys, breeding bird surveys, meteorological (met) tower acoustic bat surveys, and eagle use surveys at the Project. Stantec detailed the methods for the eagle surveys in the Project's Work Plan for Pre-Construction Avian and Bat Surveys (Work Plan; June 2013 REV September 2013) which was presented to biologists at the New York Regional Field Office of the U.S. Fish and Wildlife Service (USFWS) in Cortland, New York on 18 June 2013 and to the New York State Department of Environmental Conservation (NYSDEC) via conference call on 27 June 2013.

The planning and survey coordination history for this Project is as follows:

- In 2013, EverPower contracted Stantec Consulting Services Inc. (Stantec) to prepare the Work Plan.

- In 2013, 2014, and 2015, EverPower contracted Stantec to conduct pre-construction bird and bat studies including surveys detailed in the NYSDEC's Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects (NYSDEC Guidelines; 2009) and eagle point count surveys consistent with the USFWS's Land-based Wind Energy Guidelines (2012a) and Eagle Conservation Plan Guidance (ECP Guidance; 2013). The Work Plan was revised after the 27 June 2013 meeting based on agency feedback to indicate that eagle surveys at the Project would occur once approximately every 3 weeks. EverPower and Stantec met with USFWS a second time on 3 September 2013 via conference call to discuss the proposed eagle point count locations. The Work Plan was subsequently revised based on agency feedback and a preliminary Project layout[4].

[4] During the meeting with USFWS on 3 September, EverPower and Stantec recommended moving 2 points from the northern portion of the project area just outside the project area to attempt to obtain movement data (i.e., seasonal and direction) for the nearby nesting eagle pair. USFWS said they agreed with this approach; data would not be used in a risk assessment, but USFWS would look closely at this qualitative data when assessing risk level at the Project. USFWS noted that they agreed with this approach so long as surveys adequately cover the Project footprint. Sarah Nystrom recommended moving a point between proposed points 3 and 6 as there appeared to be a gap in coverage. Stantec revised the point count locations accordingly.

- The New York Natural Heritage Program (NYNHP) provided a list of rare birds documented within 10 miles of the Project[5] on 29 May 2013. State-listed threatened bird species identified by NYNHP included Henslow's sparrow (*Ammodramus henslowii*), bald eagle (*Haliaeetus leucocephalus*), northern harrier (*Circus cyaneus*), and pied-billed grebe (*Podilymbus podiceps*). In addition, NYNHP included 1 protected bird, great blue heron (*Ardea herodias*).

- NYSDEC provided known bald eagle nest locations on 9 August 2013. There was 1 active bald eagle nest within 10 miles of the nearest turbine location: the Wayland Nest NY132. The next closest nest was 11 miles from the nearest turbine location.

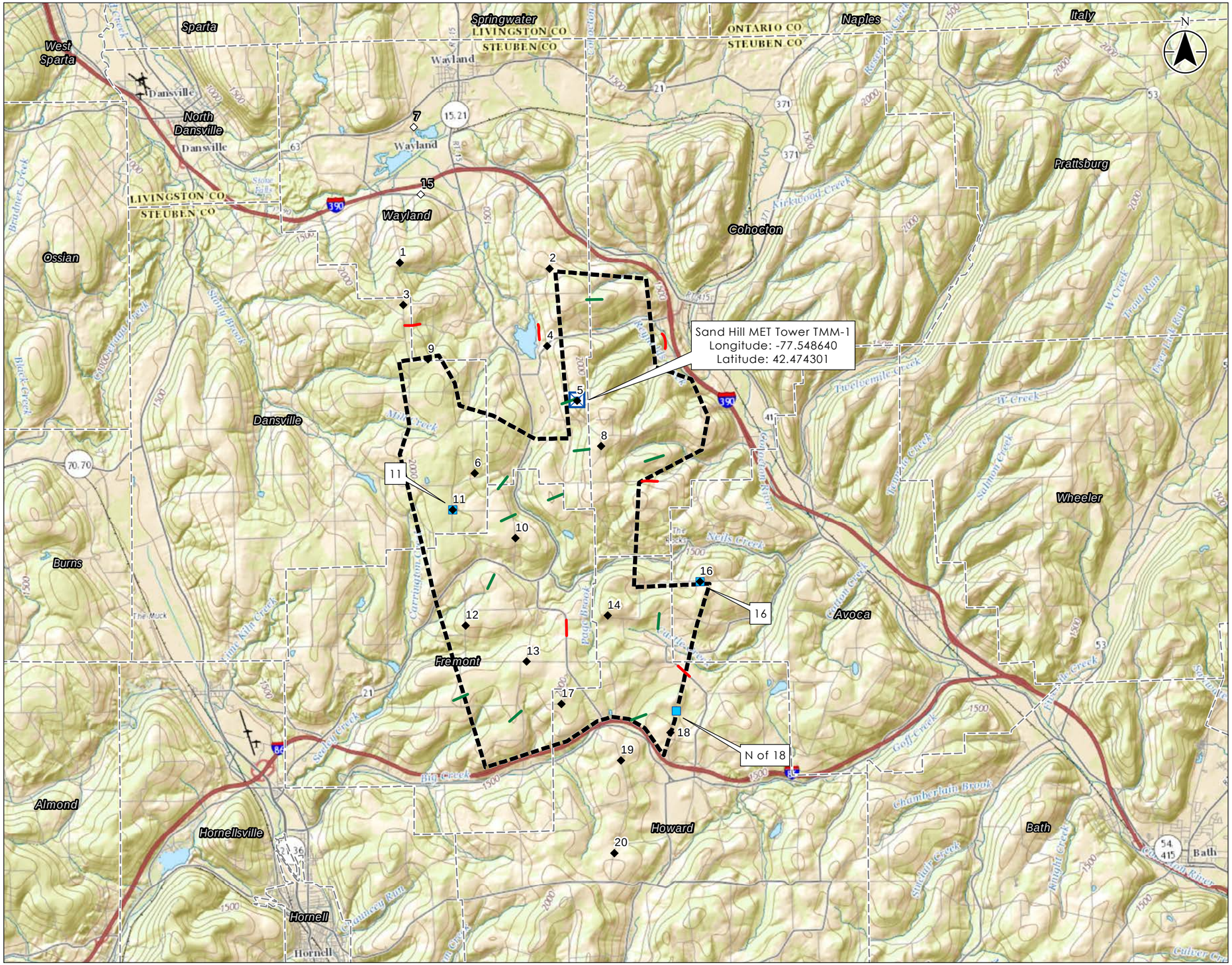
- The Project area was substantially reduced in size in 2016 (Figure 1). The NYNHP revised the new Project area on 31 May 2016 and stated that they have no records of rare state-listed animals or plants at the site or in its immediate vicinity. The NYSDEC reviewed the new Project area on 5 May 2016 and indicated that 1 bald eagle nest is within 10 miles of the Project (Wayland Nest NY 132).

- Surveys conducted constitute EverPower's good faith efforts to follow USFWS's voluntary Land-based Wind Energy Guidelines (2012) and the NYSDEC Guidelines and include:

    - bird migration surveys (fall 2013)
    - habitat assessment (fall 2013)
    - breeding bird surveys (spring 2015)
    - acoustic bat surveys (summer/fall 2015)
    - eagle use point count surveys (2013–2014)

This report presents results of surveys conducted in the Project area as depicted in Figure 1: the fall 2013 bird migration surveys, spring 2015 breeding bird surveys, 2015 acoustic bat surveys, and 2013–2014 eagle use surveys. Results of the habitat assessment are included in a separate memo report (*Baron Winds Project – Habitat Assessment*; 11 February 2014).

[5] Previously known as Baron Winds 1 and 2.




Stantec

Legend

- Eagle Point Count and September Stopover Survey Location
- Eagle Point Count Location Outside Project Area
- Breeding Bird Survey at Henslow's Sparrow Potential Habitat
- Met Tower and Acoustic Survey Location
- Breeding Bird Survey Control Transect
- Breeding Bird Survey Transect
- Project Boundary
- Town Boundary

0 2 Miles
1" = 2 miles (At original document size of 11x17)

Notes
1. Eagle point count locations excluding #7 and #15 are also September stopover survey locations.
2. Two bat detectors were placed by Stantec at the Sand Hill MET Tower (TMM-1).
3. Coordinate System: NAD 1983 UTM Zone 17N
4. Base map: The National Map USGS Topo base map.

Project Location
Steuben County, New York

195600885
Prepared by DLJ on 2015-10-21
Quality Review by KWH on 2015-10-23
Independent Review by SB on 2015-10-22

Client/Project
EverPower Wind Holdings, Inc.
Baron Winds Project

Figure No.
1

REV 1

Title
Bird and Bat Survey Locations

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## 1.2 PROJECT DESCRIPTION

The Project area is within the High Allegheny Plateau Ecoregion (Edinger et al. (eds.) 2014). The High Allegheny Plateau Ecoregion is characterized by a broad series of high elevation hills that form a plateau rising to approximately 518 meters (m) (1,700 ft) to 640 m (2,100 ft). The plateau extends from the Great Lakes Plains of Lake Ontario southward to the ridge and valley region of the Central Appalachians, and from the Lake Erie Plain eastward to the Hudson River Valley (NYSDEC 2015a).

The Project area is located in the northwestern corner of Steuben County. Typical of western New York State, this area of Steuben County is dominated by agriculture but also contains mixed hardwood and softwood forest, pine plantations, wetlands, ponds, lakes, rural residential areas, and low intensity development.

Stantec conducted the habitat assessment on 9–14 September 2013 at the 20 eagle point count locations (Stantec 2014). The Project area contains a mixture of agricultural land and mixed (hardwood and softwood) forest. Agricultural land is a mixture of active, empty, and fallow fields with forbs and grasses. Cover types present include agricultural, fallow field, maintained field, mixed forest, hardwood forest, softwood forest, and urban development. Wetlands and waterbodies in or adjacent to the Project area include wetland, pond, and lake. Stantec did not identify habitat within the Project area with potential to support federally listed avian species, state-listed species bald eagle, or protected bird great blue heron.

# 2.0 Fall Bird Migration Surveys

## 2.1 METHODS

### 2.1.1 Field Surveys

Stantec conducted migratory point count surveys at 18 survey locations once each week in September 2013 (Figure 1). The 18 survey locations were the same points sampled during eagle point count surveys. They were chosen initially via desktop analysis and were finalized in the field based on ground conditions. Survey locations took into consideration proposed wind turbine locations and landowner participation. Survey points were finalized after the first site visit on 4–5 September. Two of the mapped 18 points were deemed unsuitable for surveys due to safety, access permissions, or limited viewshed, and were moved to more suitable locations prior to the second round of surveys on 13–15 September. Consequently, 2 of 18 survey points were visited 3 times instead of 4 times. This varying survey frequency was considered in data calculations (see Section 2.2).

A Stantec biologist conducted surveys from sunrise until no later than approximately 11:30 a.m., in weather conditions conducive to hearing birdsong and seeing birds move about in vegetation and in flight. All birds identified by sight or sound, including soaring raptors, waterfowl, large flocks, and fly-overs, were recorded during a 5-minute session at each survey

point. The biologist also recorded weather information and general habitat conditions at each survey point.

### 2.1.2 Data Summary and Analysis

Survey points were grouped into 5 habitat categories based on dominant vegetation cover and general habitat characteristics: crop field, fallow field, forest edge, hardwood forest, and mixed forest.

The species and number of individuals documented during surveys were used to calculate species richness, relative abundance, frequency of occurrence, and community diversity, for all species for all habitats combined, and for each habitat classification. These indexes are described in more detail below.

- Species richness (SR) is the total number of species detected.
- Relative abundance (RA) is a way to quantify the number of individuals of a species in relation to other species observed. RA takes into account the total number of individuals detected, the number of times each point count location was surveyed, and the number of survey points.
- Frequency (Fr) of occurrence, expressed as a percentage, measures the percentage of points where a particular species is detected.
- Shannon Diversity Index (SDI) is a measure of species diversity in a community or habitat. SDI can provide more information about community composition than species richness alone because it takes into account relative abundance and the evenness of the distribution of species. It indicates not only the number of species, but also how abundance is distributed among all the species in the community or habitat.

## 2.2 RESULTS

### 2.2.1 Survey Effort and Weather Summary

Surveys were conducted on 5, 13, 15, 19, and 27 September 2013. Surveys were not conducted when wind or rain adversely affected the auditory detection of birds. Wind speeds ranged from 0–18 miles per hour (mph; 0–8.05 m/s), average daily temperatures ranged from 10.7–21.2 degrees Celsius (°C), and sky conditions were typically clear to partly cloudy with early morning fog on 5 September, and short periods of drizzle on 13 September (Table 2-1).

**Table 2-1. Summary of weather parameters during September migration surveys, Baron Winds Project, Fall, 2013.**

| Date | Wind Speed Code(s) | Average Temp (°C) | Sky Conditions |
|---|---|---|---|
| 9/5/2013 | 0,1 | 21.2 | clear to partly cloudy, early fog |
| 9/13/2013 | 2,3,4 | 12.1 | cloudy, periods of drizzle |
| 9/15/2013 | 1 | 10.7 | partly cloudy |
| 9/19/2013 | 1 | 15.3 | partly cloudy |
| 9/27/2013 | 1,2 | 13.6 | partly cloudy |
| **wind speed codes 1** = 0-3 mph; **2** = 4-8 mph; **3** = 9-12 mph; **4** = 13-18 mph; **5** = 19-24 mph | | | |

### 2.2.2 Species and Habitat Results

Biologists detected 41 species (excluding unidentified birds that could only be identified to genus) and 1,198 individual birds (Table 2-2, Appendix A Table 1). One additional species, merlin (*Falco columbarius*), was observed incidental to surveys. At survey points, Stantec documented 3 flocks of Canada geese ranging from 10–100 individuals per flock.

Mixed forest habitat had the most individuals observed (n = 453). For points visited 4 times, mixed forest, forest edge, and crop field all had the greatest species richness (SR = 23). Crop field habitat (for points visited 3 times) had the greatest relative abundance (RA = 48.33), and crop field habitat (for points visited 4 times) had the highest diversity index (SDI = 2.50). Table 2-2 summarizes the results of the surveys and analysis by habitat type classification.

**Table 2-2. Summary of migration point count results by habitat type, Baron Winds Project, Fall, 2013.**

| Habitat Type | # Survey Points | Total Birds Observed | Relative Abundance | Species Richness* | Shannon Diversity Index |
|---|---|---|---|---|---|
| crop field | 7 | 392 | 10.29 [1], 48.33 [2] | 23 [1], 8 [2] | 2.50 [1], 0.96 [2] |
| fallow field | 2 | 119 | 14.88 [1] | 11 [1] | 1.52 [1] |
| forest edge | 5 | 198 | 11.00 [1], 7.33 [2] | 23 [1], 8 [2] | 2.38 [1], 1.90 [2] |
| hardwood forest | 1 | 36 | 9.00 [1] | 13 [1] | 2.40 [1] |
| mixed forest | 3 | 453 | 37.75 [1] | 23 [1] | 1.64 [1] |
| **Totals** | **18** | **1,198** | | **41** | |
| * Not including unidentified genera of birds (e.g., unidentified warbler, *Parulidae*) | | | | | |
| [1] for sites visited 4 times | | | | | |
| [2] for sites visited 3 times | | | | | |

Appendix A Table 2 shows the relative abundance and frequency of each species observed by habitat type. In crop field habitat, Canada goose (*Branta canadensis*) had the greatest relative abundance among points surveyed 3 times (RA = 37.33), and American crow (*Corvus brachyrhynchos*) had the greatest relative abundance among points surveyed 4 times (RA =

2.00). In forest edge habitat, black-capped chickadee (*Poecile atricapillus*) had the greatest relative abundance among points surveyed 3 times (RA = 2.33), and European starling (*Sturnus vulgaris*) had the greatest relative abundance among points surveyed 4 times (RA = 2.63). American goldfinch (*Spinus tristis*) had the greatest relative abundance among points in fallow field habitat (RA = 6.63), European starling had the greatest relative abundance among points in mixed forest habitat, (RA = 20.83), and American goldfinch and blue jay (*Cyanocitta cristata*) had the greatest relative abundance among points in hardwood forest habitat (RA = 1.75). Diversity indexes among all 5 habitat types were similar, and ranged from 0.96–2.50.

### 2.2.3 Rare, Threatened and Endangered Species

Stantec did not observe any state- or federally listed endangered or threatened species. Stantec observed 2 species of special concern (NYSDEC 2015b): sharp-shinned hawk (*Accipiter striatus*) (n = 1), and yellow-breasted chat (*Icteria virens*) (n = 1) (Appendix A Table 1).

## 2.3 DISCUSSION

Objectives of the September migration point count surveys were to provide baseline data of songbird species occurring in the Project area during fall migration, to assess the likelihood that rare bird species occur in the Project area during fall migration, and to evaluate the degree to which the migratory bird community in the Project area is typical of the region.

There are several factors that can influence the detection probability of migratory song birds, including time of day, weather, bird behaviors, distance to the observer, and season. Drab plumage of songbirds in the fall may inhibit an observer's ability to differentiate among similar species, and lack of birdsong in the fall may inhibit auditory detection of songbirds. These factors may affect species composition and species richness estimates.

There were no state- or federally listed endangered or threatened species observed. No flocks of protected migratory waterbirds or waterfowl were observed (Canada goose is not a protected species). The species detected are generally common, regionally abundant and typical of the habitats in which they were observed.

The selected points sampled the various available habitats within the Project area, and have primary habitat characteristics representative of the Project and surrounding areas. The surveys were timed to coincide with the peak migration in September, targeted optimal weather conditions to facilitate the maximum detection of birds, and used standard point count survey methods. Therefore, the results of the surveys provide a suitable reflection of the fall bird community within the Project and surrounding areas.

# 3.0 Spring Breeding Bird Surveys

## 3.1 METHODS

### 3.1.1 Field Surveys

Stantec conducted breeding bird surveys along 18 transects in the Project area. Each transect had 5 to 6 points spaced approximately 125 m apart. Of the 18 transects, 12 were centered on proposed turbine locations and extended outward linearly, and 6 linear transects were in control areas outside turbine areas where no impact is expected to occur. Survey points included 92 total points, 61 survey points proximal to proposed turbine locations and 31 control points. Three additional points, identified during the habitat assessment conducted in fall 2013 (*Baron Winds Project – Habitat Assessment*; 11 February 2014), were surveyed in suitable habitat for Henslow's sparrow (*Ammodramus henslowii*). Points were chosen using aerial Project photos and adjusted in the field based on the following criteria:

1) to sample the various available habitats
2) available site access via roads and trails
3) proposed wind turbine locations
4) available site access via participating landowner parcels

A Stantec biologist conducted surveys from sunrise until 10:00 a.m. in weather conditions conducive to hearing birdsong and seeing birds move about in vegetation and in flight. All birds identified by sight or sound, including soaring raptors, waterfowl, and other fly-overs, were recorded during a 5-minute session at each survey point. The biologist also recorded weather information and general habitat conditions at each survey point.

### 3.1.2 Data Summary and Analysis

Survey points were grouped into 5 habitat categories based on dominant vegetation cover and general habitat characteristics for both turbine and control points: agricultural, forest edge, hardwood forest, mixed (hardwood and conifer) forest, and over-grown field.

The species and number of individuals for all birds observed during surveys were summarized. Excluding flyovers and those birds observed beyond 100 m of the observer, the species and number of individuals documented were used to calculate species richness, relative abundance, frequency, and Shannon Diversity Index. All indexes were calculated for each habitat classification, for all habitats combined, and separately for turbine points and control points.

The three additional points identified as potential habitat for Henslow's sparrow were not included in the analysis, and results of these surveys are included in a separate species list.

## 3.2 RESULTS

### 3.2.1 Survey Effort and Weather Summary

A Stantec biologist conducted surveys at 92 points and 3 additional points in Henslow's sparrow habitat once in May and once in June 2015, totaling 190 point counts (Table 3-1). Wind speeds ranged from 0–24 miles per hour (mph; 0 to 10.7 m/s), and average daily temperatures ranged from 4.4–19.3 °C. Sky conditions were typically clear to mostly cloudy, and periods of fog occurred on 7 May and 2 June (Table 3-1).

