Summer and Fall 2011 Radar and Acoustic Bat Survey Report

for the Antrim Wind Energy Project
In Antrim, New Hampshire

Prepared for

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Executive Summary

Antrim Wind Energy, LLC is considering development of the Antrim Wind Energy Project (Project) located in Antrim, New Hampshire. The proposed Project would include wind turbines located on a series of ridgelines associated with Tuttle Hill (Figure 1). Stantec Consulting Services Inc. performed nocturnal radar surveys and acoustic bat surveys at the Project to characterize seasonal nocturnal migration and bat activity patterns at the Project. This report discusses the methods and results of the fall 2011 radar and acoustic bat surveys. Results of the spring 2011 radar and acoustic bat surveys are included in a separate report.

Nocturnal Radar Survey

To characterize fall nocturnal migration activity over the Project area, radar surveys were conducted on 30 nights between August 17 and October 8, 2011. Surveys were conducted from sunset to sunrise using X-band radar. Each hour of sampling included the recording of radar video files during horizontal and vertical operation. The radar was placed within a clearing for the meteorological (met) tower, Met Tower 1, located at the northeastern end of Tuttle Hill. This site provided adequate visibility of the surrounding airspace.

The overall mean passage rate for the entire fall survey period was 138 ± 9 targets per kilometer per hour (t/km/hr), and nightly passage rates varied from 4 ± 2 t/km/hr on October 1 to 538 ± 71 t/km/hr on August 26. The seasonal mean flight height of targets was 203 ± 1 meters (m; 666 ft [']) above the radar site, and nightly flight heights ranged from 147 ± 23 m to 266 ± 45 m. Mean flight direction through the Project area for the season was southwesterly at 217° ± 56°. Flight heights, when analyzed for the anticipated 150 m (492') height of the proposed turbines, indicate that the percentage of targets flying below turbine height ranged from 25 to 56 percent with a seasonal average of 40 percent.

In summary, results at the Project provide a sample of baseline migration activity over the Project area during fall 2011.

Acoustic Bat Survey

Stantec conducted summer/fall acoustic bat surveys between June 1 and October 23, 2011 to sample bat activity patterns and species composition within the Project area. Six Anabat® detectors were deployed during this period, collecting data for a total of 677 detector-nights over a period of 849 available calendar nights. Two detectors were deployed in the guy wires of an existing 60 m meteorological tower and the remaining four detectors were suspended from trees along forested corridors and adjacent to wetlands where bats would likely travel or forage.

The six detectors recorded a total of 35,450 bat call sequences yielding an overall detection rate of 52.4 bat call sequences per detector-night. Among sampling locations, detection rates ranged from 2.6 to 126.2 bat call sequences per detector-night. Typical of this type of survey, activity levels varied considerably among nights within the survey period and among detectors.

Bats within the big brown bat/silver-haired bat (BBSH) guild comprised the greatest overall percentage of detected call sequences (48%, n=17,006). The North Met Low detector recorded the majority of BBSH calls (47%). Other species such as hoary bats (*Lasiurus cinereus*) were detected at five of the six detectors, and species belonging to the *Myotis* guild and the eastern red bat/tri-colored bat guild were recorded by all six detectors. Summer/fall 2011 acoustic bat surveys documented variable activity levels within the Project area, although results suggest that activity was highest in July and August.

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1.0 Introduction

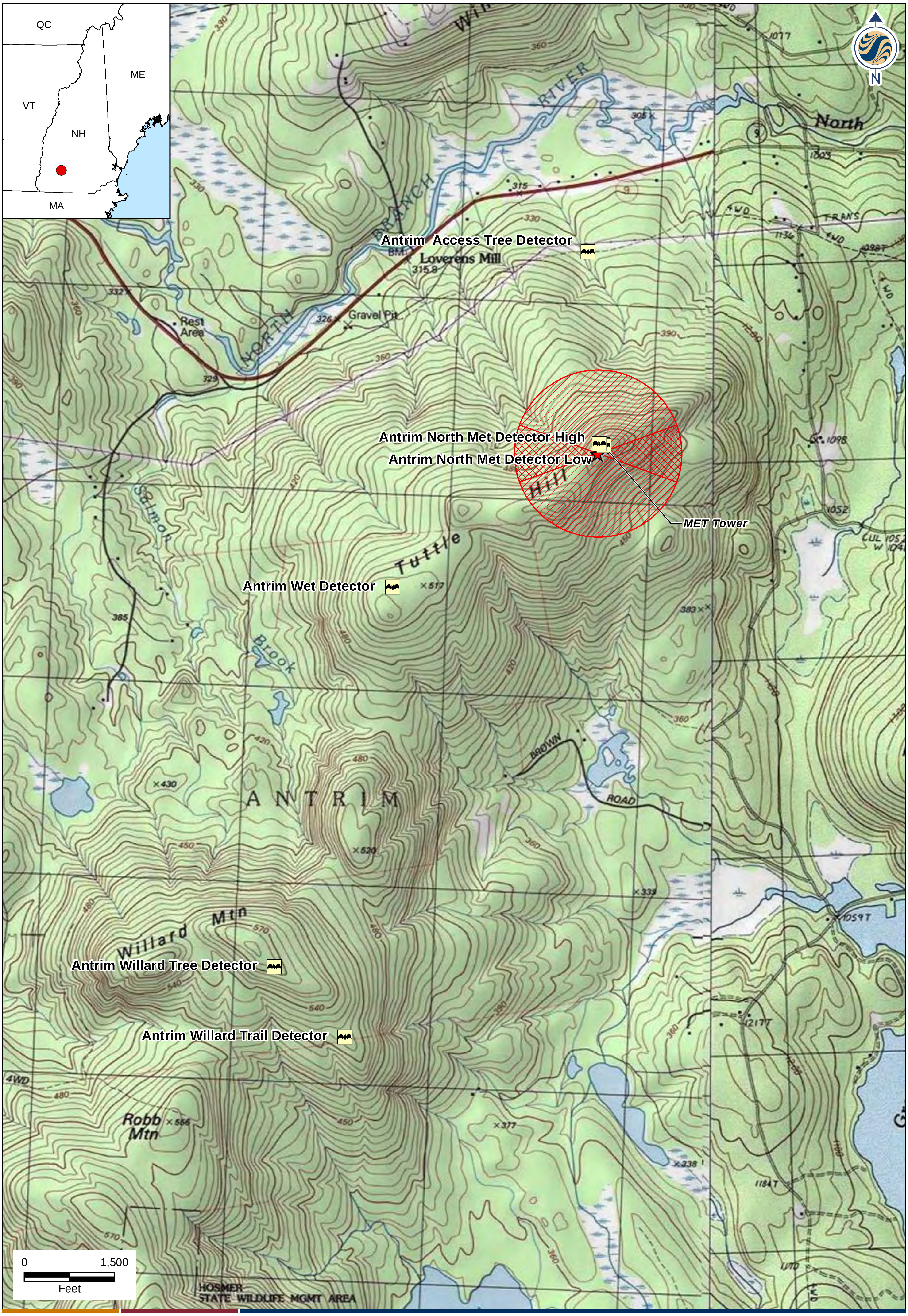
1.1 PROJECT BACKGROUND

Antrim Wind Energy, LLC (AWE) is considering development of the Antrim Wind Energy Project (Project) located in Antrim, New Hampshire (Project; Figure 1-1). The Project is in the preliminary stages of design and the layout of Project infrastructure, including turbines and access roads, has not been determined at this time. The proposed turbines are expected to have a maximum height of 150 meters (m) (492 feet [']).

As part of Project planning, AWE contracted Stantec Consulting Services Inc. (Stantec) to conduct fall 2011 nocturnal radar surveys, and acoustic bat surveys. Stantec developed a work plan for the Project that described survey scopes and methodologies and presented it to the New Hampshire Department of Fish and Game and the U.S. Fish and Wildlife Service at an introductory project meeting on June 21, 2011. The scope and methodology of these surveys are consistent with several other studies conducted recently at proposed wind projects in New Hampshire and the Northeast U.S. Results of the spring 2011 radar and acoustic bat surveys are included in a separate report. Mist nest surveys for bats also were conducted for the Project, and the results of these surveys are presented in a separate report.

1.2 PROJECT AREA DESCRIPTION

The Project is located along the edge of the Sunapee Uplands and Worcester/Monadnock Plateau ecogregions of New England (Griffith *et al*. 2009). The Sunapee Uplands is a transition zone from the Worcester/Monadnock Plateau and the typically cooler ecoregions to the north. The mountains within the Sunapee Uplands are generally of lower elevations than those mountains to the north, but higher in elevation than those found in the Worcester/Monadnock Plateau (Griffith *et al*. 2009). The mountains and hills of the Sunapee Uplands are mostly between 305 to 610 m (1000 to 2000') in elevation, but range from 152 m (500') to more than 914 m (3000'). This ecoregion includes many streams and small lakes. Northern hardwood forests dominated by sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*) and yellow birch (*Betula alleghaniensis*) are common. Also present, but less common are eastern hemlock dominated (*Tsuga canadensis*) forests, oak (*Quercus* spp.) dominated forests, and forests dominated by spruce (*Picea* sp.) and balsam fir (*Abies balsamea*) (Griffith *et al*. 2009). The Worcester/Monadnock Plateau includes the north-central portion of Massachusetts and the south-central portion of New Hampshire. In many basic characteristics including elevation and climate this ecoregion is similar to colder and more mountainous ecoregions to the north. Elevations within this ecoregion range from 152 to 427 m (500 to 1400') with some peaks exceeding 610 m (2000'). Forested uplands include transition hardwoods such as maple-beech-birch-oak-hickory forests and northern hardwoods such as the maple-beech-birch forests (Griffith *et al*. 2009). Forested wetlands are common within the Worcester/Monadnock Plateau.



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Legend

- Met Tower
- Radar Survey Location
- Bat Detector Location
- Alignment Vertical Radar Sweep
- Horizontal Radar Detection Range

Client/Project
TRC Companies, Inc.
Antrim Wind Energy Project
Antrim, New Hampshire

Figure No.
1-1

Title
2011 Survey Location Map
11/22/2011

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The Project area is associated with Tuttle Hill, which has an elevation of approximately 423 m (1,390'). The Project area is dominated by mixed forests with coniferous species more common along the ridge tops and deciduous species dominant along the slopes. Common tree species present include paper birch (*Betula papyrifera*), red spruce (*Picea rubens*), eastern hemlock (*Tsuga canadensis*), northern red oak (*Quercus rubra*), American beech (*Fagus grandifolia*), maple (*Acer* spp.), and eastern white pine (*Pinus strobus*). Forest management activities have occurred throughout the area in the recent past and are still ongoing. Evidence of these activities includes numerous skidder trails and stumps throughout the Project area.

2.0 Nocturnal Radar Survey

2.1 INTRODUCTION

Nocturnal radar surveys were conducted in the Project area to sample and characterize nocturnal migration patterns in fall 2011. The majority of North American passerines (songbirds) migrate at night. This migratory strategy may have evolved to take advantage of more stable atmospheric conditions for flapping flight (Kerlinger 1995); additionally, cooler nighttime temperatures may help regulate body temperature during more active, flapping flight and reduce predation risk while in flight (Alerstam 1990, Kerlinger 1995). Documenting the patterns of nocturnal migrants requires the use of radar or other non-visual technologies. The goal of the surveys was to sample and characterize nocturnal migration at the Project area including passage rate, flight direction, and flight altitude.

2.2 DATA COLLECTION METHODS

Fall radar surveys were conducted from sunset to sunrise on 30 nights between August 17 and October 8, 2011. The radar location in fall 2011 was the same as in spring 2011; the radar was placed within the clearing for the meteorological (met) tower, Met Tower 1, located at the northeastern end of Tuttle Hill (Figures 1-1, 2-1). This site has an elevation of approximately 423 m (1,390').

Efforts were made to maximize the airspace sampled by elevating the radar antenna approximately 6 m (20') above ground level. Elevating the antenna helps to reduce the amount of the radar beam reflected back by surrounding vegetation and topography, which can cause ground clutter interference on the radar screen. The elevated radar limited ground clutter obstructions and resulted in an adequate view of the surrounding airspace.

Figure 2-1. Photo of the radar on the ridgeline of Tuttle Hill.

2.2.1 Radar Data

Marine surveillance radar, similar to that described by Cooper *et al.* (1991), was used during field data collection. The radar has a peak power output of 12 kilowatts (kW) and has the ability to track small animals, including birds, bats, and insects, based on settings selected for the radar functions. It cannot, however, readily distinguish between different types of animals. Consequently, all animals, excluding insects, observed on the radar screen were identified as "targets." The radar has an "echo trail" function that captures past echoes of flight trails, enabling determination of flight direction. During all operations, the radar's echo trail was set to 30 seconds. The radar was equipped with a 2 m (6.5') waveguide antenna. The antenna has a vertical beam height of 20° (10° above and below horizontal).

Objects on the ground detected by the radar cause returns on the radar screen (echoes) that appear as blotches called ground clutter. Large amounts of ground clutter reduce the ability of the radar to track targets flying over (Figure 2-2).

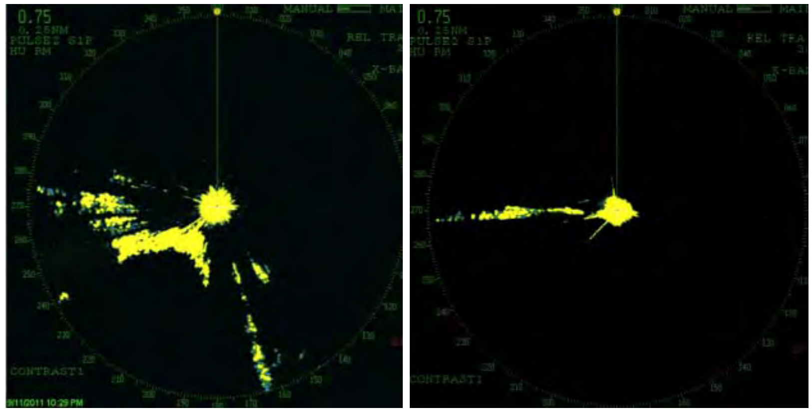

Figure 2-2. Screenshots from actual radar files showing ground clutter in horizontal mode (left) and vertical mode (right). Although the radar records three-dimensional space, it is translated by the radar screen as a two dimensional representation, which can cause targets to be obscured from view.

However, vegetation and hilltops near the radar can be used to reduce or eliminate ground clutter by "hiding" clutter-causing objects from the radar (Figure 2-3). These nearby features also cause ground clutter, but their proximity to the radar antenna generally limits the ground clutter to the center of the radar screen. Targets traveling into and out of the ground clutter areas can be tracked. The presence or reduction of potential clutter producing objects was carefully considered during site selection and radar station configuration.

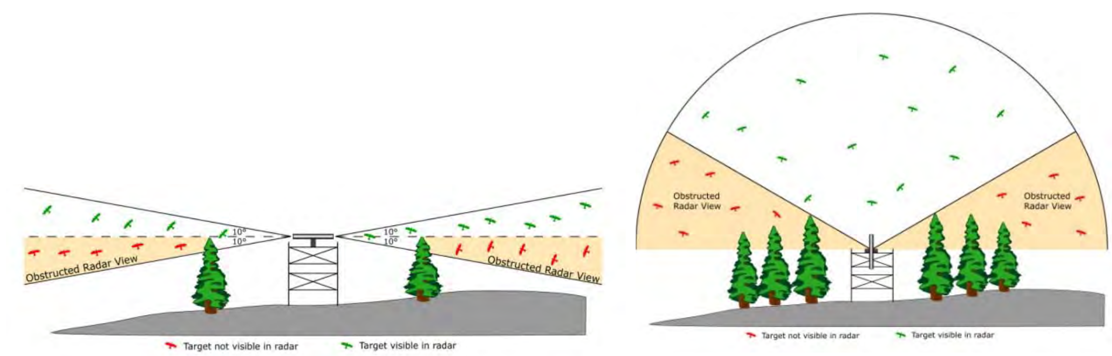

Figure 2-3. An example of a tree of a specific height that causes ground clutter, but "masks" a section of the radar beam, allowing adequate detection of targets beyond it (left). The effect of ground clutter on target detection in vertical mode is also shown (right).

The anti-rain function of the radar must be turned down to detect small songbirds and bats. Since radar surveys cannot be conducted during active rainfall, survey nights targeted nights without steady rain. To characterize migration patterns during nights without optimal conditions, some nights with weather forecasts including occasional showers, mist, or fog were sampled.

The radar was operated in two modes throughout the course of each night and both modes of operation were used during each hour of sampling. In surveillance mode, the antenna spins horizontally to survey the airspace around the radar and detects the number of targets and their flight direction as they pass through the project site (Figure 2-3). By analyzing the echo trail, the flight direction and flight speed of targets can be determined.

In vertical mode, the radar unit is tilted 90° to survey the airspace above the radar (Harmata *et al.* 1999). In vertical mode, target echoes do not provide directional data, but do provide information on the altitude of targets passing through the vertical, 20° radar beam (Figure 2-4). .

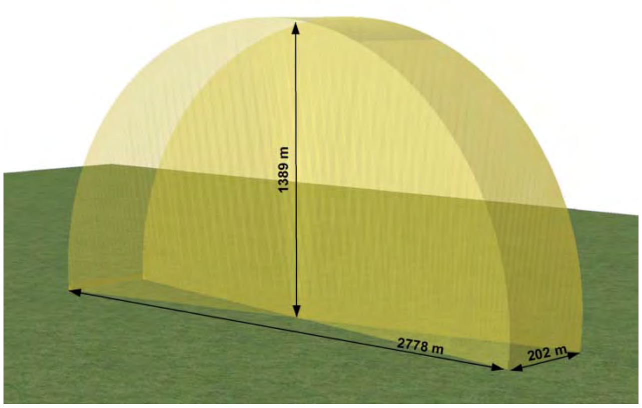

Figure 2-4. Detection range of the radar in vertical mode.

The radar was operated at a range of 1.4 km (0.75 nautical miles) to ensure detection of small targets. When radar is operated at ranges greater than 1.4 km, the echoes of small birds are reduced in size and restricted to a smaller portion of the radar screen, which limits the detection and observable movement pattern of individual targets. Consequently, 1.4 km is the appropriate detection range for this type of study.

The radar display was connected to a computer with video recording software enabling digital archiving of the radar data for subsequent analysis. This software recorded and archived video samples continuously every hour from sunset to sunrise of each survey night. By alternating the radar antenna every ten minutes from vertical mode to horizontal mode, a total of 30 minutes of vertical samples and 30 minutes of horizontal samples were collected within each hour. A stratified random sample set was developed for analysis by randomly selecting 6 horizontal samples and 6 vertical samples per hour of survey. This sampling schedule allowed for randomization of sample selection and prevented double-counting of targets due to the 30-second echo trail used to determine the flight path vector.

2.2.2 Weather Data

Temperature, wind speed and direction were recorded by the on-site met tower[2]. Additionally, to consider the atmospheric influences on migration, regional surface weather map images were interpreted to determine the dates that pressure systems (high, low, or none) moved through the region. Surface weather maps, prepared by the National Centers for Environmental Prediction,

[2] Weather data for October 7 and October 8 were compiled from wunderground.com (Weather Underground 2011).

the Hydro-meteorological Prediction Center, and the National Weather Service, were downloaded daily during the survey window.

