Spring 2010
Avian and Bat Survey Report
for the Wild Meadows Wind Project
In Grafton and Merrimack Counties, New Hampshire

Prepared for

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Executive Summary

Atlantic Wind LLC (a subsidiary of Iberdrola Renewables, LLC) contracted Stantec Consulting Services Inc. (Stantec) to conduct bird and bat migration and breeding bird field surveys in spring/summer 2010 at the proposed Wild Meadows Wind Project (Project) in Grafton and Merrimack Counties, New Hampshire. Surveys included a nocturnal marine radar survey, bat detector survey, and breeding bird survey. This report supplements the fall 2009 bird and bat survey report and concludes one full year of bird and bat surveys at the Project. Additional wildlife survey reports written in 2009, 2010, and 2011 at the Project included spring and fall raptor migration surveys, summer bat mist netting, northern long-eared bat habitat assessment, camera surveys, and a weight of evidence risk assessment. The methods and results of these surveys are presented in separate reports. Field surveys followed standard protocols for pre-construction surveys at wind energy projects in the region. The protocols were detailed in a work plan and discussed and approved at a meeting with U.S. Fish and Wildlife Service and New Hampshire Fish and Game Department on April 1, 2010.

Radar survey

Radar surveys were conducted on 33 nights in spring 2010 (between April 15 and May 26) to characterize nocturnal migration activity in the Project area. Surveys were conducted using X-band radar, sampling from sunset to sunrise. Each hour of sampling included the recording of radar video files during horizontal and vertical operation. The radar was located on the summit of Melvin Mountain and provided good views of the airspace above and surrounding the radar in all directions. Melvin Mountain was considered part of the Project area in 2009, but as of 2013, Melvin Mountain was dropped from the current design and turbines are no longer proposed for this ridgeline. However, the nocturnal radar survey from Melvin Mountain provides an adequate characterization of nocturnal migration in the area of the proposed project because nocturnal migration has been documented to occur in a broad front pattern, based on over 200 similar studies conducted on forested ridgelines in the U.S.; the results of those studies have been similar in terms of passage rates and flight heights, regardless of variations among the topography, elevation, and habitat settings of different project locations. Further, the topography and elevation of the radar survey location at Wild Meadows is representative of the Project area, and this location is adjacent to the current Project ridgelines.

The overall passage rate for the entire spring survey period was 467 ± 24 targets per kilometer per hour (t/km/hr), and nightly passage rates varied from 10 ± 3 on May 9 to 1,379 ± 157 t/km/hr on May 17. Mean flight direction through the Project area for the season was 56 ± 59°. The seasonal mean flight height of targets was 387 ± 2 meters (m; 1,270 ± 5 feet [']) above the radar site, and nightly flight heights ranged from 123 ± 37 m (402 ± 122') on May 9 to 504 ± 13 m (1,653 ± 44') on May 7. The percent of

targets observed flying below 150 m (492’) was 19 percent for the entire season and varied by night from 5 to 68 percent.

The mean flight height and mean percentage of targets below turbine height are similar to values reported at other sites located on forested ridges in the Northeast. Mean passage rate at the Project was also within the range reported at other sites during spring migration surveys in the region. The fall 2009 seasonal passage rate (980 t/km/hr) was higher than the spring 2010 passage rate; however, these findings are consistent with other studies conducted in the region. Perhaps more important than passage rates, the mean flight height for the fall 2009 (362 m) was comparable to the mean spring flight height which was well above the height of the proposed turbines.

Acoustic Bat Survey

Nine Anabat® acoustic bat detectors were deployed on ridges in the Project area between April 8 and August 19 to document bat activity in the Project area. Detectors were deployed below tree canopy height at approximately 3 m (10’) above ground (n=3), at approximately 15 m (49’) above ground (n=3), and at approximately 45 m (148’) above ground (n=3). Data were recorded on a nightly basis and summarized by guild and/or species and tallied per detector on an hourly and nightly basis.

Detectors operated properly for most of the survey period, resulting in 1,097 detector nights of data. During this survey period, 1,980 call sequences were recorded, resulting in an overall detection rate of 1.8 bat call sequences per detector night. Detectors below tree canopy height (3 m) recorded considerably more activity (4.2 call sequences per detector night) than tower detectors positioned at and above tree canopy height (15 m and 45 m; 0.4 call sequences per detector night). Species composition also differed between ground level and elevated detectors, with *Myotis* species detected only near ground level and hoary bats (*Lasiurus cinereus*) detected primarily above canopy height. Activity levels were very low during the spring (April through June), peaked in July, and declined slightly in August. Generally, activity levels and patterns documented in the Project area were similar to those documented elsewhere in the region, including the Lempster, Granite Reliable, and Groton Projects in New Hampshire.

Breeding Bird Survey

In order to assess the assemblage of species of breeding birds within the Project area, a breeding bird survey was conducted in summer 2010. Stantec biologists conducted point count surveys during two separate visits in June. The surveys consisted of sampling 21 Project area survey points at locations in proximity to the proposed turbines, and 6 control points positioned in locations outside of the Project area. Note for the breeding bird survey, the locations of 10 of the 21 Project area survey points are considered to be outside of the Project area based on the 2013 turbine layout. However, results from these 21 original Project area points are still combined and are described as ‘inside the Project area’ for this report. Survey locations on Melvin Mountain that are now outside of the Project are representative of breeding birds that may occur within the current Project area due to the proximal location and the similarities between these locations and the Project area in terms of habitat, elevation, and topography.

During both site visits, each survey point was sampled. All birds detected during the 10-minute counts were documented. Data was summarized for all points in the Project area and control areas, as well as per habitat. The habitats within the Project area were separated into five general community types based on the dominant vegetation cover present at each survey point: conifer forest, hardwood forest, mixed conifer and hardwood forest (mixed forest), natural clearing (natural rocky opening with no tree canopy), and man-made clearing. Control points were classified as conifer forest, mixed forest, and natural clearing. While there was some variability in the habitat characteristics at individual survey points within each category (i.e., age of forest, logging impacts, stage of regeneration, percent canopy cover, etc.), habitats were grouped where possible to facilitate analysis.

Including birds observed beyond 100 m from the observer and birds observed as flyovers, a total of 315 individuals and 35 species were documented during point count surveys within the Project area. The species with the greatest numbers of individuals detected were dark-eyed junco (*Junco hyemalis;* n=39), ovenbird (*Seiurus aurocapilla*; n=37), and chestnut-sided warbler (*Dendroica pensylvanica*; n=29). There were no state or federally listed endangered or threatened species observed. One state special concern species was observed in the Project area, American kestrel (*Falco sparverius*). Of the Project area habitats, hardwood forest points, including forest stands at various stages of regeneration, had the greatest number of individuals observed (n=118), the highest species richness (SR) (n=23), and the highest Shannon Diversity Index (SDI) (2.64). Natural clearing habitat had the highest relative abundance (RA) (10.50).

Including birds observed beyond 100 m from the observer, a total of 115 individuals and 27 species were observed at control points. The species with the greatest numbers of individuals detected at control points included hermit thrush (*Catharus guttatus*; n=23), dark-eyed junco (n=18), and white-throated sparrow (*Zonotrichia albicollis*; n=12). There were no state or federally listed endangered or threatened species, or state special concern species, observed at control points. Of the control point habitats, conifer forest points including forest stands at various stages of regeneration had the greatest number of individuals observed (n=43), the highest SR (n=18), and the highest SDI (2.56). Natural clearing habitat had the highest RA (8.00).

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[1] *This report was prepared by Stantec Consulting Services Inc. for Atlantic Wind LLC (a subsidiary of Iberdrola Renewables, Inc). The material in it reflects Stantec's judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any suffered by any third party as a result of decisions made or actions based on this report.*

1.0 Introduction

1.1 PROJECT BACKGROUND

Atlantic Wind LLC (Atlantic Wind),a subsidiary of Iberdrola Renewables, LLC, is proposing a wind energy development in Grafton and Merrimack Counties, New Hampshire that would consist of 23 wind turbines, a permanent meteorological (met) tower on Forbes Mountain, and associated infrastructure (e.g., access roads, transmission lines, electrical substation, and an operations and maintenance building) (Figure 1-1). The turbines will be 3.3 megawatt machines mounted on tubular steel towers with an approximate hub height of 94 meters (m; 308 feet [']) and a rotor diameter of 112 m (367'). The proposed turbines will have a maximum height of approximately 150 m (492').

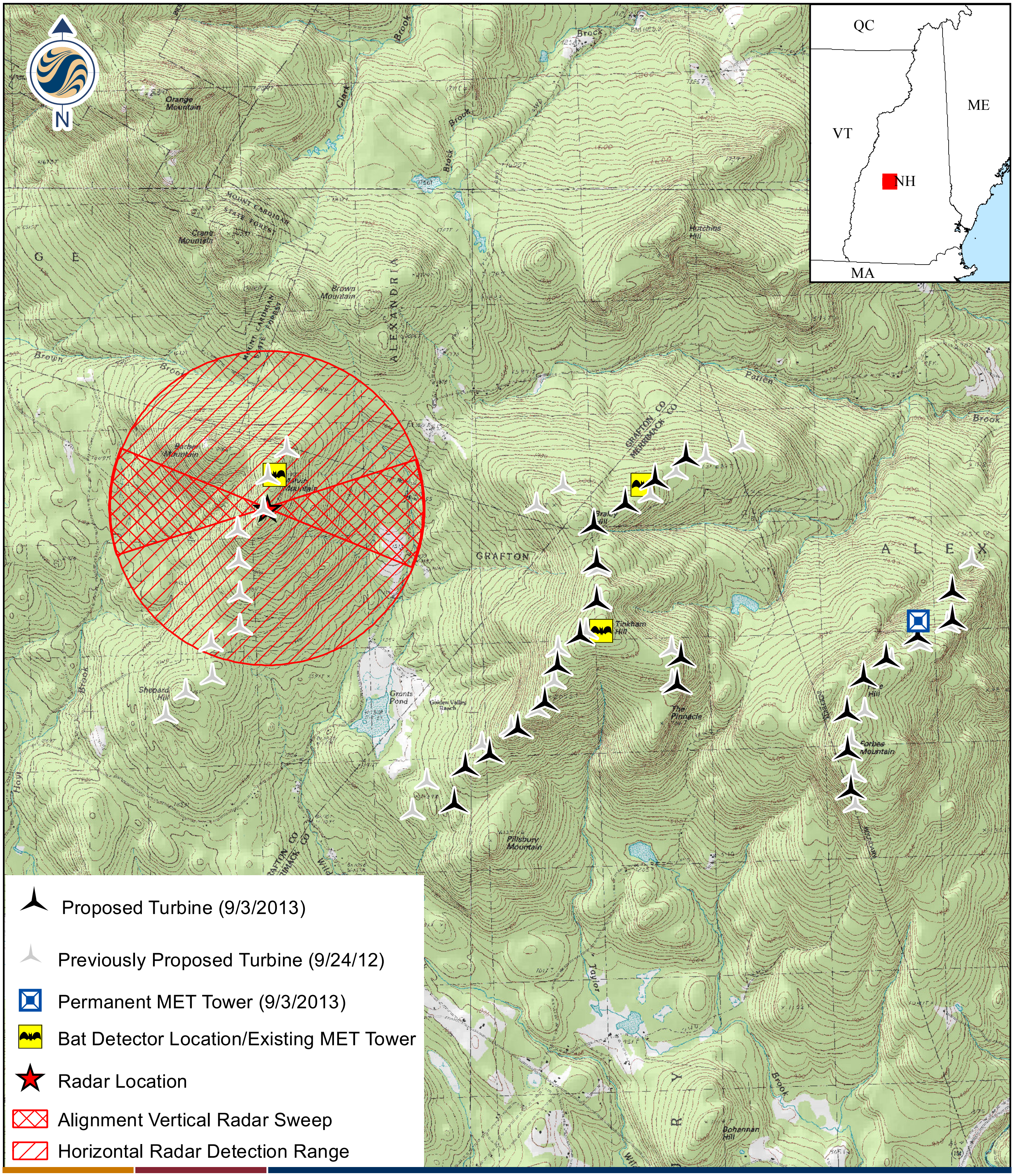
Stantec Consulting (Stantec) conducted bird and bat migration and breeding bird field surveys in spring/summer 2010 at the Project. Surveys included a nocturnal marine radar survey, bat detector survey, and breeding bird survey. The methods described in this report were based on a meeting with the U.S. Fish and Wildlife Service (USFWS), New Hampshire Fish and Game Department (NHFGD), Atlantic Wind, and Stantec, on April 1, 2010 at the USFWS office in Concord, New Hampshire. This report supplements the fall 2009 bird and bat survey report and concludes one full year of bird and bat surveys at the Project. This report was updated in September 2013 after the turbine type and layout for the Project were revised.

1.2 PROJECT AREA DESCRIPTION

Based upon defined ecoregions of northern New England and New Hampshire, the Project is located within the Vermont-New Hampshire Upland section and the Sunapee Uplands subsection (Sperduto and Nichols 2004). The Sunapee Uplands subsection is characterized by hills and peaks, principally of granite, that are interspersed with small lakes and narrow stream valleys (Sperduto and Nichols 2004). Topography of this area is generally moderate, and soils are stony, shallow, and nutrient poor.

Peaks located partially or entirely within the Project include Braley Hill (635 m; 2,083'), Tinkham Hill (692 m; 2,270') and the Pinnacle (604 m; 1981') on the western portion of the Project. Forbes Mountain (658 m; 2159') and Pine Hill (638 m; 2091') make up the eastern portion of the Project. Tinkham Hill and Braley Hill is generally oriented northeast to southwest and Forbes Mountain is a narrow north-northeast, south-southwest oriented ridgeline. The peaks range in elevation from 604 m (2,100') to 692 m (2,270) at their highest points. Located west and outside of the Project, Barber Mountain (651 meters [m]; 2,136 feet [']), Melvin Mountain (660 m; 2,165'), and Sheppard Hill (550 m; 1,640') were originally part of the Project area but as of the 2013 design, were dropped from the project layout.

Because of the moderate elevation, the dominant tree species in the Project area are hardwood species including sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), and American beech (*Fagus grandifolia*). These tree species are typical of northern hardwood – conifer forest, which is the most common forest community in the northern half of the state of New Hampshire. Conifer species such as red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*) are present, but are generally limited to the ridge summits. On the majority of Project ridgelines, conifer species are mixed with the more dominant hardwood species, or occur as small patches within the hardwood dominated landscape. Common understory species include regenerating canopy species (e.g., sugar maple, yellow birch, and American beech), hobblebush (*Viburnum lantanoides*), striped maple (*Acer pensylvanicum*), and white birch (*Betula papyrifera*). The Project area ridgelines all show signs of timber harvesting activities as evidenced by skidder trails and clear cuts in various stages of regeneration.