**Table 3-1. Summary of weather parameters during breeding bird point count surveys, Baron Winds Project, Spring, 2015.**

| Date | Wind Speed Code(s) | Average Temp (°C) | Sky Conditions |
|---|---|---|---|
| 5/6/2015 | 0,1,2 | 10.3 | cloudy |
| 5/7/2015 | 0,1,2 | no data | cloudy, fog |
| 5/12/2015 | 0,2,3,4 | 17.9 | partly to mostly cloudy |
| 5/13/2015 | 3,4,5 | 6.9 | mostly cloudy to overcast |
| 5/19/2015 | 0,1 | 17.3 | partly to mostly cloudy |
| 5/20/2015 | 2,3,4 | 4.4 | cloudy |
| 5/27/2015 | 2,3,4 | 17.6 | partly to mostly cloudy |
| 5/28/2015 | 2,3,4 | 16.2 | cloudy |
| 6/2/2015 | 1,2,3 | 8.6 | fog |
| 6/3/2015 | 0,1 | 4.8 | clear or few clouds |
| 6/9/2015 | 0,1 | 14.7 | clear to mostly cloudy |
| 6/10/2015 | 0,1 | 10 | clear or few clouds |
| 6/16/2015 | 0,1 | 19.3 | cloudy |
| 6/17/2015 | 0,1 | 14 | clear to partly cloudy |
| 6/24/2015 | 0,1 | 11.7 | clear or few clouds |
| 6/25/2015 | 0,1 | 11.7 | clear to partly cloudy |
| **wind speed codes 1** = 0-3 mph; **2** = 4-8 mph; **3** = 9-12 mph; **4** = 13-18 mph; **5** = 19-24 mph | | | |

### 3.2.2 Individuals and Species Observed

Stantec detected 2,170 individual birds at all survey points combined, including flyovers and individuals greater than 100 m from the observer. Seventy-six species were detected, excluding unidentified birds that could only be identified to genus. Appendix B Table 1 lists all species observed during surveys.

Excluding flyovers and individuals greater than 100 m from the observer, the biologist recorded 70 species and 1,542 individuals at all survey points combined (Appendix B Table 2).

Excluding flyovers and birds greater than 100 m from the observer, the biologist recorded 57 species and 879 individuals within 100 m of the turbine points, and 52 species and 663 individuals within 100 m of the control points.

### 3.2.3 Habitat Results

Survey points and control points had similar relative abundances (RA = 7.20 and 10.69) and Shannon Diversity Indices (SDI = 2.73 and 3.14) (Table 3-2).

#### *3.2.3.1 Turbine Points*

Agricultural habitat had the most individuals observed and the highest species richness (n = 507, SR = 43). Over-grown field habitat had the highest relative abundance (RA = 13.25). Hardwood forest habitat had the highest Shannon Diversity Index (SDI = 2.85) (Table 3-2).

In agricultural habitat, American crow had the greatest relative abundance (RA = 1.19). Red-winged blackbird (*Agelaius phoeniceus*) had the greatest relative abundance in over-grown field habitat (RA = 4.08). Ovenbird (*Seiurus aurocapillus*) had the greatest relative abundance in forest edge habitat (RA = 1.69), mixed forest habitat (RA = 1.33), and hardwood forest habitat (RA = 0.64) (Appendix B Table 2).

#### *3.2.3.2 Control Points*

Agricultural habitat had the most individuals observed and the highest species richness (n = 353, SR = 39). Mixed forest habitat had the highest relative abundance (RA = 15.50). Forest edge habitat had the highest Shannon Diversity Index (SDI = 3.11) (Table 3-2). No control points were established in hardwood forest or over-grown field habitats.

European starling had the greatest relative abundance (RA = 3.42). American robin (*Turdus migratorius*) had the greatest relative abundance in forest edge habitat (RA = 1.29). Red-winged blackbird had the greatest relative abundance in mixed forest habitat (RA = 5.50) (Appendix B Table 2).

**Table 3-2. Summary of breeding bird point count results by habitat type, excluding observations of birds >100 m from the observer and flyovers, Baron Winds Project, Spring, 2015.**

| Turbine Points (61) | | | | | |
|---|---|---|---|---|---|
| **Habitat Type** | **# BBS Points** | **Total Birds Observed** | **Relative Abundance** | **Species Richness[1]** | **Shannon Diversity Index** |
| Agricultural | 37 | 507 | 6.85 ± 0.03 | 43 | 2.82 |
| Forest edge | 8 | 115 | 7.19 ± 0.04 | 24 | 2.55 |
| Mixed forest | 3 | 25 | 4.17 ± 0.02 | 15 | 2.39 |
| Hardwood forest | 6 | 73 | 5.21 ± 0.02 | 23 | 2.85 |
| Over-grown field | 7 | 159 | 13.25 ± 0.08 | 26 | 2.42 |
| **All survey points** | **61** | **879** | **7.20 ± 0.03** | **57** | **2.73** |
| **Control Points (31)** | | | | | |
| Agricultural | 13 | 353 | 13.58 ± 0.08 | 39 | 2.73 |
| Forest edge | 17 | 279 | 8.21 ± 0.03 | 36 | 3.11 |
| Mixed forest | 1 | 31 | 15.50 ± 0.11 | 11 | 2.10 |
| Hardwood forest | 0 | n/a | n/a | n/a | n/a |
| Over-grown field | 0 | n/a | n/a | n/a | n/a |
| **All control points** | **31** | **663** | **10.69 ± 0.44** | **52** | **3.14** |

[1] Not including unidentified genera of birds (i.e. unidentified flycatcher, *Tyrannidae*, or unidentified warbler, *Parulidae*).

### 3.2.4 Henslow's Sparrow Surveys

Three additional points identified within potential habitat for Henslow's sparrows were surveyed twice during spring breeding bird surveys (Table 3-3). No Henslow's sparrows were observed. Stantec observed 24 species (excluding those species that could not be identified to genus) and 112 individual birds. Appendix B Table 3 lists the species and individual birds observed per point.

**Table 3-3. Summary of Henslow's sparrow point count locations, Baron Winds Project, Spring, 2015.**

| Point number | Dates surveyed | Habitat characteristics |
|---|---|---|
| Henslow's 11 | 5/20, 6/25 | over-grown field, man-made clearing |
| Henslow's 16 | 5/19, 6/25 | over-grown field, man-made clearing next to crop field and mixed forest |
| Henslow's 18 | 5/28, 6/24 | man-made clearing, crop field |

### 3.2.5 Rare, Threatened and Endangered Species

Stantec did not detect any federally listed endangered or threatened species, or state-listed endangered species. Stantec detected 2 state-threatened species, bald eagle and northern harrier, and 1 state species of special concern, sharp-shinned hawk (NYSDEC 2015b).

## 3.3 DISCUSSION

Objectives of breeding bird point count surveys were to provide baseline data of songbird species occurring and breeding within the various habitats in the Project area, to assess the likelihood that rare bird species occur in the Project area, and to evaluate the degree to which the breeding bird community in the Project area is typical of the region. Surveys also aimed to compare the breeding bird community at points in close proximity to proposed turbine locations with the breeding bird community and at control points in areas where no impact is expected to occur.

Species detected during breeding bird surveys are generally common, regionally abundant and typical of the habitats in which they were observed. Red-winged blackbird, a grassland species, was the most commonly detected species and had high rates of detection among survey points in agricultural and over-grown field habitats. Ovenbird, an abundant forest interior species, was the most commonly detected species and had the highest relative abundance values at 3 of the 5 habitats sampled: hardwood forest, mixed forest, and forest edge. Generally, species detected were common within the habitats sampled in the Project area. Stantec did not detect any federally listed endangered or threatened species or state-listed endangered species. Stantec detected 2 state-threatened species, bald eagle (1 individual flyover) and northern harrier (1 individual at a distance greater than 100 m from the observer). No Henslow's sparrows were detected, therefore direct impacts to breeding Henslow's sparrow during site construction are not anticipated. During project operation, direct impacts in the form of turbine-related collision fatality could potentially occur; although to date no Henslow's sparrow fatalities have been reported by operational wind projects with publicly available fatality monitoring results.

Comparison between turbine points and control points shows similar relative abundance and diversity index values, and similar species compositions for individual habitat types. More turbine points were established than control points, resulting in higher individual bird counts and a greater number of species recorded at survey points.

The selected points sampled the various available habitats within the Project area, and have primary habitat characteristics representative of the Project and surrounding areas. The surveys were timed to coincide with the peak breeding season in May and June, targeted optimal weather conditions to facilitate the maximum detection of birds, and used standard point count survey methods. Therefore, the results of the surveys provide a suitable reflection of the breeding bird community within the Project and surrounding areas.

# 4.0 Acoustic Bat Surveys

## 4.1 METHODS

### 4.1.1 Data Collection

Stantec conducted acoustic bat surveys to characterize activity, timing of activity, and when possible, species composition of bats in the Project area during the summer residency and fall swarming periods (1 June – 30 September 2015).

Anabat model SDI detectors (Titley Electronics Pty Ltd.) were selected for data collection based upon their widespread use for this type of survey at other wind projects, their ability to be deployed for long periods of time, and their ability to detect a broad frequency range, which allows detection of all species of bats which could occur in the Project area. Anabat detectors are frequency division detectors, dividing the frequency of echolocation sounds made by bats by a factor of 16, and then recording these sounds onto removable compact flash cards for subsequent analysis.

Each Anabat detector was powered by 12-volt batteries charged by solar panels. Each solar-powered Anabat system was deployed in waterproof housing enabling the detector to record while unattended for the duration of the survey. The housing suspended the Anabat microphone downward to give maximum protection from precipitation. To compensate for the downward position, a curved plastic joint was used to funnel sound into the downward-facing microphone, allowing the microphone to record the airspace horizontally surrounding the detector.

Detectors were programmed to begin monitoring at 18:00 hours each night and end monitoring at 08:00 hours each morning, encompassing all night hours. The audio sensitivity setting of each Anabat system was set between 6 and 7 (on a scale of 1 to 10) to maximize sensitivity while limiting ambient background noise and interference. Stantec made periodic visits (approximately every 3 weeks) to download data and maintain the detectors. During each visit, a Stantec biologist visually inspected each unit to ensure proper wiring and good battery charge, and downloaded data from the compact flash cards using CFCread© software.

### 4.1.2 Site Selection

Stantec deployed 2 Anabat SD1 detectors (Titley Electronics Pty Ltd.) in the on-site meteorological (met) tower in the Project area. The met tower clearing is an active hay field surrounded by agricultural fields and patches of mixed forest. No water features are proximal to the met tower clearing. Detectors were placed at approximately 45 m (Tower High detector) and 3 m (Tower Low detector) above ground level (agl), as recommended by NYSDEC Guidelines (Figure 4-1).

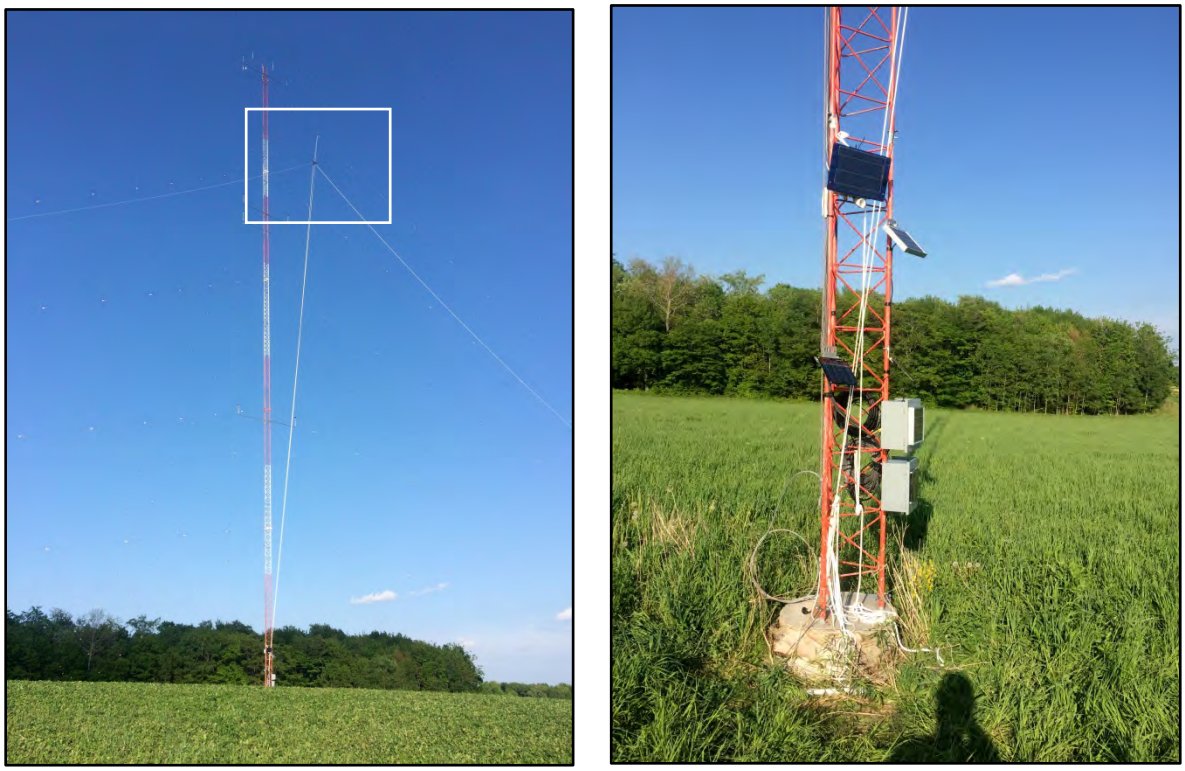

**Figure 4-1. Tower High (left) and Tower Low (right) detectors, Baron Winds Project, 2015.**

### 4.1.3 Data Analysis

Ultrasound recordings of bat echolocation may be broken into recordings of a single bat call or recordings of bat call sequences. A call is a single pulse of sound produced by a bat, while a call sequence is a combination of 2 or more pulses recorded in an Anabat file. Recordings containing less than 2 calls were eliminated from analysis as has been done in similar studies (Arnett et al. 2006). Call sequences typically include a series of calls characteristic of normal flight or prey location ("search phase") and capture periods (feeding "buzzes").

Potential call files were extracted from data files using CFCread© software. The default settings for CFCread© were used during this file extraction process, as these settings are recommended for the calls that are characteristic of bats in the Northeast. This software screens all data recorded by the bat detector and extracts call files using a filter. Using the default settings for this initial screen also provides for comparability between data sets. Settings used by the filter include a max TBC (time between calls) of 5 seconds, a minimum line length of 5 milliseconds, and a smoothing factor of 50. The smoothing factor refers to whether or not adjacent pixels can be connected with a smooth line. The higher the smoothing factor, the less restrictive the filter and the more noise files and poor quality call sequences that are retained within the data set.

Following extraction of call files, each file was visually inspected for species identification and to determine that only bat calls were included in the data set. Insect activity, wind, and

interference can sometimes produce Anabat files that pass through the initial filter and need to be visually inspected and removed from the data set. Call sequences are easily differentiated from other recordings, which typically form a diffuse band of dots at either a constant frequency or widely varying frequency.

Because bat activity levels are highly variable among individual nights and individual hours (Hayes 1997, Arnett et al. 2006), detection rates are summarized on both of these temporal scales. Hourly detection rates were summarized by hour after sunset, as recommended by Kunz et al. (2007).

Bat call sequences were individually marked and categorized by species group, or "guild" based on visual comparison to reference calls. Nine species of bats occur in New York, based upon their normal geographical range (BCI 2015), including:

- Indiana bat (*Myotis sodalis):* federally and New York state-listed endangered (NYSDEC 2015b)*;*
- little brown bat (*M. lucifugus);*
- northern long-eared bat (*M. septentrionalis*): federally and New York state-listed threatened (NYSDEC 2015b)*;*
- eastern small-footed bat (*M. leibii*): New York state-listed special concern (NYSDEC 2015b)*;*
- silver-haired bat (*Lasionycteris noctivagans*);
- tri-colored bat (*Perimyotis subflavus*);
- big brown bat (*Eptesicus fuscus*);
- eastern red bat (*Lasiurus borealis);*
- hoary bat (*Lasiurus cinereus*).

Relatively accurate identification of bat species can be attained by visually comparing recorded call sequences of sufficient length to bat call reference libraries (O'Farrell et al. 1999, O'Farrell and Gannon 1999). Call sequences were classified to species whenever possible, based on criteria developed from review of reference calls collected by Chris Corben, the developer of the Anabat system, as well as other bat researchers. Each bat species is capable of expressing characteristic call types; however, overlap in certain call patterns is common in some species that call within the same frequency range. Additionally, calls from any species may lack sufficient detail needed for species level identification because of background noise, distance of the bat from the microphone, weather, or other environmental factors. To compensate for these limitations in the analysis process, the following guilds were created to account for ambiguous calls that could not be confidently identified to species:

- **Unknown (UNKN)** – All call sequences with less than 5 calls (pulses), or poor quality sequences (those with indistinct call characteristics or background static). These sequences were further identified as either:
    - "High frequency unknown" **(HFUN)** for sequences with a minimum frequency above 30–35 kilohertz (kHz) (for this region, HFUN most likely represents eastern red

bat, tri-colored bat, and *Myotis* species since these species typically produce ultrasound sequences of more than 30 kHz); or;

- "Low frequency unknown" **(LFUN)** for sequences with a minimum frequency below 30–35 kHz. Big brown bat, silver-haired bat , and hoary bat would be the species in this region typically producing ultrasound sequences of less than 30 kHz.

- **Myotis (MYSP)** – All bats of the genus *Myotis*. While there are some general characteristics believed to be distinctive for several of the species in this genus, these characteristics are not sufficiently consistent to be relied upon for species identification at all times when using Anabat recordings.

- **Eastern red bat/tri-colored bat[6] (RBTB)** – Eastern red and tri-colored bats. These 2 species can produce distinctive calls; however, significant overlap between these species in the call pulse shape, frequency range, and slope can also occur.

- **Big brown bat/silver-haired bat (BBSH)** – Big brown and silver-haired bats. These species' call signatures commonly overlap and have therefore been included as one guild in this report.

- **Hoary bat (HB)** – Hoary bats. Calls of hoary bats can usually be distinguished from those of big brown and silver-haired bats by minimum frequency extending below 20 kHz or by calls varying widely in minimum frequency across a sequence.

This method of guild identification represents a conservative approach to bat call identification. Since some species sometimes produce calls unique only to that species, all calls were identified to the lowest possible taxonomic level before being grouped into the listed guilds. Tables and figures in this report will reflect those guilds. However, since species-specific identification did occur in some cases, each guild also will be briefly discussed with respect to potential species composition of recorded call sequences. Call results by guild and suspected species are presented in Appendix C of this report.

Once all of the call files were identified and categorized in appropriate guilds, nightly tallies of detected calls were compiled. Mean detection rates (calls/detector-night) for the entire sampling period were calculated for each detector and for both detectors combined. The sunset time was subtracted from the time of recording to determine the number of hours after sunset when each file was recorded.

[6] The scientific and common name of the eastern pipistrelle (*Pipistrellus subflavus*) has been changed to the tri-colored bat (*Perimyotis subflavus*).

### 4.1.4 Weather Data

Weather data during the 2015 survey period (1 June – 30 September) were collected from 4 weather stations on the met tower. Temperature data recorded from the weather station at 56 m agl and wind speed data from the weather station at 40 m agl were used in weather analysis for Tower High. Temperature data from the weather station at 2 m agl and wind speed data from the station deployed at 20 m were used in weather analysis for Tower Low. Barometric pressure data recorded by the 56 m agl station was used in weather analysis for both detectors. Nightly mean temperature and wind speed were summarized for each night of survey for each detector (Appendix C Tables 1 and 2).