2.3 DATA ANALYSIS METHODS

2.3.1 Radar Data

Video samples were analyzed using a digital analysis software tool developed by Stantec. For horizontal samples, targets (either birds or bats) were differentiated from insects based on their flight speed. Following adjustment for wind speed and direction, targets traveling faster than approximately 6 m (20') per second were identified as a bird or bat target (Larkin 1991, Bruderer and Boldt 2001). The software tool recorded the time, location, and flight vector for each target traveling fast enough to be a bird or bat within each horizontal sample, and these results were output to a spreadsheet. For vertical samples, the software tool recorded the entry point of targets passing through the vertical radar beam, the time, and flight altitude above the radar location, and then subsequently outputs the data to a spreadsheet. These datasets were then used to calculate passage rate (reported as targets per kilometer of migratory front per hour), flight direction, and flight altitude of targets.

Mean target flight directions (± 1 circular standard deviation) were summarized using software designed specifically to analyze directional data (Oriana2© Kovach Computing Services). The statistics used for this analysis are based on those used by Batschelet (1965) which take into account the circular nature of the data.

Flight altitude data were summarized using linear statistics. Mean flight altitudes (± 1 standard error [SE]) were calculated by hour, night, and overall season. The percent of targets flying below 150 m (492'), the approximate maximum height of the proposed wind turbines with blades, was also calculated nightly and for the entire survey period.

2.3.2 Weather Data

The mean nightly temperature, wind speed, and wind direction were calculated from the onsite met tower for each night of survey.

2.4 RESULTS

Radar surveys were conducted during 30 nights between August 17 and October 8, 2011 (Appendix A Table 1) resulting in 327 total hours surveyed.

2.4.1 Passage Rates

Nightly passage rates varied from 4 ± 2 targets per kilometer per hour (t/km/hr) on October 1 to 538 ± 71 t/km/h on August 26, and the overall passage rate for the entire survey period was 138 ± 9 t/km/hr (Figure 2-5; also Appendix A Table 1). Individual hourly passage rates varied between nights and throughout the season, and ranged from 0 t/km/hr during various hours of various nights to 839 t/km/hr during the 2nd hour of August 26 (Appendix A Table 2). For the entire season, mean passage rates increased rapidly between the 1st and 3rd hours after sunset, then gradually declined until sunrise (Figure 2-6).

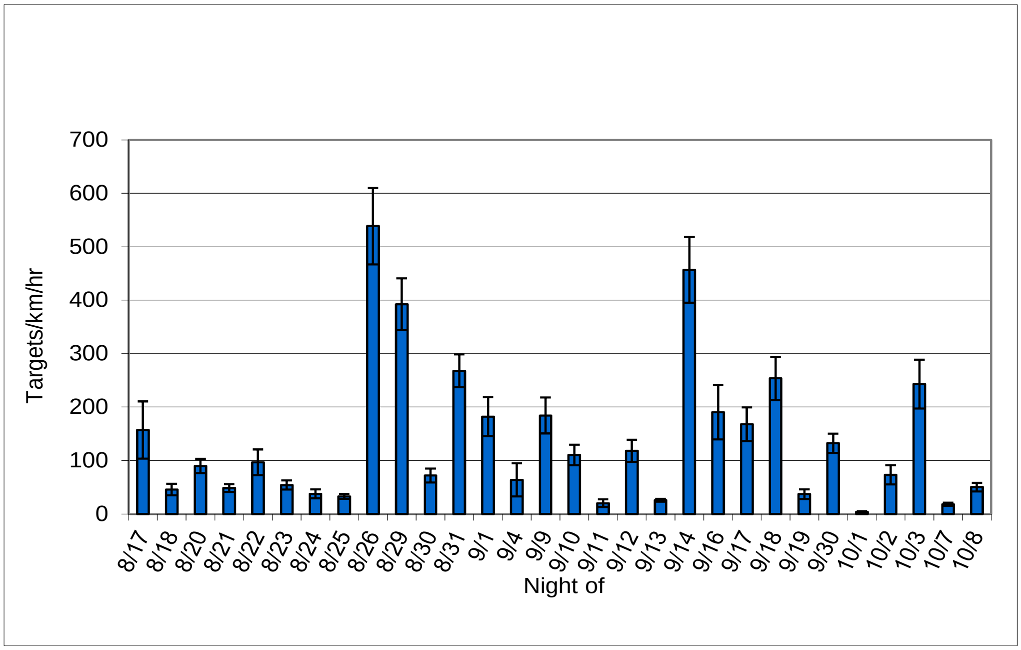

Figure 2-5. Nightly passage rates observed during fall 2011 at the Antrim Wind Project (error bars ± 1 SE).

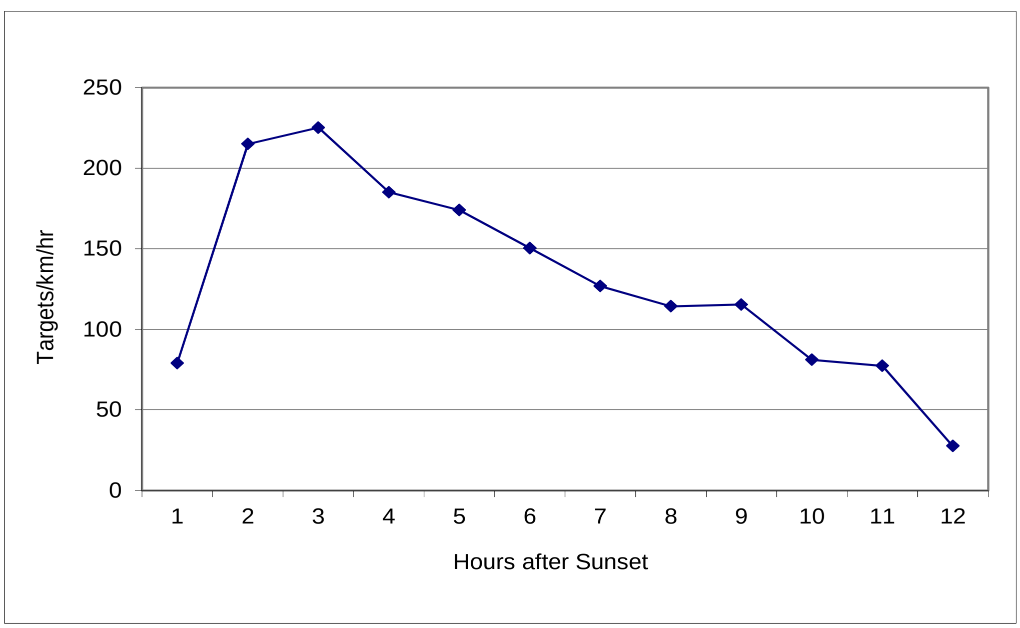

Figure 2-6. Hourly passage rates for entire season during fall 2011 at the Antrim Wind Project.

2.4.2 Flight Direction

Mean flight direction through the Project area was 217° ± 56° (Figure 2-7). Overall, the mean flight direction was southwest, but varied between nights (Appendix A Table 3).

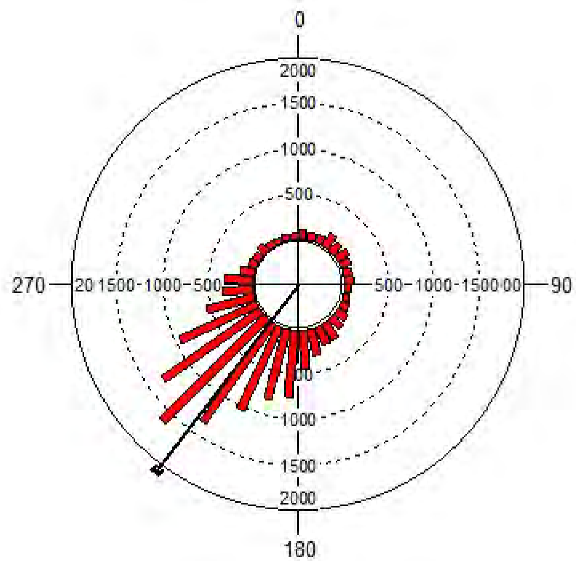

Figure 2-7. Mean flight direction for the entire season during fall 2011 at the Antrim Wind Project (the bracket along the margin of the histogram is the 95% confidence interval).

2.4.3 Flight Altitude

The seasonal mean flight height of targets was 203 ± 1 m (666') above the radar site. The average nightly flight height ranged from 147 ± 23 m on August 24 to 266 ± 45 m on September 9 (Figure 2-8; Appendix A Table 4). The percent of targets observed flying below 150 m was 40 percent for the season and varied nightly from 25 percent (169 targets) on September 9 to 56 percent (74 targets) on August 18 (Figure 2-9). Figure 2-10 below shows the distribution of individual nightly flight heights of all targets recorded relative to the proposed turbine height. The yellow boxes seen in Figure 2-10 depict the middle 50 percent of targets. The error bars depict the statistical outliers, or 25 percent of targets above and below the middle 50 percent of targets. The horizontal line within each box represents the median flight height value for that night. For the entire season, the mean hourly flight heights were lowest during 1st and 10th hour after sunset (Figure 2-11).

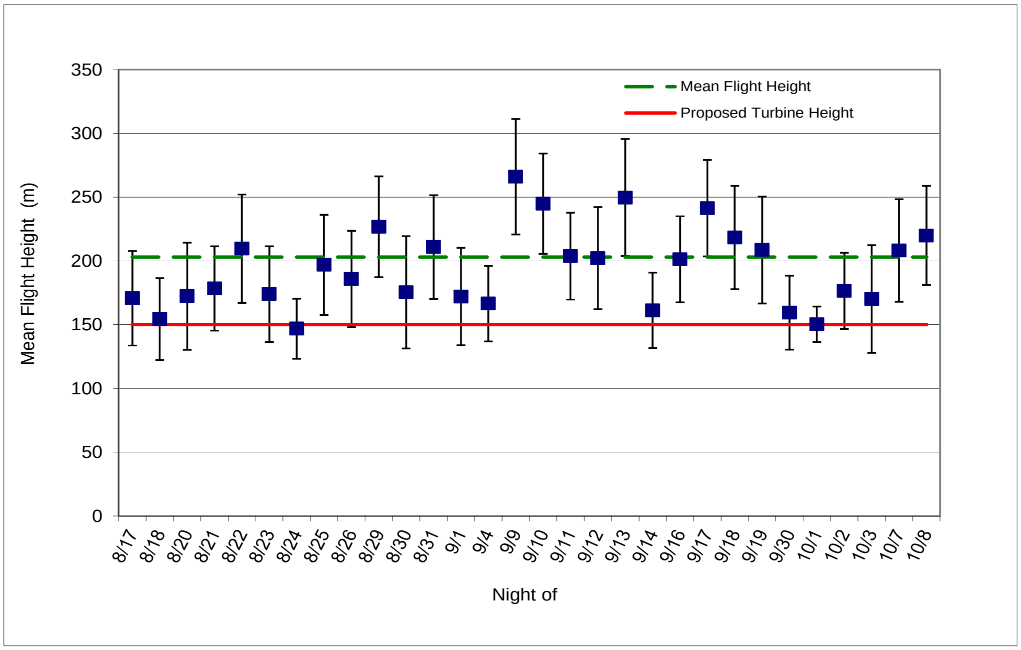

Figure 2-8. Mean nightly flight height of targets during fall 2011 at the Antrim Wind Project (error bars ± 1 SE).

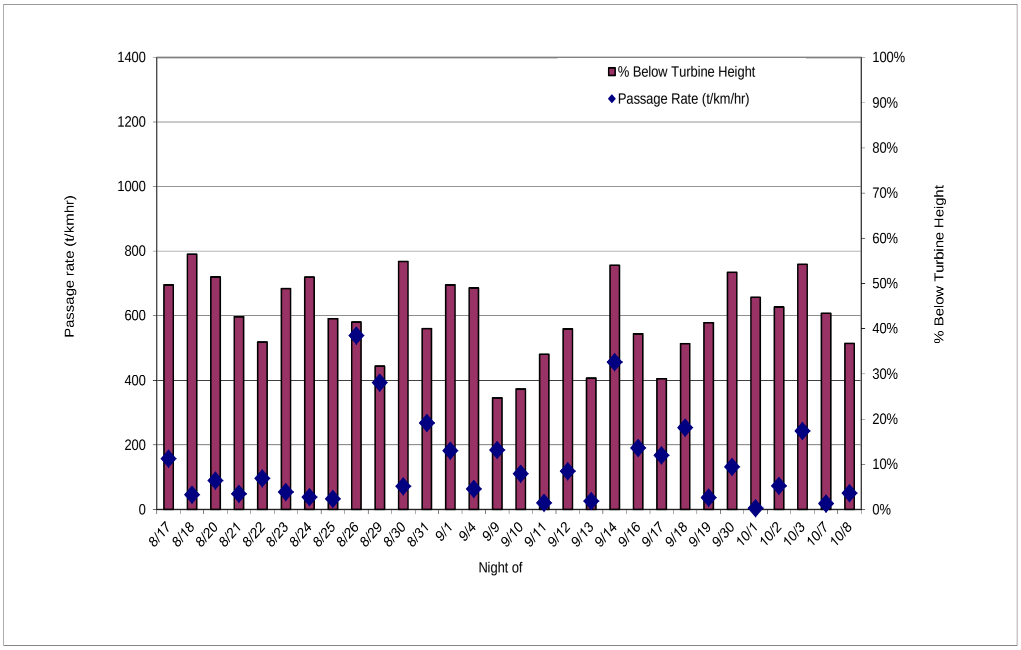

Figure 2-9. Percent of targets observed flying below a height of 150 m (492') during fall 2011 at the Antrim Wind Project.

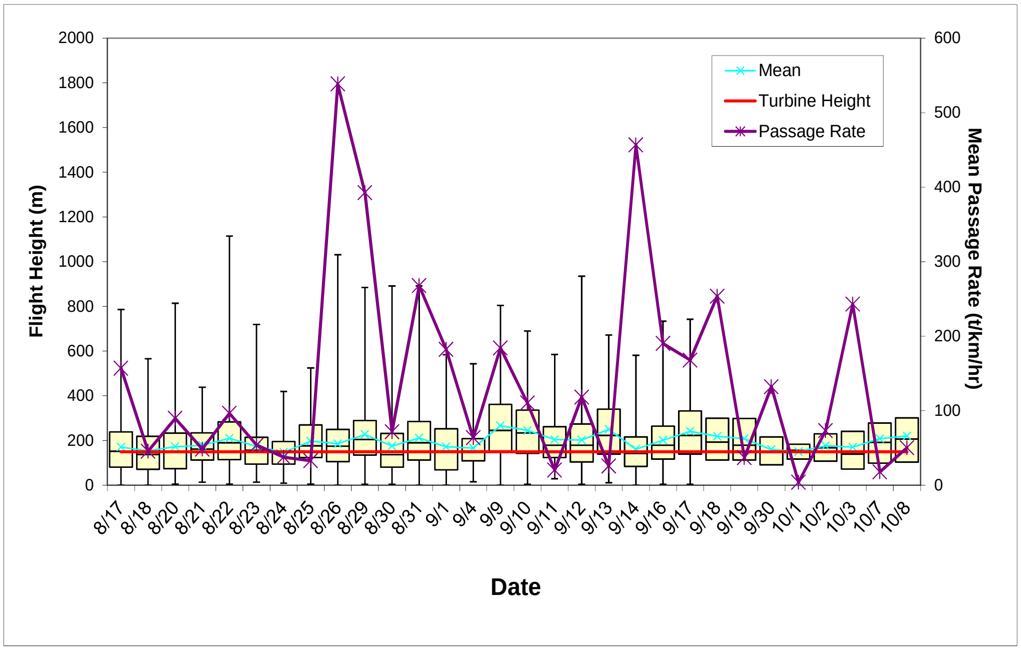

Figure 2-10. Flight height whisker plot depicting the vertical distribution of targets for each survey night during fall 2011 at the Antrim Wind Project.

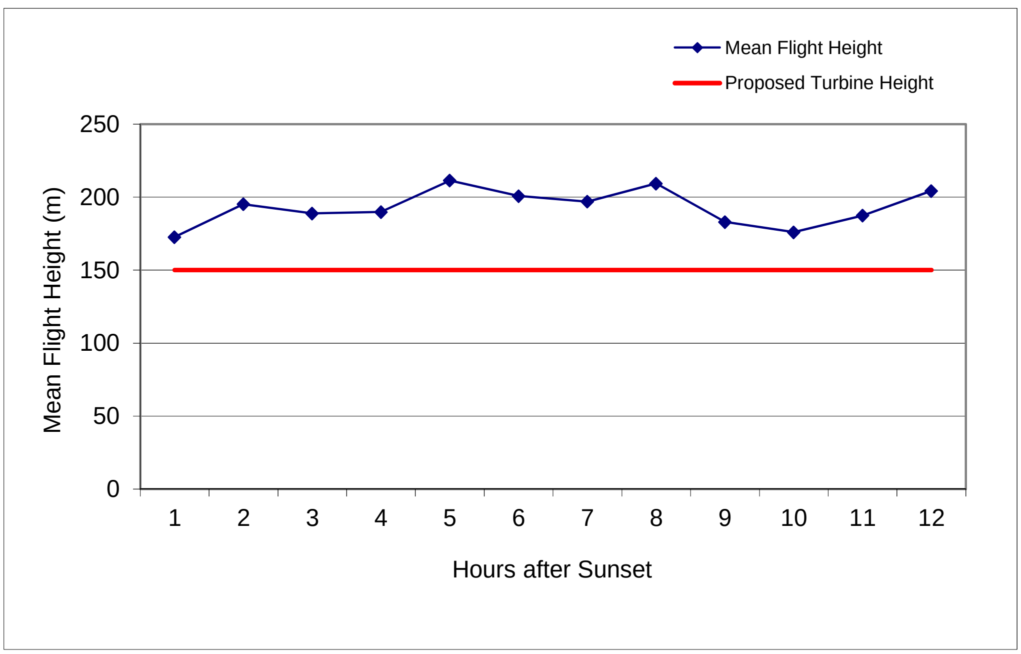

Figure 2-11. Hourly target flight height distribution during fall 2011 at the Antrim Wind Project.

2.4.4 Weather Data

During the nights surveyed from August 17 to October 8, average nightly wind speed varied between 2 and 11 meters per second (m/s), with an overall mean of 7 m/s (Figure 2-12). Mean nightly temperatures gradually decreased throughout the survey period, and varied between 5 °C and 20 °C, with an overall mean of 14 °C (Figure 2-13).