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Client/Project
Atlantic Wind LLC
Wild Meadows Wind Project
Merrimack & Grafton Counties, New Hampshire

Figure No.
1-1

Title
Spring 2010 Survey Location Map

8/7/2012
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2.0 Nocturnal Radar Survey

2.1 INTRODUCTION

Documenting the patterns of nocturnal migrants requires the use of radar or other non-visual technologies. A nocturnal radar survey was conducted in the Project area to characterize spring 2010 nocturnal migration patterns using x band radar. The goal of the surveys was to document the overall passage rates for nocturnal migration in the Project area, including the number of migrants, their flight direction, and their flight altitude. The survey protocol was detailed in a work plan and discussed with the U.S. Fish and Wildlife Service (USFWS) and New Hampshire Department of Fish and Game (NHDFG) on April, 1 2010.

Radar surveys were conducted from sunset to sunrise on 33 nights between April 15 and May 26, 2010. The radar was deployed in a clearing on Melvin Mountain (Figure 2-1), at an elevation of approximately 661 m (2,170'), the same location used during fall 2009 radar surveys. At the time, Melvin Mountain was considered part of the Project area but as of the 2013 design, no turbines are proposed for Melvin Mountain. The antenna was placed on an elevated platform at a height of 7 m (23') so that the surrounding trees did not obstruct the radars view of the surrounding airspace. This effort helped to maximize the airspace sampled by reducing the amount of the radar beam reflected back by surrounding vegetation. This location and set-up provided good views in most directions within the radar's range. It is important to note that surveys from the radar location provide an accurate assessment of migration activity at locations and elevations within the range of the radar at this location; however, the radar is not intended to assess migration over specific turbine locations or various elevations of the Project area (Figure 1-1).

2.2 DATA COLLECTION METHODS

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 even insects, based on settings selected for the radar functions. It cannot, however, readily distinguish between different types of animals being detected. Consequently, all animals 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, deployed 7 m (25') above ground. 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 birds and bats flying over those areas (Figure 2-1).

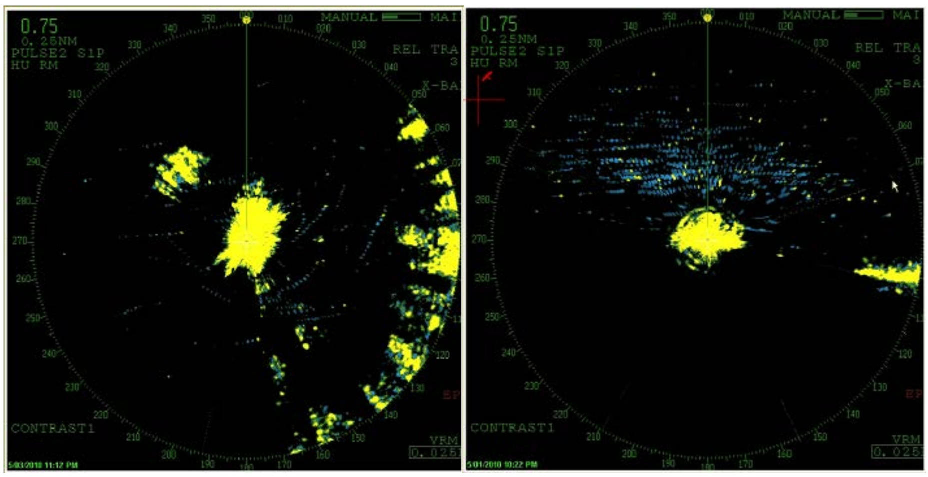


Figure 2-1. Screenshots from actual radar files for the Wild Meadows Wind Project showing ground clutter in horizontal mode (left) and vertical mode (right). Although the radar records three-dimensional space, it is translated by the radar screen into a two dimensional representation, which can cause targets to be obscured from view.

Vegetation and hilltops near the radar can be used to reduce or eliminate ground clutter by “hiding” clutter-causing objects from the radar (Figure 2-2). 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 are indistinguishable from the “clutter” as represented on the radar screen. However, 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.

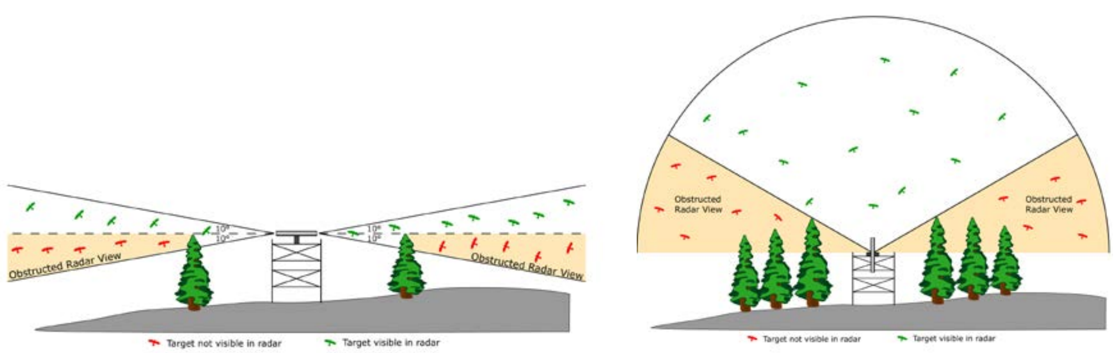


Figure 2-2. An example of ground clutter “hiding” a section of the radar beam, allowing adequate detection of targets (left). The effect of ground clutter on target detection in vertical mode is also shown (right).

Because the anti-rain function of the radar must be turned down to detect small songbirds and bats, surveys could not be conducted during active rainfall. Therefore, surveys were planned largely for nights without rain. However, in order 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. 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 2-1). 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 vertically 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 2-3). Both modes of operation were used during each hour of sampling.

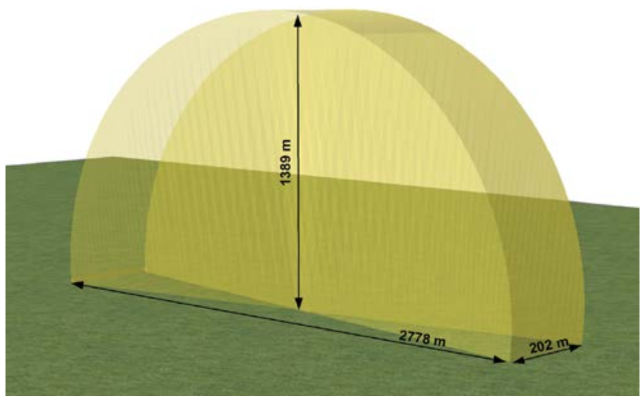


Figure 2-3. Detection Range of the radar in vertical mode

The radar was operated at a range of 1.4 kilometers (km) (0.75 nautical mile) to ensure detection of small targets. When the radar is operated at ranges greater than 1.4 km, larger birds can be detected but the echoes of small birds are reduced in size and restricted to a smaller portion of the radar screen, thus limiting the ability to observe the 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 the video recording software of a computer 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 10 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 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.

2.2.1 Weather Data

Temperature and wind speed and direction were recorded by an on-site meteorological (met) tower. This information was used during data analysis to help characterize any patterns in migration activity for particular nights and for the season overall. In addition, in order to consider the atmospheric influences on migration, regional surface weather map images were interpreted to determine the dates that daytime pressure systems (high, low, or none) moved through the region. Surface weather maps, prepared by the National Centers for Environmental Prediction, the Hydro-meteorological Prediction Center, and the National Weather Service, were downloaded daily for the majority of 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 output the data to a spreadsheet. These datasets were then used to calculate passage rate (reported as targets per kilometer of migratory front per hour [t/km/hr]), 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) because they 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, was also calculated for each night and for the entire survey period.

2.4 RESULTS

Radar surveys were conducted during 33 nights between April 15 and May 26, 2010 (Appendix A Table 1), resulting in 285 total hours surveyed. The radar location provided a good view of the airspace in most directions, including to the east where topography drops abruptly to the adjacent valley. Views into the adjacent valley allowed for the detection of targets below the horizon, but the small number of targets observed below the radar horizon were not subtracted from passage rates or flight height summaries. This is consistent with other radar studies that have had views of small numbers of targets below the radar horizon.

2.4.1 Passage Rates

The overall passage rate for the entire survey period was 467 ± 24 t/km/hr (Figure 2-5, Appendix A Table 1). Nightly passage rates varied from 10 ± 3 t/km/hr on May 9 to 1,379 ± 157 t/km/h on May 17. Individual hourly passage rates varied between nights and throughout the season, and ranged from 0 t/km/hr on multiple hours of multiple nights to 2,043 t/km/hr on the 3rd hour of May 17 (Appendix A Table 2). For the entire season, passage rates were typically highest during the fourth hour after sunset, and then gradually declined until sunrise (Figure 2-5).

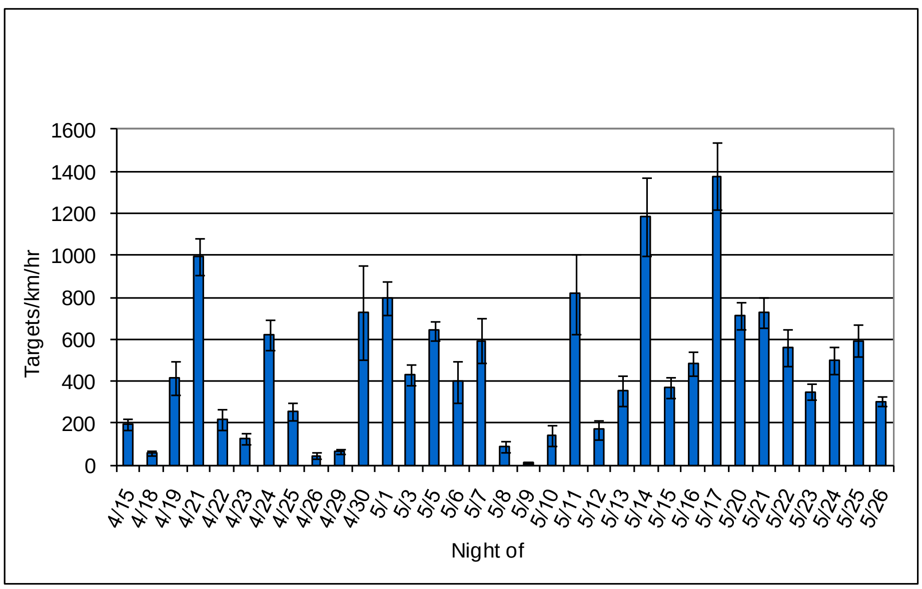


Figure 2-4. Nightly passage rates observed (error bars ± 1 SE) during Spring 2010 at the Wild Meadows Wind Project.

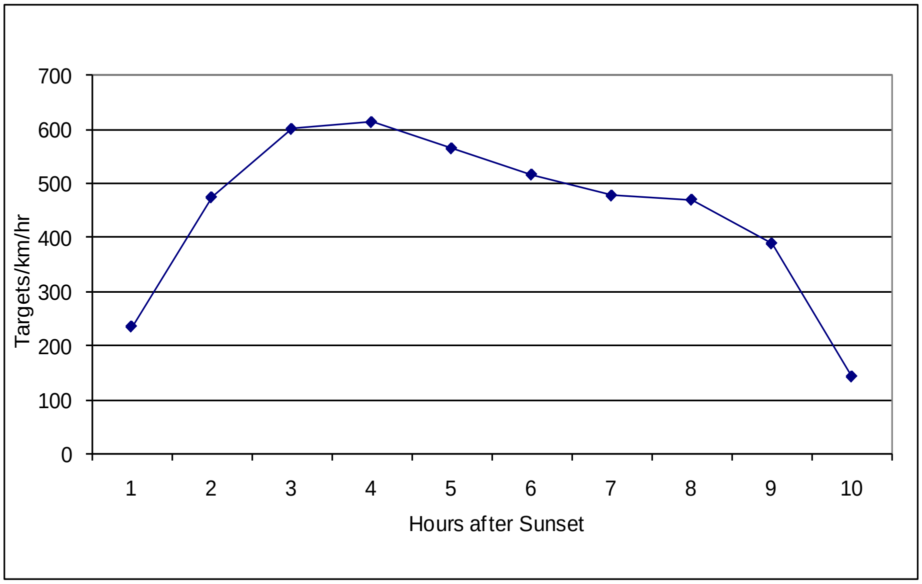


Figure 2-5. Hourly passage rates for entire season during Spring 2010 at the Wild Meadows Wind Project.

2.4.2 Flight Direction

Mean flight direction through the Project area was 56° ± 59°(Figure 2-6). Overall, the mean flight direction was to the northeast but varied between nights (Appendix A Table 3).

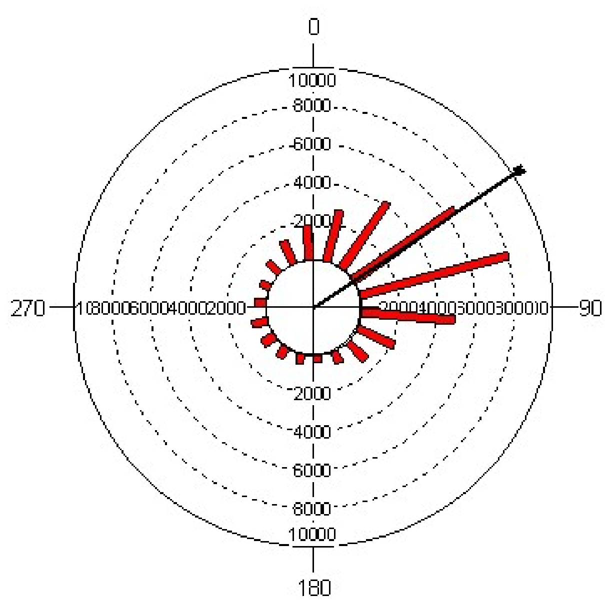


Figure 2-6. Mean flight direction for the entire season during Spring 2010 at the Wild Meadows Wind Project (the bracket along the margin of the histogram is the 95% confidence interval).

2.4.3 Flight Altitude

The seasonal mean flight height of all targets was 387 ± 2 m (1,270± 5') above the radar site. The average nightly flight height ranged from 123 ± 37 m (402 ± 122') on May 9 to 504 ± 13 m (1,653 ± 44') on May 7 (Figure 2-7, Appendix A Table 4). The percent of targets observed flying below 150 m was 19 percent for the season and varied nightly from 5 percent on May 21 to 68 percent on April 19 (Figure 2-8). For the entire season, the mean hourly flight heights were typically highest during the second hour after sunset (Figure 2-9).