## 4.2 RESULTS

### 4.2.1 Timing of Activity

Stantec deployed detectors from 1 June – 30 September 2015. Detectors operated successfully on 100% of survey nights. Detectors recorded 835 call sequences during 244 detector-nights, and had an overall detection rate of 3.4 bat call sequences per detector-night (calls/detector-night) (Table 4-1, Appendix C Tables 1 and 2).

**Table 4-1. Summary of bat detector field survey effort and results, Baron Winds Project, 2015.**

| Location | Dates Deployed | Calendar Nights | Detector-Nights* | Recorded Sequences | Detection Rate ** | Maximum Sequences recorded *** |
|---|---|---|---|---|---|---|
| Tower High | 6/1/15 - 9/30/15 | 122 | 122 | 334 | 2.7 | 26 |
| Tower Low | 6/1/15 - 9/30/15 | 122 | 122 | 501 | 4.1 | 22 |
| ***Overall Results*** | 6/1/15 - 9/30/15 | ***244*** | ***244*** | ***835*** | ***3.4*** | -- |
| * One detector-night is equal to a one detector successfully operating throughout the night. | | | | | | |
| ** Number of bat echolocation sequences recorded per detector-night. | | | | | | |
| *** Maximum number of bat passes recorded from the single detector for a detector-night. | | | | | | |

Tower High recorded the greatest activity during 23 days between 28 August – 19 September, resulting in 42% of the total call sequences recorded by this detector during the survey period (n = 141 call sequences). Tower Low recorded the greatest activity between 10 July – 9 August (n = 261 call sequences, 52%). Calls peaked at Tower High on 19 September (n = 26 call sequences), and at Tower Low on 28 July (n = 22 call sequences) (Figure 4-2, Appendix C Tables 1 and 2). Monthly detection rates ranged from 1.4 calls/detector-night at Tower Low in June to 7.6 calls/detector-night at Tower Low in July. Tower High had the highest detection rate in August (3.7 calls/detector-night) (Figure 4-3).

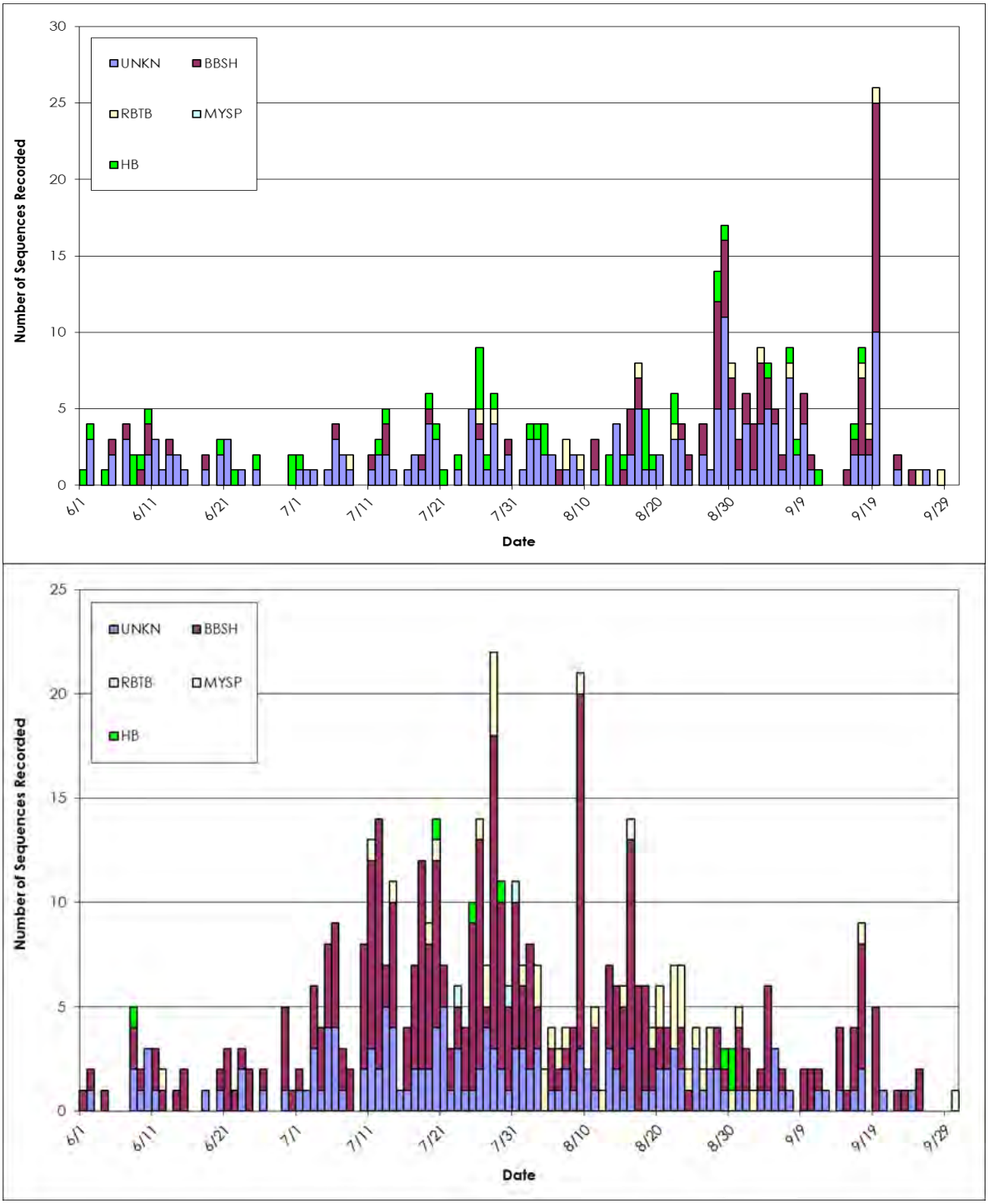


**Figure 4-2. Nightly bat call sequence detections recorded at Tower High (top) and Tower Low (bottom), Baron Winds Project, 2015.**

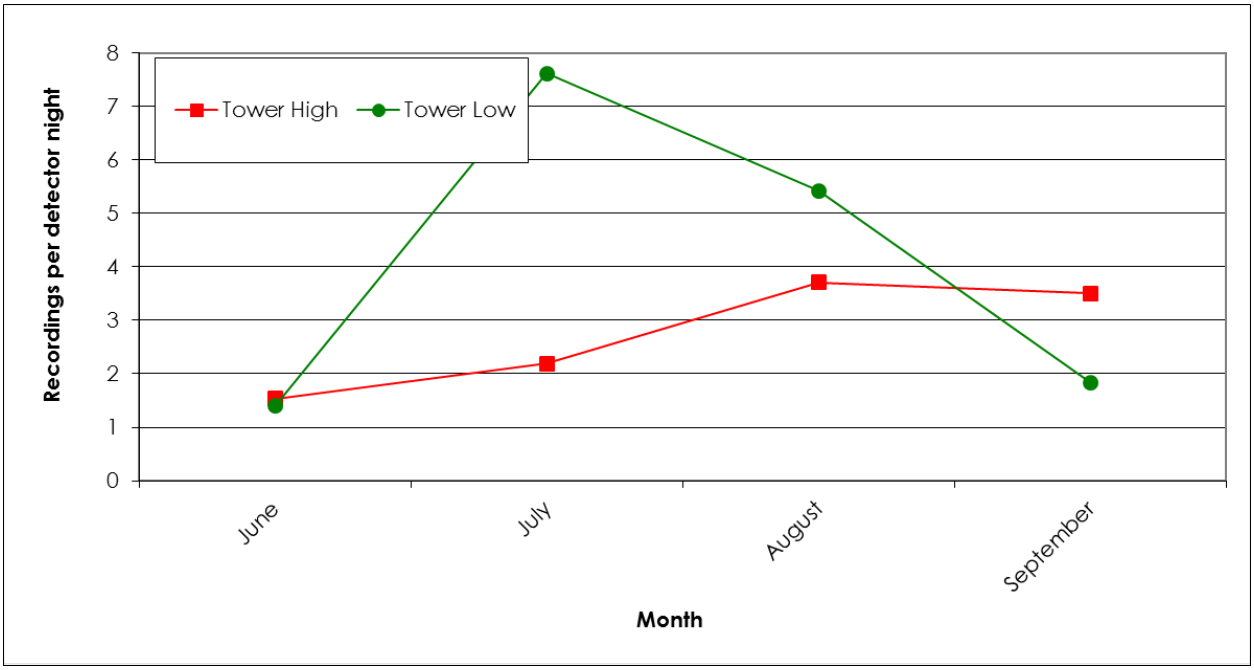


**Figure 4-3. Total monthly detection rates recorded by 2 detectors, Baron Winds Project, 2015.**

The timing of hourly peaks in acoustic activity recorded was similar between detectors. Both detectors recorded the highest level of activity from sunset (hour = 0) until the beginning of the second hour after sunset. Combined, the detectors recorded 287 call sequences (34% of total call sequences) during these 2 hours (Figure 4-4).

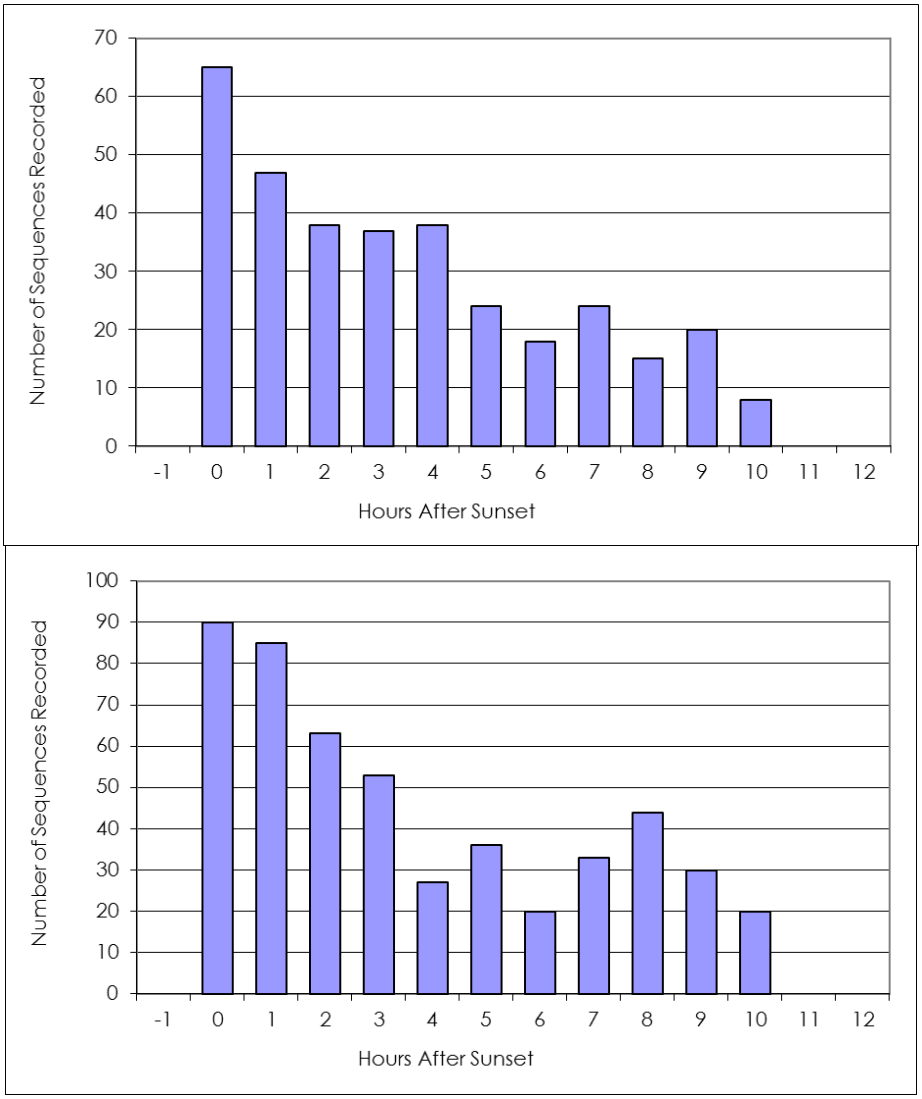


**Figure 4-4. Number of call sequences recorded during each hour of the night at Tower High (top) and Tower Low (bottom), Baron Winds Project, 2015.**

### 4.2.2 Species Composition

The greatest percentage of call sequences recorded at the detectors was from bats in the BBSH guild (n = 383, 46%), followed by the UNKN guild (n = 333, 40%) (Table 4-2). Within the BBSH guild, 14% of calls sequences were identified as big brown bats (n = 55), and 13% of call sequences were identified as silver-haired bats (n = 49); the remaining call sequences within the BBSH guild (n = 279, 73%) lacked sufficient detail to be identified to species level. Detectors recorded only 3 *Myotis* calls sequences (< 1% of total call sequences recorded). All 3 call sequences were recorded by Tower Low (Appendix C Tables 1 and 2).

The majority of call sequences recorded by Tower High were identified as UNKN (n = 185, 55% of call sequences recorded at Tower High), and the majority of call sequences recorded by Tower Low were identified as BBSH (n = 298, 59% of call sequences recorded at Tower Low) (Table 4-2, Figure 4-5).

Appendix C Tables 1 and 2 provide information on the number of call sequences by guild and suspected species, recorded at each detector for each night of survey, and weather conditions for that night.

**Table 4-2. Distribution of detections by guild for both detectors, Baron Winds Project, 2015.**

| Detector | Guild | | | | | Total |
|---|---|---|---|---|---|---|
| | BBSH | HB | MYSP | RBTB | UNKN | |
| Tower High | 85 | 48 | 0 | 16 | 185 | 334 |
| Tower Low | 298 | 7 | 3 | 45 | 148 | 501 |
| **Total** | **383** | **55** | **3** | **61** | **333** | **835** |
| **Guild Composition %** | **45.9%** | **6.6%** | **0.4%** | **7.3%** | **39.9%** | |

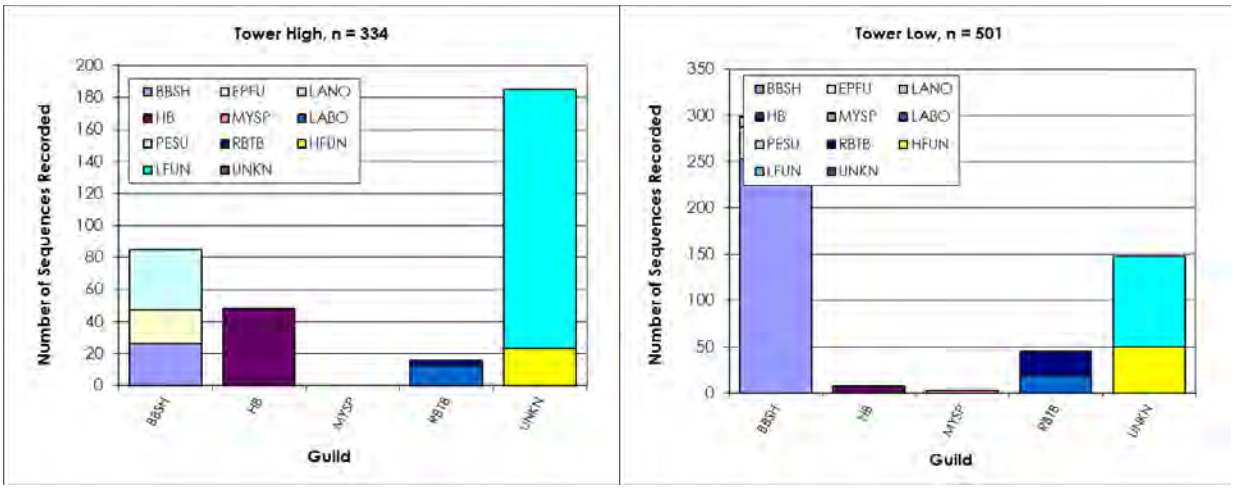


**Figure 4-5. Histograms showing species composition of recorded bat call sequences from 2 detectors. BBSH = big brown/silver-haired, HB = hoary bat, MYSP = Myotis species, RBTB = red bat/tri-colored bat, UNKN = unknown, LFUN = low frequency unknown, HFUN = high frequency unknown, PESU = tri-colored bat, LABO = red bat, LANO = silver-haired bat, EPFU = big brown bat, Baron Winds Project, 2015.**

### 4.2.3 Activity and Weather

Nightly mean wind speeds at Tower High varied between 2 and 11 m/s (Figure 4-6). Nightly mean wind speeds at Tower Low varied between 1 and 9 m/s (Figure 4-7). Ninety percent of all call sequences (n = 751) were recorded when nightly mean wind speeds were 6 m/s or less at each detector. Nightly mean temperatures at Tower High varied between 7°C and 23°C (Figure

4-8). Nightly mean temperatures at Tower Low varied between 8 and 22 °C (Figure 4-9). Sixty percent of all call sequences (n = 498) were recorded on nights when nightly mean temperatures at each detector were 18°C (64 °F) or above. Figure 4-10 and Figure 4-11 display scatterplots of overall acoustic activity versus mean nightly wind speed and temperature at Tower High and Tower Low separately.