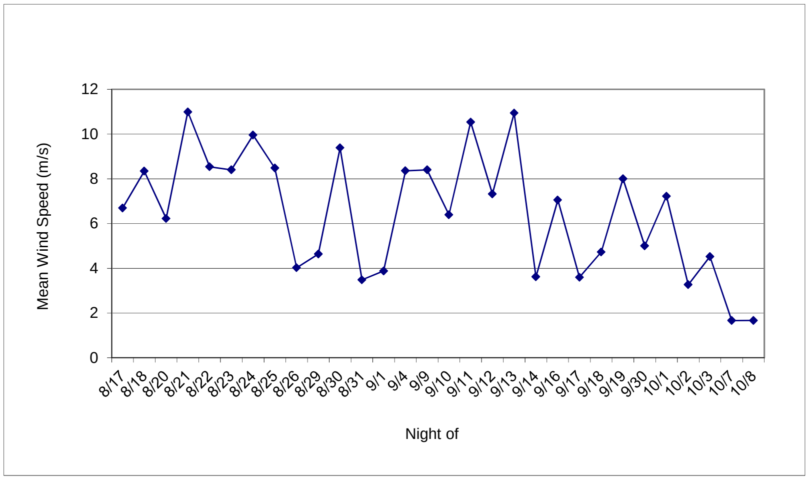

Figure 2-12. Nightly mean wind speed (m/s) during fall 2011 at the Antrim Wind Project. (nightly maximum and minimum temperatures not available)

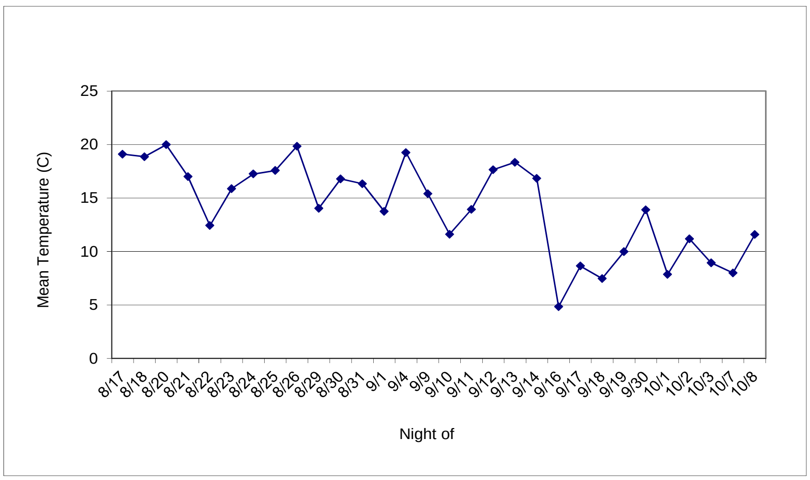

Figure 2-13. Nightly mean temperature (Celsius) during fall 2011 at the Antrim Wind Project.

2.5 DISCUSSION

Radar surveys are designed and implemented to sample migration activity over a specific location in the Project area to provide baseline pre-construction site data. The results of this nocturnal radar survey provide a snapshot of avian migration in space and time; in this case, over the Project area during dates typical for fall migration in New Hampshire. Fall radar surveys in the Project area documented patterns in nocturnal migration similar to those documented at recent radar surveys conducted at other locations in New Hampshire and the Eastern US (Appendix A Table 5). These include highly variable passage rates between nights, a generally southward flight direction, and flight heights typically averaging over 200 m.

The radar had somewhat limited visibility of the airspace west and south of the radar site, but was still capable of detecting targets within the majority of its range. Nightly mean passage rates were highly variable, ranging from 4 ± 2 to 538 ± 71 t/km/hr. As in spring 2011, average nightly passage rates were below 200 t/km/hr on most nights of the survey period (Figure 2-5). This indicates that nocturnal migration was pulsed, presumably related to seasonal timing and regional weather conditions. The average passage rate at the Project (138 ± 9 t/km/hr) is at the low end of the range of results of other radar studies conducted in the East (91 t/km/hr to 811 t/km/hr; Appendix A Table 5). Comparing the Project's passage rates to similar surveys conducted at other sites must be done with caution, as differences in passage rates are due in large part to differences in radar view among sites and varying weather patterns between years. Even at the same location in the same year, the radar's view may change between seasons depending on changes in the landscape (i.e. leaf off versus leaf out conditions).

The emerging body of studies characterizing nocturnal migrant movements shows a relatively consistent pattern in flight altitude, with most targets appearing to fly at altitudes of several hundred meters or more above the ground (Figure 2-8; Appendix A Table 5). The average flight height (203 ± 1 m) is the lowest average flight height recorded at other radar studies conducted in the East (287 m to 583 m), however is above the proposed turbine height (150 m). Comparison of flight height between survey sites as measured by radar is generally less influenced by site characteristics as the main portion of the radar beam is directed skyward, and the potential effects of surrounding vegetation on the radar's view can be more easily controlled. The nightly average flight height was below the proposed turbine height on one night (August 24) and at the proposed turbine height on one night (October 1). Passage rates on these nights were relatively low: 38 t/km/hr on August 24 and 4 t/km/hr on October 1.

Nightly variation in the magnitude and flight characteristics of nocturnal migrants is not uncommon and is often attributed to weather patterns, such as cold fronts and winds aloft (Hassler *et al.* 1963, Gauthreaux and Able 1970, Richardson 1972, Able 1973, Bingman *et al.* 1982, Gauthreaux 1991). A low pressure system bringing some rain occurred on the night with the lowest average passage rate (4 t/km/hr on October 1); this night also had a relatively low average temperature of 8°C. On the night with the highest passage rate (538 t/km/hr on August), a high pressure systems was present, average temperature was relatively high (20°C respectively), and average wind speed was relatively low (4 m/s).

In summary, average passage rates at the Project are within the range of results recorded at other radar studies conducted in New Hampshire and the East, and average flight height was at the low end of the range of flight heights. These radar results provide a sample of baseline migration activity over the Project area during fall 2011.

3.0 Acoustic Bat Survey

3.1 INTRODUCTION

Acoustic sampling of bat activity has become a standard pre-construction survey for proposed wind-energy development (Kunz *et al.* 2007). Although acoustic surveys are associated with several major assumptions (Hayes 2000) and results cannot be used to determine the number of bats inhabiting an area or determine the number of bats which will be killed post-construction, acoustic surveys can provide insight into seasonal patterns in activity levels and examine how weather conditions influence bat activity. While these data may be useful in predicting trends in post-construction mortality rates, the current lack of data on this topic precludes quantitative prediction of risk. The object of summer/fall acoustic surveys at the Project were (1) to document bat activity patterns from June 1 through October 20 in airspace near the rotor zone of the proposed turbines, at an intermediate height, and near the ground; and (2) to document bat activity patterns in relation to weather factors including wind speed, temperature, and relative humidity.

Eight species of bats occur in New Hampshire, based upon their normal geographical range. These are the little brown bat (*Myotis lucifugus*), northern long-eared bat, (*M. septentrionalis*), eastern small-footed bat (*M. leibii*), silver-haired bat (*Lasionycteris noctivagans*), tri-colored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), and hoary bat (*L. cinereus*) (BCI 2001). Of these eight species, the eastern small-footed bat is state-listed as endangered with a rank of S1 ("Critically Imperiled"[3]), and five species (tri-colored bat, eastern red bat, silver-haired bat, hoary bat, and northern long-eared bat) are state-listed as Species of Special Concern. All six state-listed species are also listed as Species of Greatest Conservation Need under New Hampshire's Wildlife Action Plan (New Hampshire Fish and Game Department 2005).

3.2 DATA COLLECTION METHODS

3.2.1 Acoustic Detector Site Selection

Anabat SDI and SD2 detectors (Titley Electronics Pty Ltd.) were used for the duration of the summer/fall 2011 acoustic bat survey. Anabat detectors were selected based upon their widespread use for this type of survey, 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 that could occur in the Project area. Anabat detectors were programmed to turn on and off on a

[3] A state ranking of S1 is assigned to species characterized as critically imperiled because of extreme rarity (generally one to five occurrences) or because some factor of its biology makes it particularly vulnerable to extinction.

daily basis to sample at least the period between sunset and sunrise, and stored recorded bat call sequences on removable 1 gigabyte (GB) compact flash cards. Anabat detectors are frequency division detectors, dividing the frequency of echolocation sounds made by bats by a factor of 16, then recording these sounds for subsequent analysis. The audio sensitivity setting of each Anabat system was set between six and seven (on a logarithmic scale of one to ten) to maximize sensitivity while limiting ambient background noise and interference. The sensitivity of individual detectors was then tested using an ultrasonic Bat Chirp (Reno, NV) to ensure that the detectors would be able to detect bats up to a distance of at least 10 m (33').

Each Anabat detector was powered by a 12-volt gel battery charged by a solar panel. 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 suspends the Anabat microphone downward to give maximum protection from precipitation. To compensate for the downward position, the microphone was positioned within a 90 degree PVC elbow on the bottom of the waterproof enclosure, allowing the microphone to record the airspace horizontally surrounding the detector while minimizing acoustic signal loss.

The six Anabat detectors were deployed in the Project area between April 7 and April 16, and collected data through October 20 (the Access Tree detector recorded data until October 23 due to the demobilization schedule). Results from the spring migration season were presented in the Spring 2011 Radar and Acoustic Bat Survey Report dated October 2011. Two detectors were deployed in the guy wires of the existing 60 m (197') met tower at heights of approximately 15 and 30 m (49 and 98') above ground level, and the remaining four detectors were deployed in trees throughout the Project area at heights of approximately 5 to 10 m (16 and 33') above ground level (agl) (Figures 3-1 to 3-3). Table 3-1 provides information on location and placement of detectors as well as surrounding habitat. Maintenance visits were conducted approximately every two weeks to check the condition of the detectors and to download data to a computer for archiving and subsequent analysis.

Table 3-1. Habitat descriptions of locations sampled during fall 2011 acoustic bat surveys at the Antrim Wind Project.

Detector Name	Elevation (m)	Height (m agl)	Habitat Notes
Willard Tree	563	5	Detector located 10 m from the edge of a 50 m diameter opening in an even-aged spruce/red maple forest with open understory, 15 m surrounding canopy height. Herbaceous vegetation and scattered trees in opening.
Willard Trail	522	5	Detector located 15 m from the edge of a 50 m clearing in an even-aged oak/maple forest with open understory.
Acces Tree	355	10	Detector suspended above intersection of forested trails 30 m from a transmission line corridor. Surrounding canopy (beech, birch, maple) 20 m tall with dense shrub understory.
Wetland	525	5	Detector located within a small wetland opening surrounded by uneven aged red maple/conifer forest.
N Met High	536	30	Detector deployed as high as possible in the guy wires of the met tower. Tower clearing surrounded by conifer-dominated forest.
N Met Low	536	15	Detector deployed in the guy wires of the met tower. Tower clearing surrounded by conifer-dominated forest.

Figure 3-1. Photos of the Willard Tree (left) and Willard Trail (right) bat detectors.

Figure 3-2. Photos of the Access Tree (left) and Wetland (right) bat detectors.

Figure 3-3. Photos of the North Met High (left) and Low (right) bat detectors.

3.3 DATA ANALYSIS METHODS

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 two or more pulses recorded in an Anabat file. Recordings containing less than two 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 New Hampshire. This software screens all data recorded by the bat detector and extracts call files using a filter. Using the default settings for this initial screening also ensures comparability between data sets. Settings used by the filter include a maximum 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 is and the more non-bat noise files and poor quality call sequences are retained within the data set.

Following extraction of call files, each file was visually inspected for species identification and to check that only bat calls were included in the data set. Insect activity, wind, and other sources of ultrasonic noise can also 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. Nightly detection rates were summarized by month as well as for the entire sampling period. Hourly detection rates were summarized by hour after sunset, as recommended by Kunz *et al*. (2007). Quantitative comparisons among these temporal periods were not attempted because the high amount of variability associated with bat detection would require much larger sample sizes (Arnett *et al*. 2006, Hayes 1997).

Bat call sequences were individually marked and categorized by species group, or “guild” based on visual comparison to reference calls. 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. However, due to the similar call signatures of several species, classified calls were categorized into five guilds[4] that reflect the bat community in the region of the Project area:

- **Unknown (UNKN)** – All call sequences with less than five calls, 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 to 35 kHz, or “low frequency unknown” (LFUN) for sequences with a minimum frequency below 30 to 35 kHz.

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

[4] Gannon *et al.* 2003 categorized bats into guilds based upon similar minimum frequency and call shape. These guilds were: Unidentified, Myotis, LABO-PISU and EPFU-LANO-LACI. To report the activity of the migratory hoary bat, it was placed into a separate guild.

- **Eastern red bat/tri-colored bat[5] (RBTB)** – Eastern red bats and tri-colored bats. These two species can produce distinctive calls; however, significant overlap in the call pulse shape, frequency range, and slope can also occur.

- **Big brown/silver-haired bat (BBSH)** – Big brown and silver-haired bats. The call signatures of these species commonly overlap and are 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 the body of this report will reflect those guilds. In addition, since species-specific identification did occur in some cases, each guild will also be briefly discussed with respect to potential species composition of recorded call sequences.

Once all of the call files were identified and categorized in appropriate guilds, nightly tallies of detected calls were compiled. Mean detection rates (number of recordings/detector-night) for the entire sampling period were calculated for each detector and for all detectors combined.

3.3.1 Weather Data

Temperature, and wind speed data were recorded by the on-site met tower at 10-minute intervals. For this report, met tower data was available for the survey period between June 1 and October 5, 2011. Daily wind speed and temperature data from October 6 through October 20 were compiled from the weather station in Hillsborough, New Hampshire approximately nine miles northeast of the Project (The Weather UnderGround, Inc. [c2008], accessed December 1, 2011). Weather data from the met tower was summarized on a nightly basis and weather data from the Hillsborough weather station was summarized on a daily basis. Weather data was compared to nightly bat activity levels using a scatterplot and linear correlation analysis.

3.4 RESULTS

3.4.1 Timing of Activity

During the 67-night survey period (June 1 through October 23), detectors surveyed a total of 677 detector-nights out of 849 available calendar-nights (80%; Table 3-2). All detectors suffered relatively short periods of equipment malfunction. The Wetland detector suffered the highest amount of data loss and operated for 85 of the 141 calendar nights (60%). The breaks in recording occurred from June 1 to July 12, and October 6 to October 20. The loss of data was a result of multiple equipment failures in conjunction with an improperly formatted memory

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

card. The initial problem was corrected during a July 13 maintenance check, and the second failure was discovered during detector retrieval at the end of the fall survey.

Combined, detectors recorded a total of 35,450 bat call sequences during the summer/fall survey period (Table 3-2). Individual detectors recorded between 224 sequences (Wet Tree) and 11,989 sequences (North Met Low [N Met Low]) during the summer/fall survey period; detection rates ranged from 2.6 sequences per detector-night at the Wet Tree detector to 126.2 sequences per detector-night at the N Met Low detector. The overall detection rate of all detectors combined was 52.4 sequences per detector-night during the summer/fall 2011 survey period (Table 3-2).

Table 3-2. Summary of bat detector field survey effort and results, Antrim Wind Project, Summer/Fall 2011.

Location	Dates Deployed	Calendar Nights	Detector-Nights*	Recorded Sequences	Detection Rate **	Maximum Sequences recorded ***
Access Tree	June 1 - Oct 23	144	134	7039	52.5	304
N Met High	June 1 - Oct 20	141	127	585	4.6	132
N Met Low	June 1 - Oct 20	141	95	11989	126.2	749
Wet Tree	June 1 - Oct 20	141	85	224	2.6	25
Willard Trail	June 1 - Oct 20	141	113	7143	63.2	449
Willard Tree	June 1 - Oct 20	141	123	8470	68.9	415
Overall Results		***849***	***677***	***35450***	***52.4***	--

* 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 any single detector for a detector-night.

Acoustic bat activity was sporadic throughout the survey period, but the number of nights with recorded bat activity peaked between July and August (Table 3-3). By detector, acoustic activity was detected on the greatest percentage of detector nights (percent of nights surveyed) at the Willard Tree detector (92%), followed by the Willard Trail detector (90%). The Access Tree detector recorded acoustic bat activity on the lowest percentage of nights (50%) sampled during the survey period. Nightly timing of acoustic activity varied among nights and detectors, although overall timing peaked during the first hour past sunset and declined steadily until sunrise (Figure 3-4).

Table 3-3. Percent of nights with acoustic activity by month and overall, Antrim Wind Project, Summer/Fall 2011*

Detector	June	July	August	September	October	Detector Overall
Access Tree	97% (29/30)	100% (20/20)	100% (31/31)	87% (26/30)	35% (8/23)	**50% (58/116)**
N Met High	33% (9/27)	74% (14/19)	74% (23/31)	70% (21/30)	25% (5/20)	**57% (72/127)**
N Met Low	77% (23/30)	100% (31/31)	95% (20/21)	0% (0/0)	38% (5/13)	**83% (79/95)**
Wetland Tree	0% (0/0)	95% (18/19)	90% (28/31)	7% (2/30)	20% (1/5)	**58% (49/85)**
Willard Trail	67% (20/30)	100% (21/21)	100% (31/31)	100% (30/30)	0% (0/1)	**90% (102/113)**
Willard Tree	73% (22/30)	100% (31/31)	100% (31/31)	93% (28/30)	100% (1/1)	**92% (113/123)**
Monthly Overall	**70% (103/147)**	**96% (135/141)**	**93% (164/176)**	**71% (107/150)**	**32% (20/63)**	

*% Nights with activity (# nights with activity/# nights surveyed)

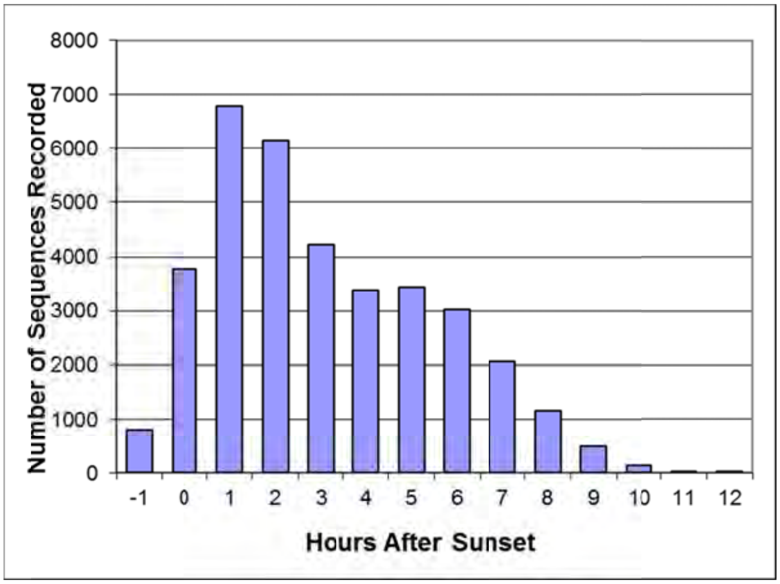

Figure 3-4. Hourly bat call sequence detections during summer/fall 2011 surveys at the Antrim Wind Project.

The two graphs in Figure 3-4 compare the percentage of nights each month with species occurrence, and species detection rates by month. Monthly detection rates varied between species, and peaks in activity may indicate periods of migration through the Project area (Figure 3-4, right). Big brown bats (EPFU), *Myotis* species (MYSP) and red bats (LABO) were detected most consistently throughout the survey period, and the timing of peak detection rates for these species varied by month. Hoary bats (LACI), silver-haired bats (LANO), and tri-colored bats (PESU) did not show the same consistent presence (Figure 3-4, left). Although not discernible at the inclusive scale used in Figure 3-4 (left), the highest monthly detection rate for both silver haired bats and tri-colored bats occurred in September. The highest monthly detection rate for hoary bats occurred in June. To highlight species-specific trends, calls identified to guild were not included in these figures.