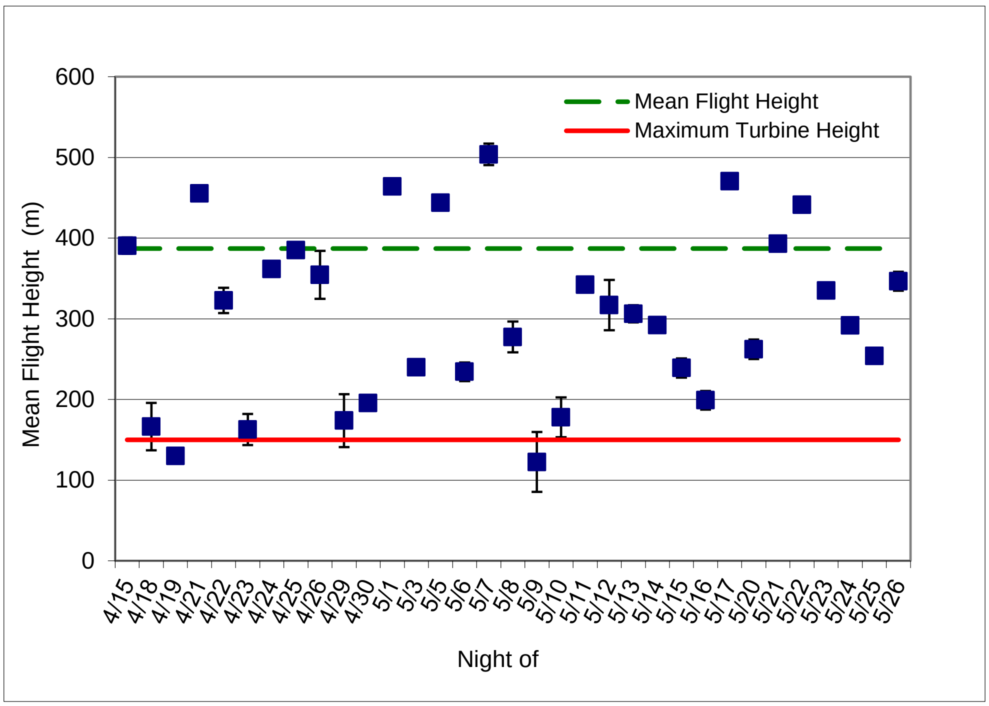


Figure 2-7. Mean nightly flight height of targets during Spring 2010 at the Wild Meadows Wind Project (error bars ± 1 SE)

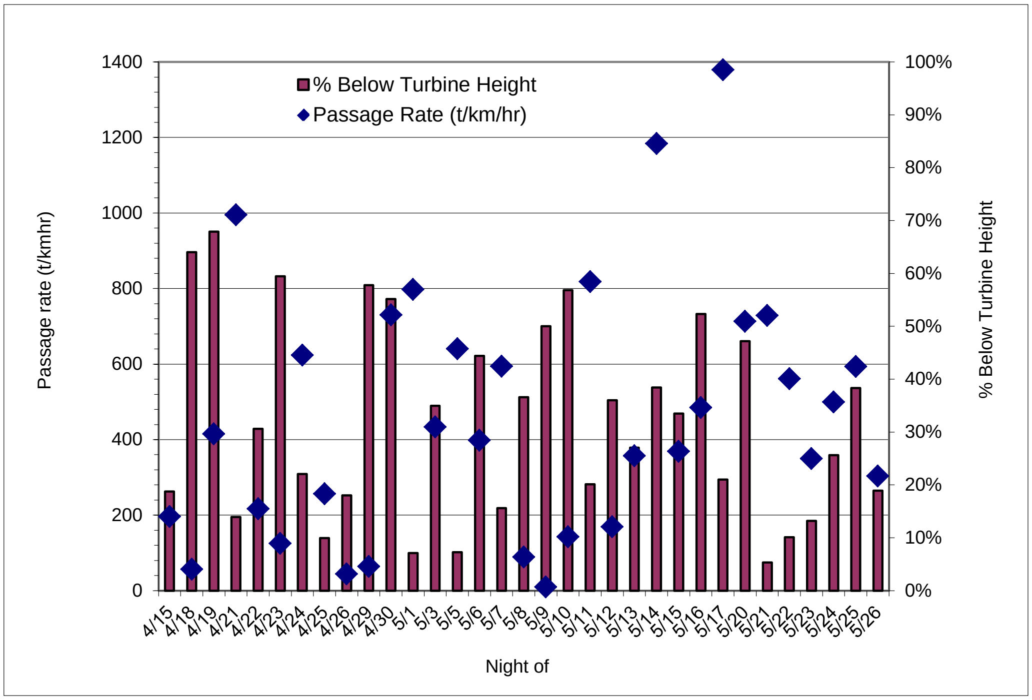


Figure 2-8. Percent of targets observed flying below a height of 150 m (492') during Spring 2010 at the Wild Meadows Wind Project.

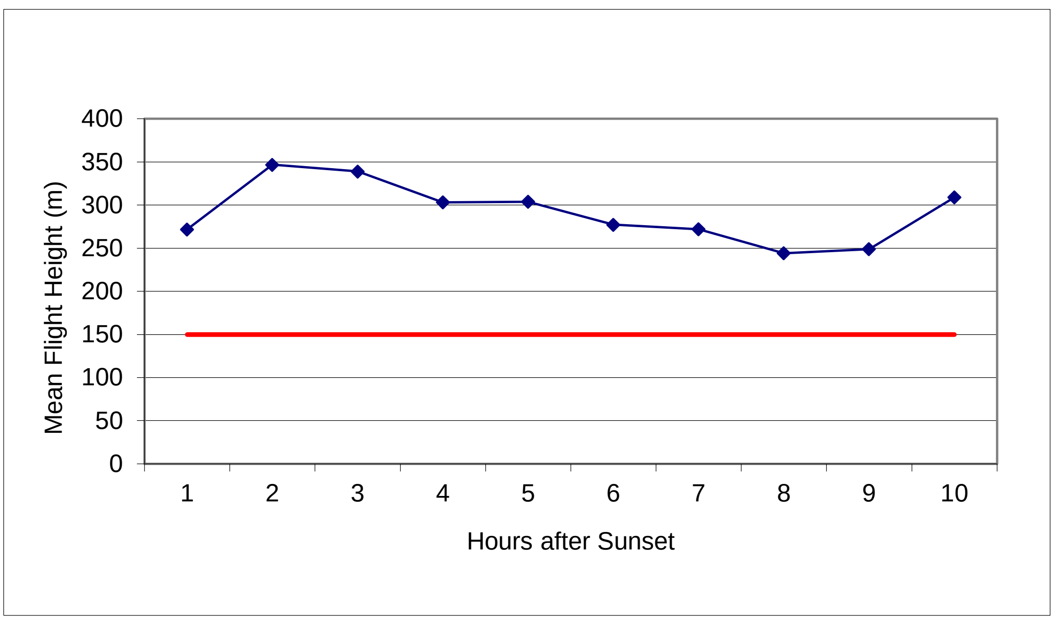


Figure 2-9. Hourly target flight height distribution during Spring 2010 at the Wild Meadows Wind Project.

2.4.4 Weather Data

During the survey period, mean nightly wind speeds in the Project area varied between 1.8 meters per second (m/s) on May 11 to 13.2 m/s on April 29, with an overall mean of 6.4 m/s. Mean nightly temperatures varied between -1.1 °Celsius (C) on May 9 and 22.9 °C on May 25, with an overall mean of 9.4 °C (Appendix A Table 1).

Analysis of regional surface weather maps reveals that spring 2010 surveys were conducted during periods of high atmospheric pressure and favorable conditions for migration.

2.5 DISCUSSION

Spring radar surveys in the vicinity of the Project area documented similar nocturnal migration patterns to those observed during other recent radar surveys conducted in the eastern US (Appendix A Table 5). These include highly variable passage rates between nights, a generally northeasterly flight direction, flight heights primarily occurring between 100 and 500 m above the ridgeline, and a peak in flight height occurring near the third hour after sunset between nights. The Wild Meadows spring seasonal passage rate of 467 t/km/hr was within the range of passage rates of other projects in New England; for example, the spring passage rates at the Lempster and Groton projects in New Hampshire were 542 and 234 t/km/hr, respectively (Appendix A Table 5). The mean flight height at Wild Meadows (387 m) was similar, but slightly higher than the mean flight heights at the Lempster and Groton projects: 358 m and 321 m, respectively.

The fall 2009 seasonal passage rate (980 t/km/hr) at Wild Meadows was higher than the spring 2010 passage rate; however, these findings are consistent with other studies conducted in the region. The mean flight height for the fall 2009 (362 m) was comparable to the mean spring flight height. The radar site had good visibility and was capable of detecting targets within nearly all of its detection range, including into the valley to the east. The average passage rate at the Project (467 ± 24 t/km/hr) is within the range of results of other radar studies conducted in the northeast (110 t/km/hr to 1020 t/km/hr; Appendix A Table 5). 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). For the 2010 spring radar surveys, high pressure systems were either present or had passed through the region just prior to the two nights with the highest passage rates (May 17 [1379 ± 157 t/km/hr] and May 14 [1184 ± 187 t/km/hr]). Winds were generally light (2.9 m/s on May 17 and 7.6 m/s on May 14) and from the south on May 17 and west on May 14. The sharp difference between passage rates on April 29 (64 ± 10 t/km/hr) and April 30 (730 ± 223 t/km/hr) is likely due to the passage of a high pressure system; a low pressure system had stalled over the area for several days at the end of April causing heavy cloud cover, precipitation and northwest winds. Once a high pressure system moved through the area, allowing a break in weather, migration conditions improved and appeared to be reflected in the relatively higher passage rate on April 30 compared to previous nights. The extremely low passage rate 10 ± 3 t/km/hr on May 9 was likely the result of poor visibility due to a low pressure system bringing light snow to the region. The average temperature on this night was the lowest recorded (-1.1 °C) and winds were relatively strong (10.3 m/s) and from the northwest (Appendix A Table 1). Similarly, low pressure systems bringing heavy rain and light snow occurred on April 26 and April 29, which had passage rates of 44 ± 15 t/km/hr and 64 ± 10 t/km/hr, respectively.

The average flight height (387 ± 2 m) is within the range of average flight heights recorded at other radar studies conducted in the east (210 m to 552 m), and the overall percent below turbine height (19%) for all targets falls within the range of other results (3% to 38%). Two of the 33 nights sampled experienced an average nightly flight height lower than 150 m. The night of May 9, which had the lowest average passage rate (10 ± 3 t/km/hr) had an average flight height of 123 ± 37 m and April 19 had an average flight height of 130 ± 7 m. These average flight heights were likely the result of less than ideal conditions for migration including overcast skies and periods of light rain. Nightly wind speeds were above 7 m/s and from the northwest on both nights and birds are known to fly lower in strong headwinds (Appendix A Table 1).

For the 2010 spring Project surveys, flight heights were relatively high on nights with high passage rates (464 ± 4 m on May 1 and 471 ± 7 m on May 17), indicating that birds tend to fly higher on nights more suitable for migration. The average nightly wind speed was light (4.1 m/s) and from the southwest on May 1 and was light (2.9 m/s) and from the southeast on May 17 (Appendix A Table 1), favorable for northerly migration in the spring.It should be noted that post construction mortality studies have demonstrated that targets flying at or below turbine height observed during pre-construction radar surveys do not directly correlate to collision risk; in other words, a relatively high percentage of targets observed below turbine height does not equate to high mortality (Stantec 2010). Similarly, relatively high pre-construction passage rates do not appear to equate to high mortality (Stantec 2010). Despite some variations in pre-construction radar survey results, the observed fatality rates at operational projects in New England, including the nearby Lempster, Groton, and Granite Reliable Wind projects in New Hampshire, have been relatively similar and generally low. Regardless, radar surveys conducted at the Project in fall 2009 provide a sample of migration activity over the Project area during baseline, pre-construction conditions. In summary, results at the Project are within the range of results recorded at other radar studies conducted in the eastern U.S., and provide a sample of baseline migration activity over the Project during spring 2010.

3.0 Acoustic Bat Survey

3.1 INTRODUCTION

Acoustic sampling of bat activity has become a standard aspect of pre-construction surveys for proposed wind-energy development (Kunz *et al.* 2007b). 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 that 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 acoustic surveys at this Project were (1) to document bat activity patterns from April to August 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 and temperature. The survey protocol was detailed in a work plan and discussed with the USFWS and NHDFG on April, 1 2010.

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*)[2], big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), and hoary bat (*L. cinereus*) (BCI 2001). Of these, the eastern small-footed bat is state-listed as endangered, and the tri-colored bat, eastern red bat, silver-haired bat, northern long-eared bat, and hoary bat are state species of special concern. As of 2013, the northern long-eared bat is under consideration for federal listing under the Endangered Species Act.

3.2 DATA COLLECTION METHODS

3.2.1 Acoustic Detector Site Selection

Anabat II and Anabat SDI detectors (Titley Electronics Pty Ltd.) were used for the duration of the 2010 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 are known to occur in New Hampshire and could occur in the Project area. Anabat II detectors were coupled with CF Storage ZCAIM (Titley Electronics Pty Ltd.), which programmed the on/off times and stored data on removable 1 GB compact flash cards; newer SD1 model detectors do not require use of a ZCAIM. Anabat

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

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 6 and 7 (on a scale of 1 to 10) 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 12-volt batteries charged by solar panels. Each solar-powered Anabat system was deployed in waterproof housing enabling the detector to record while unattended for the duration of the survey. The housing suspends the Anabat microphone downward to give maximum protection from precipitation. To compensate for the downward position, a PVC elbow is placed directly below the microphone, allowing the microphone to record the airspace horizontally surrounding the detector while minimizing acoustic signal loss.

An array of acoustic detectors was installed at each of the three locations previously sampled during 2009 acoustic bat surveys. These locations were Melvin Mountain, Tinkham Hill, and Braley Hill (Photos 1-3, Figure 1-1). At the time of the surveys, Melvin Mountain was part of the Project area but as of 2013, the Project layout was reduced and Melvin Mountain was dropped from the Project area; however, the data collected at Melvin Mountain was included in this analysis and report. The results from each detector location are reported separately.

A temporary 60-m tall met tower was present on Braley Hill throughout the April to August survey period, and temporary met towers were installed on Tinkham Hill and Melvin Mountain on May 12. At each of these three locations, three detectors were deployed: one at approximately 3 m (10') above ground; one at approximately 15 m (49') above ground; and one at approximately 45 m (148') above ground (Photo 4). Prior to erection of met towers at Melvin and Tinkham in mid-May, "low" detectors were deployed either in a portable tower (Melvin) or branches of a tall tree (Tinkham); these were moved to the guy wires of the met towers once installed on May 12. High detectors were deployed only after installation of temporary met towers (Photo 4). Acoustic detectors were programmed to record data each night from prior to sunset until after sunrise (usually 1800 to 0800). 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.