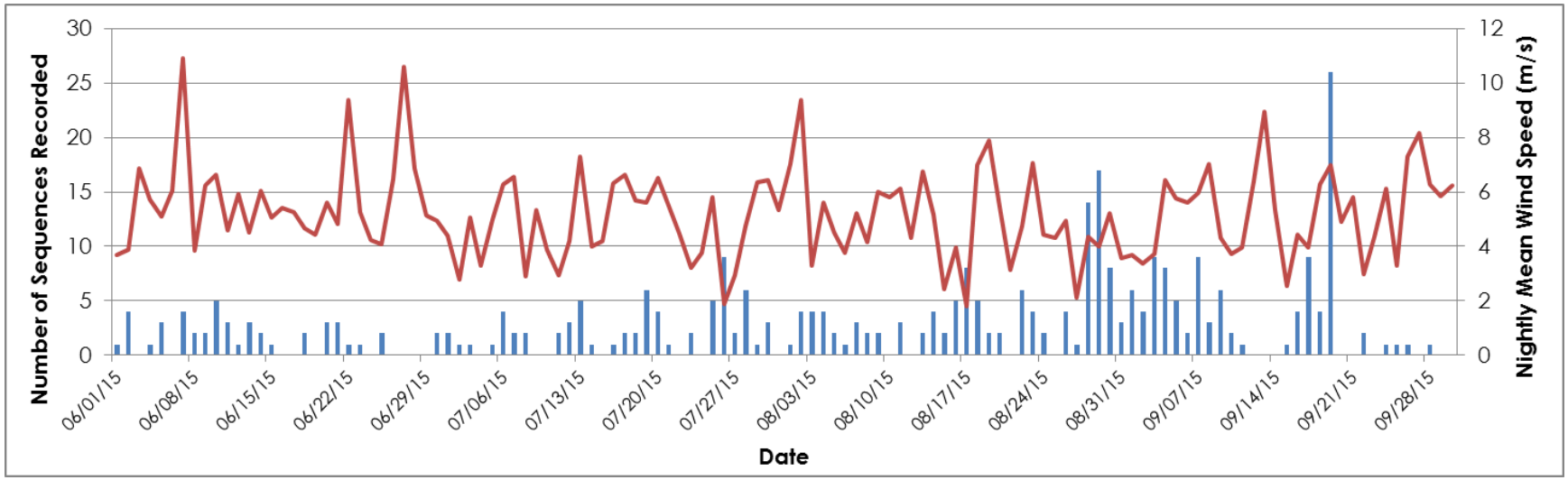


**Figure 4-6. Nightly mean wind speed at Tower High (m/s; red line) and bat call sequence detections at Tower High, Baron Winds Project, 2015.**

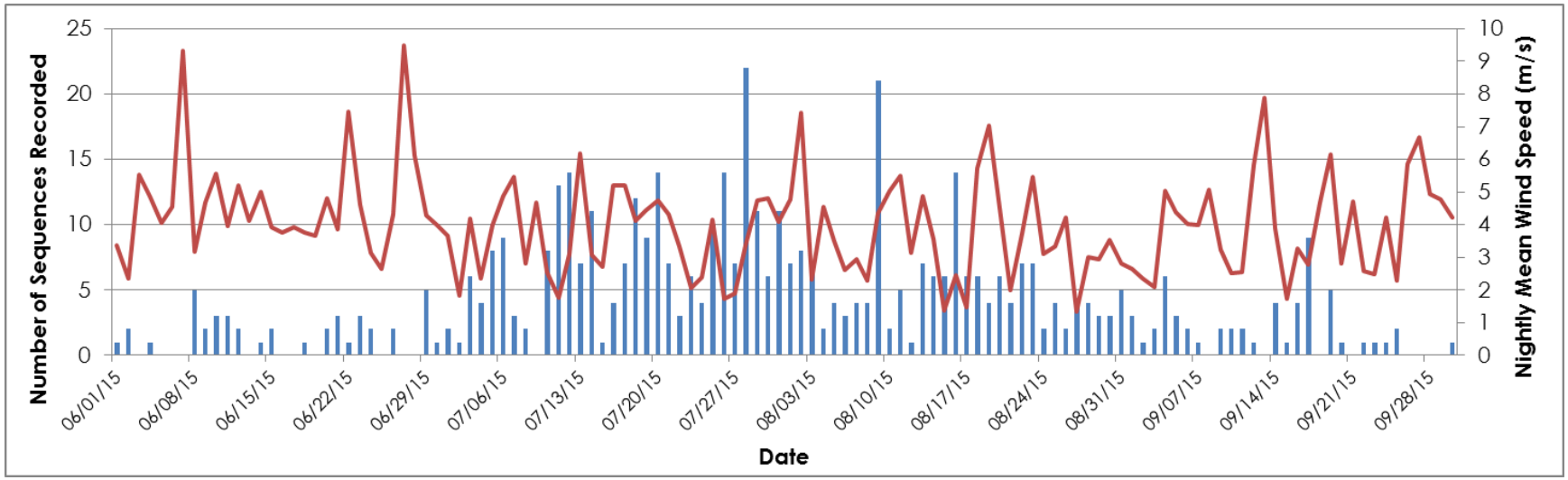


**Figure 4-7. Nightly mean wind speed at Tower Low (m/s; red line) and bat call sequence detections at Tower Low, Baron Winds Project, 2015.**

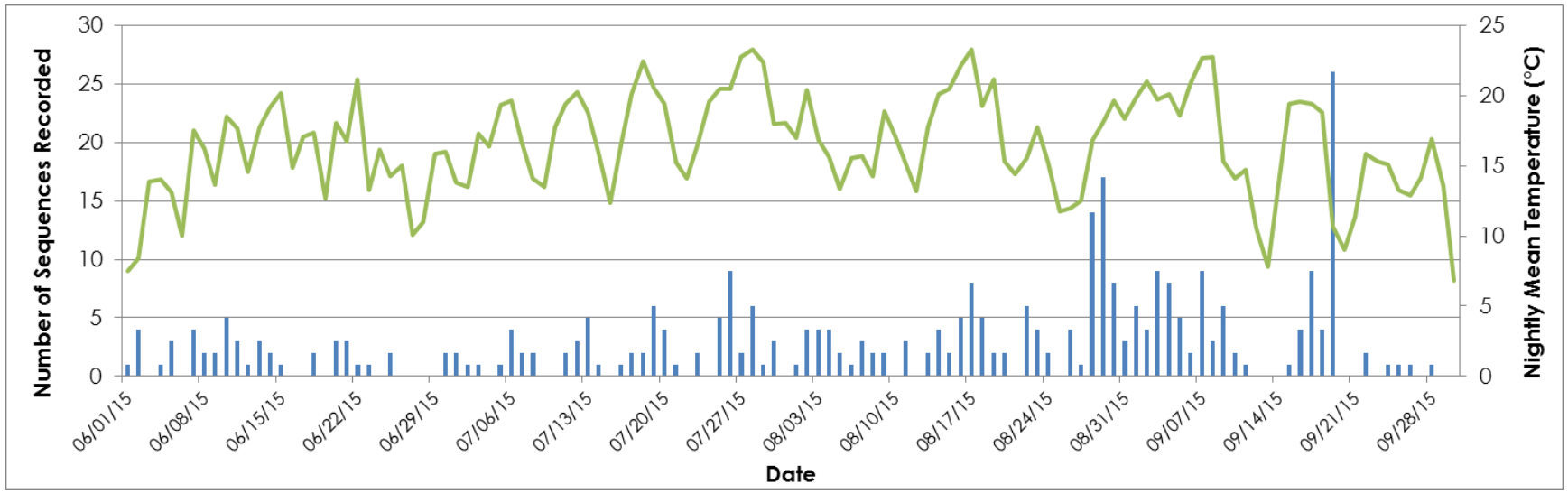


**Figure 4-8. Nightly mean temperature at Tower High (°C; green line) and bat call sequence detections at Tower High, Baron Winds Project, 2015.**

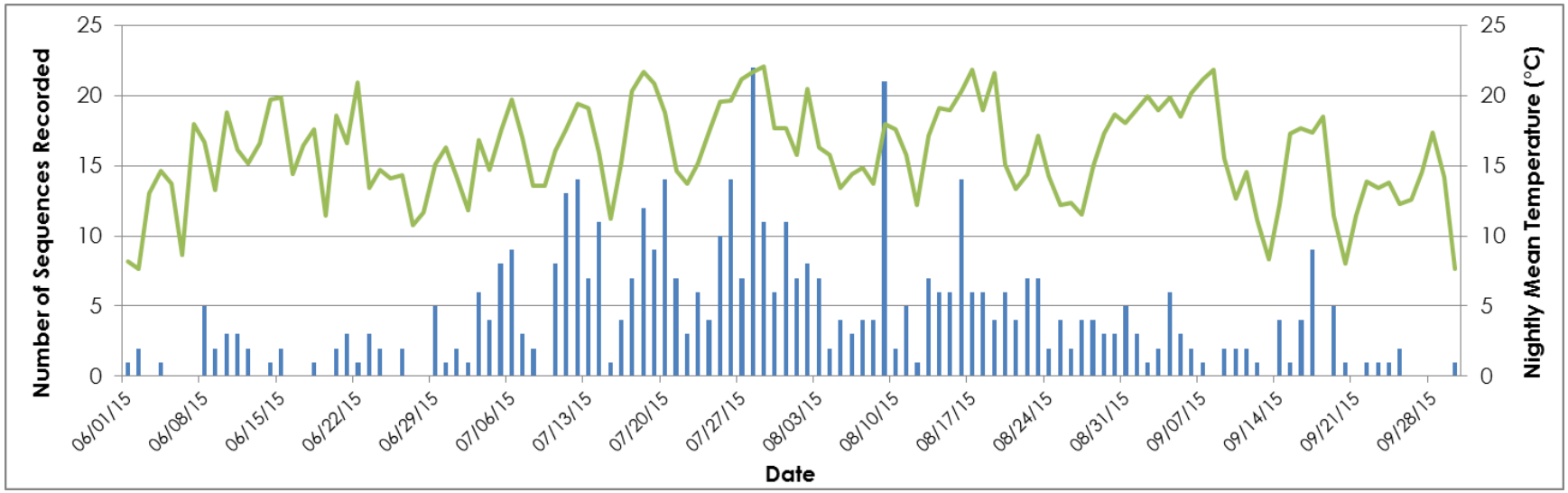


**Figure 4-9. Nightly mean temperature at Tower Low (°C; green line) and bat call sequence detections at Tower Low, Baron Winds Project, 2015.**

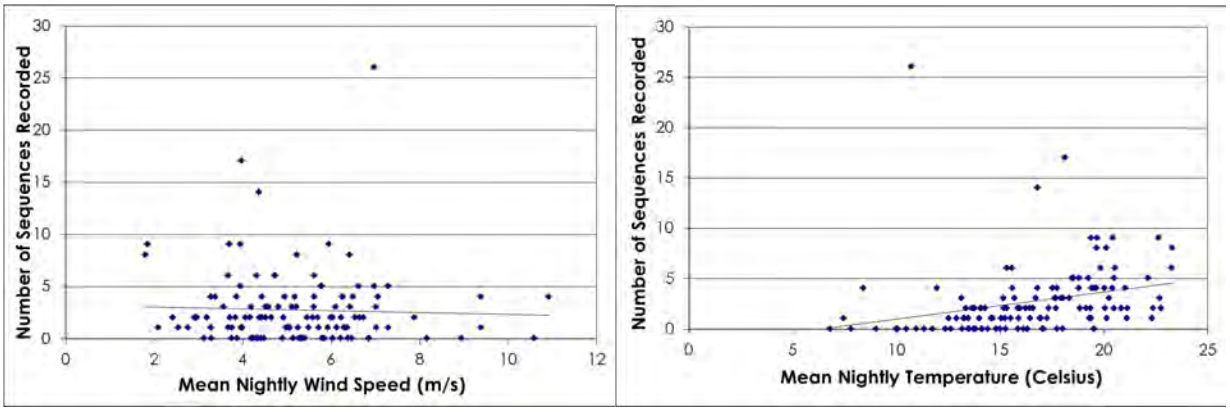


**Figure 4-10. Nightly mean wind speed at Tower High (left), and nightly mean temperature at Tower High (right) versus bat call sequences at Tower High Baron Winds Project, 2015.**

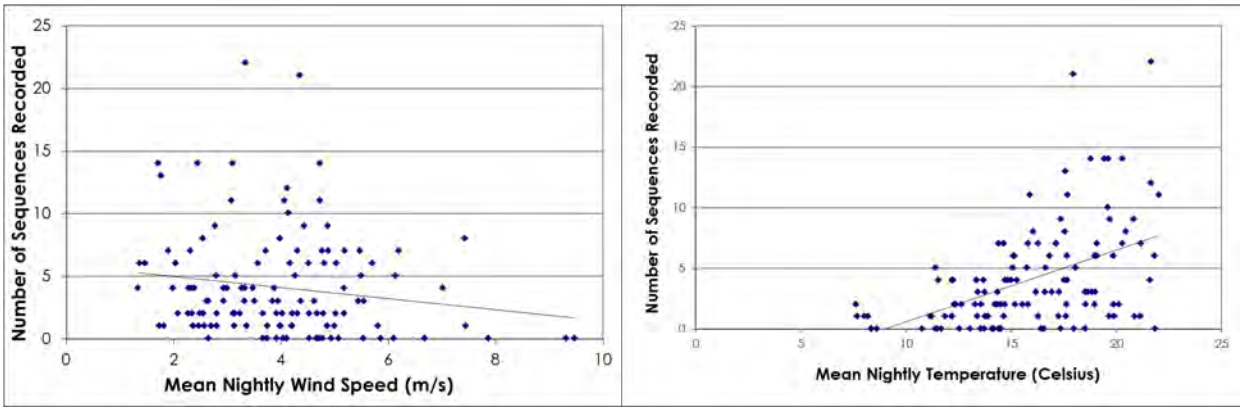


**Figure 4-11. Nightly mean wind speed at Tower Low (left), and nightly mean temperature at Tower Low (right) versus bat call sequences at Tower Low, Baron Winds Project, 2015.**

## 4.3 DISCUSSION

Overall activity was low throughout most of the survey period, with an overall detection rate of 3.4 calls/detector-night for both detectors combined. Tower Low detector recorded more activity than Tower High. The majority of call sequences at Tower Low (n = 298, 59%) were from the BBSH guild (either big brown bat or silver-haired bat). It is possible that a single bat or a few bats made multiple passes by Tower Low while foraging. The majority of call sequences at Tower High (n = 185, 55%) were classified as UNKN because the call sequences either had fewer than 5 call pulses or were of poor quality. Eighty-eight percent of UNKN call sequences at Tower High (n = 162) contained calls pulses with a minimum frequency below 30–35 kHz, and were classified as LFUN. In this region, LFUN likely represents bats in the BBSH guild or hoary bats.

Well-known studies have found that bat activity patterns are influenced by weather conditions (Arnett et al. 2006, Arnett et al. 2008, Reynolds 2006). Acoustic surveys have documented a

decrease in bat activity rates as wind speed increases and temperature decreases, and bat activity has been shown to correlate negatively to low nightly mean temperatures (Hayes 1997, Reynolds 2006). These patterns suggest that bats are more likely to migrate on nights with low wind speeds (less than 4–6 m/s) and generally warm temperatures. Several weather variables can individually affect bat activity, as does the interaction among variables (i.e., warm nights with low wind speeds). Overall bat activity appeared to follow this trend at the Project. Ninety percent of bat activity occurred when combined nightly mean wind speeds were 6 m/s or less. Sixty percent of bat activity occurred when combined nightly mean temperatures were 18 °C (64 °F) or above. On 28 July when Tower Low recorded the most bat call sequences, mean wind speed was 3 m/s and mean nightly temperature was 22 °C. Conversely, on 19 September when Tower High recorded the most bat call sequences, mean wind speed was 7 m/s and mean nightly temperature was11 °C.

Bat call sequences were identified to guild, although calls were identified to species when possible during analysis. Certain species, such as the eastern red and hoary bat, have easily identifiable calls, whereas other species, such as the big brown bat and silver-haired bat, are difficult to distinguish acoustically. Similarly, species within the *Myotis* genus have very similar call characteristics, so Stantec did not make an attempt to differentiate call sequences within this genus. Detectors recorded only 3 *Myotis* calls sequences (0.4% of total calls recorded; these 3 call sequences were recorded by Tower Low. *Myotis* species have been particularly affected by white-nose syndrome (WNS) that has become widespread in the Northeast (Brooks 2011). *Myotis* are more commonly detected beneath canopy level (Arnett et al. 2006), and prior to WNS, *Myotis* call sequences often tended to dominate acoustic data collected from detectors deployed at canopy height (Brooks 2011). No pre-WNS acoustic data exists for the Project, making it difficult to determine whether these results represent a significant decline in *Myotis* activity levels from pre-WNS conditions.

Numbers of recorded bat call sequences cannot be correlated with the number of bats in an area because acoustic detectors cannot differentiate between individuals (Hayes 2000). Thus, results of acoustic surveys must be interpreted with caution. Methods surrounding acoustic bat surveys are continually evolving, and there is currently little data aiding in the interpretation of the number of calls/detector-nights. Results cannot be used to determine the number of bats and bat species inhabiting an area. Although interpretations are limited, the surveys represent a sample of activity and the general species groups that occur in the Project area. The timing of pulses of activity and species composition are similar to that observed at other proposed wind projects in New York and the Northeast.

# 5.0 Eagle Use Point Count Surveys

## 5.1 METHODS

As part of assessing potential risk to eagles, Stantec requested from NYSDEC information regarding the nearest known bald eagle nests to the Project.

Stantec conducted point count surveys for eagles for one full year consistent with the ECP Guidance. Point count surveys consisted of 1-hour visual surveys at 18 points within the Project area and 2 points outside the Project area, each with an 800-m radius and covering an area of 2 $km^2$. Stantec surveyed 20 points[7] each cycle (18 cycles, once approximately every 3 weeks). Point count locations were based on consultation with USFWS and NYSDEC and were refined based on ground conditions during the first Fall Bird Migration Survey in early September (Figure 1). The purpose of surveying at the 2 points outside the Project area was to gain directional flight information on the eagles on the Wayland Nest NY132. At Point #7, observers had a direct view of the nest during leaf-off seasons, and at Point #15, a view of the airspace above the reservoir where the nest was located ( Figure 1). Since these points were outside the proposed turbine areas, eagle minutes for these 2 points are reported separately.

The turbine layout has been revised since the start of bird and bat studies[8]. Consequently, eagle point count locations #1, #3, and #20 are outside the proposed turbine areas, and eagle minutes observed from these points were not included in the sum of eagle minutes (Table 5-2).

Surveys occurred in all weather conditions except when visibility was poor, and occurred in a range of daylight hours. The starting point count location changed each survey cycle to enable sampling of each plot during a range of daylight hours. We recorded other songbird, waterfowl, and raptors observed during eagle surveys.

## 5.2 RESULTS

### 5.2.1 Eagle Nest Information

NYSDEC provided known bald eagle nest locations on 9 August 2013 and 5 May 2016. As of 2012, there were no nests known to be present in the Project area. There is 1 active bald eagle nest within 10 miles of a turbine location: the Wayland Nest NY132.

The ½ mean inter-nest distance at the Project was 3.8 miles. Exercising avoidance and minimization measures during the Stage 1 assessment of risk and reducing the potential for disturbance and take of eagles from Nest NY132, EverPower revised the Project layout by removing turbines within the ½ mean inter-nest distance of 3.8 miles. Therefore, turbines are outside the nest buffer within which adult and juvenile bald eagles are potentially susceptible to disturbance and collision during nesting and fledging periods, and are well outside the recommended buffers for activities including building construction and blasting (USFWS 2007).

[7] Per the ECP Guidance, the number of proposed point count locations was determined by calculating the entire turbine area including a 1-km buffer around turbines, calculating 30% of the area, and dividing by 2 (to account for the 2 $km^2$ plots).

[8] Refer to the Work Plan for the initial Project boundary on which Stantec based the level of effort for eagle point count surveys.

Consequently, Nest NY 132 is approximately 4 miles from the nearest turbine location. The next closest nest is 11 miles from the nearest turbine location.

## 5.3 SURVEY EFFORT

Stantec surveyed all 20 points for 1 hour 18 times between 11 September 2013 and 8 September 2014, totaling 360 survey hours: 324 observation hours in the Project area and 36 hours outside the Project area. Stantec recorded habitat information for each point; for results, please refer to the Baron Winds Project–Habitat Assessment memo report dated 11 February 2014 (Stantec 2014). Skies generally were partly cloudy. Drizzle or snow showers occurred intermittently during 7 survey rounds (Table 5-1).

**Table 5-1. Survey effort results and weather conditions during Eagle Point Count Surveys, Baron Winds Project, 2013–2014.**

| Survey Round | Sky Condition | Cloud Height (m) | Avg Temp (°C) | Avg Wind Speed (m/s) | Wind Direction | Eagles Observed? |
|---|---|---|---|---|---|---|
| **2013** | | | | | | |
| 1 (9/11–9/14) | partly cloudy, cloudy, some drizzle, snow shower | 200 < x < 800; > 800 | 22 | 1.8–3.1 | NW, SW | Y |
| 2 (10/3–10/5) | partly cloudy, cloudy | 200 < x < 800; < 200 | 23 | 0.4–1.3 | W | Y |
| 3 (10/21–10/23) | partly cloudy, a few showers | < 200; 200 < x < 800; >800 | 11 | 1.8–3.1 | SW | Y |
| 4 (11/13–11/15) | partly cloudy, cloudy | < 200; 200 < x < 800; >800 | 2 | 1.8–3.1 | W, SW | N |
| 5 (12/2–12/3) | cloudy | < 200; > 800 | 3 | 0.4–1.3 | SW | N |
| 6 (12/18–12/19) | partly cloudy, cloudy, some snow | < 200; > 800 | -2 | 4.0–5.4 | W | N |
| **2014** | | | | | | |
| 7 (1/14–1/15) | cloudy, some drizzle | 200 < x < 800; > 800 | 2 | 4.0–5.4 | W | N |
| 8 (2/2–2/4) | cloudy, snow | 200 < x < 800; > 800 | -5 | 1.8–3.1 | NW | Y |
| 9 (2/26–2/28) | partly cloudy, snow | > 800 | -12 | 5.8–8.0 | NW | Y |
| 10 (3/17–3/18) | clear | > 800 | -5 | 1.8–3.1 | S, E | Y |
| 11 (4/10–4/12) | clear, partly cloudy | > 800 | 12 | 4.0–5.4 | W | Y |
| 12 (5/1–5/2) | partly cloudy, cloudy, some showers | > 800 | 10 | 4.0–5.4 | SE, NW | Y |
| 13 (5/19, 5/21) | partly cloudy, cloudy | > 800 | 16 | 1.8–3.1 | SW, NW | Y |
| 14 (6/9–6/10, 6/12) | cloudy | > 800 | 15 | 1.8–3.1 | SE | Y |
| 15 (7/1–7/2) | partly cloudy | > 800 | 21 | 4.0–5.4 | SW | Y |
| 16 (7/25–7/27) | partly cloudy | 200 < x < 800 | 23 | 0.4–1.3 | SE, NW, SW | Y |
| 17 (8/9, 8/11) | partly cloudy | 200 < x < 800 | 22 | 1.8–3.1 | SE, E | N |
| 18 (9/3–9/4, 9/7–9/8) | partly cloudy | 200 < x < 800; > 800 | 25 | 0.4–1.3 | SE, NW | Y |

## 5.4 LOCATION, BEHAVIOR, AND EXPOSURE MINUTES INSIDE THE PROJECT AREA

Stantec documented 13 bald eagle observations at points inside the Project area (Table 5-2). Stantec observed eagles from these locations in 2 seasons: fall and spring. No juvenile bald eagles were observed. Observations occurred between 8:38 AM and 3:49 PM. No courtship display or territorial display behaviors thought to be associated with greater collision risk at wind projects (USFWS 2013), were observed. The eagle observed on 19 May 2014 had a small mammal (presumably a squirrel) in its talons and was being harassed by a red-tailed hawk (*Buteo jamaicensis*). All other behaviors were soaring, gliding, or perching.