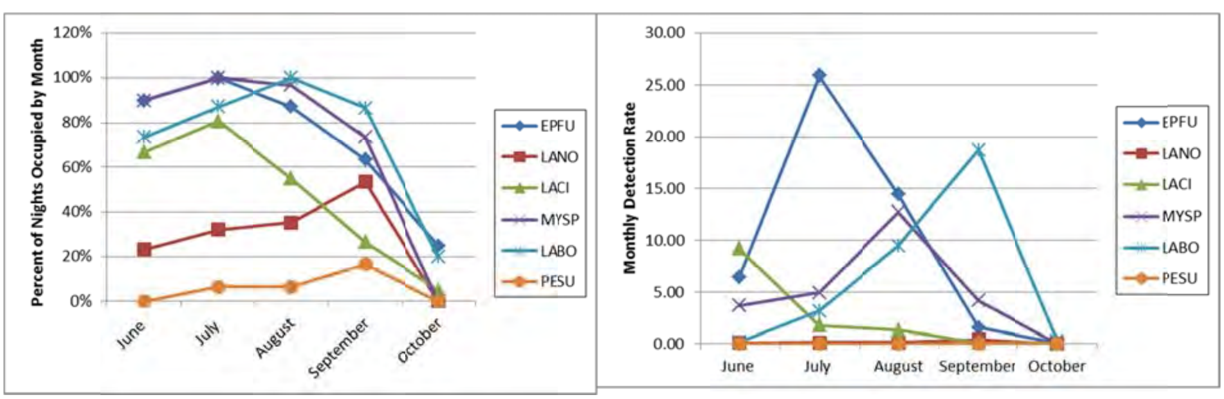

Figure 3-4. Species specific percent of nights occupied by month (left) and monthly detection rate of individual bat species (right) during summer/fall 2011 surveys at the Antrim Wind Project.

3.4.2 Species Composition

Bats within each of the defined guilds were identified during analysis. Calls of species in the big brown bat/silver-haired bat (BBSH) guild were the most common, comprising 48 percent of the total calls recorded (Table 3-4). Most call sequences within the BBSH guild were identified as big brown bats (43%) or big brown/silver-haired bats (56%), and only a small fraction were classified as silver-haired bats (1%). Twenty percent of call sequences were classified as "unknown" due to their relatively short length or quality. Within the Unknown guild, the majority of calls were classified as low-frequency calls (60%), with high-frequency unknown calls not as frequently identified (40%). The eastern red bat/tri-colored bat (RBTB) guild was the next most commonly identified guild, comprising 15.4 percent of the total calls recorded. Within the RBTB guild, eastern red bats were the most common call identified to species (91%), and a small fraction of the calls in this guild were identified as tri-colored bat calls (0.1%). Hoary bats comprised five percent of the total bat call sequences recorded and were detected at all detectors except the Wetlands Tree detector (Table 3-4).

Table 3-4. Distribution of detections by guild for detectors, Antrim Wind Project, Summer/Fall 2011.

Detector	Guild					Total
	BBSH	HB	MYSP	RBTB	UNKN	
Access Tree	2,499	5	3,302	245	988	7,039
N Met High	302	13	13	14	243	585
N Met Low	7,997	44	429	533	2,986	11,989
Wet Tree	79	0	35	11	99	224
Willard Trail	3,394	118	87	1,825	1,719	7,143
Willard Tree	2,735	1,671	238	2,834	992	8,470
Total	**17,006**	**1,851**	**4,104**	**5,462**	**7,027**	**35,450**
Guild Composition %	**48.0%**	**5.2%**	**11.6%**	**15.4%**	**19.8%**	

Species composition differed among detectors. *Myotis* species were most common at the Access Tree detector where they comprised the 47 percent of bats detected. Although the *Myotis* species were the most commonly recorded guild and represented a majority of calls at the Access Tree detector, they represented 16 percent of all calls recorded at the Wet Tree detector and less than five percent of calls at the remaining detectors. Unknown bats comprised between 12 and 44 percent of recorded call sequences by detector. The highest percentage of unknown call sequences was recorded at the Wetland Tree detector (44%), where many sequences lacked a sufficient number of pulses to be classified. Hoary bats were detected most frequently at the Willard Tree detector, where they represented 20 percent of calls recorded by that detector (Figure 3-5).

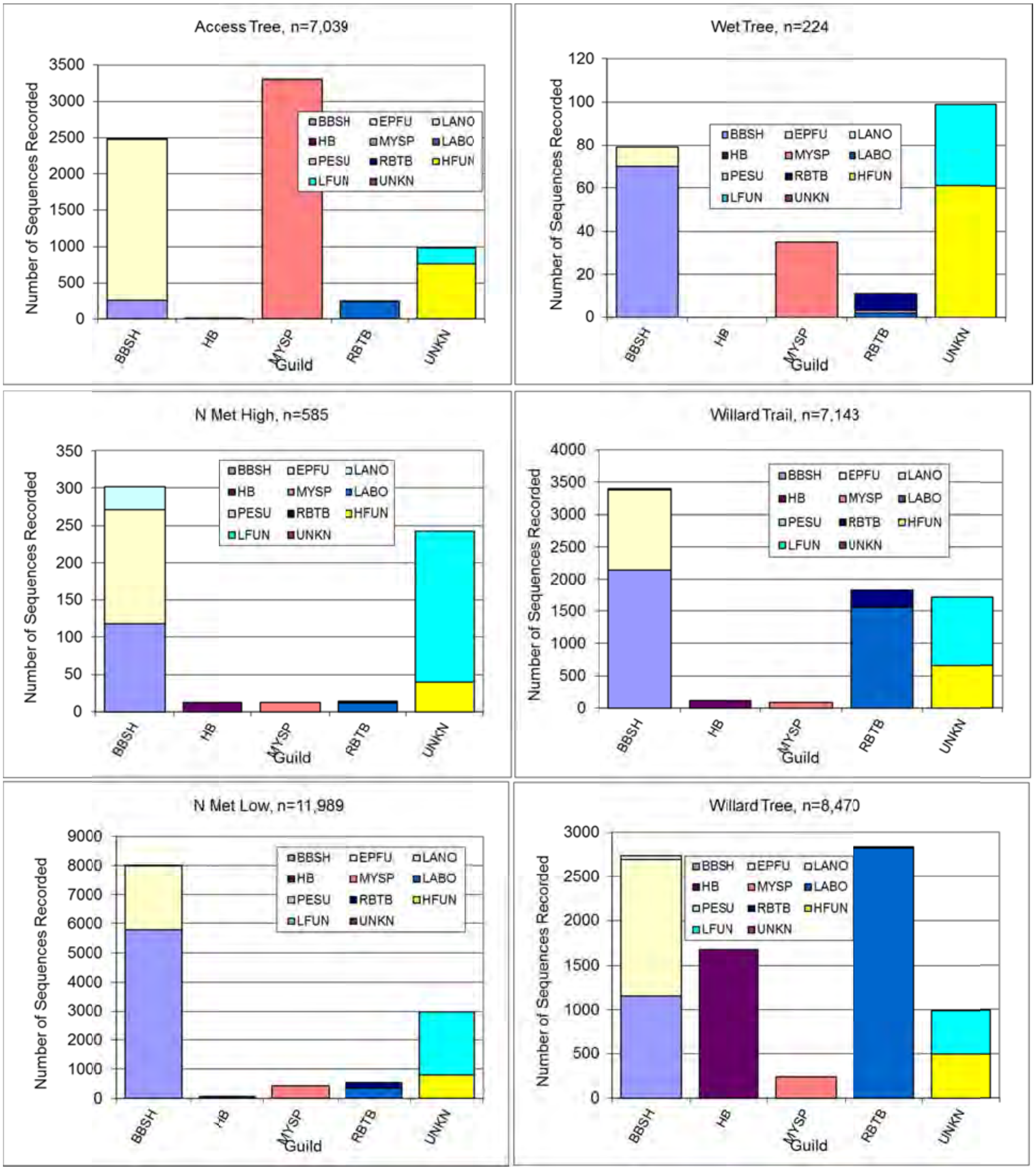

Figure 3-5. Histograms showing species composition of recorded bat call sequences during summer/fall 2011 surveys at the Antrim Wind Project. Note the differing scales on the y-axes. BBSH = big brown/silver-haired, HB = hoary bat, MYSP = Myotis species, RBTB = red bat/tri-colored bat, UNKN = unknown, LFUN = low frequency unknown, HFUN = high frequency unknown, PESU = tri-colored bat, LABO = red bat, LANO = silver-haired bat, EPFU = big brown bat.

Appendix B provides a series of tables with more specific information on the nightly timing, number, and species composition of recorded bat call sequences. Specifically, Appendix B Tables 1 through 6 provide information on the number of call sequences by guild and suspected species recorded at each detector and the weather conditions for that night. An electronic copy of all acoustic data files can be provided upon request.

3.4.3 Activity and Weather

Mean nightly wind speeds in the Project area from June 1 through October 23 varied between 0 and 15 m/s, with an overall mean of 6.4 m/s (Figure 3-6). Mean nightly temperatures varied between 3.4°C and 25.7°C, with an overall mean of 15.2°C (Figure 3-7). Figure 3-8 displays scatterplots of overall acoustic activity versus nightly temperature and wind speed. Combined bat activity levels showed a weak positive correlation with both increasing nightly wind speed, and increasing nightly temperature.

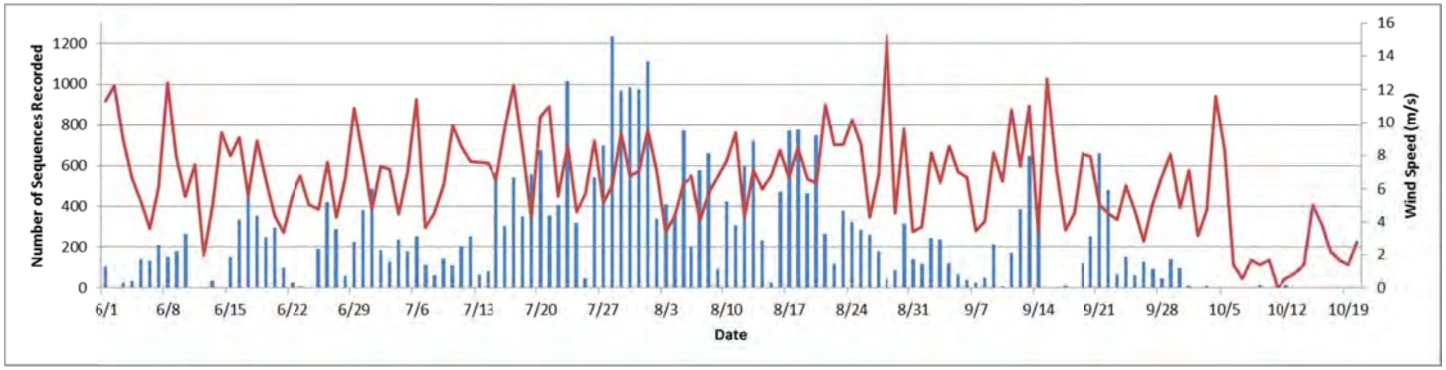

Figure 3-6. Nightly mean wind speed (m/s) (red line) and combined bat call detections during summer/fall 2011 surveys at the Antrim Wind Project.

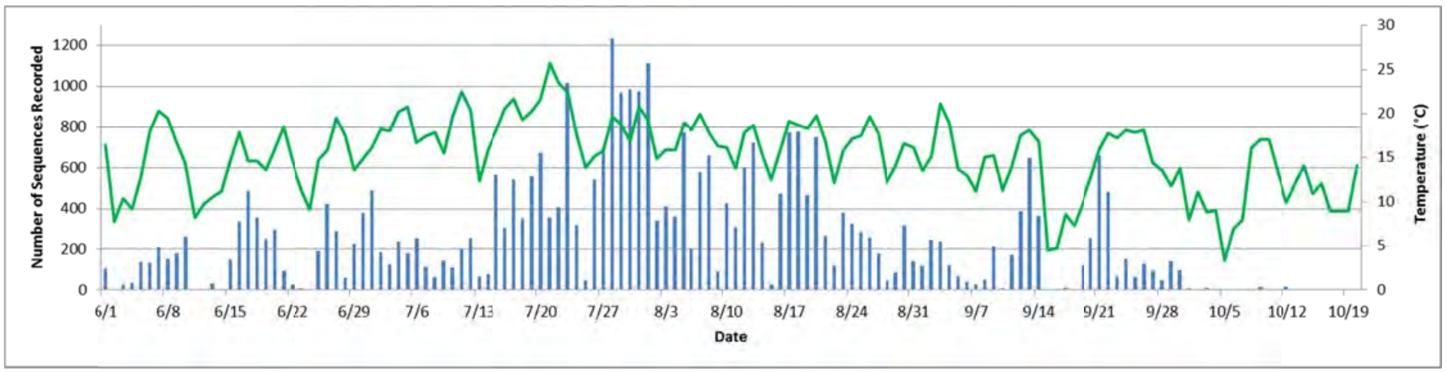

Figure 3-7. Nightly mean temperature (Celsius) (green line) and combined bat detections during summer/fall 2011 surveys at the Antrim Wind Project.

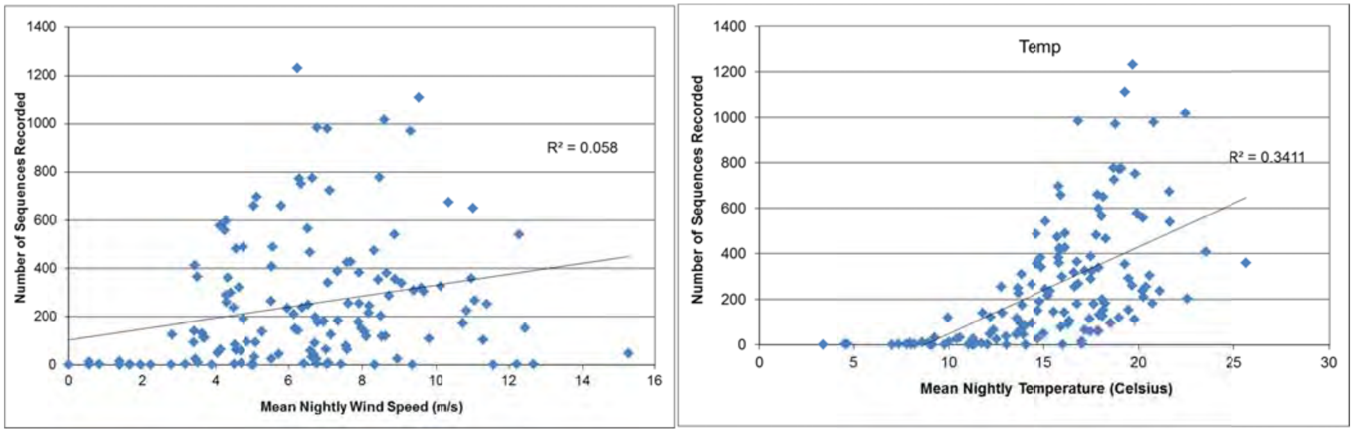

Figure 3-8. Nightly mean wind speed (left), and mean temperature (right) versus combined bat detections during summer/fall 2011 surveys at the Antrim Wind Project

3.5 DISCUSSION

Summer/fall 2011 acoustic surveys at the Antrim Wind Project documented variable levels of bat activity between the six detectors deployed in the Project area. Activity levels were also highly variable between nights during the June 1 to October 23 study period. However, some general trends also were observed, including more consistent acoustic activity in July and August (as indicated by the percentage of nights with detected activity), and overall increases in the number of call files in late July through early August as temperatures increased.

Inter-night and inter-detector variability is common in acoustic bat surveys, where microhabitat surrounding detectors can influence the number of calls recorded as well as the quality of call files. Although detectors were deployed in similar configurations (along habitat edges and corridors that may concentrate bat activity), slight differences in deployment and the surrounding vegetation likely lead to differences in detection rates.

Bat call sequences were identified to guild, although calls were provisionally categorized by 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 calls and Stantec did not make an attempt to differentiate call sequences within this genus. *Myotis* call sequences represented 11 percent of calls recorded by Project area detectors during the summer/fall 2011 surveys. Eighty percent of *Myotis* calls were recorded by the Access Tree detector, which was located approximately 30 m from a transmission line corridor that likely provided high quality foraging conditions. At the other detectors, the percent composition of *Myotis* species ranged from 1.2 percent at the Willard Trail detector, to 16 percent of all bats recorded by the Wetland Tree detector. *Myotis* species have been particularly affected by the white-nose syndrome (WNS) that has become widespread in the Northeast (Brooks 2011, Watrous *et al*. in prep). *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 in trees (Brooks 2011, Watrous *et al*. in prep). 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. A similar acoustic survey was conducted near Rutland, Vermont, approximately 100 km to the northwest, and documented significant reduction in Myotis species detection rates between pre and post-WNS outbreak (Watrous *et al*. in prep).

Comparison of acoustic bat activity documented at the North Met High and North Met Low detectors with the remaining tree detectors may help clarify activity patterns of bats in the air space above tree canopy and near the rotor zone of proposed wind turbines. The North Met High detector was located approximately 30 m above the ground, and recorded substantially less acoustic activity than any other detector. This detector had one of the lowest percentage of *Myotis* calls (2%) of all detectors. Since bats from the genus *Myotis* are more commonly detected beneath canopy level (Arnett *et al*. 2006), the low level of *Myotis* species activity at this detector is not unusual and corresponds to results from similar surveys in the Northeast. Other research conducted using Anabat detectors has shown that larger species such as big brown and hoary bats are more frequently detected at greater heights (Arnett *et al*. 2006), which is not reflected in the results of this survey. The North Met Low detector was deployed at only 15 m above the ground, and recorded the highest proportion of BBSH calls of any detector. The higher portion of BBSH calls at this lower height suggests that some other influence such as prey availability or surrounding habitat characteristic may be influencing foraging of bats at this location. Since habitats closer to the ground are generally more structurally complex, larger bats such as those in the BBSH guild are thought to be less able to maneuver in this habitat and therefore tend to forage at greater heights (Arnett *et al*. 2006). In the instance of the met tower clearing where essentially all woody vegetation is removed, these larger bats may easily forage at these lower heights, which may explain the high number of call sequences recorded at the North Met Low detector.

Recent 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 increase and temperatures decrease, 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 to 6 m/s) and generally warm temperatures. Thus, several weather variables can individually affect bat activity, as does the interaction among variables (*i.e.*, warm nights with low wind speeds). Summer/fall 2011 acoustic sampling at the Project documented weak correlations between acoustic activity and wind speed and temperature.

When considering the level of activity documented at the Project during the summer/fall 2011 acoustic survey, it is important to acknowledge that numbers of recorded bat call sequences cannot be correlated with the number of bats in an area because acoustic detectors do not allow for differentiation between individuals. The survey sampled activity over the time period when bats are known to be active and identified general species groups that occur in the Project area.