Photo 1. Melvin Mountain portable tower at the Wild Meadows Wind Project, 2010.

Photo 2. Tinkham Hill portable tower at the Wild Meadows Wind Project, 2010.

Photo 3. Braley Hill portable tower at the Wild Meadows Wind Project, 2010.

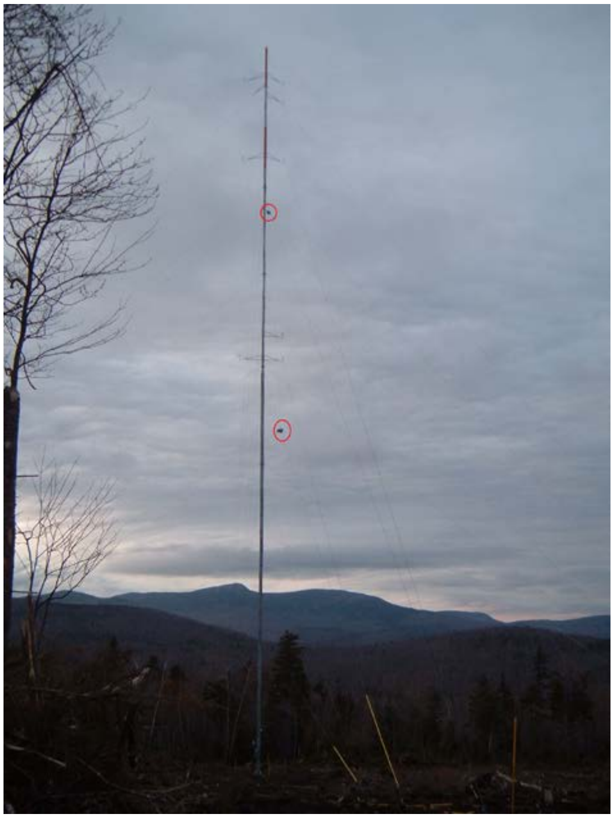


Photo 4. Example: Braley Hill temporary met tower at the Wild Meadows Wind Project, 2010.

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 New Hampshire's bats. This software screens all data recorded by the bat detector and extracts call files using a filter. Using the default settings for this initial screen also ensures comparability between data sets. Settings used by the filter include a max TBC (time between calls) of 5 seconds, a minimum line length of 5 milliseconds, and a smoothing factor of 50. The smoothing factor refers to whether or not adjacent pixels can be connected with a smooth line. The higher the smoothing factor, the less restrictive the filter is and the more 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 ensure that only bat calls were included in the data set. Insect activity, wind, and interference can also sometimes produce Anabat files that pass through the initial filter and need to be visually inspected and removed from the data set. Call sequences are easily differentiated from other recordings, which typically form a diffuse band of dots at either a constant frequency or widely varying frequency.

Because bat activity levels are highly variable among individual nights and individual hours (Hayes 1997, Arnett *et al*. 2006), detection rates are summarized on both of these temporal scales. 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*. (2007a).

Bat call sequences were individually marked and categorized by species group, or "guild" based on visual comparison to reference calls. Qualitative visual comparison of recorded call sequences of sufficient length to reference libraries of bat calls allows for relatively accurate identification of bat species (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 similarity of call signatures between several species, all classified calls have been categorized into five guilds[3] reflecting the bat community in the region of the Project area and is as follows:

- **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 several of the species in this genus, these characteristics do not occur consistently enough for any one species to be relied upon at all times when using Anabat recordings.

- **Eastern red bat/tri-colored bat[4] (RBTB)** – Eastern red bats and tri-colored bats. These two species can produce calls distinctive only to each species. 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. These species' call signatures commonly overlap and have therefore been included as one guild in this report.

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

This method of guild identification represents a conservative approach to bat call identification. Because 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. However, because 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] 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. We broke hoary bats out into a separate guild due to the importance of reporting activity patterns of migratory species in the context of wind energy development.

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

3.3.1 Weather Data

Weather data were obtained from an on-site met tower for the period between April 15 and August 19, 2010. Data used for comparison to bat data included wind speed and temperature, and values were reported at 10-minute intervals. The mean, maximum, and minimum temperature and wind speed were calculated for each night during the survey period.

3.4 RESULTS

3.4.1 Timing of Activity

Detectors were deployed on April 8 and continued to record data through August 19, for a total survey period of 134 nights. A total of 9 detectors were deployed for a total of 1,138 potential detector-nights of data, during which detectors operated properly for 1,097 (96 %) of these nights. Occasional equipment issues, including faulty batteries, caused loss of a small amount of data during the survey period. Table 3-1 summarizes the range of dates during which each detector was deployed and operating.

Table 3-1. Summary of bat detector field survey effort and results at Wild Meadows, April - August 2010

Location	Dates Deployed	Calendar Nights	Detector-Nights*	Recorded Sequences	Detection Rate **	Maximum Sequences recorded ***
Braley Met High	4/8/10 - 8/19/10	134	112	37	0.3	7
Braley Met Low	4/8/10 - 8/19/10	134	134	86	0.6	11
Braley Ground	4/8/10 - 8/19/10	134	134	615	4.6	116
Melvin Met High	5/12/10 - 8/19/10	100	100	43	0.4	4
Melvin Met Low	4/8/10 - 8/19/10	134	134	45	0.3	3
Melvin Ground	4/8/10 - 8/19/10	134	134	693	5.2	66
Tinkham Met High	5/12/10 - 8/19/10	100	81	25	0.3	3
Tinkham Met Low	4/8/10 - 8/19/10*	134	134	50	0.4	5
Tinkham Ground	4/8/10 - 8/19/10	134	134	386	2.9	275
Overall Results		***1138***	***1097***	***1980***	***1.8***	--
Met Tower Detectors		***736***	***695***	***286***	***0.4***	--
Ground Detectors		***402***	***402***	***1694***	***4.2***	--

* 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.

A total of 1,980 bat call sequences were recorded during the spring and summer acoustic bat survey, resulting in an overall call rate of 1.8 calls per detector night. By detector, mean overall detection rate ranged from 0.3 at the Tinkham and Braley met High detectors to 5.2 at the Melvin met Ground detector (Table 3-1). Call volumes were considerably higher at the ground level detectors (2.9 to 5.2 calls per detector night) than at detectors mounted in the met towers (0.3 to 0.6 calls per detector night). The maximum number of calls recorded in a single night ranged from 3 at the Tinkham met High detector to 275 at the Tinkham Ground detector (Table 3-1). Combined, the 3 ground level detectors recorded an overall activity rate of 4.2 calls per detector night, and the 6 met tower detectors recorded an overall activity rate of 0.4 calls per detector night (Table 3-1).

By month, overall activity levels increased steadily between April and June, peaked in July, and declined in August (Figure 3-1). The peak in July activity levels was due in part to spikes in activity detected by the three ground level detectors, all of which occurred between July 6 and 10 (Figure 3-2). Although nightly timing of bat activity levels was variable between nights and between detectors, overall bat activity levels peaked between one and two hours past sunset at most detectors with combined activity levels peaking approximately 3 to 4 hours past sunset (Figure 3-3).

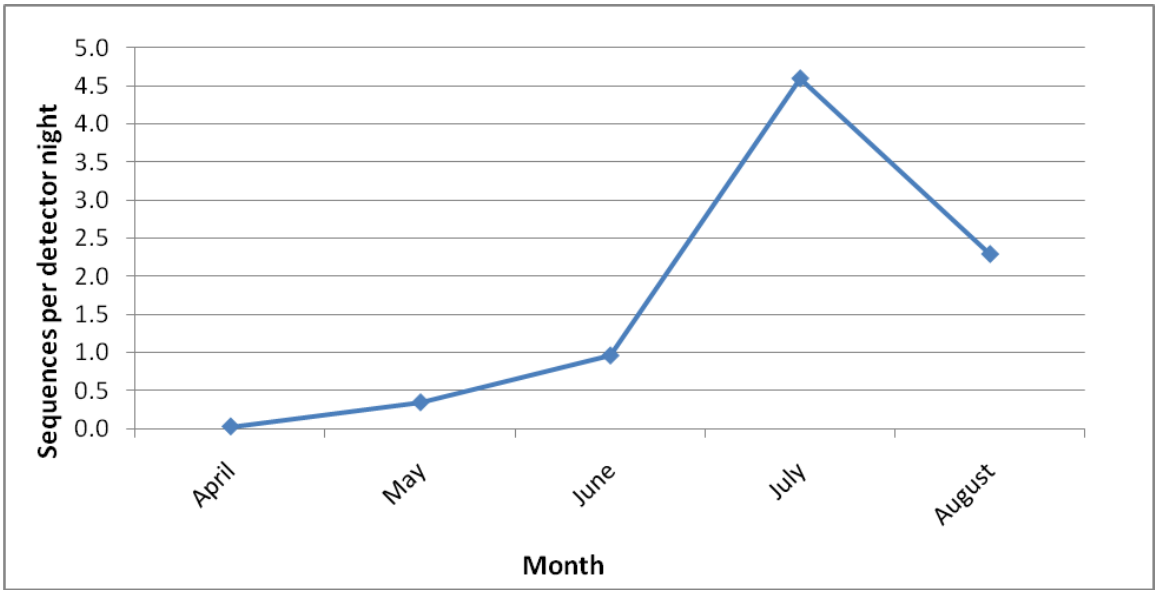


Figure 3-1. Overall bat activity index by month during spring and summer 2010 acoustic bat surveys at the Wild Meadows Wind Project

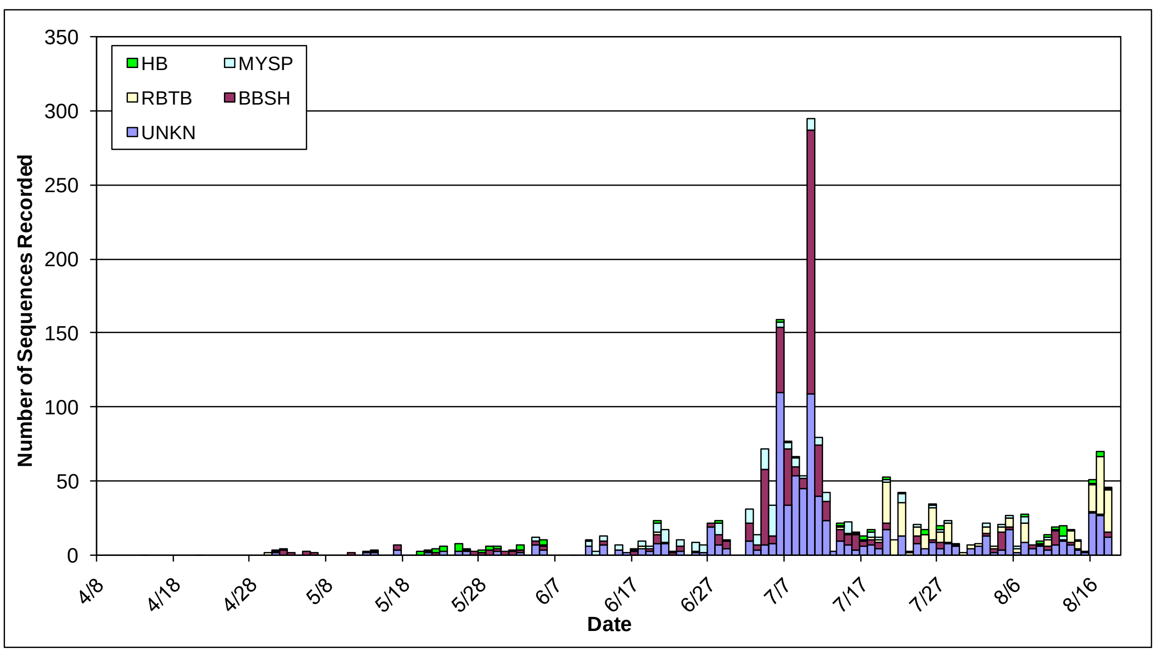


Figure 3-2. Combined bat activity during spring and summer 2010 acoustic bat surveys at the Wild Meadows Wind Project

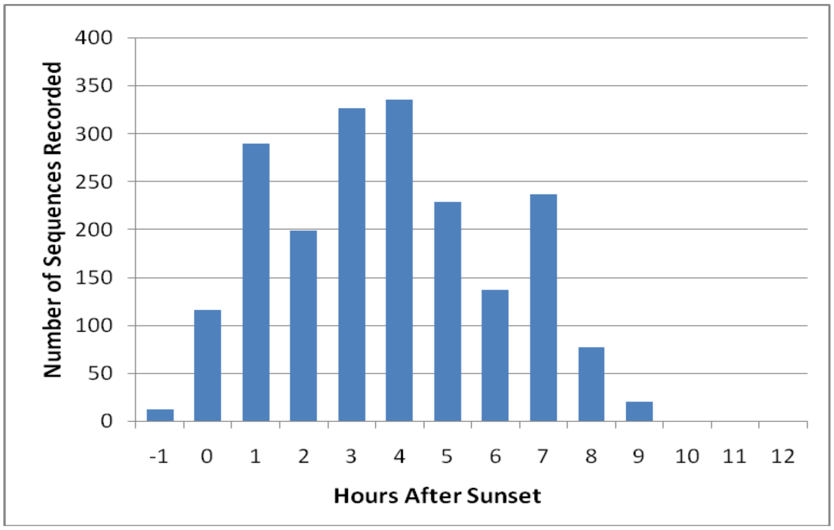


Figure 3-3. Overall timing of acoustic bat activity during spring and summer 2010 acoustic bat surveys at the Wild Meadows Wind Project

3.4.2 Species Composition

Of the 1,980 recorded call sequences, 866 (43.7%) had fewer than 5 pulses or were indistinguishable between guilds and were classified as UNKN. Of the remaining sequences, the BBSH guild was the most commonly detected (n=560, 28.3%). Remaining sequences were identified as RBTB (n=272, 13.7%), MYSP (n=202, 10.2%), and HB (n=80, 4.0%). Within the set of UNKN calls, 535 (61.8%) were identified as LFUN, and the remaining 331 (38.2%) were classified as HFUN (Table 3-2). When grouped by detector location (ground versus met tower), relative guild compositions were similar for all guilds except MYSP and HB, with no MYSP activity recorded at met detectors (at heights of approximately 15 m [49'] and 45 m [148'] above ground) and a very low percentage of HB activity documented at ground level detectors (Table 3-2). Of the 1,980 recorded call sequences, 85.6 percent were recorded by the three ground level detectors (Table 3-2).