Stantec documented 15 eagle exposure minutes (minutes inside the point count boundaries and inside the rotor-swept area, estimated as approximately 50–150 m above ground level) in the 19,440 survey minutes (324 survey hours). Eagles were observed in 0.08% of survey minutes) (Table 5-2). The greatest number of eagle minutes (n = 17) occurred at Point #2, at the northeastern-most point of the Project area; however only 4 of these minutes (24%) occurred inside the point count boundary and in the rotor-swept area. No eagles were observed at Points #1, 3, 8, 9, 11, 12, 14–17, 19, or 20. It appeared that eagle use was higher on the outer perimeter of the Project, such as along Cohocton River, than in the interior portion of the Project.

Stantec observed a group of eagles, 1 adult and 2 sub-adults, flying together over 200 m above the ground at Point #2 on 14 September 2013. No golden eagles (*Aquila chrysaetos*) were observed (Table 5-2).

**Table 5-2. Location and flight data for eagles observed from points inside the Project area during eagle point count surveys, Baron Winds Project, 2013–2014.**

| Date | Round | Point Count # | Time | Age | Height Code | Behavior | Total Minutes Observed | No. Minutes Flying Inside PC Boundary in Rotor-Swept Area (50–150m) |
|---|---|---|---|---|---|---|---|---|
| 9/11/2013 | 1 | 13 | 2:22 PM | A | E | SO | 1 | 0 |
| 9/13/2013 | 1 | 5 | 12:11 PM | A | B | SO | 2 | 2 |
| 9/14/2013 | 1 | 6 | 12:20 PM | SA | E | SO, FG | 10 | 0 |
| 9/14/2013 | 1 | 2 | 2:05 PM | A | E | SO | 3 | 0 |
| 9/14/2013 | 1 | 2 | 2:05 PM | SA | E | SO | 3 | 0 |
| 9/14/2013 | 1 | 2 | 2:05 PM | SA | E | SO | 3 | 0 |
| 9/14/2013 | 1 | 2 | 2:11 PM | A | E | SO | 4 | 0 |
| 10/4/2013 | 2 | 5 | 12:26 PM | A | B, E | SO | 3 | 2 |
| 10/21/2013 | 3 | 10 | 3:01 PM | SA | C | SO | 4 | 4 |
| 10/22/2013 | 3 | 4 | 1:07 PM | A | E | SO | 7 | 0 |
| 5/1/2014 | 12 | 5 | 3:18 PM | A | A–E | SO | 6 | 3 |
| 5/19/2014 | 13 | 2 | 3:49 PM | A | C | FG, SB | 4 | 4 |
| 9/4/2014 | 18 | 18 | 8:38 AM | SA | A | FG | 1 | 0 |
| Age: J=juvenile; SA=subadult; A=adult | | | | | | | | |
| Height Code: A=0–50 m; B=50–100 m; C=100–150 m; D=150–200 m; E= >200 m | | | | | | | | |
| Behavior: FG=flap or glide; SO=soaring; PC=perched; SB=stooping or diving in response to another bird | | | | | | | | |

## 5.5 RESULTS FROM POINT # 15 AND POINT # 7 (OUTSIDE THE PROJECT AREA)

Observers recorded bald eagle observations at Point #15 on 22 October 2013 and on 17 March 2014. On 22 October, a sub-adult bird soared for 2 minutes in a generally southward direction but was not observed over the Project area. On 17 March, observers recorded 2 observations of an adult perched on the Wayland nest, once at 8:00 and again at 8:30 am. At 8:30 AM, the adult flew off the nest westward into the valley away from the Project area.

A bald eagle pair at Point #7 was observed perching, in flap or glide flight, and soaring throughout the survey year except in the months of August, September, November, December, and January. Two adults were observed billing, courting, and constructing a nest on 14 January and 2 February 2014. The first observation of 2 juveniles occurred on 19 May 2014 and the last observation of a single juvenile occurred on 1 July 2014. A local person approached our observer in September 2014 and indicated that people from a nearby business have watched the Wayland eagle nest pair from their building for over 10 years. They reported seeing 2 fledglings leave the nest on 8 August 2014. Stantec did not observe any juvenile bald eagles in the Project area during Rounds 17 or 18 or during the survey year.

## 5.6 INCIDENTAL SPECIES

Stantec did not observe any federal or state-listed endangered species during eagle point count surveys. Stantec observed 1 state-listed threatened species (182.2(g) of 6NYCRR Part 182, NYSDEC 2015b): northern harrier (n = 36). Individuals were observed soaring or foraging over fields within the Project area. Stantec observed 4 Special Concern Species: osprey (*Pandion haliaetus*), sharp-shinned hawk, Cooper's hawk (*Accipiter cooperii*), and red-shouldered hawk (*Buteo lineatus*). Raptor and waterbird species observed incidentally are listed in Table 5-3.

**Table 5-3. Raptor and waterbird species observed incidentally during eagle point count surveys, Baron Winds Project, 2013–2014.**

| Species Common Name | Species Latin Name | No. of Observations | Point Locations |
|---|---|---|---|
| American kestrel | *Falco sparverius* | 24 | 2, 4, 5, 8, 10, 11, 12, 13, 17, 18, 20 |
| Cooper's hawk | *Accipiter cooperii* | 11 | 1, 2, 3, 6, 7, 8, 9, 17, 20 |
| double-crested cormorant | *Phalacrocorax auritus* | 1 | 10 |
| great blue heron | *Ardea herodias* | 5 | 4, 7, 11, 14 |
| herring gull | *Larus argentatus* | 13 | 4, 5, 7, 8, 10, 11, 15, 16, 20 |
| merlin | *Falco columbarius* | 1 | 7 |
| northern harrier | *Circus cyaneus* | 36 | 1, 2, 3, 4, 5, 8, 10, 11, 14, 16, 17, 18, 19, 20 |
| osprey | *Pandion haliaetus* | 3 | 3, 6, 7 |
| peregrine falcon | *Falco peregrinus* | 1 | 1 |
| red-shouldered hawk | *Buteo lineatus* | 1 | 19 |
| red-tailed hawk | *Buteo jamaicensis* | 182 | all points |
| rough-legged hawk | *Buteo lagopus* | 6 | 1, 6, 8, 16 |
| sharp-shinned hawk | *Accipiter striatus* | 10 | 4, 5, 8, 10, 14, 16, 20 |
| turkey vulture | *Cathartes aura* | 135 | all points except 6 |
| unidentified buteo | *NA* | 3 | 2, 12, 13 |
| unidentified duck | *NA* | 9 | 7, 11, 17 |
| unidentified gull | *NA* | 5 | 4,15, 20 |
| unidentified raptor | *NA* | 8 | 2, 4, 5, 17, 20 |

## 5.7 DISCUSSION

Though the USFWS's eagle collision risk model was not run for the eagle data collected at the Project in 2013–2014, based on the presence of one nest within 10 miles of the Project and the number of exposure minutes observed, the Project likely would fall into Category 2 (high to moderate risk to eagles/opportunity to mitigate impacts).

However, the fact that there are no eagle nests within 4 miles of the Project, use of the Project as assessed during a full year of point count surveys was relatively low, the percentage of minutes within point count boundaries and the rotor-swept area compared to total observation minutes was low, and that only a single foraging behavior was observed, risk to eagles at the Project is expected to be low. This finding, coupled with the fact that only 1 eagle has been killed at a wind turbine in the eastern U.S. (at a non-commercial, single turbine in Maryland [USFWS 2012b]), further supports that risk to eagles at the Project is expected to be low.

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# Appendix A

**Migration Survey Data Tables**

**Appendix A Table 1. Total number of species and individuals detected and distance from observer at 18 point count locations during 3 or 4 survey periods, Baron Winds Project, Fall 2013.**

| Acronym | Definition |
|---|---|
| USGS BBS | United States Geological Survey Breeding Bird Survey |
| SR | Species Richness |
| RA | Relative Abundance |
| Fr | Frequency |
| SDI | Shannon Diversity Index |

| Common name | Scientific name | 0-50 m | 50-100 m | > 100 m | Flyovers | Unknown distance | Grand total |
|---|---|---|---|---|---|---|---|
| American crow | *Corvus brachyrhynchos* | 29 | 74 | 14 | | 2 | 119 |
| American goldfinch | *Spinus tristis* | 63 | 59 | | 18 | 4 | 144 |
| American robin | *Turdus migratorius* | 9 | 9 | 1 | 3 | | 22 |
| barn swallow | *Hirundo rustica* | 29 | | | | | 29 |
| black-capped chickadee | *Poecile atricapillus* | 17 | 12 | | | | 29 |
| blue jay | *Cyanocitta cristata* | 25 | 36 | 5 | 2 | | 68 |
| broad-winged hawk | *Buteo platypterus* | | | 2 | | | 2 |
| Canada goose | *Branta canadensis* | 1 | 196 | 3 | 10 | | 210 |
| cedar waxwing | *Bombycilla cedrorum* | 2 | | | | | 2 |
| common raven | *Corvus corax* | | 3 | | | | 3 |
| common yellowthroat | *Geothlypis trichas* | 8 | 1 | | | | 9 |
| dark-eyed junco | *Junco hyemalis* | 2 | 1 | | | | 3 |
| downy woodpecker | *Picoides pubescens* | 1 | 1 | | 1 | | 3 |
| eastern bluebird | *Sialia sialis* | | 1 | | | | 1 |
| eastern towhee | *Pipilo erythrophthalmus* | 1 | 1 | | | | 2 |
| European starling | *Sturnus vulgaris* | | 297 | 41 | 13 | | 351 |
| gray catbird | *Dumetella carolinensis* | 9 | 1 | | | | 10 |
| hairy woodpecker | *Picoides villosus* | | 1 | | | | 1 |
| magnolia warbler | *Setophaga magnolia* | 1 | | | | | 1 |
| mourning dove | *Zenaida macroura* | 4 | 36 | 3 | 2 | | 45 |
| northern cardinal | *Cardinalis cardinalis* | | 1 | | | | 1 |
| northern flicker | *Colaptes auratus* | 2 | 4 | | | | 6 |
| northern harrier | *Circus cyaneus* | 2 | 4 | | | | 6 |
| northern mockingbird | *Mimus polyglottos* | | | | 1 | | 1 |
| pileated woodpecker | *Dryocopus pileatus* | | 3 | | | | 3 |
| red-eyed vireo | *Vireo olivaceus* | 1 | | | | | 1 |
| red-tailed hawk | *Buteo jamaicensis* | | 1 | | | | 1 |
| red-winged blackbird | *Agelaius phoeniceus* | | 1 | | | | 1 |
| rock pigeon | *Columba livia* | 2 | | | 37 | 1 | 40 |
| Savannah sparrow | *Passerculus sandwichensis* | 8 | | | | | 8 |
| sharp-shinned hawk | *Accipiter striatus* | 1 | | | | | 1 |
| song sparrow | *Melospiza melodia* | 15 | | | 1 | | 16 |
| turkey vulture | *Cathartes aura* | | | 3 | | | 3 |

**Appendix A Table 1. Total number of species and individuals detected and distance from observer at 18 point count locations during 3 or 4 survey periods, Baron Winds Project, Fall 2013.**

| Acronym | Definition |
|---|---|
| USGS BBS | United States Geological Survey Breeding Bird Survey |
| SR | Species Richness |
| RA | Relative Abundance |
| Fr | Frequency |
| SDI | Shannon Diversity Index |

| Common name | Scientific name | 0-50 m | 50-100 m | > 100 m | Flyovers | Unknown distance | Grand total |
|---|---|---|---|---|---|---|---|
| veery | *Catharus fuscescens* | | 1 | | | | 1 |
| warbling vireo | *Vireo gilvus* | 2 | | | | | 2 |
| white-breasted nuthatch | *Sitta carolinensis* | 3 | 2 | | | | 5 |
| wild turkey | *Meleagris gallopavo* | 1 | 9 | | | | 10 |
| winter wren | *Troglodytes hiemalis* | 1 | | | | | 1 |
| yellow warbler | *Setophaga petechia* | 1 | | | | | 1 |
| yellow-breasted chat | *Icteria virens* | 1 | | | | | 1 |
| yellow-rumped warbler | *Setophaga coronata* | 1 | 1 | | | | 2 |
| unidentified flycatcher | *Tyrannidae (gen, sp)* | | 1 | | | | 1 |
| unidentified sparrow | *Emberizidae (gen, sp)* | 7 | 14 | | 2 | | 23 |
| unidentified thrush | *Turdidae (gen, sp)* | | 1 | | | | 1 |
| unidentified warbler | *Parulidae (gen, sp)* | | 2 | | 2 | | 4 |
| unidentified waterfowl | *n/a* | | | | 4 | | 4 |
| **Grand total** | | 249 | 774 | 72 | 96 | 7 | 1,198 |

**Appendix A Table 2. Total number of observations, relative abundance, and frequency of species at point count locations during 3 or 4 survey periods, Baron Winds Project, Fall 2013.**

| | Crop Field Visited 4 Times (6 points) | | | Crop Field Visited 3 Times (1 point) | | | Fallow Field Visited 4 Times (2 points) | | | Forest Edge Visited 4 Times (4 points) | | | Forest Edge Visited 3 Times (1 point) | | | Hardwood Forest Visited 4 Times (1 point) | | | Mixed Forest Visited 4 Times (3 points) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] |
| American crow | 48 | 2.00 | 100% | 3 | 1.00 | 100% | 15 | 1.88 | 100% | 33 | 2.06 | 100% | 3 | 1.00 | 100% | 4 | 1.00 | 100% | 13 | 1.08 | 100% |
| American goldfinch | 41 | 1.71 | 67% | | | | 53 | 6.63 | 100% | 7 | 0.44 | 75% | 3 | 1.00 | 100% | 7 | 1.75 | 100% | 33 | 2.75 | 100% |
| American robin | 6 | 0.25 | 50% | 2 | 0.67 | 100% | | | | 6 | 0.38 | 25% | | | | 2 | 0.50 | 100% | 6 | 0.50 | 67% |
| barn swallow | 28 | 1.17 | 17% | | | | | | | | | | | | | | | | 1 | 0.08 | 33% |
| black-capped chickadee | 4 | 0.17 | 33% | | | | 1 | 0.13 | 50% | 4 | 0.25 | 50% | 7 | 2.33 | 100% | 4 | 1.00 | 100% | 9 | 0.75 | 67% |
| blue jay | 21 | 0.88 | 100% | 1 | 0.33 | 100% | 9 | 1.13 | 100% | 17 | 1.06 | 100% | 3 | 1.00 | 100% | 7 | 1.75 | 100% | 10 | 0.83 | 100% |
| broad-winged hawk | | | | | | | | | | | | | | | | | | | 2 | 0.17 | 33% |
| Canada goose | 8 | 0.33 | 33% | 112 | 37.33 | 100% | | | | 1 | 0.06 | 25% | | | | | | | 89 | 7.42 | 33% |
| cedar waxwing | 2 | 0.08 | 17% | | | | | | | | | | | | | | | | | | |
| common raven | 1 | 0.04 | 17% | | | | | | | 1 | 0.06 | 25% | | | | | | | 1 | 0.08 | 33% |
| common yellowthroat | 2 | 0.08 | 17% | | | | | | | | | | 2 | 0.67 | 100% | 1 | 0.25 | 100% | 4 | 0.33 | 67% |
| dark-eyed junco | | | | | | | | | | | | | 2 | 0.67 | 100% | | | | 1 | 0.08 | 33% |
| downy woodpecker | 1 | 0.04 | 17% | | | | | | | | | | 1 | 0.33 | 100% | 1 | 0.25 | 100% | | | |
| eastern bluebird | | | | | | | | | | | | | | | | 1 | 0.25 | 100% | | | |
| eastern towhee | 1 | 0.04 | 17% | | | | | | | | | | | | | | | | 1 | 0.08 | 33% |
| European starling | 16 | 0.67 | 17% | 10 | 3.33 | 100% | 33 | 4.13 | 50% | 42 | 2.63 | 75% | | | | | | | 250 | 20.83 | 33% |
| gray catbird | 3 | 0.13 | 33% | | | | | | | 1 | 0.06 | 25% | | | | 2 | 0.50 | 100% | 4 | 0.33 | 33% |
| hairy woodpecker | | | | | | | | | | 1 | 0.06 | 25% | | | | | | | | | |
| magnolia warbler | | | | | | | | | | 1 | 0.06 | 25% | | | | | | | | | |

**Appendix A Table 2. Total number of observations, relative abundance, and frequency of species at point count locations during 3 or 4 survey periods, Baron Winds Project, Fall 2013.**

| | Crop Field Visited 4 Times (6 points) | | | Crop Field Visited 3 Times (1 point) | | | Fallow Field Visited 4 Times (2 points) | | | Forest Edge Visited 4 Times (4 points) | | | Forest Edge Visited 3 Times (1 point) | | | Hardwood Forest Visited 4 Times (1 point) | | | Mixed Forest Visited 4 Times (3 points) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] |
| mourning dove | 6 | 0.25 | 50% | 5 | 1.67 | 100% | 1 | 0.13 | 50% | 29 | 1.81 | 50% | | | | | | | 4 | 0.33 | 33% |
| northern cardinal | | | | | | | | | | 1 | 0.06 | 25% | | | | | | | | | |
| northern flicker | 1 | 0.04 | 17% | | | | 1 | 0.13 | 50% | 2 | 0.13 | 25% | | | | 2 | 0.50 | 100% | | | |
| northern harrier | 2 | 0.08 | 17% | 2 | 0.67 | 100% | | | | 1 | 0.06 | 25% | | | | | | | 1 | 0.08 | 33% |
| northern mockingbird | | | | | | | | | | 1 | 0.06 | 25% | | | | | | | | | |
| pileated woodpecker | | | | | | | | | | 2 | 0.13 | 50% | | | | 1 | 0.25 | 100% | | | |
| red-eyed vireo | | | | | | | | | | | | | | | | 1 | 0.25 | 100% | | | |
| red-tailed hawk | 1 | 0.04 | 17% | | | | | | | | | | | | | | | | | | |
| red-winged blackbird | 1 | 0.04 | 17% | | | | | | | | | | | | | | | | | | |
| rock pigeon | 32 | 1.33 | 33% | 6 | 2.00 | 100% | 1 | 0.13 | 50% | 1 | 0.06 | 25% | | | | | | | | | |
| Savannah sparrow | | | | | | | 1 | 0.13 | 50% | 6 | 0.38 | 25% | | | | | | | 1 | 0.08 | 33% |
| sharp-shinned hawk | | | | | | | 1 | 0.13 | 50% | | | | | | | | | | | | |
| song sparrow | 8 | 0.33 | 33% | | | | 1 | 0.13 | 50% | 3 | 0.19 | 25% | | | | | | | 4 | 0.33 | 67% |
| turkey vulture | | | | | | | | | | | | | | | | | | | 3 | 0.25 | 33% |
| veery | | | | | | | | | | 1 | 0.06 | 25% | | | | | | | | | |
| warbling vireo | 1 | 0.04 | 17% | | | | | | | | | | | | | | | | 1 | 0.08 | 33% |
| white-breasted nuthatch | | | | | | | | | | 2 | 0.13 | 50% | | | | | | | 3 | 0.25 | 67% |
| wild turkey | | | | | | | | | | 10 | 0.63 | 25% | | | | | | | | | |
| winter wren | 1 | 0.04 | 17% | | | | | | | | | | | | | | | | | | |
| yellow warbler | | | | | | | | | | | | | | | | | | | 1 | 0.08 | 33% |