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Appendix A

Radar survey results

Appendix A Table 1. Survey dates, results, level of effort, and weather - Fall 2011										
Date	**Sunset**	**Sunrise**	**# of Hours Analyzed**	**Passage rate**	**Flight Direction**	**Flight Height (m)**	**% below 150 m**	**Temperature (C)**	**Wind Speed (m/s)**	**Wind Direction (degrees)**
8/17	19:49	5:56	10	157	201	171	50%	19	7	256
8/18	19:48	5:57	10	46	47	154	56%	19	8	246
8/20	19:44	5:59	10	90	182	172	51%	20	6	249
8/21	19:43	6:00	9	48	29	178	43%	17	11	236
8/22	19:41	6:02	10	96	186	210	37%	12	9	297
8/23	19:40	6:03	10	54	42	174	49%	16	8	245
8/24	19:38	6:04	11	38	325	147	51%	17	10	197
8/25	19:36	6:05	11	33	133	197	42%	18	8	262
8/26	19:35	6:06	9	538	225	186	41%	20	4	231
8/29	19:30	6:09	11	393	215	227	32%	14	5	314
8/30	19:28	6:10	11	72	144	175	55%	17	9	280
8/31	19:26	6:11	11	268	230	211	40%	16	3	90
9/1	19:25	6:12	11	182	230	172	50%	14	4	123
9/4	19:20	6:16	10	64	158	166	49%	19	8	232
9/9	19:11	6:21	11	184	200	266	25%	15	8	308
9/10	19:09	6:22	11	110	259	245	27%	12	6	158
9/11	19:07	6:23	11	20	69	204	34%	14	11	241
9/12	19:05	6:24	11	118	173	202	40%	18	7	254
9/13	19:04	6:26	11	26	28	250	29%	18	11	239
9/14	19:02	6:27	12	457	222	161	54%	17	4	204
9/16	18:58	6:29	12	190	218	201	39%	5	7	330
9/17	18:56	6:30	12	168	227	241	29%	9	4	80
9/18	18:55	6:31	12	254	228	218	37%	7	5	68
9/19	18:53	6:32	12	37	264	209	41%	10	8	203
9/30	18:33	6:44	9	132	208	159	52%	14	5	349
10/1	18:31	6:45	12	4	150	150	47%	8	7	19
10/2	18:29	6:47	12	73	209	176	45%	11	3	88
10/3	18:28	6:48	11	243	215	170	54%	9	5	65
10/7[1]	18:21	6:52	12	18	93	208	43%	8	2	170
10/8	18:19	6:53	12	50	123	220	37%	12	2	158
Entire Season			**327**	**138**	**217**	**203**	**40%**	**14**	**7**	**206**

[1]Weather data for 10/7 and 10/8 were retrieved from wunderground.com

Appendix A Table 2. Summary of passage rates by hour, night, and for entire season.

Night of	Passage Rate (targets/km/hr) by hour after sunset												Entire Night			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Mean**	**Median**	**Stdev**	**SE**
8/17	321	525	304	111	99	50	60	50	25	25	N/A	N/A	157	79	169	53
8/18	111	77	79	64	29	26	14	18	14	25	N/A	N/A	46	27	34	11
8/20	64	96	93	161	121	118	75	111	25	32	N/A	N/A	90	95	42	13
8/21	82	rain	75	64	43	39	43	36	43	11	N/A	N/A	48	43	22	7
8/22	57	221	229	150	82	68	54	43	39	21	N/A	N/A	96	63	76	24
8/23	39	82	64	50	82	86	36	71	11	18	N/A	N/A	54	57	27	9
8/24	36	39	93	54	54	61	43	14	14	7	0	N/A	38	39	27	8
8/25	46	36	11	25	32	29	39	46	57	36	4	N/A	33	36	16	5
8/26	239	839	779	743	586	486	493	304	379	N/A[1]	N/A[1]	N/A	538	493	214	71
8/29	204	407	650	575	536	475	407	346	325	264	129	N/A	393	407	160	48
8/30	50	71	68	129	121	146	64	61	39	32	7	N/A	72	64	43	13
8/31	207	325	229	254	229	275	381	436	339	211	60	N/A	268	254	101	31
9/1	32	186	382	314	357	196	150	136	114	93	43	N/A	182	150	121	36
9/4	54	rain	321	118	64	18	4	11	0	7	39	N/A	64	29	98	31
9/9	82	189	354	296	364	236	107	89	121	121	64	N/A	184	121	111	34
9/10	43	193	204	146	132	111	93	161	79	32	21	N/A	110	111	63	19
9/11	39	75	39	18	21	7	0	14	4	4	0	N/A	20	14	23	7
9/12	29	89	139	139	246	200	175	54	86	79	64	N/A	118	89	68	20
9/13	7	36	32	18	21	18	25	32	29	29	36	N/A	26	29	9	3
9/14	57	646	618	532	646	550	482	421	450	518	557	0	457	525	212	61
9/16	125	439	400	439	339	282	118	82	25	25	7	0	190	121	177	51
9/17	14	279	282	139	68	75	161	111	246	346	243	50	168	150	108	31
9/18	68	404	471	361	368	336	250	271	189	171	132	21	254	261	140	40
9/19	54	96	68	86	32	36	25	7	18	7	14	0	37	29	32	9
9/30	rain	182	211	rain	rain	75	111	121	121	182	143	43	132	121	54	18
10/1	11	14	0	0	7	11	4	0	0	0	0	0	4	0	5	2
10/2	68	125	143	21	29	32	11	0	179	25	132	114	73	50	62	18
10/3	64	200	311	325	271	389	318	354	425	0	14	rain	243	311	152	46
10/7	18	32	32	11	11	21	7	7	7	14	32	21	18	16	10	3
10/8	68	114	75	25	54	61	54	21	57	14	36	25	50	54	28	8
Entire Season	**79**	**215**	**225**	**185**	**174**	**150**	**127**	**114**	**115**	**81**	**77**	**28**	**138**	**68**	**162**	**9**

0 indicates no targets counted for that hour   N/A indicates no or only partial data for that hour

N/A[1] indicates equiment failure during that hour

Appendix A Table 3. Mean Nightly Flight Direction		
Night of	**Mean Flight Direction**	**Circular Stdev**
8/17	201	67
8/18	47	55
8/20	182	77
8/21	29	60
8/22	186	49
8/23	42	119
8/24	325	70
8/25	133	57
8/26	225	44
8/29	215	31
8/30	144	73
8/31	230	33
9/1	230	32
9/4	158	79
9/9	200	56
9/10	259	57
9/11	69	132
9/12	173	74
9/13	28	98
9/14	222	45
9/16	218	42
9/17	227	49
9/18	228	33
9/19	264	70
9/30	208	53
10/1	150	65
10/2	209	39
10/3	215	40
10/7	93	74
10/8	123	60
Entire Season	**217**	**56**

Stantec

Appendix A Table 4. Summary of mean flight heights by hour, night, and for entire season.

Night of	Mean Flight Height (m) by hour after sunset												Entire Night				# of targets below 150 meters	% of targets below 150 meters
	1	2	3	4	5	6	7	8	9	10	11	12	Mean	Median	STDV	SE		
8/17	174	158	170	228	171	156	286	112	137	68	N/A	N/A	171	152	117	37	159	50%
8/18	134	144	144	169	209	162	174	170	122	86	N/A	N/A	154	138	101	32	74	56%
8/20	217	183	179	173	172	128	96	123	209	215	N/A	N/A	172	148	133	42	127	51%
8/21	151	rain	rain	137	192	190	180	393	181	132	N/A	N/A	178	162	94	33	29	43%
8/22	179	206	213	207	239	257	248	185	176	189	N/A	N/A	210	190	134	42	170	37%
8/23	246	218	181	154	149	139	127	118	212	139	N/A	N/A	174	157	119	38	65	49%
8/24	130	145	165	129	133	173	160	138	145	134	N/A	N/A	147	148	74	23	55	51%
8/25	119	142	127	175	267	255	196	278	161	145	N/A	N/A	197	176	124	39	49	42%
8/26	186	177	182	215	181	190	157	193	176	N/A[1]	N/A	N/A	186	175	114	38	326	41%
8/29	305	250	197	229	212	208	242	201	192	238	278	N/A	227	205	131	40	238	32%
8/30	147	179	131	121	217	163	248	336	128	128	--	N/A	175	137	140	44	45	55%
8/31	191	209	238	245	279	236	192	162	139	133	164	N/A	211	190	135	41	476	40%
9/1	164	169	151	143	206	185	177	193	111	195	234	N/A	172	153	127	38	215	50%
9/4	160	rain	144	205	257	190	173	311	109	170	152	N/A	166	153	94	30	71	49%
9/9	248	247	247	243	226	253	216	320	346	276	247	N/A	266	245	150	45	169	25%
9/10	207	227	256	283	268	269	248	201	164	145	134	N/A	245	234	130	39	213	27%
9/11	58	253	197	163	238	189	239	189	168	184	141	N/A	204	179	113	34	45	34%
9/12	233	245	224	198	205	194	168	176	211	128	178	N/A	202	179	133	40	212	40%
9/13	105	224	255	273	302	274	307	222	210	217	190	N/A	250	223	152	46	27	29%
9/14	196	190	155	163	163	156	157	144	125	150	132	26	161	143	103	30	587	54%
9/16	145	222	184	185	203	193	194	246	306	253	306	--	201	179	112	34	264	39%
9/17	240	211	202	220	278	280	293	270	216	240	243	274	241	223	131	38	241	29%
9/18	200	228	193	198	238	218	223	223	249	236	216	317	218	193	140	40	377	37%
9/19	212	223	233	155	199	273	156	213	232	136	111	--	209	179	139	42	50	41%
9/30	181	126	73	rain	rain	148	155	138	163	186	197	184	159	146	92	29	117	52%
10/1	111	114	116	169	146	160	145	149	120	219	162	173	150	157	48	14	23	47%
10/2	139	153	162	167	185	198	168	187	188	200	184	204	176	168	103	30	137	45%
10/3	160	203	168	182	92	79	131	237	201	rain	rain	rain	170	139	126	42	386	54%
10/7	110	207	415	189	222	234	187	207	213	200	78	164	208	192	139	40	59	43%
10/8	132	211	176	187	278	275	267	245	179	186	214	292	220	207	135	39	61	37%
Entire Night	**173**	**195**	**189**	**190**	**211**	**201**	**197**	**209**	**183**	**176**	**187**	**204**	**203**	**179**	**130**	**1**	**5067**	**40%**

-- indicates no targets counted for that hour N/A indicates no or only partial data for that hour

N/A[1] indicates equiment failure during that hour

Appendix A Table 5. Summary of available avian fall radar survey results conducted at proposed (pre-construction) US wind power facilities on forested ridges in the eastern US, using X-band mobile radar systems (2004-present)

Project Site	Number of Survey Nights	Number of Survey Hours	Landscape	Average Passage Rate (t/km/hr)	Range in Nightly Passage Rates	Average Flight Direction	Average Flight Height (m)	(Turbine Ht) % Targets Below Turbine Height	Reference
Fall 2004									
Sheffield, Caledonia Cty, VT	18	176	Forested ridge	91	19-320	200	566	(125 m) 1%	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Power Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
Casselman, Somerset Cty, PA	30	n/a	Forested ridge	174	n/a	n/a	436	(125 m) 7%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Dans Mountain, Allegany Cty, MD	34	318	Forested ridge	188	2-633	193	542	(125 m) 11%	Woodlot Alternatives, Inc. 2004. A Fall 2004 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Dan's Mountain Wind Project in Frostburg, Maryland. Prepared for US Wind Force.
Franklin, Pendleton Cty, WV	34	349	Forested ridge	229	7-926	175	583	(125 m) 8%	Woodlot Alternatives, Inc. 2005. A Fall 2005 Radar and Acoustic Survey of Bird and Bat Migration at the Proposed Liberty Gap Wind Project in Franklin, West Virginia. Prepared for US Wind Force, LLC.
Fall 2005									
Swallow Farm, PA	58	n/a	Forested ridge	166	n/a	n/a	402	(125 m) 5%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Kibby, Franklin Cty, ME (Range 1)	12	101	Forested ridge	201	12-783	196	352	(125 m) 12%	Woodlot Alternatives, Inc. 2006. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Fayette Cty, PA	26	n/a	Forested ridge	297	n/a	n/a	426	(125 m) 5%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Stamford, Delaware Cty, NY	48	418	Forested ridge	315	22-784	251	494	(110 m) 3%	Woodlot Alternatives, Inc. 2007. A Spring and Fall 2005 Radar and Acoustic Survey of Bird Migration at the Proposed Moresville Energy Center in Stamford and Roxbury, New York. Prepared for Invenergy, LLC. Rockville, MD.
Preston Cty, WV	26	n/a	Forested ridge	379	n/a	n/a	420	(125 m) 10%	Plissner, J.H., T.J. Mabee, and B.A. Cooper. 2006 A radar and visual study of nocturnal bird and bat migration at the proposed Preston Wind Development project, Virginia, Fall 2005. Report to Highland New Wind Development, LLC.
Highland, VA	58	n/a	Forested ridge	385	n/a	n/a	442	(125 m) 12%	Plissner, J.H., T.J. Mabee, and B.A. Cooper. 2006 A radar and visual study of nocturnal bird and bat migration at the proposed Highland New Wind Development project, Virginia, Fall 2005. Report to Highland New Wind Development, LLC.
Kibby, Franklin Cty, ME (Valley)	5	13	Forested ridge	452	52-995	193	391	(125 m) 16%	Woodlot Alternatives, Inc. 2006. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Mars Hill, Aroostook Cty, ME	18	117	Forested ridge	512	60-1092	228	424	(120 m) 8%	Woodlot Alternatives, Inc. 2006. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird Migration at the Mars Hill Wind Farm in Mars Hill, Maine. Prepared for Evergreen Windpower, LLC.
Deerfield, Bennington Cty, VT	32	324	Forested ridge	559	3-1736	221	395	(100 m) 13%	Woodlot Alternatives, Inc. 2006. Fall 2005 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
Kibby, Franklin Cty, ME (Mountain)	12	115	Forested ridge	565	109-1107	167	370	(125 m) 16%	Woodlot Alternatives, Inc. 2006. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Fall 2006									
Somerset Cty, PA	29	n/a	Forested ridge	316	n/a	n/a	374	(125 m) 8%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Bedford Cty, PA	29	n/a	Forested ridge	438	n/a	n/a	379	(125 m) 10%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Stetson, Washington Cty, ME	12	77	Forested ridge	476	131-1192	227	378	(125 m) 13%	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Lempster, Sullivan Cty, NH	32	290	Forested ridge	620	133-1609	206	387	(125 m) 8%	Woodlot Alternatives, Inc. 2007. A Fall 2007 Survey of Nocturnal Bird Migration, Breeding Birds, and Bicknell's Thrush at the Proposed Lempster Mountain Wind Power Project Lempster, New Hampshire. Prepared for Lempster Wind, LLC.
Fall 2007									
Laurel Mountain, Barbour Cty, WV	20	212	Forested ridge	321	76-513	209	533	(130 m) 6%	Stantec Consulting Services Inc. 2007. A Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Laurel Mountain Wind Energy Project near Elkins, West Virginia. Prepared for AES Laurel Mountain, LLC.
Errol, Coos County, NH	29	232	Forested ridge	366	54 to 1234	223	343	(125 m) 15%	Stantec Consulting Inc. 2007. Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Power, LLC. Prepared for Granite Reliable Power, LLC.
Rollins, Lincoln, Penobscot Cty, ME	22	231	Forested ridge	368	82-953	284	343	(120 m) 13%	Woodlot Alternatives, Inc. 2008. A Fall 2007 Survey of Bird and Bat Migration at the Rollins Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.
Roxbury, Oxford Cty, ME	20	220	Forested ridge	420	88-1006	227	365	(130 m) 14%	Woodlot Alternatives, Inc. 2007. A Fall 2007 Survey of Bird and Bat Migration at the Record Hill Wind Project, Roxbury, Maine. Prepared for Roxbury Hill Wind LLC.
Allegany, Cattaraugus Cty, NY	46	n/a	Forested ridge	451	n/a	230	382	(150 m) 14%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
New Creek, Grant Cty, WV	20	n/a	Forested ridge	811	263-1683	231	360	(130 m) 17%	Stantec Consulting Services Inc. 2008. A Fall 2007 Survey of Bird and Bat Migration at the New Creek Wind Project, West Virginia. Prepared for AES New Creek, LLC.
Fall 2008									
Georgia Mountain, VT	21	n/a	Forested ridge	326	56-700	230	371	(120 m) 7%	Stantec Consulting Services Inc. 2008. A Fall 2008 Survey of Bird Migration at the Georgia Mountain Wind Project, Vermont. Prepared for Georgia Mountain Community Wind.
Oakfield, Penobscot Cty, ME	20	n/a	Forested ridge	501	116-945	200	309	(125 m) 18%	Woodlot Alternatives, Inc. 2008. A Fall 2008 Survey of Bird and Bat Migration at the Oakfield Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.
Tenney, Grafton Cty, NH	45	509	Forested ridge	470	94-1174	260	342	(125m) 13%	Stantec Consulting Services Inc. 2008. Fall 2008 Radar Survey Report for the Groton Wind Project. Prepared for Groton Wind, LLC.
Highland, Somerset Cty, ME	20	216	Forested ridge	549	68-1201	227	348	(130.5m) 17%	Stantec Consulting. 2009. Fall 2008 Bird and Bat Migration Survey Report: Radar and Acoustic Avian and Bat Surveys for the Highland Wind Project Highland Plantation, Maine. Prepared for Highland Wind LLC
Fall 2009									
Sisk (Kibby Expansion) Franklin Cty, ME	20	210	Forested ridge	458	44-1067	206	287	(125m) 23%	Stantec Consulting Services. 2009. Fall 2009 Nocturnal Migration Survey Report. Prepared for TRC Engineers LLC.
Vermont Community Wind Farm, Orleans Cty, VT	20	227	Forested ridge	443	110-1029	215	330	(130m) 15%	Stantec Consulting Services. 2009. Fall 2009 Bird and Bat Survey Report. Nocturnal Radar, Acoustic, and Diurnal Raptor Surveys performed for the Vermont Community Wind Farm Project in Rutland County, Vermont. Prepared for Vermont Community Wind Farm, LLC.
Stetson, Washington Cty, ME	18	201	Forested ridge	457	106-1746	227	420	(119m) 2%	Stantec Consulting Services. 2010. Stetson I Mountain Wind Project Year 1 Post-Construction Monitoring Report, 2009. Prepared for First Wind Management, LLC.
Bull Hill, Hancock Cty, ME	20	232	Forested ridge	614	188-1500	260	357	(145m) 20%	Stantec Consulting Services. 2010. Summer and Fall 2009 Avian and Bat Survey Report for the Bull Hill Project. Prepared for Blue Sky East Wind, LLC.
Bowers, Washington Cty, ME	22	249	Forested ridge	344	95-844	231	453	(119m) 14%	Stantec Consulting Services Inc. 2010. 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy, LLC.
Fall 2010									
Bingham, Somerset Cty, ME	20	232	Forested ridge	803	194-2463	234	377	(150m) 20%	Stantec Consulting Services Inc. 2010. 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy, LLC.
Fall 2011									
Antrim, Hillsborough Cty, NH	30	327	Forested ridge	138	4-538	217	203	(150m) 40%	*this report*

Appendix B

Bat survey results

Appendix B Table 1. Summary of acoustic bat data and weather during each survey night at the Access Tree detector – Antrim Wind Project, Summer/Fall 2011.