Table 3-2. Distribution of detections by guild for detectors at Wild Meadows, April - August 2010

Detector	Guild					Total
	BBSH	HB	MYSP	RBTB	UNKN	
Braley Met High	7	6	0	1	23	37
Braley Met Low	37	5	0	1	43	86
Braley Ground	176	7	58	18	356	615
Melvin Met High	9	19	0	2	13	43
Melvin Met Low	16	6	0	6	17	45
Melvin Ground	95	10	122	231	235	693
Tinkham Met Low	12	8	0	6	24	50
Tinkham Met High	2	8	0	2	13	25
Tinkham Ground	206	11	22	5	142	386
Total	**560**	**80**	**202**	**272**	**866**	**1,980**
Total Guild Composition %	**28.3%**	**4.0%**	**10.2%**	**13.7%**	**43.7%**	
Met Total	**83**	**52**	**0**	**18**	**133**	**286**
Met Guild Composition %	**29.0%**	**18.2%**	**0.0%**	**6.3%**	**46.5%**	
Ground Total	**477**	**28**	**202**	**254**	**733**	**1,694**
Ground Guild Composition %	**28.2%**	**1.7%**	**11.9%**	**15.0%**	**43.3%**	

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 9 provide information on the number of call sequences, by guild and suspected species, recorded at each detector and the weather conditions for that night.

3.4.3 Activity and Weather

Mean nightly wind speeds in the Project area collected from the on-site met tower from April 15 through August 19 ranged from 0.4 to 13.2 m/s, with an overall mean of 5.9 m/s (Figure 3-4). Mean nightly temperatures varied between -2.3 °C and 25.0 °C, with an overall mean of 14.1 °C (Figure 3-5). A qualitative comparison of bat activity levels and wind speed and temperature suggests that bat activity rates decreased with increasing wind speed, and that bats were rarely active below 10 °C (Figure 3-6).

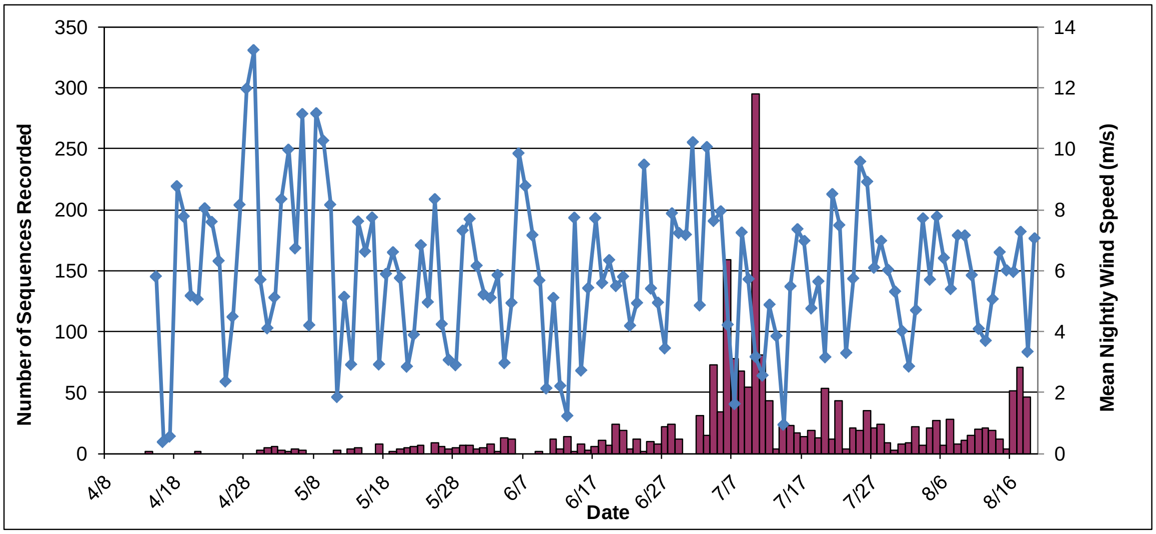


Figure 3-4. Nightly mean wind speed (m/s) (blue line) and total bat call sequences detected during 2010 surveys at the Wild Meadows Wind Project

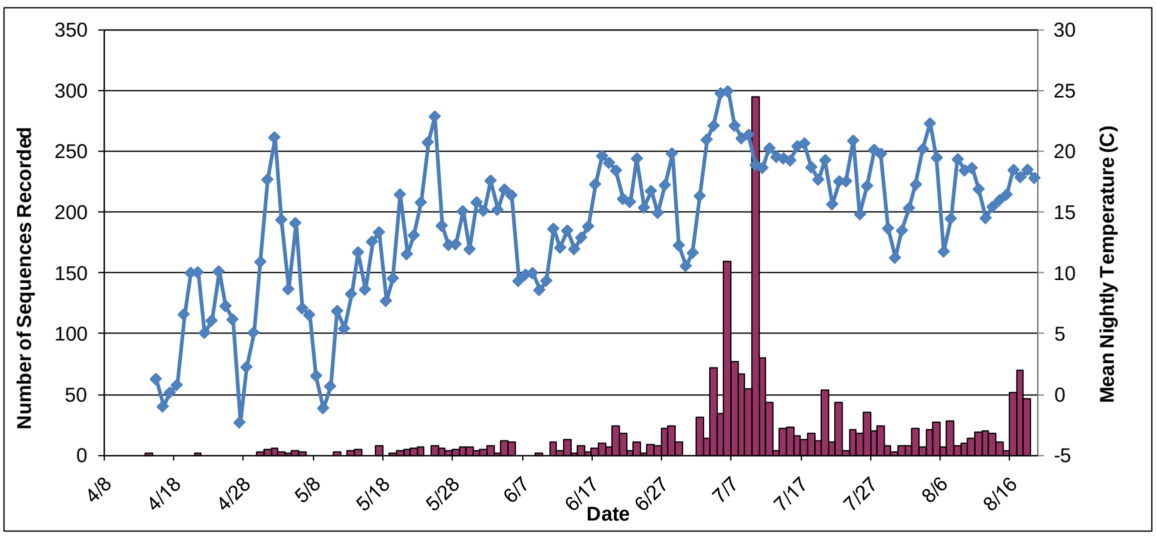


Figure 3-5. Nightly mean temperature (Celsius) (blue line) and total bat call sequences detected during 2010 surveys at the Wild Meadows Wind Project

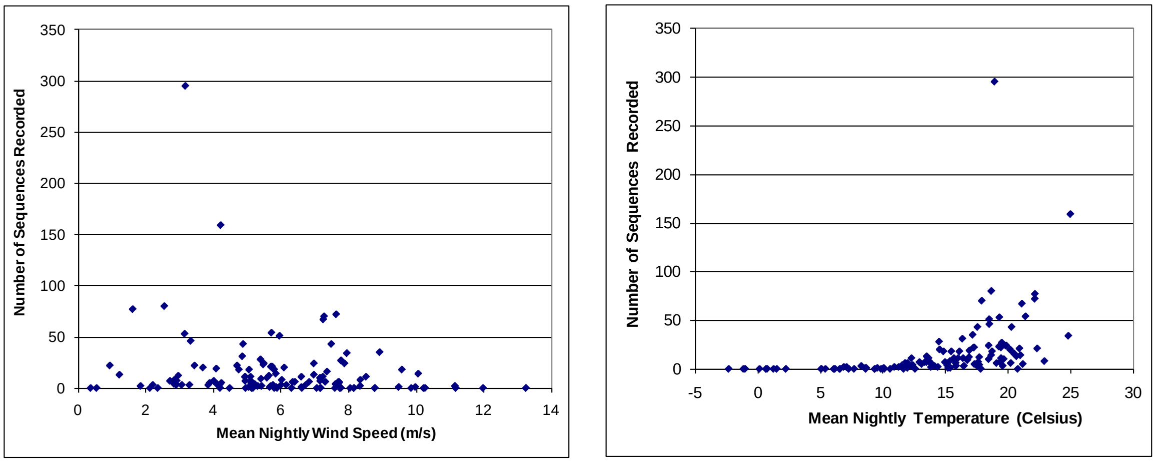


Figure 3-6. Scatterplot of overall bat activity versus mean nightly wind speed (left) and mean nightly temperature (right) during spring and summer 2010 acoustic bat surveys at the Wild Meadows Wind Project

3.5 DISCUSSION

Relatively low acoustic bat activity was documented during the spring migration period; this is consistent with the results of other studies in New Hampshire and other places in the eastern U.S. which indicate that bat activity is greater during the fall migration period. Overall call volumes documented during spring and summer 2010 acoustic bat surveys increased steadily between April and early July, at which point activity levels spiked for approximately one week. Activity then returned to moderate levels in August, although there was higher activity in August than between April and June. The most apparent result from acoustic bat surveys were the peaks in activity documented by the three ground level detectors between July 6 and July 10. The peak detector night at the each of 3 ground detectors accounted for 457 (23.1%) of the total number of call sequences recorded during the entire survey period. At the 6 met tower detectors, the peak number of calls recorded per night was only 11, and only 14.4% of call sequences were recorded at these detectors.

While the fall 2009 bat detectors were placed only at or just above tree canopy height, 2010 surveys included detectors at ground level, tree canopy height, and at a height near the proposed rotor zone This variation in methods was because met towers were not available for deployment during the fall 2009 surveys and were available for the spring 2010 surveys. The overall call volume recorded by detectors placed near ground level was higher than that documented at met tower detectors by a factor of 10 during summer and fall acoustic bat surveys. Species composition of bats was also different at ground level versus met tower detectors, suggesting that bats are more active near the ground than above tree canopy height, and that different species are active near the ground versus above canopy. Specifically, hoary bats were more active above the tree canopy, and *Myotis* bats were detected only at ground level. This pattern has been documented at numerous similar surveys conducted across the northeastern U.S (Appendix B Table 10).

The overall call volume of 1.8 calls/detector night was similar to the value of 1.1 documented during fall 2009 bat surveys at the Project, although 2009 surveys included data collected only at the “low” height sampled in 2010. Individual detector detection rates (0.3 to 5.2 calls/detector night) in the spring 2010 were within the range of detector rates from other met tower detectors at projects on forested ridges in the East (0 to 5.1 calls/detector night) (Appendix B Table 10).

Bat calls were categorized to guild in this report, although calls were identified to species when possible during analysis. Certain species such as the eastern red bat and hoary bat have easily identifiable calls, whether other species, such as the big brown bat and silver-haired bat can often be difficult to distinguish between each other acoustically. Similarly, although certain members of the *Myotis* genus such as the little brown bat can produce some calls that are identifiable to species, calls were not identified to species within this guild because calls within this guild are very similar between species. A large number of calls were categorized by high frequency or low frequency unknown calls due to their short duration or poor quality. This is typical for passive acoustic surveys, where detectors cannot be moved to follow individual bats, thereby improving the quality of the recordings.

Aside from the UNKN category, most calls were identified to the BBSH guild, which includes the big brown bat and silver-haired bat. While most of these sequences could not be distinguished between the two species, a greater number of calls were identified as big brown bats than silver-haired bats within the subset of calls identified to species. This, combined with the fact that big brown bats are likely more common within the Project area, suggests that big brown bats produced most of the recorded call sequences, particularly those documented near ground level.

The RBTB guild includes eastern red bats and tri-colored bats. Within this grouping, over half of the recorded sequences were identified as eastern red bats while a very small percentage were identified as tri-colored bats. While this may suggest that eastern red bats are more active in the Project area, calls of higher quality and longer duration, which are not common during passive acoustic surveys, are necessary to identify a call as a tri-colored bat, whereas even short, lower quality calls can be identified as eastern red bats, introducing a potential bias in results of acoustic surveys for these species.

Hoary bats, which have their own guild due to their unique call characteristics, were documented primarily at the met tower detectors. This is the largest species found in the northeastern U.S., and is thought to be a higher altitude forager as well as migrant based on its size, as well as the frequency with which the species is found during mortality surveys at operational wind projects. Although hoary bats were detected at all six met tower detectors, they were the most commonly identified guild at the Melvin and Tinkham High detectors supporting the hypothesis that they are high flyers.

The MYSP guild comprised a small number of recorded call sequences, and was detected only at the three ground level detectors. Potential species within this guild are the little brown bat, northern long-eared bat, and eastern small-footed bat. All species in this guild are small, and are thought to typically forage at or below tree canopy height.

Acoustic surveys at the Project in fall 2009 and spring and summer 2010 suggest that bat activity levels are highest in the Project area in mid-July. However, this pattern was most prominent at ground-level detectors, which may be more influenced by the activity of summer resident bat species flying at lower altitudes while foraging, as compared to the long-distance migratory species, which would likely be flying at greater heights while migrating through the region in late summer or early fall. Consistent with the findings of other regional studies, activity patterns and species composition of bats appear to vary by height above ground. Species within the *Myotis* genus were more active near the ground, and hoary bats more active above the tree canopy.

Generally speaking, results from acoustic surveys at the Project follow activity trends that have emerged during pre- and post-construction acoustic and mortality surveys at wind power sites in the eastern U.S. Specifically, these include a greater risk of collision during the fall migration period compared to the spring (Arnett *et al.* 2008). Bat activity and risk of collision has also been found to be influenced by a negative relationship between bat activity and wind speed, and a positive relationship between bat activity and temperature (Hayes 1997; Reynolds 2006).

When considering the level of activity documented at the Project during fall 2009 acoustic surveys, 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. However, patterns of acoustic activity documented at the Project, including overall seasonal trends in activity, and differing species composition between ground level and met tower detectors were typical of those documented at similar surveys in the region, including the Lempster, Granite Reliable, and Groton Projects in New Hampshire (Appendix B Table 10).

4.0 Breeding Bird Survey

4.1 INTRODUCTION

Stantec conducted a breeding bird survey at the Project during the summer of 2010. The goal of the surveys was to determine species composition, abundance, diversity, and distribution of breeding birds in the Project area, and at nearby control locations in similar habitats. The surveys focused effort on documenting the occurrence of endangered, threatened, or special concern species; however, all species detected either acoustically or visually within the Project area were documented. Survey methods were modeled after the United States Geological Survey (USGS) Breeding Bird Survey methodology (Sauer *et al*. 1997). The survey protocol was detailed in a work plan and discussed with the USFWS and NHDFG on April, 1 2010.

The breeding bird survey methods were designed to be repeatable in order to compare data to other sites, as well as to compare to future data collection, if necessary. The 2010 survey provides baseline data of the species present in the Project area, their abundance, the community structures among the different habitats present on-site, and at nearby control locations. The purpose of the control points was to provide a frame of reference for changes among the breeding bird community within the Project area.