**Appendix A Table 2. Total number of observations, relative abundance, and frequency of species at point count locations during 3 or 4 survey periods, Baron Winds Project, Fall 2013.**

| | Crop Field Visited 4 Times (6 points) | | | Crop Field Visited 3 Times (1 point) | | | Fallow Field Visited 4 Times (2 points) | | | Forest Edge Visited 4 Times (4 points) | | | Forest Edge Visited 3 Times (1 point) | | | Hardwood Forest Visited 4 Times (1 point) | | | Mixed Forest Visited 4 Times (3 points) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** |
| yellow-breasted chat | | | | | | | | | | | | | | | | 1 | 0.25 | 100% | | | |
| yellow-rumped warbler | | | | | | | | | | | | | 1 | 0.33 | 100% | | | | 1 | 0.08 | 33% |
| unidentified flycatcher | | | | | | | | | | | | | | | | 1 | 0.25 | 100% | | | |
| unidentified sparrow | 10 | 0.42 | 67% | 4 | 1.33 | 100% | 2 | 0.25 | 50% | 2 | 0.13 | 50% | | | | | | | 5 | 0.42 | 67% |
| unidentified thrush | | | | | | | | | | | | | | | | 1 | 0.25 | 100% | | | |
| unidentified warbler | 2 | 0.08 | 17% | | | | | | | 1 | 0.06 | 25% | | | | | | | 1 | 0.08 | 33% |
| unidentified waterfowl | | | | | | | | | | | | | | | | | | | 4 | 0.33 | 33% |
| **Grand Total** | | | **247** | | | **145** | | | **119** | | | **176** | | | **22** | | | **36** | | | **453** |
| **Relative abundance** | | | **10.29** | | | **48.33** | | | **14.88** | | | **11.00** | | | **7.33** | | | **9.00** | | | **37.75** |
| **Species richness*** | | | **23** | | | **8** | | | **11** | | | **23** | | | **8** | | | **13** | | | **23** |
| **Shannon Diversity Index** | | | **2.50** | | | **0.96** | | | **1.52** | | | **2.38** | | | **1.90** | | | **2.40** | | | **1.64** |

a Total number of individuals detected

b Mean number of birds observed

c Percentage of survey points at which the species was observed

* Not including unidentified genera of birds (e.g., unidentified warbler, *Parulidae)*

# Appendix B

**Breeding Bird Survey Data Tables**

**Appendix B Table 1. Total number of species and individuals detected and distance from observer at 92 point count locations during two survey periods, Baron Winds Project, Spring 2015.**

| Common Name | Scientific name | 0-50m | 50-100m | >100m | flyovers | Total |
|---|---|---|---|---|---|---|
| Acadian flycatcher | *Empidonax virescens* | 2 | 4 | | | 6 |
| alder flycatcher | *Empidonax alnorum* | 3 | 1 | | | 4 |
| American crow | *Corvus brachyrhynchos* | 20 | 150 | 103 | 11 | 284 |
| American goldfinch | *Spinus tristis* | 7 | 22 | 10 | 35 | 74 |
| American robin | *Turdus migratorius* | 62 | 30 | 26 | 9 | 127 |
| bald eagle | *Haliaeetus leucocephalus* | | | | 1 | 1 |
| Baltimore oriole | *Icterus galbula* | 3 | 4 | 1 | 1 | 9 |
| barn swallow | *Hirundo rustica* | 10 | 3 | 1 | 10 | 24 |
| black-and-white warbler | *Mniotilta varia* | 1 | | | | 1 |
| black-capped chickadee | *Poecile atricapillus* | 15 | 14 | 5 | | 34 |
| black-throated green warbler | *Setophaga virens* | 11 | 6 | 4 | | 21 |
| blue jay | *Cyanocitta cristata* | 23 | 22 | 15 | 9 | 69 |
| blue-headed vireo | *Vireo solitarius* | 1 | 1 | | | 2 |
| bobolink | *Dolichonyx oryzivorus* | 62 | 56 | 13 | 9 | 140 |
| brown thrasher | *Toxostoma rufum* | | 2 | 1 | | 3 |
| brown-headed cowbird | *Molothrus ater* | 3 | 1 | | | 4 |
| Canada goose | *Branta canadensis* | | 9 | 43 | 16 | 68 |
| cedar waxwing | *Bombycilla cedrorum* | 12 | 30 | 2 | 14 | 58 |
| chestnut-sided warbler | *Setophaga pensylvanica* | 3 | 3 | 1 | | 7 |
| chipping Sparrow | *Spizella passerina* | 21 | 5 | 3 | | 29 |
| clay-colored sparrow | *Spizella pallida* | | 1 | | | 1 |
| common grackle | *Quiscalus quiscula* | 20 | 7 | 7 | 8 | 42 |
| common raven | *Corvus corax* | | 1 | 7 | | 8 |
| common yellowthroat | *Geothlypis trichas* | 42 | 40 | 10 | | 92 |
| dark-eyed junco | *Junco hyemalis* | 10 | 11 | | | 21 |
| eastern bluebird | *Sialia sialis* | 4 | 2 | | | 6 |
| eastern meadowlark | *Sturnella magna* | 1 | 5 | 2 | 2 | 10 |
| eastern phoebe | *Sayornis phoebe* | 1 | | | | 1 |
| eastern towhee | *Pipilo erythrophthalmus* | 2 | 6 | | | 8 |
| eastern wood-pewee | *Contopus virens* | 6 | 3 | | | 9 |
| European starling | *Sturnus vulgaris* | 10 | 95 | 40 | 9 | 154 |
| field sparrow | *Spizella pusilla* | 3 | 5 | 2 | | 10 |
| grasshopper sparrow | *Ammodramus savannarum* | 1 | | | | 1 |
| gray catbird | *Dumetella carolinensis* | 12 | 2 | | | 14 |
| great blue heron | *Ardea herodias* | 1 | | | 1 | 2 |
| hermit thrush | *Catharus guttatus* | 1 | 5 | 7 | | 13 |
| house finch | *Haemorhous mexicanus* | | 2 | | | 2 |
| house wren | *Troglodytes aedon* | 4 | 4 | 1 | | 9 |
| indigo bunting | *Passerina cyanea* | 4 | 5 | 1 | | 10 |
| killdeer | *Charadrius vociferus* | | 7 | 3 | 1 | 11 |
| least flycatcher | *Empidonax minimus* | 1 | | | | 1 |
| mallard | *Anas platyrhynchos* | | | 1 | 4 | 5 |
| mourning dove | *Zenaida macroura* | 11 | 13 | 12 | 1 | 37 |
| mourning warbler | *Geothlypis philadelphia* | 1 | 1 | | | 2 |
| northern cardinal | *Cardinalis cardinalis* | 3 | 4 | 1 | | 8 |
| northern flicker | *Colaptes auratus* | 1 | 6 | 7 | | 14 |
| northern harrier | *Circus cyaneus* | | | 1 | | 1 |
| northern mockingbird | *Mimus polyglottos* | 2 | 4 | | | 6 |
| northern parula | *Setophaga americana* | 1 | 1 | 1 | | 3 |
| ovenbird | *Seiurus aurocapilla* | 38 | 32 | 27 | | 97 |
| pileated woodpecker | *Dryocopus pileatus* | | | | 5 | 5 |
| red-bellied woodpecker | *Melanerpes carolinus* | | 1 | | | 1 |
| red-breasted nuthatch | *Sitta canadensis* | | 1 | | | 1 |
| red-eyed vireo | *Vireo olivaceus* | 12 | 7 | 2 | | 21 |
| red-winged blackbird | *Agelaius phoeniceus* | 76 | 142 | 26 | 8 | 252 |
| rock pigeon | *Columba livia* | | 6 | | 3 | 9 |
| rose-breasted grosbeak | *Pheucticus ludovicianus* | 3 | 8 | 5 | | 16 |
| ruby-crowned kinglet | *Regulus calendula* | | 2 | | | 2 |
| ruby-throated hummingbird | *Archilochus colubris* | 1 | | | | 1 |
| ruffed grouse | *Bonasa umbellus* | 1 | | | | 1 |
| Savannah sparrow | *Passerculus sandwichensis* | 43 | 49 | 10 | | 102 |
| scarlet tanager | *Piranga olivacea* | 1 | 5 | 2 | | 8 |
| sharp-shinned hawk | *Accipiter striatus* | | | | 1 | 1 |
| song sparrow | *Melospiza melodia* | 22 | 15 | 1 | | 38 |
| tree swallow | *Tachycineta bicolor* | 5 | 1 | | 3 | 9 |
| tufted titmouse | *Baeolophus bicolor* | | 1 | | | 1 |
| veery | *Catharus fuscescens* | 1 | 2 | 1 | | 4 |
| warbling vireo | *Vireo gilvus* | | 1 | | | 1 |
| white-breasted nuthatch | *Sitta carolinensis* | 1 | 3 | | | 4 |
| white-throated sparrow | *Zonotrichia albicollis* | | 1 | | | 1 |
| wild turkey | *Meleagris gallopavo* | | | 3 | | 3 |
| willow flycatcher | *Empidonax traillii* | 2 | | | | 2 |
| winter wren | *Troglodytes hiemalis* | 2 | | | | 2 |

**Appendix B Table 1. Total number of species and individuals detected and distance from observer at 92 point count locations during two survey periods, Baron Winds Project, Spring 2015.**

| Common Name | Scientific name | 0-50m | 50-100m | >100m | flyovers | Total |
|---|---|---|---|---|---|---|
| wood thrush | *Hylocichla mustelina* | 2 | | 2 | | 4 |
| yellow warbler | *Setophaga petechia* | 20 | 19 | 1 | | 40 |
| yellow-bellied sapsucker | *Sphyrapicus varius* | 3 | 1 | | | 4 |
| unidentified duck | *Anatinae (gen, sp)* | | | | 5 | 5 |
| unidentified passerine | *n/a* | | 2 | 5 | 32 | 39 |
| unidentified sparrow | *Emberizidae (gen, sp)* | | 4 | | | 4 |
| unidentified thrush | *Turdidae (gen, sp)* | 1 | | | | 1 |
| unidentified warbler | *Parulidae (gen, sp)* | | 5 | | 1 | 6 |
| unidentified woodpecker | *Picadae (gen, sp)* | | 6 | 13 | | 19 |
| **Total** | | **635** | **907** | **429** | **199** | **2170** |

*Numbers largely represent singing males, but also include male and some female individuals that were visually detected.

**Appendix B Table 2. Total number of observations, relative abundance, and frequency of species at 92 survey and control point count locations during two survey periods, Baron Winds Project, Spring 2015.**

| Acronym | Definition |
|---|---|
| USGS BBS | United States Geological Survey Breeding Bird Survey |
| SR | Species Richness |
| RA | Relative Abundance |
| Fr | Frequency |
| SDI | Shannon Diversity Index |

| | Agricultural (50 points) | | | | | | Forest edge (25 points) | | | | | | Mixed forest (4 points) | | | | | | Hardwood forest (7 points) | | | Over-grown field (6 points) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Survey points (37) | | | Control points (13) | | | Survey points (8) | | | Control points (17) | | | Survey points (3) | | | Control points (1) | | | Survey points (7) | | | Survey points (6) | | |
| Species | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] |
| Acadian flycatcher | 2 | 0.03 | 5% | | | | | | | 3 | 0.09 | 12% | | | | | | | | | | 1 | 0.08 | 17% |
| alder flycatcher | | | | 1 | 0.04 | 8% | | | | 1 | 0.03 | 6% | | | | 2 | 1.00 | 100% | | | | | | |
| American crow | 88 | 1.19 | 68% | 22 | 0.85 | 46% | 26 | 1.63 | 75% | 14 | 0.41 | 35% | 1 | 0.17 | 33% | 2 | 1.00 | 100% | 4 | 0.29 | 29% | 13 | 1.08 | 100% |
| American goldfinch | 4 | 0.05 | 8% | 14 | 0.54 | 31% | | | | 6 | 0.18 | 12% | | | | 2 | 1.00 | 100% | | | | 3 | 0.25 | 17% |
| American robin | 14 | 0.19 | 22% | 20 | 0.77 | 46% | 3 | 0.19 | 38% | 44 | 1.29 | 76% | 1 | 0.17 | 33% | 1 | 0.50 | 100% | 8 | 0.57 | 57% | 1 | 0.08 | 17% |
| Baltimore oriole | 2 | 0.03 | 5% | 1 | 0.04 | 8% | | | | 3 | 0.09 | 12% | | | | | | | | | | 1 | 0.08 | 17% |
| barn swallow | 9 | 0.12 | 14% | 4 | 0.15 | 15% | | | | | | | | | | | | | | | | | | |
| black-and-white warbler | 1 | 0.01 | 3% | | | | | | | | | | | | | | | | | | | | | |
| black-capped chickadee | 1 | 0.01 | 3% | | | | | | | 26 | 0.76 | 76% | | | | | | | 1 | 0.07 | 14% | 1 | 0.08 | 17% |
| black-throated green warbler | 3 | 0.04 | 5% | | | | 7 | 0.44 | 25% | | | | | | | | | | 7 | 0.50 | 43% | | | |
| blue jay | 10 | 0.14 | 16% | 4 | 0.15 | 31% | 5 | 0.31 | 50% | 13 | 0.38 | 41% | 1 | 0.17 | 33% | 2 | 1.00 | 100% | 7 | 0.50 | 57% | 3 | 0.25 | 33% |
| blue-headed vireo | | | | | | | | | | | | | | | | | | | 2 | 0.14 | 29% | | | |
| bobolink | 86 | 1.16 | 38% | | | | 2 | 0.13 | 13% | | | | | | | | | | | | | 30 | 2.50 | 50% |
| brown thrasher | | | | 1 | 0.04 | 8% | 1 | 0.06 | 13% | | | | | | | | | | | | | | | |
| brown-headed cowbird | | | | 3 | 0.12 | 15% | | | | 1 | 0.03 | 6% | | | | | | | | | | | | |
| Canada goose | 4 | 0.05 | 3% | | | | | | | | | | | | | | | | | | | 5 | 0.42 | 33% |
| cedar waxwing | 2 | 0.03 | 3% | 19 | 0.73 | 31% | 4 | 0.25 | 13% | 15 | 0.44 | 18% | | | | | | | 2 | 0.14 | 14% | | | |
| chestnut-sided warbler | 1 | 0.01 | 3% | | | | | | | | | | | | | | | | 5 | 0.36 | 43% | | | |
| chipping Sparrow | 2 | 0.03 | 5% | 6 | 0.23 | 46% | | | | 17 | 0.50 | 53% | | | | | | | 1 | 0.07 | 14% | | | |
| clay-colored sparrow | | | | | | | | | | | | | | | | | | | | | | 1 | 0.08 | 17% |
| common grackle | 1 | 0.01 | 3% | 11 | 0.42 | 23% | | | | 11 | 0.32 | 24% | 1 | 0.17 | 33% | 3 | 1.50 | 100% | | | | | | |
| common raven | | | | | | | | | | 1 | 0.03 | 6% | | | | | | | | | | | | |
| common yellowthroat | 33 | 0.45 | 49% | 13 | 0.50 | 77% | 9 | 0.56 | 50% | 12 | 0.35 | 47% | 1 | 0.17 | 33% | | | | 3 | 0.21 | 29% | 11 | 0.92 | 83% |
| dark-eyed junco | | | | | | | | | | 14 | 0.41 | 53% | 2 | 0.33 | 33% | | | | 5 | 0.36 | 43% | | | |
| eastern bluebird | | | | 5 | 0.19 | 38% | | | | | | | | | | | | | | | | 1 | 0.08 | 17% |
| eastern meadowlark | 4 | 0.05 | 8% | 2 | 0.08 | 15% | | | | | | | | | | | | | | | | | | |
| eastern phoebe | | | | | | | | | | 1 | 0.03 | 6% | | | | | | | | | | | | |
| eastern towhee | 2 | 0.03 | 3% | | | | 1 | 0.06 | 13% | | | | 1 | 0.17 | 33% | | | | | | | 4 | 0.33 | 50% |
| eastern wood-pewee | 1 | 0.01 | 3% | 2 | 0.08 | 8% | 1 | 0.06 | 13% | 2 | 0.06 | 12% | 2 | 0.33 | 33% | | | | 1 | 0.07 | 14% | | | |
| European starling | | | | 89 | 3.42 | 54% | | | | 16 | 0.47 | 35% | | | | | | | | | | | | |
| field sparrow | 4 | 0.05 | 8% | 1 | 0.04 | 8% | 3 | 0.19 | 13% | | | | | | | | | | | | | | | |
| grasshopper sparrow | 1 | 0.01 | 3% | | | | | | | | | | | | | | | | | | | | | |
| gray catbird | 2 | 0.03 | 5% | 1 | 0.04 | 8% | | | | 10 | 0.29 | 41% | | | | | | | | | | 1 | 0.08 | 17% |
| great blue heron | 1 | 0.01 | 3% | | | | | | | | | | | | | | | | | | | | | |