		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	Relative Humidity (%)
06/01/11	1		2			3				1	3		**9**	11.3	16.4	1014	79
06/02/11	1		1			1				1			**3**	12.2	7.8	1011	61
06/03/11	1		2			2					1		**5**	9.0	10.4	1016	54
06/04/11	1		3			1							**4**	6.6	9.2	1019	57
06/05/11	1		3			6				7	1		**17**	5.3	12.8	1019	73
06/06/11	1		12			4				1	1		**18**	3.6	17.9	1016	81
06/07/11	1	1	7			30				3	3		**44**	6.1	20.3	1013	62
06/08/11	1		8			1				3	1		**13**	12.4	19.5	1012	65
06/09/11	1		9			1					1		**11**	7.9	16.8	1012	88
06/10/11	1	1	13			4				1			**19**	5.5	14.4	1014	83
06/11/11	1		1							1			**2**	7.4	8.2	1020	94
06/12/11	1					1							**1**	2.0	9.7	1015	94
06/13/11	1		6			9				4	1		**20**	5.1	10.6	1012	85
06/14/11	1		1										**1**	9.4	11.2	1013	88
06/15/11	1		5			20				3	3		**31**	8.0	14.7	1011	78
06/16/11	1	1	3			8				2	1		**15**	9.1	17.9	1013	78
06/17/11	1	1	1			6				4	3		**15**	5.6	14.6	1013	90
06/18/11	1	3				1				3	2		**9**	8.9	14.6	1010	80
06/19/11	1	1	2			4				1			**8**	6.5	13.6	1011	61
06/20/11	1	1	1			10					1		**13**	4.4	16.0	1013	67
06/21/11	1	4	9			43				3	2		**61**	3.4	18.5	1014	66
06/22/11	1		1			22				1			**24**	5.5	14.7	1014	96
06/23/11	1					6							**6**	6.8	11.7	1012	98
06/24/11	1												**0**	5.1	9.1	1011	97
06/25/11	1		2			6				2			**10**	4.8	14.8	1011	94
06/26/11	1	4	5			5	2			5	3		**24**	7.6	15.9	1014	82
06/27/11	1	4	2			8	2			5	2		**23**	4.3	19.5	1017	72
06/28/11	1		7								11		**18**	6.6	17.5	1014	77
06/29/11	1		13		1	13				9	3		**39**	10.9	13.6	1011	81
06/30/11	1		2			15	1			5	4		**27**	7.9	14.9	1013	63
07/01/11	1	1	6			29				11	2		**49**	4.8	16.1	1016	71
07/02/11	1		16			14			1	1	4		**36**	7.4	18.2	1018	72
07/03/11	1		17			6				4	2		**29**	7.1	18.1	1012	86
07/04/11	1		13			3				4	4		**24**	4.5	20.2	1010	80
07/05/11	1		15			5				1			**21**	6.9	20.7	1013	82
07/06/11	1		6	1						1	2		**10**	11.4	16.6	1013	73
07/07/11	0												**0**	3.7	17.4	1014	74
07/08/11	0												**0**	4.6	17.8	1013	87
07/09/11	0												**0**	6.3	15.5	1010	84
07/10/11	0												**0**	9.8	19.8	1018	66
07/11/11	0												**0**	8.5	22.5	1014	72
07/12/11	0												**0**	7.6	20.4	1005	71
07/13/11	1	1	2			9				2	1		**15**	7.6	12.3	1008	74
07/14/11	1	1	2			12				3	1		**19**	7.5	15.9	1016	69
07/15/11	1	11	62			1	2			28	7		**111**	6.5	18.0	1019	63
07/16/11	1	4	19			92	1			4			**120**	9.7	20.6	1021	65
07/17/11	1	3	42			18	1			19	4		**87**	12.3	21.6	1019	63
07/18/11	1	6	57			7	2		1	11	4		**88**	8.4	19.3	1013	78
07/19/11	1	2	17			5				1	1		**26**	4.2	20.2	1011	69
07/20/11	1		1										**1**	10.4	21.6	1012	72
07/21/11	0												**0**	11.0	25.7	1008	78
07/22/11	0												**0**	5.5	23.5	1010	60
07/23/11	0												**0**	8.6	22.4	1013	71
07/24/11	0												**0**	4.6	17.5	1014	68
07/25/11	0												**0**	5.7	13.9	1014	85
07/26/11	1	9	109		1	21	1			12	5		**158**	8.9	15.1	1008	84
07/27/11	1	3	30			15				6			**54**	5.1	15.8	1012	69
07/28/11	1	5	79			33	3			20	9		**149**	6.2	19.7	1018	71
07/29/11	1	22	243			15				8	15		**303**	9.3	18.8	1013	90
07/30/11	1	7	121			10				1	5		**144**	6.8	16.8	1012	76
07/31/11	1	17	182	1		10	2			11	13		**236**	7.1	20.8	1017	70
08/01/11	1	11	142			74				13	4		**244**	9.5	19.3	1011	80
08/02/11	1	4	44			27	1			3	1		**80**	7.1	14.9	1007	66
08/03/11	1	10	123			23	6			30	11		**203**	3.4	15.9	1008	74
08/04/11	1	6	107			50	2			15	8		**188**	4.3	15.8	1014	81
08/05/11	1	11	102			52				36	15		**216**	6.3	19.0	1019	77
08/06/11	1	1	3			33	1			12	3		**53**	6.7	18.1	1016	81
08/07/11	1	13	142			105				27	6		**293**	4.1	19.9	1008	91
08/08/11	1	29	66			15				1	3		**114**	5.8	17.8	1001	90
08/09/11	1	1	14			16	22		1	19	3		**76**	6.7	16.3	1004	89
08/10/11	1	11	179			99				14	1		**304**	7.7	16.1	1002	88
08/11/11	1	2	4			21	1			4	2		**34**	9.4	13.8	1010	65
08/12/11	1		2			192				10	2		**206**	4.3	17.9	1016	74
08/13/11	1	3	29			92	2			20	5		**151**	7.1	18.7	1019	74
08/14/11	1		2			117	10			12	1		**142**	6.0	15.3	1015	92
08/15/11	1					2	4			3			**9**	6.8	12.5	1010	98
08/16/11	1	2	8			221	10	1	1	29	3		**275**	8.3	15.7	1010	92
08/17/11	1		2			223	2			5	3		**235**	6.6	19.1	1020	78
08/18/11	1	2	44		1	14	6			8	6		**81**	8.5	18.7	1016	80
08/19/11	1	1	12			112	4			14	2		**145**	6.6	18.3	1014	80
08/20/11	1	1	3			48	3			8	1		**64**	6.3	19.8	1015	81
08/21/11	1		1			37	4			16	1		**59**	11.1	16.8	1012	89
08/22/11	1					11				1			**12**	8.6	12.2	1009	74
08/23/11	1					70				11			**81**	8.7	15.8	1016	77
08/24/11	1		1			22	7			20			**50**	10.1	17.2	1017	75
08/25/11	1	1	4			38	2			9	1		**55**	8.7	17.5	1012	89
08/26/11	1	2	4			149	2			10			**167**	4.3	19.7	1016	82
08/27/11	1	2	1			153	1			13			**170**	6.8	17.6	1013	91
08/28/11	1						7			23			**30**	15.2	12.1	992	96
08/29/11	1					53	1			5			**59**	4.5	14.0	1012	73
08/30/11	1		1	2		54	1			3			**61**	9.6	16.6	1020	84
08/31/11	1	1	1			36				6			**44**	3.4	16.1	1023	77
09/01/11	1					1	4			6	1		**12**	3.7	13.5	1024	84
09/02/11	1	2		3		48	5		1	10	1		**70**	8.2	15.1	1021	76
09/03/11	1	2	2	2		35	2	1		7			**51**	6.4	21.1	1014	85
09/04/11	1	1		1		4	1	1		1	1		**10**	8.5	19.0	1012	91
09/05/11	1					20				3			**23**	7.0	13.7	1011	86
09/06/11	1	1				24	2			6			**33**	6.7	13.0	1017	93
09/07/11	1	1		1			4			11	1		**18**	3.4	11.2	1024	98
09/08/11	1	1				15	2			4	1		**23**	4.0	15.0	1019	96
09/09/11	1		1			148				14			**163**	8.2	15.2	1012	83
09/10/11	1												**0**	6.4	11.4	1015	75
09/11/11	1	1				60				3			**64**	10.8	13.8	1020	80
09/12/11	1		3		1	18	10			9	2		**43**	7.3	17.5	1016	84
09/13/11	1		2		1	52	10			2	1		**68**	11.0	18.1	1013	86
09/14/11	1	1				46	2			9	1		**59**	3.5	16.8	1014	83
09/15/11	1	2											**2**	12.7	4.5	1013	91
09/16/11	1												**0**	7.0	4.7	1023	67
09/17/11	1												**0**	3.5	8.6	1032	77
09/18/11	1												**0**	4.5	7.4	1032	76
09/19/11	1					1							**1**	8.1	9.9	1026	77
09/20/11	1					28	6			6			**40**	7.9	12.7	1020	93
09/21/11	1	2	1			75	8			14			**100**	5.1	15.9	1025	84
09/22/11	1	1		2			5			2	1		**11**	4.6	17.8	1021	93
09/23/11	1					1	7			9			**17**	4.1	17.2	1020	95
09/24/11	1	1				2	1			1			**5**	6.2	18.1	1017	95
09/25/11	1		11							2	1		**14**	4.7	17.9	1019	90
09/26/11	1	1				22	3			2			**28**	2.8	18.1	1017	92
09/27/11	1	3		2		2	7			6	1		**21**	5.1	14.4	1017	88
09/28/11	1	2	1	2		6	4			9	2		**26**	6.7	13.5	1019	80
09/29/11	1	1					21			3			**25**	8.1	11.7	1008	97
09/30/11	1	3	1	1			8			3	1		**17**	4.9	13.7	1006	88
10/01/11	1						1			3			**4**	7.1	8.0	1005	98
10/02/11	1		1								1		**2**	3.2	11.2	1011	99
10/03/11	1												**0**	4.7	8.9	1017	91
10/04/11	1												**0**	11.6	9.0	1015	97
10/05/11	1												**0**	8.3	3.4	1017	76
10/06/11	1												**0**	1.4	7.0	1026	61
10/07/11	1		1										**1**	0.6	8.0	1031	69
10/08/11	1												**0**	1.7	16.0	1030	71
10/09/11	1		1				8			2	1		**12**	1.4	17.0	1028	71
10/10/11	1									1			**1**	1.7	17.0	1023	71
10/11/11	1									1			**1**	0.0	13.0	1024	79
10/12/11	1												**0**	0.6	10.0	1023	87
10/13/11	1	1								1			**2**	0.8	12.0	1013	99
10/14/11	1												**0**	1.4	14.0	1000	96
10/15/11	1												**0**	5.0	11.0	999	77
10/16/11	1		1										**1**	3.9	12.0	1006	55
10/17/11	1												**0**	2.2	9.0	1005	67
10/18/11	1												**0**	1.7	9.0	1011	70
10/19/11	1												**0**	1.4	9.0	1011	94
10/20/11	1												**0**	2.8	14.0	1001	91
10/21/11	1												**0**	2.0	9.0	1010	73
10/22/11	1												**0**				
10/23/11	1												**0**				
By Species		**254**	**2227**	**18**	**5**	**3302**	**237**	**3**	**5**	**763**	**225**	**0**	**7039**				
By Guild		**2499**			**5**	**3302**	**245**			**988**							
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**				

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

Appendix B **Table 2**. Summary of acoustic bat data and weather during each survey night at the North Met High detector – Antrim Wind Project, Summer/Fall 2011.

		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	Relative Humidity (%)
06/01/11	1												**0**	11	16	1014	79
06/02/11	1												**0**	12	8	1011	61
06/03/11	1	1		1									**2**	9	10	1016	54
06/04/11	1												**0**	7	9	1019	57
06/05/11	1	1											**1**	5	13	1019	73
06/06/11	1	1		1							2		**4**	4	18	1016	81
06/07/11	1	12	20								11		**43**	6	20	1013	62
06/08/11	1				3						4		**7**	12	19	1012	65
06/09/11	1	13	2								1		**16**	8	17	1012	88
06/10/11	1	28	27								60		**115**	6	14	1014	83
06/11/11	1												**0**	7	8	1020	94
06/12/11	1												**0**	2	10	1015	94
06/13/11	1		2										**2**	5	11	1012	85
06/14/11	1												**0**	9	11	1013	88
06/15/11	1												**0**	8	15	1011	78
06/16/11	1												**0**	9	18	1013	78
06/17/11	1										5		**5**	6	15	1013	90
06/18/11	1												**0**	9	15	1010	80
06/19/11	1												**0**	7	14	1011	61
06/20/11	1												**0**	4	16	1013	67
06/21/11	1												**0**	3	19	1014	66
06/22/11	1												**0**	6	15	1014	96
06/23/11	1												**0**	7	12	1012	98
06/24/11	1												**0**	5	9	1011	97
06/25/11	1												**0**	5	15	1011	94
06/26/11	1												**0**	8	16	1014	82
06/27/11	1												**0**	4	19	1017	72
06/28/11	0												**0**	7	17	1014	77
06/29/11	0												**0**	11	14	1011	81
06/30/11	0												**0**	8	15	1013	63
07/01/11	0												**0**	5	16	1016	71
07/02/11	0												**0**	7	18	1018	72
07/03/11	0												**0**	7	18	1012	86
07/04/11	0												**0**	4	20	1010	80
07/05/11	0												**0**	7	21	1013	82
07/06/11	0												**0**	11	17	1013	73
07/07/11	0												**0**	4	17	1014	74
07/08/11	0												**0**	5	18	1013	87
07/09/11	0												**0**	6	16	1010	84
07/10/11	0												**0**	10	20	1018	66
07/11/11	0												**0**	8	23	1014	72
07/12/11	0												**0**	8	20	1005	71
07/13/11	1	1	5								2		**8**	8	12	1008	74
07/14/11	1				1								**1**	8	16	1016	69
07/15/11	1												**0**	7	18	1019	63
07/16/11	1	1	1								2		**4**	10	21	1021	65
07/17/11	1												**0**	12	22	1019	63
07/18/11	1												**0**	8	19	1013	78
07/19/11	1												**0**	4	20	1011	69
07/20/11	1	3					1				2		**6**	10	22	1012	72
07/21/11	1									1			**1**	11	26	1008	78
07/22/11	1	2	2		1						3		**8**	6	23	1010	60
07/23/11	1	5	5		2						15		**27**	9	22	1013	71
07/24/11	1	16	65	5		7		1		2	36		**132**	5	18	1014	68
07/25/11	1	1	2							2	3		**8**	6	14	1014	85
07/26/11	1												**0**	9	15	1008	84
07/27/11	1		1			1				1			**3**	5	16	1012	69
07/28/11	1		1								2		**3**	6	20	1018	71
07/29/11	1				1						2		**3**	9	19	1013	90
07/30/11	1										1		**1**	7	17	1012	76
07/31/11	1		2		1								**3**	7	21	1017	70
08/01/11	1						1						**1**	10	19	1011	80
08/02/11	1	1											**1**	7	15	1007	66
08/03/11	1	4	5	2		3				3	3		**20**	3	16	1008	74
08/04/11	1	5	2	3			1			1	7		**19**	4	16	1014	81
08/05/11	1	1									1		**2**	6	19	1019	77
08/06/11	1									1			**1**	7	18	1016	81
08/07/11	1									1			**1**	4	20	1008	91
08/08/11	1		1								2		**3**	6	18	1001	90
08/09/11	1										1		**1**	7	16	1004	89
08/10/11	1									2	2		**4**	8	16	1002	88
08/11/11	1												**0**	9	14	1010	65
08/12/11	1	2								1	1		**4**	4	18	1016	74
08/13/11	1	1									1		**2**	7	19	1019	74
08/14/11	1									2	1		**3**	6	15	1015	92
08/15/11	1												**0**	7	12	1010	98
08/16/11	1												**0**	8	16	1010	92
08/17/11	1						1						**1**	7	19	1020	78
08/18/11	1	1											**1**	8	19	1016	80
08/19/11	1						1						**1**	7	18	1014	80
08/20/11	1									2	1		**3**	6	20	1015	81
08/21/11	1									1			**1**	11	17	1012	89
08/22/11	1												**0**	9	12	1009	74
08/23/11	1												**0**	9	16	1016	77
08/24/11	1	1											**1**	10	17	1017	75
08/25/11	1												**0**	9	17	1012	89
08/26/11	1										3		**3**	4	20	1016	82
08/27/11	1												**0**	7	18	1013	91
08/28/11	1												**0**	15	12	992	96
08/29/11	1			1						1			**2**	5	14	1012	73
08/30/11	1				1					2			**3**	10	17	1020	84
08/31/11	1	3	2	3		2				4	3		**17**	3	16	1023	77
09/01/11	1			2							1		**3**	4	14	1024	84
09/02/11	1												**0**	8	15	1021	76
09/03/11	1	2									3		**5**	6	21	1014	85
09/04/11	1	1											**1**	9	19	1012	91
09/05/11	1												**0**	7	14	1011	86
09/06/11	1		2										**2**	7	13	1017	93
09/07/11	1			2									**2**	3	11	1024	98
09/08/11	1	2									2		**4**	4	15	1019	96
09/09/11	1										1		**1**	8	15	1012	83
09/10/11	1			1							1		**2**	6	11	1015	75
09/11/11	1	1											**1**	11	14	1020	80
09/12/11	1												**0**	7	17	1016	84
09/13/11	1				1						1		**2**	11	18	1013	86
09/14/11	1			4							2		**6**	3	17	1014	83
09/15/11	1										1		**1**	13	5	1013	91
09/16/11	1	1									1		**2**	7	5	1023	67
09/17/11	1			1							1		**2**	4	9	1032	77
09/18/11	1												**0**	5	7	1032	76
09/19/11	1												**0**	8	10	1026	77
09/20/11	1												**0**	8	13	1020	93
09/21/11	1									2	1		**3**	5	16	1025	84
09/22/11	1												**0**	5	18	1021	93
09/23/11	1												**0**	4	17	1020	95
09/24/11	1			1					1		1		**3**	6	18	1017	95
09/25/11	1										1		**1**	5	18	1019	90
09/26/11	1	1		1			2			1	1		**6**	3	18	1017	92
09/27/11	1	2	4	3						1	4		**14**	5	14	1017	88
09/28/11	1	3								1	1		**5**	7	14	1019	80
09/29/11	1												**0**	8	12	1008	97
09/30/11	1		1				2			1	1		**5**	5	14	1006	88
10/01/11	1									1			**1**	7	8	1005	98
10/02/11	1	1	1										**2**	3	11	1011	99
10/03/11	1						3			5			**8**	5	9	1017	91
10/04/11	1												**0**	12	9	1015	97
10/05/11	1												**0**	8	3	1017	76
10/06/11	1												**0**	1	7	1026	61
10/07/11	1												**0**	1	8	1031	69
10/08/11	1									1			**1**	2	16	1030	71
10/09/11	1												**0**	1	17	1028	71
10/10/11	1												**0**	2	17	1023	71
10/11/11	1												**0**	0	13	1024	79
10/12/11	1				2						2		**4**	1	10	1023	87
10/13/11	1												**0**	1	12	1013	99
10/14/11	1												**0**	1	14	1000	96
10/15/11	1												**0**	5	11	999	77
10/16/11	1												**0**	4	12	1006	55
10/17/11	1												**0**	2	9	1005	67
10/18/11	1												**0**	2	9	1011	70
10/19/11	1												**0**	1	9	1011	94
10/20/11	1												**0**	3	14	1001	91
By Species		**118**	**153**	**31**	**13**	**13**	**12**	**1**	**1**	**40**	**203**	**0**	**585**				
By Guild		**302**			**13**	**13**	**14**			**243**							
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**				

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

Appendix B Table 3. Summary of acoustic bat data and weather during each survey night at the North Met Low detector – Antrim Wind Project, Summer/Fall 2011.