4.2 METHODS

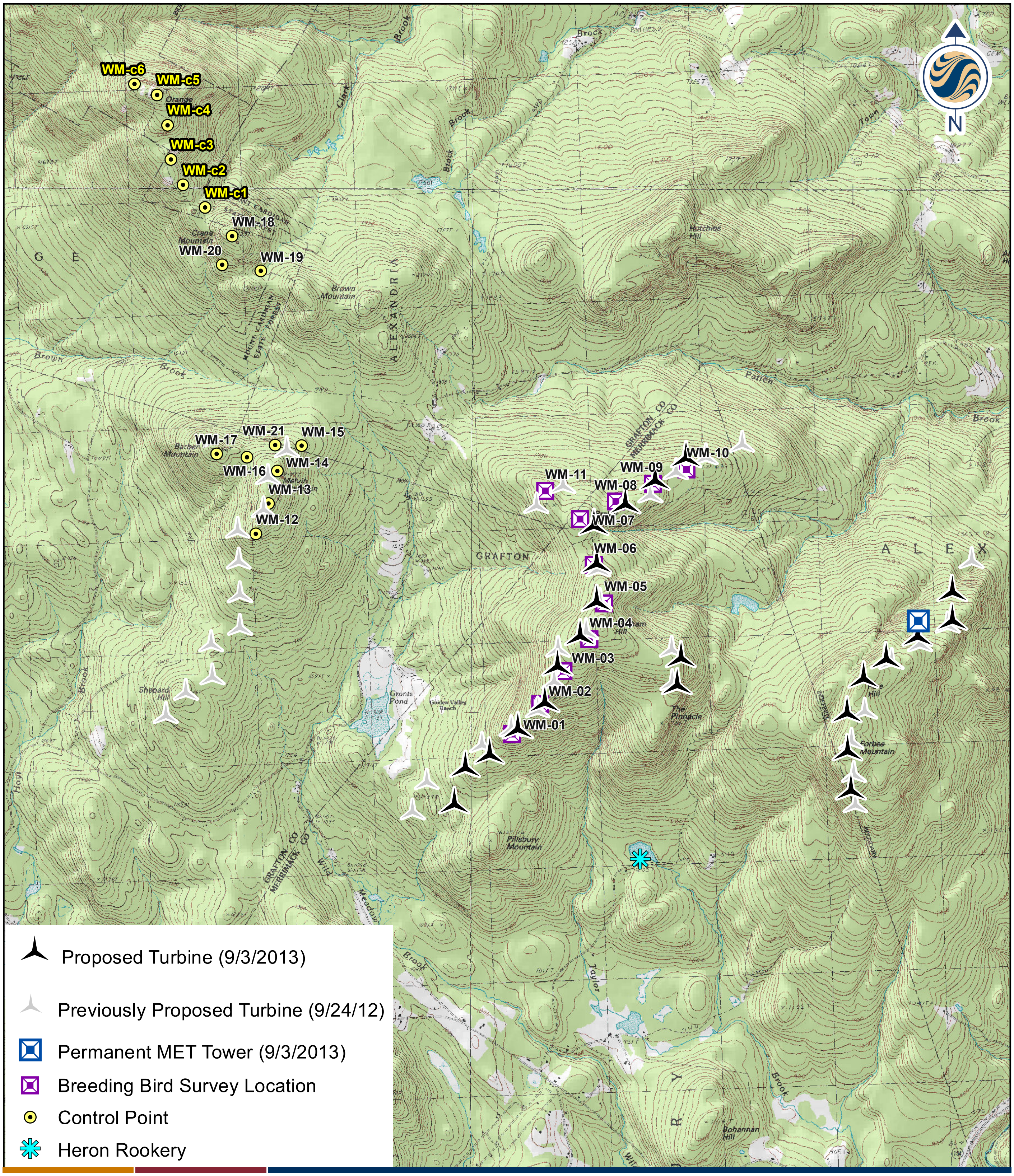
4.2.1 Point Count Surveys

Stantec biologists conducted breeding bird point count surveys during two separate visits to the Project area in June 2010. Twenty-one point count locations were established within the proposed Project area, and 6 control points were established in nearby locations with similar habitats using Global Positioning System (GPS) equipment (Figure 4-1). It is important to note that as of the 2013 project layout the locations of 10 of the 21 2010 Project area survey points that were on Melvin Mountain are now no longer part of the Project area. For the purposes of the analysis already completed for this report, all 21 original Project area survey points will still be considered as inside the Project area because habitats are similar between the two ridgelines of the Project area. The points in the Project area were positioned to sample representative habitats that occur throughout the Project area, and to sample locations in proximity to the proposed turbines. Control points were positioned at locations that are outside of the potential areas of disturbance from the proposed development.

Surveys were timed to begin approximately 15 minutes before sunrise and end 6 (+/-) hours after sunrise on days with suitably clear weather, mild temperatures, and when rain or wind would not inhibit the detection of birds. GPS location, time, weather, habitat, species, number of individuals, and other behavioral notes were recorded during each survey point. During surveys, observers orientated themselves to the north and recorded the general locations of birds within the directional quadrants of a count circle. Point count sample periods were broken into three periods: the first three minutes, the following two minutes, and the final five minutes. For the duration of the 10-minute count surveys, the number of individuals by species was recorded on data sheets as occurring at distances of 0-50 m, 50-100 m, or greater than 100 m from the observer, or flying overhead depending upon when the bird was first seen or heard. During each consecutive time period, observers determined the location of previously recorded birds and tracked any movements within the count circle in order to avoid recounting birds. Other notes related to breeding behavior, weather conditions, and habitat descriptions were recorded. When possible, observers made digital recordings for later review, if necessary. Only adult birds were counted when juveniles were present. Observations of birds made before and after the point count timeframes were recorded separately as incidental observations.

4.2.2 Data summary and analysis

The data from the breeding bird survey points within the Project area and from the control points were treated as separate datasets. The habitats within the Project area were separated into five general community types based on the dominant vegetation cover present at each survey point: conifer forest, hardwood forest, mixed conifer and hardwood forest (mixed forest), natural clearing (natural rocky opening with no tree canopy), and man-made clearing. Control points were classified as conifer forest, mixed forest, and natural clearing. While there was some variability in the habitat characteristics at individual survey points within each category (i.e., age of forest, logging impacts, stage of regeneration, percent canopy cover, etc.), habitats were grouped where possible to facilitate analysis.



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Client/Project
Atlantic Wind LLC
Wild Meadows Wind Project
Merrimack & Grafton Counties, New Hampshire

Figure No.
4-1

Title
Spring 2010 Breeding Bird Survey Map

8/7/2012
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Quantitative data collected during point counts were used to calculate the species richness, relative abundance, community diversity, and frequency of breeding birds within the available habitats of the Project area.

- Species richness (SR) is the total number of species that are detected at a specific point, within a habitat classification, or across the Project area.
- In order to quantify the number of individuals of a species in the Project area and within the different habitat types, relative abundance (RA) was calculated. RA measures the number of individuals of a species within a habitat classification or across the Project area, and takes into account the number of times each point is surveyed and the number of points per habitat, or per Project area.
- Frequency (Fr) of occurrence, expressed as a percentage, measures the number of points within a habitat type, or across the Project area, where a particular species is detected.
- The Shannon Diversity Index (SDI) is a measure of species diversity in a community or habitat. SDI can provide more information about community composition than species richness alone because it takes into account relative abundance and evenness of species. It indicates not only the number of species, but also how abundance is distributed among all the species in the community or habitat.

Species recorded as beyond 100 m from the observer, as flyovers, or birds detected incidentally were not included in the statistical analysis for relative abundance, species frequency, or community diversity due to the probability that they were not breeding within the direct vicinity of the point count location; however, these data were used to determine overall species richness and the total number of birds observed.

4.3 RESULTS

The first round of the 2010 breeding bird surveys was conducted on June 2 and 3; the second round was conducted on June 15 and 16. Surveys were conducted when wind or rain conditions did not adversely affect bird detection. Over the course of the surveys, wind speed ranged from calm to approximately 5.4 m/s. Weather conditions generally ranged from clear to overcast skies, with periods of fog and light rain on one survey day (June 3). Over the course of the surveys, temperatures ranged from 10º to 18º C (50º to 64º Fahrenheit).

4.3.1 Project area point count survey results

Each of the 21 point counts were surveyed during the 2 separate site visits. The distance category from the observer at which the majority of individuals were detected was 50 to 100 m (n=163; 52%), followed by birds seen at 0 to 50 m (n=98; 31%) (Appendix C Table 1). Thirteen percent (n=40) and 4 percent (n=14) of birds were detected greater than 100 m from the observer and as flyovers, respectively (Appendix C Table 1).

Including birds observed beyond 100 m from the observer and birds observed as flyovers, a total of 35 species (and one unidentified passerine) were observed within the Project area during point count surveys (Appendix C Table 1). Four additional species were observed incidentally in or near the Project area between point counts: American robin (*Turdus migratorius*), barred owl (*Strix varia*), least flycatcher (*Empidonax minimus*), and pine siskin (*Spinus pinus*) (Appendix C Table 2).

Including birds observed beyond 100 m from the observer and birds observed as flyovers, a total of 315 individuals were documented during surveys within the Project area. The species with the greatest numbers of individuals detected were dark-eyed junco (n=39), ovenbird (n=37), and chestnut-sided warbler (n=29) (Appendix C Table 1). There were no endangered or threatened species observed; one state special concern species was observed, American kestrel (*Falco sparverius*). It was seen flying over survey point number 14 on June 16.

Excluding birds beyond 100 m from the observer and flyovers, point count data were analyzed to determine SR, RA, and community diversity for the 21 Project area survey points combined, and for each habitat present within the Project area. There were a total of 261 individuals observed within 100 m from the observer (and as non-flyovers) (Table 4-1, Appendix C Table 3). For the 21 Project area survey points combined, the RA was 6.21, the SR was 31, and the SDI was 2.88 (Table 4-1, Appendix C Table 3).

Table 4-1. Summary of results at breeding bird point counts by habitat type, excluding observations of birds >100 m from the observer and flyovers, at Project area BBS points

Habitat Type	# BBS Points	Total Birds Observed	Relative Abundance	Species Richness	Shannon Diversity Index
Conifer forest	4	47	5.88	17	2.54
Hardwood forest	11	118	5.36	23	2.64
Mixed forest	4	61	7.63	18	2.56
Man-made clearing	1	14	7.00	7	1.87
Natural clearing	1	21	10.50	7	1.86
21 BBS points	**21**	**261**	**6.21**	**31**	**2.88**

Of the Project area habitats, hardwood forest had the greatest number of individuals observed (n=118), the highest SR (n=23), and the highest SDI (2.64). Natural clearing habitat had the highest RA (10.50) (Table 4-1, Appendix C Table 3 and 4). Results indicate that, among the habitats sampled, hardwood forest points, including forest stands at various stages of regeneration, had the greatest number of individuals detected, the highest diversity of species, and the most even distribution of species across points sampled within this habitat.

It should be noted that during summer 2011 mist netting surveys, Stantec biologists incidentally documented a great blue heron (*Ardea herodias*) rookery. The rookery was located at the wetland south of The Pinnacle (Figure 4-1). Seven nests were counted and adults and juveniles were present. The rookery is approximately 1,525 m (5,000') south of the nearest turbine located on The Pinnacle. There were no great-blue herons observed during the breeding bird surveys at any of the breeding bird point count survey locations.

4.3.2 Control point survey results

Each of the six control points were surveyed during the two separate site visits. The distance category from the observer at which the majority of individuals were detected was 50 to 100 m (n=45; 39%), followed by birds seen at 0 to 50 m (n=38; 33%) (Appendix C Table 1). Twenty-eight percent (n=32) were detected greater than 100 m from the observer (Appendix C Table 1).

Including birds observed beyond 100 m from the observer, a total 115 individuals and 27 species were observed at control point surveys (Appendix C Table 1). The species with the greatest numbers of individuals detected at control points include hermit thrush (n=23), dark-eyed junco (n=18), and white-throated sparrow (n=12) (Appendix C Table 1). There were no endangered or threatened species observed, or state special concern species observed at control points.

Excluding birds beyond 100 m from the observer, point count data were analyzed to determine species richness, relative abundance, and community diversity for the 6 control points combined, and for each habitat type present within the control study area. There were a total of 83 individuals observed within 100 m from the observer (Table 4-2, Appendix C Table 5). For the 6 control points combined, the RA was 6.92, the SR was 24, and the SDI was 2.74 (Table 4-2, Appendix C Table 5).

Table 4-2. Summary of results at breeding bird control points by habitat type, excluding observations of birds >100 m from the observer and flyovers, at control points

Habitat Type	# BBS Points	Total Birds Observed	Relative Abundance	Species Richness	Shannon Diversity Index
Conifer forest	3	43	7.17	18	2.56
Mixed forest	1	8	4.00	7	1.9
Natural clearing	2	32	8.00	12	2.22
6 control points	**6**	**83**	**6.92**	**24**	**2.74**

Of the control point habitats, conifer forest had the greatest number of individuals observed (n=43), the highest SR (n=18), and the highest SDI (2.56). Natural clearing habitat had the highest RA (8.00) (Table 4-2, Appendix C Table 5). Results indicate that, among the habitats sampled, conifer forest points including forest stands at various stages of regenerationhad the greatest number of individuals detected, the highest diversity of species, and the most even distribution of species across points sampled within this habitat.

4.4 DISCUSSION

The intent of the 2010 surveys was to document the occurrence of species of conservation concern, as well as to provide baseline data of all species occurring within the Project area and at control points. The surveys were conducted during the peak nesting period and were initiated in early morning when birds are typically the most vocal. In addition, these surveys targeted optimal weather conditions that would allow for maximum detection of vocalizing birds. Certain species of bird vocalize less frequently and are, therefore, often under-represented during breeding bird surveys (Farnsworth *et al.* 2002). However, the 2010 surveys used standard methods that are comparable to other breeding bird surveys conducted in the region; therefore, the results of the surveys provide a suitable reflection of the baseline breeding bird community in the Project area, as well as a control point dataset providing a frame of reference for future surveys, if necessary.

The species composition between Project and control points was similar; however, SR for the control points was lower. This may be a reflection of the relatively fewer points sampled for control points, and/or differences among habitat at control verses Project area points. Among the Project area habitats sampled, hardwood forest had the greatest number of detected individuals, the highest diversity of species, and the most even distribution of species across points sampled within this habitat. Among control points sampled, conifer forest had the greatest number of individuals detected, the highest diversity of species, and the most even distribution of species across points sampled within this habitat.

Of the 42 total species documented on-site during the 2010 surveys, all are generally common and regionally abundant, and are generally representative of the habitats in which they were detected. There were no state or federally endangered or threatened species; however, there was one special concern species (American kestrel) observed flying over one of the Project area survey points.