**Appendix B Table 2. Total number of observations, relative abundance, and frequency of species at 92 survey and control point count locations during two survey periods, Baron Winds Project, Spring 2015.**

| Acronym | Definition |
|---|---|
| USGS BBS | United States Geological Survey Breeding Bird Survey |
| SR | Species Richness |
| RA | Relative Abundance |
| Fr | Frequency |
| SDI | Shannon Diversity Index |

| | Agricultural (50 points) | | | | | | Forest edge (25 points) | | | | | | Mixed forest (4 points) | | | | | | Hardwood forest (7 points) | | | Over-grown field (6 points) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Survey points (37) | | | Control points (13) | | | Survey points (8) | | | Control points (17) | | | Survey points (3) | | | Control points (1) | | | Survey points (7) | | | Survey points (6) | | |
| Species | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] | Total[a] | RA[b] | FR[c] |
| hermit thrush | 2 | 0.03 | 5% | 2 | 0.08 | 15% | 1 | 0.06 | 13% | | | | 1 | 0.17 | 33% | | | | | | | | | |
| house finch | | | | 2 | 0.08 | 8% | | | | | | | | | | | | | | | | | | |
| house wren | 2 | 0.03 | 5% | 3 | 0.12 | 23% | 1 | 0.06 | 13% | 2 | 0.06 | 6% | | | | | | | | | | | | |
| indigo bunting | 4 | 0.05 | 11% | 3 | 0.12 | 15% | 2 | 0.13 | 25% | | | | | | | | | | | | | | | |
| killdeer | 6 | 0.08 | 11% | 1 | 0.04 | 8% | | | | | | | | | | | | | | | | | | |
| least flycatcher | | | | 1 | 0.04 | 8% | | | | | | | | | | | | | | | | | | |
| mourning dove | | | | 10 | 0.38 | 46% | 1 | 0.06 | 13% | 13 | 0.38 | 35% | | | | | | | | | | | | |
| mourning warbler | | | | | | | 1 | 0.06 | 13% | | | | | | | | | | | | | 1 | 0.08 | 17% |
| northern cardinal | | | | 3 | 0.12 | 23% | | | | 2 | 0.06 | 12% | | | | 1 | 0.50 | 100% | 1 | 0.07 | 14% | | | |
| northern flicker | 2 | 0.03 | 5% | | | | 1 | 0.06 | 13% | | | | | | | | | | 3 | 0.21 | 43% | 1 | 0.08 | 17% |
| northern mockingbird | 2 | 0.03 | 3% | 1 | 0.04 | 8% | | | | | | | | | | | | | 1 | 0.07 | 14% | 2 | 0.17 | 33% |
| northern parula | 1 | 0.01 | 3% | | | | | | | | | | | | | | | | | | | 1 | 0.08 | 17% |
| ovenbird | 15 | 0.20 | 22% | | | | 27 | 1.69 | 88% | 8 | 0.24 | 29% | 8 | 1.33 | 100% | | | | 9 | 0.64 | 57% | 3 | 0.25 | 33% |
| red-bellied woodpecker | | | | 1 | 0.04 | 8% | | | | | | | | | | | | | | | | | | |
| red-breasted nuthatch | | | | | | | | | | 1 | 0.03 | 6% | | | | | | | | | | | | |
| red-eyed vireo | 4 | 0.05 | 11% | 2 | 0.08 | 15% | 4 | 0.25 | 38% | 7 | 0.21 | 35% | | | | | | | 2 | 0.14 | 14% | | | |
| red-winged blackbird | 70 | 0.95 | 30% | 71 | 2.73 | 62% | 6 | 0.38 | 25% | 6 | 0.18 | 12% | | | | 11 | 5.50 | 100% | 5 | 0.36 | 29% | 49 | 4.08 | 50% |
| rock pigeon | | | | 6 | 0.23 | 8% | | | | | | | | | | | | | | | | | | |
| rose-breasted grosbeak | 6 | 0.08 | 14% | | | | | | | 4 | 0.12 | 18% | 1 | 0.17 | 33% | | | | | | | | | |
| ruby-crowned kinglet | | | | 2 | 0.08 | 8% | | | | | | | | | | | | | | | | | | |
| ruby-throated hummingbird | | | | | | | | | | 1 | 0.03 | 6% | | | | | | | | | | | | |
| ruffed grouse | | | | | | | | | | | | | 1 | 0.17 | 33% | | | | | | | | | |
| Savannah sparrow | 72 | 0.97 | 62% | 6 | 0.23 | 31% | 4 | 0.25 | 13% | | | | | | | | | | | | | 10 | 0.83 | 50% |
| scarlet tanager | | | | | | | 1 | 0.06 | 13% | 2 | 0.06 | 12% | | | | | | | 1 | 0.07 | 14% | 2 | 0.17 | 33% |
| song sparrow | 15 | 0.20 | 30% | 7 | 0.27 | 38% | | | | 4 | 0.12 | 24% | 2 | 0.33 | 33% | 2 | 1.00 | 100% | | | | 7 | 0.58 | 50% |
| tree swallow | 1 | 0.01 | 3% | 2 | 0.08 | 8% | | | | | | | | | | 2 | 1.00 | 100% | | | | 1 | 0.08 | 17% |
| tufted titmouse | 1 | 0.01 | 3% | | | | | | | | | | | | | | | | | | | | | |
| veery | | | | | | | | | | 1 | 0.03 | 6% | 1 | 0.17 | 33% | | | | 1 | 0.07 | 14% | | | |
| warbling vireo | | | | | | | | | | | | | | | | | | | 1 | 0.07 | 14% | | | |
| white-breasted nuthatch | 1 | 0.01 | 3% | 1 | 0.04 | 8% | | | | 1 | 0.03 | 6% | | | | | | | 1 | 0.07 | 14% | | | |
| white-throated sparrow | | | | | | | 1 | 0.06 | 13% | | | | | | | | | | | | | | | |
| willow flycatcher | 1 | 0.01 | 3% | | | | | | | | | | | | | | | | | | | 1 | 0.08 | 17% |
| winter wren | | | | | | | | | | 2 | 0.06 | 6% | | | | | | | | | | | | |
| wood thrush | | | | | | | | | | 1 | 0.03 | 6% | 1 | 0.17 | 33% | | | | | | | | | |

**Appendix B Table 2. Total number of observations, relative abundance, and frequency of species at 92 survey and control point count locations during two survey periods, Baron Winds Project, Spring 2015.**

| Acronym | Definition |
|---|---|
| USGS BBS | United States Geological Survey Breeding Bird Survey |
| SR | Species Richness |
| RA | Relative Abundance |
| Fr | Frequency |
| SDI | Shannon Diversity Index |

| | Agricultural (50 points) | | | | | | Forest edge (25 points) | | | | | | Mixed forest (4 points) | | | | | | Hardwood forest (7 points) | | | Over-grown field (6 points) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Survey points (37) | | | Control points (13) | | | Survey points (8) | | | Control points (17) | | | Survey points (3) | | | Control points (1) | | | Survey points (7) | | | Survey points (6) | | |
| **Species** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** | **Total[a]** | **RA[b]** | **FR[c]** |
| yellow warbler | 14 | 0.19 | 27% | 6 | 0.23 | 38% | | | | 10 | 0.29 | 53% | | | | 3 | 1.50 | 100% | 2 | 0.14 | 14% | 4 | 0.33 | 50% |
| yellow-bellied sapsucker | 1 | 0.01 | 3% | 1 | 0.04 | 8% | 1 | 0.06 | 13% | 1 | 0.03 | 6% | | | | | | | | | | | | |
| unidentified passerine | 1 | 0.01 | 3% | | | | | | | 1 | 0.03 | 6% | | | | | | | | | | | | |
| unidentified sparrow | 4 | 0.05 | 3% | | | | | | | | | | | | | | | | | | | | | |
| unidentified thrush | | | | | | | 1 | 0.06 | 13% | | | | | | | | | | | | | | | |
| unidentified warbler | 2 | 0.03 | 5% | | | | 1 | 0.06 | 13% | 1 | 0.03 | 6% | | | | | | | | | | 1 | 0.08 | 17% |
| unidentified woodpecker | 2 | 0.03 | 5% | 3 | 0.12 | 23% | | | | 1 | 0.03 | 6% | | | | | | | | | | | | |
| **Total[1]** | **507** | | | **353** | | | **115** | | | **279** | | | **25** | | | **31** | | | **73** | | | **159** | | |
| **Mean RA** | **6.85 ± 0.03** | | | **13.58 ± 0.08** | | | **7.19 ± 0.04** | | | **8.21 ± 0.03** | | | **4.17 ± 0.02** | | | **15.50 ± 0.11** | | | **5.21 ± 0.02** | | | **13.25 ± 0.08** | | |
| **SR[2]** | **43** | | | **39** | | | **24** | | | **36** | | | **15** | | | **11** | | | **23** | | | **26** | | |
| **SDI** | **2.82** | | | **2.73** | | | **2.55** | | | **3.11** | | | **2.39** | | | **2.10** | | | **2.85** | | | **2.42** | | |

[1] Excluding birds detected at greater than 100 m and flyovers
a Total number of individuals detected (mainly singing males, also males and females that were visually observed)
b Mean number of birds observed
c Percentage of survey points at which the species was observed
[2] Not including unidentified genera of birds (i.e. unidentified flycatcher, *Tyrannidae*, or unidentified warbler, *Parulidae*).

**Appendix B Table 3. Total number of species and individuals detected at 3 locations identified as potential Henslow's sparrow habitat during two survey periods, Baron Winds Project, Spring 2015.**

| Common Name | Scientific name | Point number | | | Total |
|---|---|---|---|---|---|
| | | Henslow's 11 | Henslow's 16 | Henslow's 18 | |
| American crow | *Corvus brachyrhynchos* | | 3 | 2 | 5 |
| American goldfinch | *Spinus tristis* | 4 | 4 | 2 | 10 |
| American kestrel | *Falco sparverius* | | 2 | | 2 |
| American robin | *Turdus migratorius* | 1 | 2 | 3 | 6 |
| Baltimore oriole | *Icterus galbula* | | 1 | | 1 |
| barn swallow | *Hirundo rustica* | 2 | 2 | 2 | 6 |
| bobolink | *Dolichonyx oryzivorus* | 1 | | | 1 |
| cedar waxwing | *Bombycilla cedrorum* | 1 | | | 1 |
| chipping sparrow | *Spizella passerina* | | 2 | 1 | 3 |
| common grackle | *Quiscalus quiscula* | 2 | 1 | 2 | 5 |
| common yellowthroat | *Geothlypis trichas* | 2 | 3 | 3 | 8 |
| European starling | *Sturnus vulgaris* | | 1 | | 1 |
| field sparrow | *Spizella pusilla* | | 1 | | 1 |
| gray catbird | *Dumetella carolinensis* | | | 1 | 1 |
| indigo bunting | *Passerina cyanea* | | | 1 | 1 |
| mourning dove | *Zenaida macroura* | 4 | 3 | | 7 |
| northern cardinal | *Cardinalis cardinalis* | | 1 | | 1 |
| northern flicker | *Colaptes auratus* | 1 | 1 | | 2 |
| northern parula | *Setophaga americana* | 1 | | | 1 |
| red-winged blackbird | *Agelaius phoeniceus* | 15 | 20 | 4 | 39 |
| song sparrow | *Melospiza melodia* | | 1 | 1 | 2 |
| tree swallow | *Tachycineta bicolor* | 2 | 2 | | 4 |
| warbling vireo | *Vireo gilvus* | 1 | | | 1 |
| yellow-bellied flycatcher | *Empidonax flaviventris* | | | 1 | 1 |
| unidentified passerine | *n/a* | | 1 | | 1 |
| unidentified sparrow | *Emberizidae (gen, sp)* | 1 | | | 1 |
| **Total** | | **38** | **51** | **23** | **112** |

# Appendix C

**Acoustic Bat Survey Results Tables**

**Appendix C Table 1. Summary of acoustic bat data and weather during each survey night at Tower High, Baron Winds Project, 2015.**

| | | BBSH | | | HB | MYSP | RBTB | | | UNKN | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Night of | Operational? | BBSH | Big brown | Silver-haired | Hoary | MYSP | Eastern red | Tri-colored | RBTB | HFUN | LFUN | UNKN | Total | Wind Speed (m/s) | Temperature (Celsius) | Barometric Pressure |
| 06/01/15 | 1 | | | | 1 | | | | | | | | **1** | 4 | 7 | 935 |
| 06/02/15 | 1 | | | | 1 | | | | | | 3 | | **4** | 4 | 8 | 937 |
| 06/03/15 | 1 | | | | | | | | | | | | **0** | 7 | 14 | 938 |
| 06/04/15 | 1 | | | | 1 | | | | | | | | **1** | 6 | 14 | 936 |
| 06/05/15 | 1 | | | 1 | | | | | | | 2 | | **3** | 5 | 13 | 932 |
| 06/06/15 | 1 | | | | | | | | | | | | **0** | 6 | 10 | 935 |
| 06/07/15 | 1 | | | 1 | | | | | | | 3 | | **4** | 11 | 18 | 928 |
| 06/08/15 | 1 | | | | 2 | | | | | | | | **2** | 4 | 16 | 923 |
| 06/09/15 | 1 | 1 | | | 1 | | | | | | | | **2** | 6 | 14 | 928 |
| 06/10/15 | 1 | 1 | | 1 | 1 | | | | | | 2 | | **5** | 7 | 18 | 929 |
| 06/11/15 | 1 | | | | | | | | | | 3 | | **3** | 5 | 18 | 933 |
| 06/12/15 | 1 | | | | | | | | | | 1 | | **1** | 6 | 15 | 931 |
| 06/13/15 | 1 | 1 | | | | | | | | | 2 | | **3** | 5 | 18 | 937 |
| 06/14/15 | 1 | | | | | | | | | | 2 | | **2** | 6 | 19 | 933 |
| 06/15/15 | 1 | | | | | | | | | | 1 | | **1** | 5 | 20 | 933 |
| 06/16/15 | 1 | | | | | | | | | | | | **0** | 5 | 15 | 937 |
| 06/17/15 | 1 | | | | | | | | | | | | **0** | 5 | 17 | 935 |
| 06/18/15 | 1 | | 1 | | | | | | | | 1 | | **2** | 5 | 17 | 932 |
| 06/19/15 | 1 | | | | | | | | | | | | **0** | 4 | 13 | 935 |
| 06/20/15 | 1 | | | | 1 | | | | | | 2 | | **3** | 6 | 18 | 929 |
| 06/21/15 | 1 | | | | | | | | | | 3 | | **3** | 5 | 17 | 933 |
| 06/22/15 | 1 | | | | 1 | | | | | | | | **1** | 9 | 21 | 930 |
| 06/23/15 | 1 | | | | | | | | | | 1 | | **1** | 5 | 13 | 933 |
| 06/24/15 | 1 | | | | | | | | | | | | **0** | 4 | 16 | 937 |
| 06/25/15 | 1 | | | | 1 | | | | | | 1 | | **2** | 4 | 14 | 933 |
| 06/26/15 | 1 | | | | | | | | | | | | **0** | 6 | 15 | 935 |
| 06/27/15 | 1 | | | | | | | | | | | | **0** | 11 | 10 | 923 |
| 06/28/15 | 1 | | | | | | | | | | | | **0** | 7 | 11 | 926 |
| 06/29/15 | 1 | | | | | | | | | | | | **0** | 5 | 16 | 931 |
| 06/30/15 | 1 | | | | 2 | | | | | | | | **2** | 5 | 16 | 927 |
| 07/01/15 | 1 | | | | 1 | | | | | | 1 | | **2** | 4 | 14 | 931 |
| 07/02/15 | 1 | | | | | | | | | | 1 | | **1** | 3 | 13 | 933 |
| 07/03/15 | 1 | | | | | | | | | | 1 | | **1** | 5 | 17 | 932 |
| 07/04/15 | 1 | | | | | | | | | | | | **0** | 3 | 16 | 936 |
| 07/05/15 | 1 | | | | | | | | | | 1 | | **1** | 5 | 19 | 939 |
| 07/06/15 | 1 | 1 | | | | | | | | | 3 | | **4** | 6 | 20 | 935 |
| 07/07/15 | 1 | | | | | | | | | | 2 | | **2** | 7 | 17 | 933 |
| 07/08/15 | 1 | | | | | | 1 | | | | 1 | | **2** | 3 | 14 | 934 |
| 07/09/15 | 1 | | | | | | | | | | | | **0** | 5 | 13 | 933 |
| 07/10/15 | 1 | | | | | | | | | | | | **0** | 4 | 18 | 938 |
| 07/11/15 | 1 | | 1 | | | | | | | | 1 | | **2** | 3 | 19 | 938 |
| 07/12/15 | 1 | | | | 1 | | | | | | 2 | | **3** | 4 | 20 | 934 |
| 07/13/15 | 1 | | 2 | | 1 | | | | | 1 | 1 | | **5** | 7 | 19 | 925 |
| 07/14/15 | 1 | | | | | | | | | | 1 | | **1** | 4 | 16 | 923 |
| 07/15/15 | 1 | | | | | | | | | | | | **0** | 4 | 12 | 934 |
| 07/16/15 | 1 | | | | | | | | | | 1 | | **1** | 6 | 16 | 936 |
| 07/17/15 | 1 | | | | | | | | | | 2 | | **2** | 7 | 20 | 932 |
| 07/18/15 | 1 | | 1 | | | | | | | | 1 | | **2** | 6 | 22 | 933 |
| 07/19/15 | 1 | | 1 | | 1 | | | | | 1 | 3 | | **6** | 6 | 21 | 929 |
| 07/20/15 | 1 | | | | 1 | | | | | 1 | 2 | | **4** | 7 | 19 | 926 |
| 07/21/15 | 1 | | | | 1 | | | | | | | | **1** | 6 | 15 | 927 |
| 07/22/15 | 1 | | | | | | | | | | | | **0** | 4 | 14 | 932 |
| 07/23/15 | 1 | | | | 1 | | | | | | 1 | | **2** | 3 | 16 | 933 |
| 07/24/15 | 1 | | | | | | | | | | | | **0** | 4 | 20 | 935 |
| 07/25/15 | 1 | | | | | | | | | | 5 | | **5** | 6 | 20 | 933 |
| 07/26/15 | 1 | | 1 | | 4 | | 1 | | | | 3 | | **9** | 2 | 20 | 935 |
| 07/27/15 | 1 | | | | 1 | | | | | | 1 | | **2** | 3 | 23 | 938 |
| 07/28/15 | 1 | | | | 1 | | 1 | | | | 4 | | **6** | 5 | 23 | 937 |
| 07/29/15 | 1 | | | | | | | | | | 1 | | **1** | 6 | 22 | 932 |
| 07/30/15 | 1 | 1 | | | | | | | | | 2 | | **3** | 6 | 18 | 932 |
| 07/31/15 | 1 | | | | | | | | | | | | **0** | 5 | 18 | 929 |
| 08/01/15 | 1 | | | | | | | | | | 1 | | **1** | 7 | 17 | 930 |
| 08/02/15 | 1 | | | | 1 | | | | | | 3 | | **4** | 9 | 20 | 927 |
| 08/03/15 | 1 | | | | 1 | | | | | 1 | 2 | | **4** | 3 | 17 | 929 |
| 08/04/15 | 1 | | | | 2 | | | | | 1 | 1 | | **4** | 6 | 16 | 932 |