		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	Relative Humidity (%)
06/01/11	1	2	2							1	4		**9**	11	16	1014	79
06/02/11	1												**0**	12	8	1011	61
06/03/11	1	1								1			**2**	9	10	1016	54
06/04/11	1												**0**	7	9	1019	57
06/05/11	1	9	3		1						2		**15**	5	13	1019	73
06/06/11	1	26	14								7		**47**	4	18	1016	81
06/07/11	1	12	9								5		**26**	6	20	1013	62
06/08/11	1	8	8		8						44		**68**	12	19	1012	65
06/09/11	1	16	21			1					47		**85**	8	17	1012	88
06/10/11	1	8	7		1					3	8		**27**	6	14	1014	83
06/11/11	1												**0**	7	8	1020	94
06/12/11	1												**0**	2	10	1015	94
06/13/11	1		4		1						1		**6**	5	11	1012	85
06/14/11	1												**0**	9	11	1013	88
06/15/11	1	9	7								11		**27**	8	15	1011	78
06/16/11	1	2	5			12				2	2		**23**	9	18	1013	78
06/17/11	1	2	1			1				2	1		**7**	6	15	1013	90
06/18/11	1	51	44			10	4			23	20		**152**	9	15	1010	80
06/19/11	1	27	119			3			4	5	9		**167**	7	14	1011	61
06/20/11	1	51	110	1		26	1		14	15	15		**233**	4	16	1013	67
06/21/11	1	4	6			1	2		1	5	4		**23**	3	19	1014	66
06/22/11	1					1							**1**	6	15	1014	96
06/23/11	1												**0**	7	12	1012	98
06/24/11	1												**0**	5	9	1011	97
06/25/11	1	58	32			10			7	10	7		**124**	5	15	1011	94
06/26/11	1	94	10			7			1	38	21		**171**	8	16	1014	82
06/27/11	1	26	4			12				26	8		**76**	4	19	1017	72
06/28/11	1	1	1			6			1	2	1		**12**	7	17	1014	77
06/29/11	1					2				8	1		**11**	11	14	1011	81
06/30/11	1	10	8			37			2	31	23		**111**	8	15	1013	63
07/01/11	1	111	109			96				64	30		**410**	5	16	1016	71
07/02/11	1	41	37			1					5		**84**	7	18	1018	72
07/03/11	1	3	1			2	1			13	3		**23**	7	18	1012	86
07/04/11	1	63	9			13	1		3	43	13		**145**	4	20	1010	80
07/05/11	1	61	17	1		19				4	27		**129**	7	21	1013	82
07/06/11	1	64	7			3				2	17		**93**	11	17	1013	73
07/07/11	1	26	38			1				3	19		**87**	4	17	1014	74
07/08/11	1	10	11			14				6	4		**45**	5	18	1013	87
07/09/11	1	18	18			26	9		16	13	5		**105**	6	16	1010	84
07/10/11	1	28	9			1				1	13		**52**	10	20	1018	66
07/11/11	1	4	5		1				1	1	1		**13**	8	23	1014	72
07/12/11	1	164	27			3			5	6	5		**210**	8	20	1005	71
07/13/11	1	6	15		1					2	8		**32**	8	12	1008	74
07/14/11	1	10	6			8	7		3	6	3		**43**	8	16	1016	69
07/15/11	1		1			4	2			1	1		**9**	7	18	1019	63
07/16/11	1	17	10		3						13		**43**	10	21	1021	65
07/17/11	1	234	23								55		**312**	12	22	1019	63
07/18/11	1	73	19			1	53		3	18	50		**217**	8	19	1013	78
07/19/11	1	207	103		1	1	12		36	45	87		**492**	4	20	1011	69
07/20/11	1	44	19			1	35		13	11	138		**261**	10	22	1012	72
07/21/11	1	181	6	1			10		21	13	21		**253**	11	26	1008	78
07/22/11	1	128	31		2		20		13	44	82		**320**	6	23	1010	60
07/23/11	1	402	50	1	3	1	22		20	27	204		**730**	9	22	1013	71
07/24/11	1	46	31			11	1			4	14		**107**	5	18	1014	68
07/25/11	1	4	3			3	1		1	5			**17**	6	14	1014	85
07/26/11	1	136	41		1	34	3		6	28	14		**263**	9	15	1008	84
07/27/11	1	338	155		4	4	5		7	6	65		**584**	5	16	1012	69
07/28/11	1	173	39		6	2			1	5	34		**260**	6	20	1018	71
07/29/11	1	233	87		1	25	43		10	66	40		**505**	9	19	1013	90
07/30/11	1	414	158		1	4	3		1	10	158		**749**	7	17	1012	76
07/31/11	1	230	73	1		1	4		1	7	89		**406**	7	21	1017	70
08/01/11	1	520	86	1			8		1	18	112		**746**	10	19	1011	80
08/02/11	1	115	72				7		3	9	29		**235**	7	15	1007	66
08/03/11	1	45	22			1	1		2	12	36		**119**	3	16	1008	74
08/04/11	1	27	10			2	4		1	14	48		**106**	4	16	1014	81
08/05/11	1	65	29	1			1			1	54		**151**	6	19	1019	77
08/06/11	1	26	21		1	1				1	9		**59**	7	18	1016	81
08/07/11	1	137	44			1	12		2	9	31		**236**	4	20	1008	91
08/08/11	1	364	108							2	44		**518**	6	18	1001	90
08/09/11	1						1			5			**6**	7	16	1004	89
08/10/11	1	11	6		1	2	6	1		10	2		**39**	8	16	1002	88
08/11/11	1	46	67			1	6		4	23	8		**155**	9	14	1010	65
08/12/11	1	124	33		1	1	7			21	87		**274**	4	18	1016	74
08/13/11	1	28	8		1	1	1			1	19		**59**	7	19	1019	74
08/14/11	1	6				1	3		2	7	1		**20**	6	15	1015	92
08/15/11	1												**0**	7	12	1010	98
08/16/11	1	42	19			7	14			16	22		**120**	8	16	1010	92
08/17/11	1	114	44		1		3		1	8	44		**215**	7	19	1020	78
08/18/11	1	32	11		2	1	3			2	15		**66**	8	19	1016	80
08/19/11	1	16	5			2	3		1		21		**48**	7	18	1014	80
08/20/11	1	182	45		1		2			1	147		**378**	6	20	1015	81
08/21/11	1										1		**1**	11	17	1012	89
08/22/11	0												**0**	9	12	1009	74
08/23/11	0												**0**	9	16	1016	77
08/24/11	0												**0**	10	17	1017	75
08/25/11	0												**0**	9	17	1012	89
08/26/11	0												**0**	4	20	1016	82
08/27/11	0												**0**	7	18	1013	91
08/28/11	0												**0**	15	12	992	96
08/29/11	0												**0**	5	14	1012	73
08/30/11	0												**0**	10	17	1020	84
08/31/11	0												**0**	3	16	1023	77
09/01/11	0												**0**	4	14	1024	84
09/02/11	0												**0**	8	15	1021	76
09/03/11	0												**0**	6	21	1014	85
09/04/11	0												**0**	9	19	1012	91
09/05/11	0												**0**	7	14	1011	86
09/06/11	0												**0**	7	13	1017	93
09/07/11	0												**0**	3	11	1024	98
09/08/11	0												**0**	4	15	1019	96
09/09/11	0												**0**	8	15	1012	83
09/10/11	0												**0**	6	11	1015	75
09/11/11	0												**0**	11	14	1020	80
09/12/11	0												**0**	7	17	1016	84
09/13/11	0												**0**	11	18	1013	86
09/14/11	0												**0**	3	17	1014	83
09/15/11	0												**0**	13	5	1013	91
09/16/11	0												**0**	7	5	1023	67
09/17/11	0												**0**	4	9	1032	77
09/18/11	0												**0**	5	7	1032	76
09/19/11	0												**0**	8	10	1026	77
09/20/11	0												**0**	8	13	1020	93
09/21/11	0												**0**	5	16	1025	84
09/22/11	0												**0**	5	18	1021	93
09/23/11	0												**0**	4	17	1020	95
09/24/11	0												**0**	6	18	1017	95
09/25/11	0												**0**	5	18	1019	90
09/26/11	0												**0**	3	18	1017	92
09/27/11	0												**0**	5	14	1017	88
09/28/11	0												**0**	7	14	1019	80
09/29/11	0												**0**	8	12	1008	97
09/30/11	0												**0**	5	14	1006	88
10/01/11	1						1			1			**2**	7	8	1005	98
10/02/11	0												**0**	3	11	1011	99
10/03/11	0												**0**	5	9	1017	91
10/04/11	0												**0**	12	9	1015	97
10/05/11	0												**0**	8	3	1017	76
10/06/11	0												**0**	1	7	1026	61
10/07/11	0												**0**	1	8	1031	69
10/08/11	0												**0**	2	16	1030	71
10/09/11	1									3			**3**	1	17	1028	71
10/10/11	1		1										**1**	2	17	1023	71
10/11/11	1												**0**	0	13	1024	79
10/12/11	1				1		2			3	3		**9**	1	10	1023	87
10/13/11	1												**0**	1	12	1013	99
10/14/11	1									1			**1**	1	14	1000	96
10/15/11	1												**0**	5	11	999	77
10/16/11	1												**0**	4	12	1006	55
10/17/11	1												**0**	2	9	1005	67
10/18/11	1												**0**	2	9	1011	70
10/19/11	1												**0**	1	9	1011	94
10/20/11	1												**0**	3	14	1001	91
By Species		**5786**	**2204**	**7**	**44**	**429**	**324**	**1**	**208**	**794**	**2192**	**0**	**11989**				
By Guild		**7997**			**44**	**429**	**533**			**2986**							
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**				

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

Appendix B Table 4. Summary of acoustic bat data and weather during each survey night at the Wetland Tree detector – Antrim Wind Project, Summer/Fall 2011.

		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**	**Relative Humidity (%)**
06/01/11	0												**0**	11	16	1014	79
06/02/11	0												**0**	12	8	1011	61
06/03/11	0												**0**	9	10	1016	54
06/04/11	0												**0**	7	9	1019	57
06/05/11	0												**0**	5	13	1019	73
06/06/11	0												**0**	4	18	1016	81
06/07/11	0												**0**	6	20	1013	62
06/08/11	0												**0**	12	19	1012	65
06/09/11	0												**0**	8	17	1012	88
06/10/11	0												**0**	6	14	1014	83
06/11/11	0												**0**	7	8	1020	94
06/12/11	0												**0**	2	10	1015	94
06/13/11	0												**0**	5	11	1012	85
06/14/11	0												**0**	9	11	1013	88
06/15/11	0												**0**	8	15	1011	78
06/16/11	0												**0**	9	18	1013	78
06/17/11	0												**0**	6	15	1013	90
06/18/11	0												**0**	9	15	1010	80
06/19/11	0												**0**	7	14	1011	61
06/20/11	0												**0**	4	16	1013	67
06/21/11	0												**0**	3	19	1014	66
06/22/11	0												**0**	6	15	1014	96
06/23/11	0												**0**	7	12	1012	98
06/24/11	0												**0**	5	9	1011	97
06/25/11	0												**0**	5	15	1011	94
06/26/11	0												**0**	8	16	1014	82
06/27/11	0												**0**	4	19	1017	72
06/28/11	0												**0**	7	17	1014	77
06/29/11	0												**0**	11	14	1011	81
06/30/11	0												**0**	8	15	1013	63
07/01/11	0												**0**	5	16	1016	71
07/02/11	0												**0**	7	18	1018	72
07/03/11	0												**0**	7	18	1012	86
07/04/11	0												**0**	4	20	1010	80
07/05/11	0												**0**	7	21	1013	82
07/06/11	0												**0**	11	17	1013	73
07/07/11	0												**0**	4	17	1014	74
07/08/11	0												**0**	5	18	1013	87
07/09/11	0												**0**	6	16	1010	84
07/10/11	0												**0**	10	20	1018	66
07/11/11	0												**0**	8	23	1014	72
07/12/11	0												**0**	8	20	1005	71
07/13/11	1												**0**	8	12	1008	74
07/14/11	1					2				1			**3**	8	16	1016	69
07/15/11	1					1				1	1		**3**	7	18	1019	63
07/16/11	1	1				1				1			**3**	10	21	1021	65
07/17/11	1	4	2			2		1		1	1		**11**	12	22	1019	63
07/18/11	1	2	1			2				1			**6**	8	19	1013	78
07/19/11	1	1				1				1			**3**	4	20	1011	69
07/20/11	1	3								1	2		**6**	10	22	1012	72
07/21/11	1	2	1							1	2		**6**	11	26	1008	78
07/22/11	1	1								2			**3**	6	23	1010	60
07/23/11	1	5				2					2		**9**	9	22	1013	71
07/24/11	1	4							1	1	2		**8**	5	18	1014	68
07/25/11	1									2	3		**5**	6	14	1014	85
07/26/11	1	2								1			**3**	9	15	1008	84
07/27/11	1					2			1		1		**4**	5	16	1012	69
07/28/11	1	15				6				2	2		**25**	6	20	1018	71
07/29/11	1	1				2				4			**7**	9	19	1013	90
07/30/11	1	2				1			1	3	2		**9**	7	17	1012	76
07/31/11	1	4				1				3			**8**	7	21	1017	70
08/01/11	1	1				1				4	1		**7**	10	19	1011	80
08/02/11	1	1				1				2			**4**	7	15	1007	66
08/03/11	1	1											**1**	3	16	1008	74
08/04/11	1	1							1				**2**	4	16	1014	81
08/05/11	1								1	1	3		**5**	6	19	1019	77
08/06/11	1	1											**1**	7	18	1016	81
08/07/11	1					1				2	1		**4**	4	20	1008	91
08/08/11	1	1								1			**2**	6	18	1001	90
08/09/11	1									1			**1**	7	16	1004	89
08/10/11	1	2							1	3	1		**7**	8	16	1002	88
08/11/11	1					2							**2**	9	14	1010	65
08/12/11	1	1				1				1			**3**	4	18	1016	74
08/13/11	1	7	2								3		**12**	7	19	1019	74
08/14/11	1									1			**1**	6	15	1015	92
08/15/11	1												**0**	7	12	1010	98
08/16/11	1					2				2			**4**	8	16	1010	92
08/17/11	1	2	1				2		1	3	2		**11**	7	19	1020	78
08/18/11	1		1			2				2	1		**6**	8	19	1016	80
08/19/11	1	1				1				2			**4**	7	18	1014	80
08/20/11	1	1	1								1		**3**	6	20	1015	81
08/21/11	1									2	1		**3**	11	17	1012	89
08/22/11	1									3	1		**4**	9	12	1009	74
08/23/11	1										1		**1**	9	16	1016	77
08/24/11	1									1			**1**	10	17	1017	75
08/25/11	1									1			**1**	9	17	1012	89
08/26/11	1									1	1		**2**	4	20	1016	82
08/27/11	1								1				**1**	7	18	1013	91
08/28/11	1												**0**	15	12	992	96
08/29/11	1					1				1			**2**	5	14	1012	73
08/30/11	1	2									1		**3**	10	17	1020	84
08/31/11	1												**0**	3	16	1023	77
09/01/11	1												**0**	4	14	1024	84
09/02/11	1												**0**	8	15	1021	76
09/03/11	1												**0**	6	21	1014	85
09/04/11	1												**0**	9	19	1012	91
09/05/11	1												**0**	7	14	1011	86
09/06/11	1												**0**	7	13	1017	93
09/07/11	1												**0**	3	11	1024	98
09/08/11	1												**0**	4	15	1019	96
09/09/11	1	1								1			**2**	8	15	1012	83
09/10/11	1										1		**1**	6	11	1015	75
09/11/11	1												**0**	11	14	1020	80
09/12/11	1												**0**	7	17	1016	84
09/13/11	1												**0**	11	18	1013	86
09/14/11	1												**0**	3	17	1014	83
09/15/11	1												**0**	13	5	1013	91
09/16/11	1												**0**	7	5	1023	67
09/17/11	1												**0**	4	9	1032	77
09/18/11	1												**0**	5	7	1032	76
09/19/11	1												**0**	8	10	1026	77
09/20/11	1												**0**	8	13	1020	93
09/21/11	1												**0**	5	16	1025	84
09/22/11	1												**0**	5	18	1021	93
09/23/11	1												**0**	4	17	1020	95
09/24/11	1												**0**	6	18	1017	95
09/25/11	1												**0**	5	18	1019	90
09/26/11	1												**0**	3	18	1017	92
09/27/11	1												**0**	5	14	1017	88
09/28/11	1												**0**	7	14	1019	80
09/29/11	1												**0**	8	12	1008	97
09/30/11	1												**0**	5	14	1006	88
10/01/11	1												**0**	7	8	1005	98
10/02/11	1												**0**	3	11	1011	99
10/03/11	1										1		**1**	5	9	1017	91
10/04/11	1												**0**	12	9	1015	97
10/05/11	1												**0**	8	3	1017	76
10/06/11	0												**0**	1	7	1026	61
10/07/11	0												**0**	1	8	1031	69
10/08/11	0												**0**	2	16	1030	71
10/09/11	0												**0**	1	17	1028	71
10/10/11	0												**0**	2	17	1023	71
10/11/11	0												**0**	0	13	1024	79
10/12/11	0												**0**	1	10	1023	87
10/13/11	0												**0**	1	12	1013	99
10/14/11	0												**0**	1	14	1000	96
10/15/11	0												**0**	5	11	999	77
10/16/11	0												**0**	4	12	1006	55
10/17/11	0												**0**	2	9	1005	67
10/18/11	0												**0**	2	9	1011	70
10/19/11	0												**0**	1	9	1011	94
10/20/11	0												**0**	3	14	1001	91
By Species		**70**	**9**	**0**	**0**	**35**	**2**	**1**	**8**	**61**	**38**	**0**	**224**				
By Guild		**79**			**0**	**35**	**11**			**99**							
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**				

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

Appendix B **Table 5**. Summary of acoustic bat data and weather during each survey night at the Willard Tree detector – Antrim Wind Project, Summer/Fall 2011.