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Appendix A

Radar survey results

Appendix A Table 1. Survey dates, results, level of effort, and weather - Spring 2010									
Date	Sunset	Sunrise	Passage rate	Flight Direction	Flight Height (m)	% below 138.5 m	Temperature (C)	Wind Speed (m/s)	Wind Direction (degrees)
4/15	19:29	6:03	196	7	391	19%	1.3	5.8	167.7
4/18	19:32	5:58	57	128	166	64%	0.8	8.8	335.3
4/19	19:33	5:56	415	97	130	68%	6.6	7.8	317.2
4/21	19:36	5:53	995	52	456	14%	10.1	5.0	260.4
4/22	19:37	5:51	217	155	323	31%	5.1	8.0	338.2
4/23	19:38	5:50	125	116	163	59%	6.1	7.6	330.5
4/24	19:39	5:48	623	52	362	22%	10.1	6.3	273.7
4/25	19:40	5:47	256	291	385	10%	7.3	2.3	90.7
4/26	19:42	5:45	44	30	354	18%	6.2	4.5	172.4
4/29	19:45	5:41	64	76	174	58%	5.1	13.2	298.9
4/30	19:46	5:39	730	62	196	55%	10.9	5.7	302.9
5/1	19:47	5:38	798	18	464	7%	17.7	4.1	193.7
5/3	19:50	5:35	434	76	240	35%	14.4	8.3	280.4
5/5	19:52	5:33	640	26	444	7%	14.1	6.7	217.4
5/6	19:53	5:31	398	94	234	44%	7.1	11.1	307.6
5/7	19:54	5:30	594	70	504	16%	6.5	4.2	173.7
5/8	19:56	5:29	89	80	278	37%	1.5	11.2	274.2
5/9	19:57	5:28	10	155	123	50%	-1.1	10.3	314.3
5/10	19:58	5:26	143	107	178	57%	0.7	8.2	324.0
5/11	19:59	5:25	818	57	342	20%	6.9	1.8	154.9
5/12	20:00	5:24	169	129	317	36%	5.4	5.1	254.1
5/13	20:01	5:23	357	67	306	27%	8.3	2.9	236.7
5/14	20:02	5:22	1184	50	292	38%	11.7	7.6	276.4
5/15	20:03	5:21	369	84	239	33%	8.6	6.6	324.6
5/16	20:05	5:20	485	93	199	52%	12.6	7.7	329.4
5/17	20:06	5:19	1379	43	471	21%	13.4	2.9	123.0
5/20	20:09	5:16	713	75	262	47%	16.5	5.8	308.6
5/21	20:10	5:15	728	6	393	5%	11.6	2.8	173.3
5/22	20:11	5:14	561	25	441	10%	13.1	3.9	152.6
5/23	20:12	5:13	350	36	335	13%	15.8	6.8	223.8
5/24	20:13	5:13	499	87	292	26%	20.8	4.9	298.6
5/25	20:14	5:12	594	87	254	38%	22.9	8.3	313.2
5/26	20:15	5:11	304	267	347	19%	13.9	4.2	100.7
Entire Season			**467**	**56**	**387**	**19%**	**9.4**	**6.4**	**249.8**

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	Mean	Median	Stdev	SE
4/15	Rain	268	204	261	218	218	143	61	Rain	Rain	196	218	72	27
4/18	Rain	86	61	79	114	75	54	14	7	21	57	61	36	12
4/19	71	129	464	754	832	518	439	411	361	175	415	425	250	79
4/21	713	1018	1339	1018	1440	1282	943	654	782	761	995	980	279	88
4/22	439	364	371	350	221	196	86	36	36	71	217	209	155	49
4/23	39	111	132	218	232	236	107	57	64	54	125	109	77	24
4/24	379	386	425	754	929	879	718	621	823	321	623	670	229	72
4/25	482	373	314	313	246	304	196	146	150	39	256	275	128	41
4/26	99	Rain	Rain	Rain	94	51	17	11	7	32	44	32	38	15
4/29	0	46	61	89	64	104	68	79	64	N/A	64	64	29	10
4/30	39	218	257	357	589	825	1207	1868	1900	43	730	473	707	223
5/1	304	736	829	618	1021	875	1029	1154	857	557	798	843	254	80
5/3	143	521	493	636	589	389	432	368	332	N/A	434	432	149	50
5/5	357	621	564	657	693	593	611	800	868	N/A	640	621	146	49
5/6	218	621	1014	686	471	429	286	146	96	11	398	357	311	98
5/7	79	386	518	914	832	704	729	Rain	Rain	Rain	594	704	290	110
5/8	18	200	243	146	89	68	32	46	39	9	89	57	81	26
5/9	0	14	0	4	11	14	4	17	27	7	10	9	8	3
5/10	17	336	325	375	236	75	21	32	13	0	143	54	155	49
5/11	39	629	1443	1507	1464	1421	871	486	286	36	818	750	605	191
5/12	96	471	182	286	167	99	89	61	68	N/A	169	99	134	45
5/13	296	274	461	771	416	Rain	204	318	116	N/A	357	307	200	71
5/14	179	600	1925	1793	1496	1296	1421	975	971	N/A	1184	1296	562	187
5/15	136	621	504	291	439	450	325	325	227	N/A	369	325	149	50
5/16	114	668	586	543	346	454	414	600	639	N/A	485	543	176	59
5/17	396	1650	2043	1684	1118	1154	1333	1664	1368	N/A	1379	1368	471	157
5/20	343	525	613	936	849	818	764	811	761	N/A	713	764	186	62
5/21	733	914	961	668	868	789	804	575	243	N/A	728	789	218	73
5/22	257	714	743	886	797	707	450	407	89	N/A	561	707	272	91
5/23	404	375	461	464	354	325	332	379	57	N/A	350	375	121	40
5/24	339	454	496	461	532	493	689	836	193	N/A	499	493	185	62
5/25	229	519	861	861	650	414	525	693	N/A	N/A	594	588	218	77
5/26	330	325	332	250	218	268	411	382	218	N/A	304	325	69	23
Entire Season	**235**	**474**	**601**	**613**	**565**	**516**	**477**	**470**	**389**	**142**	**467**	**372**	**418**	**24**
0 indicates no targets counted for that hour									N/A indicates no data for that hour					

Appendix A Table 3. Mean Nightly Flight Direction		
Night of	**Mean Flight Direction**	**Circular Stdev**
4/15	7	41
4/18	128	59
4/19	97	37
4/21	52	44
4/22	155	68
4/23	116	46
4/24	52	33
4/25	291	59
4/26	30	63
4/29	76	38
4/30	62	31
5/1	18	56
5/3	76	57
5/5	26	40
5/6	94	55
5/7	70	92
5/8	80	45
5/9	155	75
5/10	107	61
5/11	57	47
5/12	129	67
5/13	67	62
5/14	50	37
5/15	84	62
5/16	93	45
5/17	43	47
5/20	75	47
5/21	6	51
5/22	25	58
5/23	36	50
5/24	87	45
5/25	87	43
5/26	267	75
Entire Season	**56**	**59**

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	Mean	Median	STDV	SE		
4/15	Rain	459	386	357	404	401	285	Rain	Rain	Rain	391	327	273	10	134	19%
4/18	Rain	138	197	85	191	178	149	103	4	286	166	89	207	29	32	64%
4/19	201	248	107	134	111	114	121	153	110	104	130	87	139	7	288	68%
4/21	365	446	511	554	406	467	396	352	338	N/A	456	419	279	5	365	14%
4/22	308	315	365	374	280	217	437	149	206	198	323	259	258	16	83	31%
4/23	235	237	196	59	113	125	128	222	284	298	163	121	165	19	44	59%
4/24	216	439	479	438	424	257	195	192	240	230	362	316	245	7	290	22%
4/25	337	463	412	418	397	331	327	301	289	201	385	371	184	7	70	10%
4/26	Rain	Rain	Rain	Rain	323	343	366	508	488	--	354	291	233	30	11	18%
4/29	167	308	281	146	217	176	88	26	105	N/A	174	124	220	33	26	58%
4/30	166	252	195	194	179	131	127	125	286	738	196	131	202	8	352	55%
5/1	338	461	461	478	519	498	448	432	378	515	464	444	221	4	263	7%
5/3	315	274	318	243	206	158	213	215	230	309	240	217	174	8	148	35%
5/5	288	433	465	434	378	405	507	494	453	N/A	444	401	233	5	179	7%
5/6	233	336	298	171	143	109	131	142	65	213	234	181	201	12	135	44%
5/7	124	291	674	467	514	475	540	Rain	Rain	Rain	504	465	322	13	91	16%
5/8	283	316	279	333	283	94	128	134	14	N/A	278	226	228	19	52	37%
5/9	--	--	167	--	--	--	--	--	108	N/A	123	128	74	37	2	50%
5/10	--	120	230	144	240	151	117	130	149	N/A	178	133	164	25	25	57%
5/11	332	440	379	306	284	272	313	296	213	N/A	342	302	228	7	188	20%
5/12	290	349	424	303	404	335	321	75	166	N/A	317	245	271	31	27	36%
5/13	255	316	274	309	301	Rain	Rain	304	377	N/A	306	281	208	11	105	27%
5/14	228	369	363	375	277	152	214	175	130	N/A	292	206	257	8	404	38%
5/15	349	241	290	243	209	302	212	185	189	N/A	239	213	171	12	70	33%
5/16	228	252	199	186	225	168	146	144	167	N/A	199	144	183	11	134	52%
5/17	290	422	344	360	472	548	530	498	500	N/A	471	422	325	7	442	21%
5/20	232	453	351	212	138	309	263	245	219	N/A	262	165	260	12	219	47%
5/21	304	411	416	389	393	354	364	390	418	N/A	393	369	178	3	146	5%
5/22	389	520	528	497	406	393	303	288	288	N/A	441	387	250	7	142	10%
5/23	314	407	392	363	355	287	273	203	291	N/A	335	295	198	7	100	13%
5/24	302	311	249	238	234	227	325	316	463	N/A	292	252	206	9	138	26%
5/25	274	357	228	218	284	194	182	233	N/A	N/A	254	227	190	9	163	38%
5/26	251	367	391	371	415	426	287	301	301	N/A	347	284	244	12	83	19%
Entire Season	**272**	**347**	**339**	**303**	**304**	**277**	**272**	**244**	**249**	**309**	**387**	**344**	**254**	**2**	**4951**	**19%**