**Appendix C Table 1. Summary of acoustic bat data and weather during each survey night at Tower High, Baron Winds Project, 2015.**

| | | BBSH | | | HB | MYSP | RBTB | | | UNKN | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Night of | Operational? | BBSH | Big brown | Silver-haired | Hoary | MYSP | Eastern red | Tri-colored | RBTB | HFUN | LFUN | UNKN | Total | Wind Speed (m/s) | Temperature (Celsius) | Barometric Pressure |
| 08/05/15 | 1 | | | | | | | | | 1 | 1 | | **2** | 5 | 13 | 933 |
| 08/06/15 | 1 | | | 1 | | | | | | | | | **1** | 4 | 16 | 933 |
| 08/07/15 | 1 | | | | | | 2 | | | 1 | | | **3** | 5 | 16 | 933 |
| 08/08/15 | 1 | | | | | | | | | | 2 | | **2** | 4 | 14 | 935 |
| 08/09/15 | 1 | | | | | | 1 | | | | 1 | | **2** | 6 | 19 | 934 |
| 08/10/15 | 1 | | | | | | | | | | | | **0** | 6 | 17 | 927 |
| 08/11/15 | 1 | | 1 | 1 | | | | | | 1 | | | **3** | 6 | 15 | 930 |
| 08/12/15 | 1 | | | | | | | | | | | | **0** | 4 | 13 | 934 |
| 08/13/15 | 1 | | | | 2 | | | | | | | | **2** | 7 | 18 | 937 |
| 08/14/15 | 1 | | | | | | | | | | 4 | | **4** | 5 | 20 | 939 |
| 08/15/15 | 1 | | | 1 | 1 | | | | | | | | **2** | 2 | 21 | 940 |
| 08/16/15 | 1 | 1 | 2 | | | | | | | | 2 | | **5** | 4 | 22 | 940 |
| 08/17/15 | 1 | | | 2 | | | 1 | | | 2 | 3 | | **8** | 2 | 23 | 938 |
| 08/18/15 | 1 | | | | 4 | | | | | | 1 | | **5** | 7 | 19 | 933 |
| 08/19/15 | 1 | | | | 1 | | | | | | 1 | | **2** | 8 | 21 | 932 |
| 08/20/15 | 1 | | | | | | | | | | 2 | | **2** | 5 | 15 | 934 |
| 08/21/15 | 1 | | | | | | | | | | | | **0** | 3 | 14 | 938 |
| 08/22/15 | 1 | | | | 2 | | | | 1 | 1 | 2 | | **6** | 5 | 16 | 937 |
| 08/23/15 | 1 | 1 | | | | | | | | 2 | 1 | | **4** | 7 | 18 | 931 |
| 08/24/15 | 1 | | | 1 | | | | | | 1 | | | **2** | 4 | 15 | 930 |
| 08/25/15 | 1 | | | | | | | | | | | | **0** | 4 | 12 | 932 |
| 08/26/15 | 1 | 1 | 1 | | | | | | | 1 | 1 | | **4** | 5 | 12 | 935 |
| 08/27/15 | 1 | | | | | | | | | | 1 | | **1** | 2 | 13 | 938 |
| 08/28/15 | 1 | 2 | | 5 | 2 | | | | | 1 | 4 | | **14** | 4 | 17 | 940 |
| 08/29/15 | 1 | 1 | | 4 | 1 | | | | | 2 | 9 | | **17** | 4 | 18 | 938 |
| 08/30/15 | 1 | | 2 | | | | | | 1 | 2 | 3 | | **8** | 5 | 20 | 937 |
| 08/31/15 | 1 | | 1 | 1 | | | | | | 1 | | | **3** | 4 | 18 | 937 |
| 09/01/15 | 1 | 1 | 1 | | | | | | | | 4 | | **6** | 4 | 20 | 938 |
| 09/02/15 | 1 | | 2 | 1 | | | | | | | 1 | | **4** | 3 | 21 | 935 |
| 09/03/15 | 1 | | 3 | 1 | | | | | 1 | | 4 | | **9** | 4 | 20 | 936 |
| 09/04/15 | 1 | 1 | | 1 | 1 | | | | | | 5 | | **8** | 6 | 20 | 941 |
| 09/05/15 | 1 | 1 | | | | | | | | | 4 | | **5** | 6 | 19 | 941 |
| 09/06/15 | 1 | | | 1 | | | | | | | 1 | | **2** | 6 | 21 | 939 |
| 09/07/15 | 1 | | | | 1 | | 1 | | | | 7 | | **9** | 6 | 23 | 937 |
| 09/08/15 | 1 | | | | 1 | | | | | | 2 | | **3** | 7 | 23 | 933 |
| 09/09/15 | 1 | 1 | 1 | | | | | | | | 4 | | **6** | 4 | 15 | 932 |
| 09/10/15 | 1 | | | 1 | | | | | | | 1 | | **2** | 4 | 14 | 929 |
| 09/11/15 | 1 | | | | 1 | | | | | | | | **1** | 4 | 15 | 928 |
| 09/12/15 | 1 | | | | | | | | | | | | **0** | 6 | 11 | 921 |
| 09/13/15 | 1 | | | | | | | | | | | | **0** | 9 | 8 | 928 |
| 09/14/15 | 1 | | | | | | | | | | | | **0** | 5 | 14 | 941 |
| 09/15/15 | 1 | | | 1 | | | | | | | | | **1** | 3 | 19 | 946 |
| 09/16/15 | 1 | | | 1 | 1 | | | | | | 2 | | **4** | 4 | 20 | 942 |
| 09/17/15 | 1 | | | 5 | 1 | | 1 | | | | 2 | | **9** | 4 | 19 | 936 |
| 09/18/15 | 1 | | | 1 | | | 1 | | | | 2 | | **4** | 6 | 19 | 932 |
| 09/19/15 | 1 | 11 | | 4 | | | 1 | | | 2 | 8 | | **26** | 7 | 11 | 930 |
| 09/20/15 | 1 | | | | | | | | | | | | **0** | 5 | 9 | 937 |
| 09/21/15 | 1 | | | | | | | | | | | | **0** | 6 | 11 | 939 |
| 09/22/15 | 1 | | | 1 | | | | | | | 1 | | **2** | 3 | 16 | 942 |
| 09/23/15 | 1 | | | | | | | | | | | | **0** | 4 | 15 | 943 |
| 09/24/15 | 1 | | | 1 | | | | | | | | | **1** | 6 | 15 | 944 |
| 09/25/15 | 1 | | | | | | 1 | | | | | | **1** | 3 | 13 | 944 |
| 09/26/15 | 1 | | | | | | | | | | 1 | | **1** | 7 | 13 | 944 |
| 09/27/15 | 1 | | | | | | | | | | | | **0** | 8 | 14 | 939 |
| 09/28/15 | 1 | | | | | | 1 | | | | | | **1** | 6 | 17 | 935 |
| 09/29/15 | 1 | | | | | | | | | | | | **0** | 6 | 14 | 928 |
| 09/30/15 | 1 | | | | | | | | | | | | **0** | 6 | 7 | 935 |
| **By Species** | | **26** | **21** | **38** | **48** | **0** | **13** | **0** | **3** | **23** | **162** | **0** | **334** | | | |
| **By Guild** | | **85** | | | **48** | **0** | **16** | | | **185** | | | | | | |
| | | **BBSH** | | | **HB** | **MYSP** | **RBTB** | | | **UNKN** | | | **Total** | | | |

* 1 = Detector functioned for the entire night; 0 = Non-operational for all or part of the night

**Appendix C Table 2. Summary of acoustic bat data and weather during each survey night at Tower Low, Baron Winds Project, 2015.**

| | | BBSH | | | HB | MYSP | RBTB | | | UNKN | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Night of | Operational? | BBSH | Big brown | Silver-haired | Hoary | MYSP | Eastern red | Tri-colored | RBTB | HFUN | LFUN | UNKN | Total | Wind Speed (m/s) | Temperature (Celsius) | Barometric Pressure |
| 06/01/15 | 1 | 1 | | | | | | | | | | | **1** | 3 | 8 | 935 |
| 06/02/15 | 1 | 1 | | | | | | | | | 1 | | **2** | 2 | 8 | 937 |
| 06/03/15 | 1 | | | | | | | | | | | | **0** | 6 | 13 | 938 |
| 06/04/15 | 1 | 1 | | | | | | | | | | | **1** | 5 | 15 | 936 |
| 06/05/15 | 1 | | | | | | | | | | | | **0** | 4 | 14 | 932 |
| 06/06/15 | 1 | | | | | | | | | | | | **0** | 5 | 9 | 935 |
| 06/07/15 | 1 | | | | | | | | | | | | **0** | 9 | 18 | 928 |
| 06/08/15 | 1 | 2 | | | 1 | | | | | | 2 | | **5** | 3 | 17 | 923 |
| 06/09/15 | 1 | 1 | | | | | | | | 1 | | | **2** | 5 | 13 | 928 |
| 06/10/15 | 1 | | | | | | | | | | 3 | | **3** | 6 | 19 | 929 |
| 06/11/15 | 1 | 1 | | 1 | | | | | | | 1 | | **3** | 4 | 16 | 933 |
| 06/12/15 | 1 | 1 | | | | | 1 | | | | | | **2** | 5 | 15 | 931 |
| 06/13/15 | 1 | | | | | | | | | | | | **0** | 4 | 17 | 937 |
| 06/14/15 | 1 | 1 | | | | | | | | | | | **1** | 5 | 20 | 933 |
| 06/15/15 | 1 | | 2 | | | | | | | | | | **2** | 4 | 20 | 933 |
| 06/16/15 | 1 | | | | | | | | | | | | **0** | 4 | 14 | 937 |
| 06/17/15 | 1 | | | | | | | | | | | | **0** | 4 | 16 | 935 |
| 06/18/15 | 1 | | | | | | | | | | 1 | | **1** | 4 | 18 | 932 |
| 06/19/15 | 1 | | | | | | | | | | | | **0** | 4 | 11 | 935 |
| 06/20/15 | 1 | 1 | | | | | | | | | 1 | | **2** | 5 | 19 | 929 |
| 06/21/15 | 1 | 3 | | | | | | | | | | | **3** | 4 | 17 | 933 |
| 06/22/15 | 1 | 1 | | | | | | | | | | | **1** | 7 | 21 | 930 |
| 06/23/15 | 1 | 1 | | | | | | | | 1 | 1 | | **3** | 5 | 13 | 933 |
| 06/24/15 | 1 | | 2 | | | | | | | | | | **2** | 3 | 15 | 937 |
| 06/25/15 | 1 | | | | | | | | | | | | **0** | 3 | 14 | 933 |
| 06/26/15 | 1 | 1 | | | | | | | | | 1 | | **2** | 4 | 14 | 935 |
| 06/27/15 | 1 | | | | | | | | | | | | **0** | 9 | 11 | 923 |
| 06/28/15 | 1 | | | | | | | | | | | | **0** | 6 | 12 | 926 |
| 06/29/15 | 1 | 2 | 2 | | | | | | | | 1 | | **5** | 4 | 15 | 931 |
| 06/30/15 | 1 | 1 | | | | | | | | | | | **1** | 4 | 16 | 927 |
| 07/01/15 | 1 | 1 | | | | | | | | | 1 | | **2** | 4 | 14 | 931 |
| 07/02/15 | 1 | | | | | | | | | 1 | | | **1** | 2 | 12 | 933 |
| 07/03/15 | 1 | 3 | | | | | | | | 1 | 2 | | **6** | 4 | 17 | 932 |
| 07/04/15 | 1 | 3 | | | | | | | | | 1 | | **4** | 2 | 15 | 936 |
| 07/05/15 | 1 | 4 | | | | | | | | | 4 | | **8** | 4 | 18 | 939 |
| 07/06/15 | 1 | 5 | | | | | | | | | 4 | | **9** | 5 | 20 | 935 |
| 07/07/15 | 1 | 2 | | | | | | | | | 1 | | **3** | 5 | 17 | 933 |
| 07/08/15 | 1 | 2 | | | | | | | | | | | **2** | 3 | 14 | 934 |
| 07/09/15 | 1 | | | | | | | | | | | | **0** | 5 | 14 | 933 |
| 07/10/15 | 1 | 6 | | | | | | | | 1 | 1 | | **8** | 3 | 16 | 938 |
| 07/11/15 | 1 | 7 | 2 | | | | 1 | | | 1 | 2 | | **13** | 2 | 18 | 938 |
| 07/12/15 | 1 | 11 | 1 | | | | | | | | 2 | | **14** | 3 | 19 | 934 |
| 07/13/15 | 1 | 2 | | | | | | | | | 5 | | **7** | 6 | 19 | 925 |
| 07/14/15 | 1 | 5 | 1 | | | | 1 | | | 2 | 2 | | **11** | 3 | 16 | 923 |
| 07/15/15 | 1 | | | | | | | | | 1 | | | **1** | 3 | 11 | 934 |
| 07/16/15 | 1 | 3 | | | | | | | | 1 | | | **4** | 5 | 15 | 936 |
| 07/17/15 | 1 | 5 | | | | | | | | | 2 | | **7** | 5 | 20 | 932 |
| 07/18/15 | 1 | 9 | 1 | | | | | | | | 2 | | **12** | 4 | 22 | 933 |
| 07/19/15 | 1 | 6 | | | | | | | 1 | | 2 | | **9** | 4 | 21 | 929 |
| 07/20/15 | 1 | 8 | | | 1 | | 1 | | | 1 | 3 | | **14** | 5 | 19 | 926 |
| 07/21/15 | 1 | 2 | | | | | | | | 5 | | | **7** | 4 | 15 | 927 |
| 07/22/15 | 1 | 1 | 1 | | | | | | | | 1 | | **3** | 3 | 14 | 932 |
| 07/23/15 | 1 | 2 | | | | 1 | | | | 2 | 1 | | **6** | 2 | 15 | 933 |
| 07/24/15 | 1 | 3 | | | | | | | | | 1 | | **4** | 2 | 18 | 935 |
| 07/25/15 | 1 | 8 | | | 1 | | | | | | 1 | | **10** | 4 | 20 | 933 |
| 07/26/15 | 1 | 9 | 2 | | | | 1 | | | | 2 | | **14** | 2 | 20 | 935 |
| 07/27/15 | 1 | | 1 | | | | 1 | | 1 | 1 | 3 | | **7** | 2 | 21 | 938 |
| 07/28/15 | 1 | 14 | 1 | | | | 3 | | 1 | 1 | 2 | | **22** | 3 | 22 | 937 |
| 07/29/15 | 1 | 5 | 3 | | 1 | | | | | | 2 | | **11** | 5 | 22 | 932 |
| 07/30/15 | 1 | 4 | | | | 1 | | | | | 1 | | **6** | 5 | 18 | 932 |
| 07/31/15 | 1 | 7 | | | | 1 | | | | | 3 | | **11** | 4 | 18 | 929 |
| 08/01/15 | 1 | 3 | | | | | | | 1 | 2 | 1 | | **7** | 5 | 16 | 930 |
| 08/02/15 | 1 | 5 | 1 | | | | | | | | 2 | | **8** | 7 | 20 | 927 |
| 08/03/15 | 1 | 2 | | | | | 1 | | 1 | 1 | 2 | | **7** | 2 | 16 | 929 |
| 08/04/15 | 1 | | | | | | | | 2 | | | | **2** | 5 | 16 | 932 |

**Appendix C Table 2. Summary of acoustic bat data and weather during each survey night at Tower Low, Baron Winds Project, 2015.**

| | | BBSH | | | HB | MYSP | RBTB | | | UNKN | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Night of | Operational? | BBSH | Big brown | Silver-haired | Hoary | MYSP | Eastern red | Tri-colored | RBTB | HFUN | LFUN | UNKN | Total | Wind Speed (m/s) | Temperature (Celsius) | Barometric Pressure |
| 08/05/15 | 1 | 2 | | | | | 1 | | | 1 | | | **4** | 3 | 13 | 933 |
| 08/06/15 | 1 | 1 | | | | | 1 | | | 1 | | | **3** | 3 | 14 | 933 |
| 08/07/15 | 1 | | | 1 | | | | | 1 | 2 | | | **4** | 3 | 15 | 933 |
| 08/08/15 | 1 | 3 | | | | | | | | | 1 | | **4** | 2 | 14 | 935 |
| 08/09/15 | 1 | 15 | 2 | | | | 1 | | | 2 | 1 | | **21** | 4 | 18 | 934 |
| 08/10/15 | 1 | | | | | | | | | 1 | 1 | | **2** | 5 | 18 | 927 |
| 08/11/15 | 1 | 2 | 1 | | | | | | 1 | | 1 | | **5** | 6 | 16 | 930 |
| 08/12/15 | 1 | | | | | | | | 1 | | | | **1** | 3 | 12 | 934 |
| 08/13/15 | 1 | 2 | 2 | | | | | | | | 3 | | **7** | 5 | 17 | 937 |
| 08/14/15 | 1 | 3 | 1 | | | | | | | | 2 | | **6** | 4 | 19 | 939 |
| 08/15/15 | 1 | 4 | | | | | 1 | | | | 1 | | **6** | 1 | 19 | 940 |
| 08/16/15 | 1 | 10 | | | | | | | 1 | 1 | 2 | | **14** | 2 | 20 | 940 |
| 08/17/15 | 1 | 6 | | | | | | | | | | | **6** | 1 | 22 | 938 |
| 08/18/15 | 1 | 5 | | | | | | | | 1 | | | **6** | 6 | 19 | 933 |
| 08/19/15 | 1 | 1 | 1 | | | | | | 1 | 1 | | | **4** | 7 | 22 | 932 |
| 08/20/15 | 1 | 2 | | | | | 1 | | 1 | 1 | 1 | | **6** | 5 | 15 | 934 |
| 08/21/15 | 1 | 2 | | | | | | | | 1 | 1 | | **4** | 2 | 13 | 938 |
| 08/22/15 | 1 | | | | | | 1 | | 3 | 1 | 2 | | **7** | 4 | 14 | 937 |
| 08/23/15 | 1 | 2 | | | | | | | 3 | 1 | 1 | | **7** | 5 | 17 | 931 |
| 08/24/15 | 1 | 1 | | | | | | | 1 | | | | **2** | 3 | 14 | 930 |
| 08/25/15 | 1 | | | | | | | | 1 | 3 | | | **4** | 3 | 12 | 932 |
| 08/26/15 | 1 | | | | | | | | 1 | 1 | | | **2** | 4 | 12 | 935 |
| 08/27/15 | 1 | | | | | | 1 | | 1 | | 2 | | **4** | 1 | 12 | 938 |
| 08/28/15 | 1 | 1 | | 1 | | | | | | | 2 | | **4** | 3 | 15 | 940 |
| 08/29/15 | 1 | | | 1 | 1 | | | | | | 1 | | **3** | 3 | 17 | 938 |
| 08/30/15 | 1 | | | | 2 | | 1 | | | | | | **3** | 4 | 19 | 937 |
| 08/31/15 | 1 | 1 | 2 | | | | | | 1 | 1 | | | **5** | 3 | 18 | 937 |
| 09/01/15 | 1 | | 2 | | | | | | | | 1 | | **3** | 3 | 19 | 938 |
| 09/02/15 | 1 | | | | | | | | 1 | | | | **1** | 2 | 20 | 935 |
| 09/03/15 | 1 | | | 1 | | | | | | | 1 | | **2** | 2 | 19 | 936 |
| 09/04/15 | 1 | 4 | 1 | | | | | | | 1 | | | **6** | 5 | 20 | 941 |
| 09/05/15 | 1 | | | | | | | | | | 3 | | **3** | 4 | 19 | 941 |
| 09/06/15 | 1 | 1 | | | | | | | | 1 | | | **2** | 4 | 20 | 939 |
| 09/07/15 | 1 | | | | | | | | | | 1 | | **1** | 4 | 21 | 937 |
| 09/08/15 | 1 | | | | | | | | | | | | **0** | 5 | 22 | 933 |
| 09/09/15 | 1 | 1 | | 1 | | | | | | | | | **2** | 3 | 16 | 932 |
| 09/10/15 | 1 | 1 | | 1 | | | | | | | | | **2** | 2 | 13 | 929 |
| 09/11/15 | 1 | 1 | | | | | | | | 1 | | | **2** | 3 | 15 | 928 |
| 09/12/15 | 1 | | | | | | | | | 1 | | | **1** | 6 | 11 | 921 |
| 09/13/15 | 1 | | | | | | | | | | | | **0** | 8 | 8 | 928 |
| 09/14/15 | 1 | 2 | | 1 | | | | | | | 1 | | **4** | 4 | 12 | 941 |
| 09/15/15 | 1 | 1 | | | | | | | | | | | **1** | 2 | 17 | 946 |
| 09/16/15 | 1 | 3 | | | | | | | | 1 | | | **4** | 3 | 18 | 942 |
| 09/17/15 | 1 | 6 | | | | | | | 1 | 2 | | | **9** | 3 | 17 | 936 |
| 09/18/15 | 1 | | | | | | | | | | | | **0** | 5 | 19 | 932 |
| 09/19/15 | 1 | 2 | 2 | 1 | | | | | | | | | **5** | 6 | 11 | 930 |
| 09/20/15 | 1 | | | | | | | | | | 1 | | **1** | 3 | 8 | 937 |
| 09/21/15 | 1 | | | | | | | | | | | | **0** | 5 | 11 | 939 |
| 09/22/15 | 1 | | | 1 | | | | | | | | | **1** | 3 | 14 | 942 |
| 09/23/15 | 1 | 1 | | | | | | | | | | | **1** | 2 | 13 | 943 |
| 09/24/15 | 1 | | | | | | | | | 1 | | | **1** | 4 | 14 | 944 |
| 09/25/15 | 1 | 1 | | 1 | | | | | | | | | **2** | 2 | 12 | 944 |
| 09/26/15 | 1 | | | | | | | | | | | | **0** | 6 | 13 | 944 |
| 09/27/15 | 1 | | | | | | | | | | | | **0** | 7 | 15 | 939 |
| 09/28/15 | 1 | | | | | | | | | | | | **0** | 5 | 17 | 935 |
| 09/29/15 | 1 | | | | | | | | | | | | **0** | 5 | 14 | 928 |
| 09/30/15 | 1 | | | | | | 1 | | | | | | **1** | 4 | 8 | 935 |
| **By Species** | | **253** | **34** | **11** | **7** | **3** | **19** | **0** | **26** | **50** | **98** | **0** | **501** | | | |
| **By Guild** | | **298** | | | **7** | **3** | **45** | | | **148** | | | | | | |
| | | **BBSH** | | | **HB** | **MYSP** | **RBTB** | | | **UNKN** | | | **Total** | | | |