		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**	**Relative Humidity (%)**
06/01/11	1	1	7		18						17		**43**	11	16	1014	79
06/02/11	1												**0**	12	8	1011	61
06/03/11	1	10	5							1	1		**17**	9	10	1016	54
06/04/11	1	4	4	1	9						11		**29**	7	9	1019	57
06/05/11	1	27	30		3						10		**70**	5	13	1019	73
06/06/11	1	11	9		2					2	12		**36**	4	18	1016	81
06/07/11	1	23	12		5						9		**49**	6	20	1013	62
06/08/11	1	9	7								17		**33**	12	19	1012	65
06/09/11	1	10	4		5	1	1				7		**28**	8	17	1012	88
06/10/11	1	14	6	4	7	1				1	11		**44**	6	14	1014	83
06/11/11	1												**0**	7	8	1020	94
06/12/11	1												**0**	2	10	1015	94
06/13/11	1		1										**1**	5	11	1012	85
06/14/11	1												**0**	9	11	1013	88
06/15/11	1	7	1		4					1	3		**16**	8	15	1011	78
06/16/11	1	21	5		3						5		**34**	9	18	1013	78
06/17/11	1	123	30		16					1	61		**231**	6	15	1013	90
06/18/11	1	18	8		10						6		**42**	9	15	1010	80
06/19/11	1	3	1								2		**6**	7	14	1011	61
06/20/11	1												**0**	4	16	1013	67
06/21/11	1												**0**	3	19	1014	66
06/22/11	1												**0**	6	15	1014	96
06/23/11	1												**0**	7	12	1012	98
06/24/11	1												**0**	5	9	1011	97
06/25/11	1	32	1	1		2					7		**43**	5	15	1011	94
06/26/11	1	22	2		3						10		**37**	8	16	1014	82
06/27/11	1												**0**	4	19	1017	72
06/28/11	1	2	3				3			7			**15**	7	17	1014	77
06/29/11	1	2			1						1		**4**	11	14	1011	81
06/30/11	1		8								7		**15**	8	15	1013	63
07/01/11	1	5					2			2			**9**	5	16	1016	71
07/02/11	0												**0**	7	18	1018	72
07/03/11	0												**0**	7	18	1012	86
07/04/11	0												**0**	4	20	1010	80
07/05/11	0												**0**	7	21	1013	82
07/06/11	0												**0**	11	17	1013	73
07/07/11	0												**0**	4	17	1014	74
07/08/11	0												**0**	5	18	1013	87
07/09/11	0												**0**	6	16	1010	84
07/10/11	0												**0**	10	20	1018	66
07/11/11	0												**0**	8	23	1014	72
07/12/11	1	2			1	4					1		**8**	8	20	1005	71
07/13/11	1		4								2		**6**	8	12	1008	74
07/14/11	1	1				2				1	2		**6**	8	16	1016	69
07/15/11	1	22	5			4				1	36		**68**	7	18	1019	63
07/16/11	1	11	4							1	3		**19**	10	21	1021	65
07/17/11	1	40	18							1	20		**79**	12	22	1019	63
07/18/11	1	14	4		1	1				1	7		**28**	8	19	1013	78
07/19/11	1	6	5	1		1				5	2		**20**	4	20	1011	69
07/20/11	1	134	33	1		3	1		1	3	91		**267**	10	22	1012	72
07/21/11	1	14	10			5	3		1	3	11		**47**	11	26	1008	78
07/22/11	1	16	8	1		2	3			4	6		**40**	6	23	1010	60
07/23/11	1	127	53			1	5		1	5	39		**231**	9	22	1013	71
07/24/11	1	21	22			4				1	8		**56**	5	18	1014	68
07/25/11	1	1	1				3			5	1		**11**	6	14	1014	85
07/26/11	1	50	27	1			3			4	13		**98**	9	15	1008	84
07/27/11	1	15	18			4			1	1	3		**42**	5	16	1012	69
07/28/11	1	216	149		4	6	1		2	9	62		**449**	6	20	1018	71
07/29/11	1	64	24				1			7	20		**116**	9	19	1013	90
07/30/11	1	13	15			3	1			2	5		**39**	7	17	1012	76
07/31/11	1	91	140			4	4			1	14		**254**	7	21	1017	70
08/01/11	1	20	27			1	1			3	8		**60**	10	19	1011	80
08/02/11	1	2	1			1			1	2	1		**8**	7	15	1007	66
08/03/11	1	12	4	1		1	1		1	7	3		**30**	3	16	1008	74
08/04/11	1	2	6			3	4			2	6		**23**	4	16	1014	81
08/05/11	1	118	102		6	1	5			4	44		**280**	6	19	1019	77
08/06/11	1	32	20				1			4	6		**63**	7	18	1016	81
08/07/11	1	9	11		1		4			5	4		**34**	4	20	1008	91
08/08/11	1	5	2				2			1	3		**13**	6	18	1001	90
08/09/11	1						1			2	1		**4**	7	16	1004	89
08/10/11	1	1	3		1	3	8			11	4		**31**	8	16	1002	88
08/11/11	1		2				9		3	28			**42**	9	14	1010	65
08/12/11	1				1	2	16			30			**49**	4	18	1016	74
08/13/11	1	97	30		1	1	9		2	6	123		**269**	7	19	1019	74
08/14/11	1	2	2				4			2	1		**11**	6	15	1015	92
08/15/11	1						7		3	4			**14**	7	12	1010	98
08/16/11	1	3	1				6		9	3	1		**23**	8	16	1010	92
08/17/11	1	50	39		4	1	45		3	19	22		**183**	7	19	1020	78
08/18/11	1	120	35	1	3	2	86		30	17	55		**349**	8	19	1016	80
08/19/11	1	39	46			5	25		4	9	35		**163**	7	18	1014	80
08/20/11	1	68	58		1	1	45		6	12	16		**207**	6	20	1015	81
08/21/11	1	2	3		1	1	43		75	22	1		**148**	11	17	1012	89
08/22/11	1		3	1		3	19		25	37	1		**89**	9	12	1009	74
08/23/11	1						136		30	89			**255**	9	16	1016	77
08/24/11	1	1	5		1		164		4	14	14		**203**	10	17	1017	75
08/25/11	1	7	2			1	120		36	26	18		**210**	9	17	1012	89
08/26/11	1	12	3				6		9	6	6		**42**	4	20	1016	82
08/27/11	1									2			**2**	7	18	1013	91
08/28/11	1						7		8				**15**	15	12	992	96
08/29/11	1	1					4		1	7			**13**	5	14	1012	73
08/30/11	1	44	59		2		71			13	15		**204**	10	17	1020	84
08/31/11	1	18	3				16			4	12		**53**	3	16	1023	77
09/01/11	1		4			1	6			11	1		**23**	4	14	1024	84
09/02/11	1	37	21			2	28	1		7	11		**107**	8	15	1021	76
09/03/11	1	3			1	2	16			9	6		**37**	6	21	1014	85
09/04/11	1	4	1			1	4			3	8		**21**	9	19	1012	91
09/05/11	1	1				1	4			7			**13**	7	14	1011	86
09/06/11	1									1			**1**	7	13	1017	93
09/07/11	1	1		1			2			1			**5**	3	11	1024	98
09/08/11	1	6	1	1	1	1	1			1	2		**14**	4	15	1019	96
09/09/11	1	10	7			1	6			4	3		**31**	8	15	1012	83
09/10/11	1	1								1			**2**	6	11	1015	75
09/11/11	1	1	1				49			18			**69**	11	14	1020	80
09/12/11	1	56	4		1		13			5	9		**88**	7	17	1016	84
09/13/11	1	68	10				31	1	1	13	39		**163**	11	18	1013	86
09/14/11	1	3	1			1	16			8	1		**30**	3	17	1014	83
09/15/11	1	1											**1**	13	5	1013	91
09/16/11	1	1											**1**	7	5	1023	67
09/17/11	1		1										**1**	4	9	1032	77
09/18/11	1						1						**1**	5	7	1032	76
09/19/11	1	1					83		2	4	1		**91**	8	10	1026	77
09/20/11	1					1	60			6			**67**	8	13	1020	93
09/21/11	1	54	31			1	112			22	26		**246**	5	16	1025	84
09/22/11	1	2					97			24			**123**	5	18	1021	93
09/23/11	1				1		17			8			**26**	4	17	1020	95
09/24/11	1	1					77			10			**88**	6	18	1017	95
09/25/11	1						10			7	1		**18**	5	18	1019	90
09/26/11	1	10	1	1			12			9	2		**35**	3	18	1017	92
09/27/11	1	5					4		1	4			**14**	5	14	1017	88
09/28/11	1	1					2			2			**5**	7	14	1019	80
09/29/11	1						13			12			**25**	8	12	1008	97
09/30/11	1	10					3			6	2		**21**	5	14	1006	88
10/01/11	1												**0**	7	8	1005	98
10/02/11	0												**0**	3	11	1011	99
10/03/11	0												**0**	5	9	1017	91
10/04/11	0												**0**	12	9	1015	97
10/05/11	0												**0**	8	3	1017	76
10/06/11	0												**0**	1	7	1026	61
10/07/11	0												**0**	1	8	1031	69
10/08/11	0												**0**	2	16	1030	71
10/09/11	0												**0**	1	17	1028	71
10/10/11	0												**0**	2	17	1023	71
10/11/11	0												**0**	0	13	1024	79
10/12/11	0												**0**	1	10	1023	87
10/13/11	0												**0**	1	12	1013	99
10/14/11	0												**0**	1	14	1000	96
10/15/11	0												**0**	5	11	999	77
10/16/11	0												**0**	4	12	1006	55
10/17/11	0												**0**	2	9	1005	67
10/18/11	0												**0**	2	9	1011	70
10/19/11	0												**0**	1	9	1011	94
10/20/11	0												**0**	3	14	1001	91
By Species		**2144**	**1234**	**16**	**118**	**87**	**1563**	**2**	**260**	**664**	**1055**	**0**	**7143**				
By Guild		**3394**			**118**	**87**	**1825**			**1719**							
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**				

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

Appendix B **Table 6**. Summary of acoustic bat data and weather during each survey night at the Willard Tree detector – Antrim Wind Project, Summer/Fall 2011.

		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**	**Relative Humidity (%)**
06/01/11	1	18	21	3	1						1		**44**	11	16	1014	79
06/02/11	1												**0**	12	8	1011	61
06/03/11	1												**0**	9	10	1016	54
06/04/11	1												**0**	7	9	1019	57
06/05/11	1	23	11		1								**35**	5	13	1019	73
06/06/11	1	13	2		5						6		**26**	4	18	1016	81
06/07/11	1	17	20		2		4			1	5		**49**	6	20	1013	62
06/08/11	1	15	13								4		**32**	12	19	1012	65
06/09/11	1	8	5		20	2					3		**38**	8	17	1012	88
06/10/11	1	3	27		19						10		**59**	6	14	1014	83
06/11/11	1												**0**	7	8	1020	94
06/12/11	1												**0**	2	10	1015	94
06/13/11	1	1	1		1								**3**	5	11	1012	85
06/14/11	1												**0**	9	11	1013	88
06/15/11	1				72	1					3		**76**	8	15	1011	78
06/16/11	1	7	16		46	157				34	6		**266**	9	18	1013	78
06/17/11	1	9	25		178	5				1	12		**230**	6	15	1013	90
06/18/11	1	1	9		132	3				1	7		**153**	9	15	1010	80
06/19/11	1	7	4		45	2					10		**68**	7	14	1011	61
06/20/11	1	9	11		25					1	6		**52**	4	16	1013	67
06/21/11	1		7							2	2		**11**	3	19	1014	66
06/22/11	1		1										**1**	6	15	1014	96
06/23/11	1												**0**	7	12	1012	98
06/24/11	1												**0**	5	9	1011	97
06/25/11	1	2	8		1	1					1		**13**	5	15	1011	94
06/26/11	1	1	1		183	4				1	2		**192**	8	16	1014	82
06/27/11	1	22	27		133	1				1	7		**191**	4	19	1017	72
06/28/11	1	2	4			4	2			2			**14**	7	17	1014	77
06/29/11	1				166					1	5		**172**	11	14	1011	81
06/30/11	1				224	1				1	3		**229**	8	15	1013	63
07/01/11	1	10	10								1		**21**	5	16	1016	71
07/02/11	1	21	28		1	5	4				3		**62**	7	18	1018	72
07/03/11	1	5	5				62			2			**74**	7	18	1012	86
07/04/11	1		4		54	1	5				4		**68**	4	20	1010	80
07/05/11	1	13	7		4		2			1	3		**30**	7	21	1013	82
07/06/11	1	12	26		93	1					18		**150**	11	17	1013	73
07/07/11	1	3	12		2	1					8		**26**	4	17	1014	74
07/08/11	1	4	7		2						4		**17**	5	18	1013	87
07/09/11	1	5	4		23		1				6		**39**	6	16	1010	84
07/10/11	1	17	25		6	2	3			1	4		**58**	10	20	1018	66
07/11/11	1	35	93			6	24			27	5		**190**	8	23	1014	72
07/12/11	1	9	9		6	1	5			3	4		**37**	8	20	1005	71
07/13/11	1		3		1								**4**	8	12	1008	74
07/14/11	1	1	5								1		**7**	8	16	1016	69
07/15/11	1	38	323			2	1			3	6		**373**	7	18	1019	63
07/16/11	1	40	63			2	2			2	6		**115**	10	21	1021	65
07/17/11	1	14	28		1		1		1		6		**51**	12	22	1019	63
07/18/11	1	5	4		1	1	2				2		**15**	8	19	1013	78
07/19/11	1	5	4			3	2			2			**16**	4	20	1011	69
07/20/11	1	24	75		4	2	2			2	23		**132**	10	22	1012	72
07/21/11	1	13	25			1	3			3	6		**51**	11	26	1008	78
07/22/11	1	11	2		1		17			3	3		**37**	6	23	1010	60
07/23/11	1	8	3		3		2			2	2		**20**	9	22	1013	71
07/24/11	1	10	4			2				1	1		**18**	5	18	1014	68
07/25/11	1	2	1				1			1			**5**	6	14	1014	85
07/26/11	1	1	2			2	8			4	2		**19**	9	15	1008	84
07/27/11	1	4			1	1	1			2	1		**10**	5	16	1012	69
07/28/11	1	176								21	149		**346**	6	20	1018	71
07/29/11	1	1	3			1	19			11	1		**36**	9	19	1013	90
07/30/11	1	15	14				2			4	7		**42**	7	17	1012	76
07/31/11	1	18	33		7	2	5			2	5		**72**	7	21	1017	70
08/01/11	1	12	22			1	3			1	14		**53**	10	19	1011	80
08/02/11	1	3	4				4			1			**12**	7	15	1007	66
08/03/11	1	6	5		3	2	19			4	1		**40**	3	16	1008	74
08/04/11	1	1				3	15			3			**22**	4	16	1014	81
08/05/11	1	24	54		7		10			2	22		**119**	6	19	1019	77
08/06/11	1						16			6			**22**	7	18	1016	81
08/07/11	1		7							1	1		**9**	4	20	1008	91
08/08/11	1	1	5							2	2		**10**	6	18	1001	90
08/09/11	1				2	1							**3**	7	16	1004	89
08/10/11	1	1			3	2	29			6	1		**42**	8	16	1002	88
08/11/11	1				8	4	47			16			**75**	9	14	1010	65
08/12/11	1	9	4				27		1	19	1		**61**	4	18	1016	74
08/13/11	1	55	99		9	2	51		2	7	6		**231**	7	19	1019	74
08/14/11	1	1					43			14			**58**	6	15	1015	92
08/15/11	1						2						**2**	7	12	1010	98
08/16/11	1		4				40			8			**52**	8	16	1010	92
08/17/11	1	18	7				97			6	2		**130**	7	19	1020	78
08/18/11	1	20	18		158		50		1	12	16		**275**	8	19	1016	80
08/19/11	1	47	33		8		12		1	3	2		**106**	7	18	1014	80
08/20/11	1	32	27		1	1	28			3	3		**95**	6	20	1015	81
08/21/11	1	5	4				34			7	4		**54**	11	17	1012	89
08/22/11	1					1	11			4			**16**	9	12	1009	74
08/23/11	1			1			36			5	2		**44**	9	16	1016	77
08/24/11	1	21	41			1	2			2	4		**71**	10	17	1017	75
08/25/11	1		14				5		1	1			**21**	9	17	1012	89
08/26/11	1	19	16	1	2		3			5			**46**	4	20	1016	82
08/27/11	1	2	1				2			1			**6**	7	18	1013	91
08/28/11	1									2			**2**	15	12	992	96
08/29/11	1	4		1			1			1	1		**8**	5	14	1012	73
08/30/11	1		6		2		31			5	3		**47**	10	17	1020	84
08/31/11	1	3	10	2			1			3	8		**27**	3	16	1023	77
09/01/11	1	18	51	1			3				4		**77**	4	14	1024	84
09/02/11	1	32	9	2	1		16			7	1		**68**	8	15	1021	76
09/03/11	1	53	10				57			16	8		**144**	6	21	1014	85
09/04/11	1	25	6				42			8	6		**87**	9	19	1012	91
09/05/11	1						16			12			**28**	7	14	1011	86
09/06/11	1									1			**1**	7	13	1017	93
09/07/11	1									1			**1**	3	11	1024	98
09/08/11	1	1	6				1	1			1		**10**	4	15	1019	96
09/09/11	1	5	6		1		7						**19**	8	15	1012	83
09/10/11	1			1									**1**	6	11	1015	75
09/11/11	1	2					29			7	1		**39**	11	14	1020	80
09/12/11	1	11	4		1		224		2	13	1		**256**	7	17	1016	84
09/13/11	1	10	9			1	376		1	17	1		**415**	11	18	1013	86
09/14/11	1	1	4	2			249		1	13			**270**	3	17	1014	83
09/15/11	1												**0**	13	5	1013	91
09/16/11	1												**0**	7	5	1023	67
09/17/11	1			5		1				1			**7**	4	9	1032	77
09/18/11	1	1											**1**	5	7	1032	76
09/19/11	1				1		19			7			**27**	8	10	1026	77
09/20/11	1						145			3			**148**	8	13	1020	93
09/21/11	1	16	11	5			249			26	2		**309**	5	16	1025	84
09/22/11	1	1					320			27			**348**	5	18	1021	93
09/23/11	1						19			3			**22**	4	17	1020	95
09/24/11	1	2	2	6			42			4			**56**	6	18	1017	95
09/25/11	1	4	2				20			1			**27**	5	18	1019	90
09/26/11	1	9	3	3			33			9	1		**58**	3	18	1017	92
09/27/11	1	2		1			30			11	1		**45**	5	14	1017	88
09/28/11	1						3			6			**9**	7	14	1019	80
09/29/11	1						83			6			**89**	8	12	1008	97
09/30/11	1	3		4		1	40			5			**53**	5	14	1006	88
10/01/11	1										1		**1**	7	8	1005	98
10/02/11	0												**0**	3	11	1011	99
10/03/11	0												**0**	5	9	1017	91
10/04/11	0												**0**	12	9	1015	97
10/05/11	0												**0**	8	3	1017	76
10/06/11	0												**0**	1	7	1026	61
10/07/11	0												**0**	1	8	1031	69
10/08/11	0												**0**	2	16	1030	71
10/09/11	0												**0**	1	17	1028	71
10/10/11	0												**0**	2	17	1023	71
10/11/11	0												**0**	0	13	1024	79
10/12/11	0												**0**	1	10	1023	87
10/13/11	0												**0**	1	12	1013	99
10/14/11	0												**0**	1	14	1000	96
10/15/11	0												**0**	5	11	999	77
10/16/11	0												**0**	4	12	1006	55
10/17/11	0												**0**	2	9	1005	67
10/18/11	0												**0**	2	9	1011	70
10/19/11	0												**0**	1	9	1011	94
10/20/11	0												**0**	3	14	1001	91
By Species		**1158**	**1539**	**38**	**1671**	**238**	**2822**	**1**	**11**	**497**	**495**	**0**	**8470**				
By Guild		**2735**			**1671**	**238**	**2834**			**992**							
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**				

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