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

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Appendix A Table 5. Summary of available avian spring radar survey results conducted at proposed (pre-construction) US wind power facilities in 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
Spring 2005									
Alabama, Genesee Cty, NY	40	n/a	Agricultural plateau	111	n/a	35	413	(125 m) 14%	Young, D. P., C. S. Nations, V. K. Poulton, J. Kerns. 2007. Avian and Bat Studies for the Proposed Alabama Ledge Wind Project, Genesee County, New York. Final Report prepared by WEST, Inc. for Horizon Wind Energy.
Noble C/E/A, Clinton Cty, NY	40	n/a	Great Lakes plain/ADK foothills	110	n/a	30	338	(125 m) 20%	Mabee, T. J., J. H. Plissner, B. A. Cooper, J. B. Barna. 2006. A Radar and Visual Study of Nocturnal Bird and Bat Migration at the Proposed Clinton County Windparks, New York, Spring and Fall 2005. Final Report prepared by ABR, Inc. for Ecology and Environment, Inc. and Noble Environmental Power, LLC.
Sheldon, Wyoming Cty, NY	38	272	Agricultural plateau	112	6-558	25	422	(120 m) 6%	Woodlot Alternatives, Inc. 2006. A Spring 2005 Radar Survey of Bird Migration at the Proposed High Sheldon Wind Project in Sheldon, New York. Prepared for Invenergy.
Munnsville, Madison Cty, NY	41	388	Agricultural plateau	160	6-1065	31	291	(118 m) 25%	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Munnsville Wind Project in Munnsville, New York. Prepared for AES-EHN NY Wind, LLC.
Sheffield, Caledonia Cty, VT	20	180	Forested ridge	166	12-440	40	552	(125 m) 6%	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.
Stamford, Delaware Cty, NY	35	301	Forested ridge	210	10-785	46	431	(110 m) 8%	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.
Churubusco, Clinton Cty, NY	39	310	Great Lakes plain/ADK foothills	254	3-728	40	422	(120 m) 11%	Woodlot Alternatives, Inc. 2005. A Spring Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Marble River Wind Project in Clinton and Ellenburg, New York. Prepared for AES Corporation.
Prattsburgh, Steuben Cty, NY	20	183	Agricultural plateau	277	70-621	22	370	(125 m) 16%	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windfarm Prattsburgh Project in Prattsburgh, New York. Prepared for UPC Wind Management, LLC.
Deerfield, Bennington Cty, VT	20	183	Forested ridge	404	74-973	69	523	(100 m) 4%	Woodlot Alternatives, Inc. 2005. Spring 2005 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
Jordanville, Herkimer Cty, NY	40	364	Agricultural plateau	409	26-1410	40	371	(125 m) 21%	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar and Acoustic Survey of Bird and Bat Migration at the Proposed Jordanville Wind Project in Jordanville, New York. Prepared for Community Energy, Inc.
Franklin, Pendleton Cty, NY	21	204	Forested ridge	457	34-1240	53	492	(125 m) 11%	Woodlot Alternatives, Inc. 2005. A Spring 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.
Clayton, Jefferson Cty, NY	36	303	Agricultural plateau	460	71-1769	30	443	(150 m) 14%	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Clayton Wind Project in Clayton, New York. Prepared for PPM Atlantic Renewable.
Dans Mountain, Allegany Cty, MD	23	189	Forested ridge	493	63-1388	38	541	(125 m) 15%	Woodlot Alternatives, Inc. 2005. A Spring 2005 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.
Fairfield, Herkimer Cty, NY	40	369	Agricultural plateau	509	80-1175	44	419	(145 m) 16%[1]	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar Survey of Bird and Bat Migration at the Proposed Top Notch Wind Project in Fairfield, New York. Prepared for PPM Atlantic Renewable.
Spring 2006									
Kibby, Franklin Cty, ME (Range 1)	10	80	Forested ridge	197	6-471	50	412	(120 m) 22%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Deerfield, Bennington Cty, VT	26	236	Forested ridge	263	5-934	58	435	(100 m) 11%	Woodlot Alternatives, Inc. 2006. Spring 2006 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
Centerville, Allegany Cty, NY	42	n/a	Agricultural plateau	290	25-1140	22	351	(125 m) 16%	Mabee, T.J., J.H. Plissner, and B.A. Cooper. 2006a. A Radar and Visual Study of Nocturnal Bird and Bat Migration at the Proposed Centerville and Wethersfield Windparks, New York, Spring 2006. Report prepared for Ecology and Environment, LLC and Noble Environmental Power, LLC. July 2006.
Wethersfield, Wyoming Cty, NY	44	n/a	Agricultural plateau	324	41-907	12	355	(125 m) 19%	Mabee, T.J., J.H. Plissner, and B.A. Cooper. 2006a. A Radar and Visual Study of Nocturnal Bird and Bat Migration at the Proposed Centerville and Wethersfield Windparks, New York, Spring 2006. Report prepared for Ecology and Environment, LLC and Noble Environmental Power, LLC. July 2006.
Mars Hill, Aroostook Cty, ME	15	85	Forested ridge	338	76-674	58	384	(120 m) 14%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Radar, Visual, and Acoustic Survey of Bird Migration at the Mars Hill Wind Farm in Mars Hill, Maine. Prepared for Evergreen Windpower, LLC.
Chateaugay, Franklin Cty, NY	35	300	Agricultural plateau	360	54-892	48	409	(120 m) 18%	Woodlot Alternatives, Inc. 2006. Spring 2006 Radar Surveys at the Proposed Chateaugay Windpark in Chateaugay, New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.
Howard, Steuben Cty, NY	42	440	Agricultural plateau	440	35-2270	27	426	(125 m) 13%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Howard Wind Power Project in Howard, New York. Prepared for Everpower Global.
Kibby, Franklin Cty, ME (Valley)	2	14	Forested ridge	443	45-1242	61	334	(120 m) n/a	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Kibby, Franklin Cty, ME (Mountain)	6	33	Forested ridge	456	88-1500	67	368	(120 m) 14%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Kibby, Franklin Cty, ME (Range 2)	7	57	Forested ridge	512	18-757	86	378	(120 m) 25%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Spring 2007									
Stetson, Washington Cty, ME	21	138	Forested ridge	147	3-434	55	210	(120 m) 22%	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Cape Vincent, Jefferson Cty, NY	50	300	Great Lakes plain	166	n/a	34	441	(125 m) 14%	Western EcoSystems Technology, Inc. (WEST). 2007. Avian and Bat Studies for the Proposed Cape Vincent Wind Power Project, Jefferson County, NY. Prepared for BP Alternative Energy North America.
Arkwright, Chautauqua County, NY	41	n/a	Great Lakes plain	175	n/a	18	450	(125 m) 13%	Kerns, J., D. P. Young, C. S. Nations, V. K. Poulton. 2008. Avian and Bat Studies for the Proposed New Grange Wind Project, Chautauqua County, New York. Final Report prepared by WEST, Inc. for New Grange Wind Farm LLC.
Laurel Mountain, Barbour Cty, WV	20	197	Forested ridge	277	13-646	27	533	(130 m) 3%	Stantec Consulting Services Inc. 2007. A Spring 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.
Granite Reliable Power, Coos County, NH	30	212	Forested ridge	342	2 to 870	76	332	(125 m) 14%	Stantec Consulting Inc. 2007. Spring 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.
Villenova, Chautauqua Cty, NY	40	n/a	Great Lakes plain	419	22-1190	10	493	(120 m) 3%	Stantec Consulting Services Inc. 2008. A Spring 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Ball Hill Windpark in Villenova and Hanover, New York. Prepared for Noble Environmental Power, LLC and Ecology and Environment.
Roxbury, Oxford Cty, ME	20	n/a	Forested ridge	539	137-1256	52	312	(130 m) 18%	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Record Hill Wind Project, Roxbury, Maine. Prepared for Roxbury Hill Wind LLC.
Lempster, Sullivan Cty, NH	30	277	Forested ridge	542	49-1094	49	358	(125 m) 18%	Woodlot Alternatives, Inc. 2007.A Spring 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.
Spring 2008									
Allegany, Cattaraugus Cty, NY	30	275	Forested ridge	268	53-755	18	316	(150 m) 19%	Stantec Consulting Services Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report, Visual, Radar, and Acoustic Bat Surveys for the Allegany Wind Project in Allegany, New York. Prepared for Allegany Wind, LLC. October 2008
Oakfield, Penobscot Cty, ME	20	194	Forested ridge	498	132-899	33	276	(120 m) 21%	Stantec Consulting Services Inc. 2008.A Spring 2008 Survey of Bird and Bat Migration at the Oakfield Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.
Hounsfield, Jefferson Cty, NY	42	379	Great Lakes island	624	74-1630	51	319	(125 m) 19%	Stantec Consulting Services Inc. 2008. A Spring 2008 Survey of Bird Migration at the Hounsfield Wind Project, New York. Prepared for American Consulting Professionals of New York, PLLC.
New Creek, Grant Cty, WV	20	n/a	Forested ridge	1020	289-2610	30	354	(130 m) 13%	Stantec Consulting Services Inc. 2008. A Spring 2008 Survey of Bird Migration at the New Creek Wind Project, West Virginia. Prepared for AES New Creek, LLC.
Groton Wind, Grafton Cty, NH	40	373	Forested ridge	234	35-549	77	321	(125 m) 12%	Stantec Consulting Services Inc. 2008. Spring 2008 Radar Survey Report for the Groton Wind Project. Prepared for Groton Wind, LLC.
Rollins, Penobscot Cty, ME	20	189	Forested ridge	247	40 - 766	75	316	(120 m) 13%	Stantec Consulting. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind, LLC.
Spring 2009									
Sisk (Kibby Expansion), Franklin Cty, ME	21	193	Forested ridge	207	50-452	28	293	(125 m) 18%	Stantec Consulting Services Inc. 2009. Spring 2009 Nocturnal Migration Survey Report for the Kibby Expansion Wind Project. Prepared for TRC Engineers LLC.
Moresville, Delaware Cty, NY	30	275	Forested ridge	230	30-575	53	314	(125 m) 12%	Stantec Consulting Services Inc. 2009. 2009 Spring Nocturnal Radar Survey Report for the Moresville Energy Center. Prepared for Moresville Energy LLC.
Highland, Somerset Cty, ME (location 1)	21	192	Forested ridge	496	10-1262	47	287	(130.5m) 26%	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys for the Highland Wind Project. Prepared for Highland Wind LLC.
Highland, Somerset Cty, ME (location 2)	19	161	Forested ridge	511	8-1735	53	314	(130.5m) 23%	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys for the Highland Wind Project. Prepared for Highland Wind LLC.
Spring 2010									
Bowers, Carroll Plantation, ME	20	188	Forested ridge	289	20-589	56	243	(131 m) 26%	Stantec Consulting Services Inc. 2010. Draft 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy LLC.
Bull Hill, T16 MD, ME	20	184	Forested ridge	387	43-879	48	217	(145 m) 38%	Stantec Consulting Services Inc. 2010. Spring 2010 Avian and Bat Survey Report for the Bull Hill Wind Project. Prepared for Blue Sky East Wind LLC.
Bingham, Somerset Cty, ME	20	184	Forested ridge	543	51-1231	43	355	(152 m) 21%	Stantec Consulting Services Inc. 2010. Spring 2010 Avian and Bat Survey Report for the Bingham Wind Project. Prepared for Blue Sky East Wind LLC.
Wild Meadows, Merrimack and Grafton Cty, NH	33	285	Forested ridge	467	10-1379	56	387	(150 m) 19%	*this report*
Spring 2011									
Antrim, Hillsborough Cty,NH	30	284	Forested ridge	223	6-1215	44	305	(150 m) 30%	Stantec Consulting Services. 2011. Spring 2011 Radar and Acoustic Bat Survey Report for the Antrim Wind Energy Project in Antrim, New Hampshire. Prepared for Eolian Renewable Energy.
Passadumkeag, Grand Falls Township, ME	20	179	Forested ridge	476	Mar-50	67	321	(140 m) 28%	Stantec Consulting Services. 2011. Spring and Summer 2011 Avian and Bat Survey Report for the Passadumkeag Wind Project in Grand Falls Township, Maine. Prepared for Passadumkeag Windpark LLC.
Bull Hill, T16 MD, ME	10	94	Forested ridge	519	88-1108	98	371	(145 m) 21%	Stantec Consulting Services Inc. 2011. Spring 2011 Radar Survey Results and Comparison to Spring 2010 Results:Memo for the Bull Hill Wind Project. Prepared for First Wind.

Note:

[1] The percent targets below turbine height can be found in the addendum to the report "Effect of Top Notch (now Hardscrabble) Wind Project revision to turbine layout and model changes on the spring and fall 2005 nocturnal radar survey reports." Prepared August 26, 2009, by Stantec Consulting Services Inc.

Appendix B

Bat survey results

Appendix B Table 1. Summary of acoustic bat data and weather during each survey night at the Braley Met Ground Detector – Wild Meadows, 2010

		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 (%)
04/08/10	1												**0**				
04/09/10	1												**0**				
04/10/10	1												**0**				
04/11/10	1												**0**				
04/12/10	1												**0**				
04/13/10	1												**0**				
04/14/10	1												**0**				
04/15/10	1												**0**	6	1		
04/16/10	1												**0**	0	-1		
04/17/10	1												**0**	1	0		
04/18/10	1												**0**	9	1		
04/19/10	1												**0**	8	7		
04/20/10	1												**0**	5	10		
04/21/10	1												**0**	5	10		
04/22/10	1												**0**	8	5		
04/23/10	1												**0**	8	6		
04/24/10	1												**0**	6	10		
04/25/10	1												**0**	2	7		
04/26/10	1												**0**	4	6		
04/27/10	1												**0**	8	-2		
04/28/10	1												**0**	12	2		
04/29/10	1												**0**	13	5		
04/30/10	1												**0**	6	11		
05/01/10	1							1					**1**	4	18		
05/02/10	1				1					1			**2**	5	21		
05/03/10	1												**0**	8	14		
05/04/10	1												**0**	10	9		
05/05/10	1												**0**	7	14		
05/06/10	1												**0**	11	7		
05/07/10	1												**0**	4	7		
05/08/10	1												**0**	11	2		
05/09/10	1												**0**	10	-1		
05/10/10	1												**0**	8	1		
05/11/10	1												**0**	2	7		
05/12/10	1												**0**	5	5		
05/13/10	1												**0**	3	8		
05/14/10	1												**0**	8	12		
05/15/10	1												**0**	7	9		
05/16/10	1												**0**	8	13		
05/17/10	1	1									2		**3**	3	13		
05/18/10	1												**0**	6	8		
05/19/10	1									1			**1**	7	10		
05/20/10	1												**0**	6	16		
05/21/10	1				1	1							**2**	3	12		
05/22/10	1				1								**1**	4	13		
05/23/10	1												**0**	7	16		
05/24/10	1												**0**	5	21		
05/25/10	1												**0**	8	23		
05/26/10	1												**0**	4	14		
05/27/10	1												**0**	3	12		
05/28/10	1												**0**	3	12		
05/29/10	1												**0**	7	15		
05/30/10	1												**0**	8	12		
05/31/10	1												**0**	6	16		
06/01/10	1												**0**	5	15		
06/02/10	1												**0**	5	18		
06/03/10	1												**0**	6	15		
06/04/10	1												**0**	3	17		
06/05/10	1												**0**	5	16		
06/06/10	1												**0**	10	9		
06/07/10	1												**0**	9	10		
06/08/10	1												**0**	7	10		
06/09/10	1												**0**	6	9		
06/10/10	1												**0**	2	9		
06/11/10	1				1	2				1	2		**6**	5	14		
06/12/10	1					1							**1**	2	12		
06/13/10	1					3				3	1		**7**	1	13		
06/14/10	1												**0**	8	12		
06/15/10	1					3							**3**	3	13		
06/16/10	1										1		**1**	5	14		
06/17/10	1								1	1			**2**	8	17		
06/18/10	1									3			**3**	6	20		
06/19/10	1												**0**	6	19		
06/20/10	1								2	1	1		**4**	5	18		
06/21/10	1	1				6				3	1		**11**	6	16		
06/22/10	1	1				1							**2**	4	16		
06/23/10	1		2			2				2			**6**	5	19		
06/24/10	1												**0**	9	15		
06/25/10	1		1			3				1	1		**6**	5	17		
06/26/10	1					3					1		**4**	5	15		
06/27/10	1	3									15		**18**	3	17		
06/28/10	1												**0**	8	20		
06/29/10	1	2									2		**4**	7	12		
06/30/10	1												**0**	7	11		
07/01/10	1												**0**	10	12		
07/02/10	1	1	2			1				1	1		**6**	5	16		
07/03/10	1	1											**1**	10	21		
07/04/10	1	1	1										**2**	8	22		
07/05/10	1	3											**3**	8	25		
07/06/10	1	28	1			1				1	85		**116**	4	25		
07/07/10	1	25	3			1				1	22		**52**	2	22		
07/08/10	1	6								1	50		**57**	7	21		
07/09/10	1	5				2				2	41		**50**	6	21		
07/10/10	1	4				2					4		**10**	3	19		
07/11/10	1	29	4			1					31		**65**	3	19		
07/12/10	1	8									17		**25**	5	20		
07/13/10	1												**0**	4	20		
07/14/10	1	4								1	3		**8**	1	19		
07/15/10	1	5				5				1	1		**12**	5	19		
07/16/10	1	6											**6**	7	20		
07/17/10	1	3								2	1		**6**	7	21		
07/18/10	1	2				2				2			**6**	5	19		
07/19/10	1	1								1			**2**	6	18		
07/20/10	1	4				1					5		**10**	3	19		
07/21/10	1												**0**	9	16		
07/22/10	1					1							**1**	7	18		
07/23/10	1								1				**1**	3	18		
07/24/10	1	2				1			1	1			**5**	6	21		
07/25/10	1									2			**2**	10	15		
07/26/10	1					1							**1**	9	17		
07/27/10	1	2								1			**3**	6	20		
07/28/10	1	1							1	1			**3**	7	20		
07/29/10	1									1			**1**	6	14		
07/30/10	1									1			**1**	5	11		
07/31/10	1								1	2	1		**4**	4	14		
08/01/10	1								2	2			**4**	3	15		
08/02/10	1	2				3			1	1			**7**	5	17		
08/03/10	1												**0**	8	20		
08/04/10	1	4				2			1				**7**	6	22		
08/05/10	1					1				1			**2**	8	19		
08/06/10	1					1				2			**3**	6	12		
08/07/10	1									1			**1**	5	14		
08/08/10	1		1							2	1		**4**	7	19		
08/09/10	1					1							**1**	7	18		
08/10/10	1	1	1		1								**3**	6	19		
08/11/10	1	3					1			1	1		**6**	4	17		
08/12/10	1					2	1			7			**10**	4	15		
08/13/10	1					1	3			4			**8**	5	15		
08/14/10	1					1			1	2			**4**	7	16		
08/15/10	1												**0**	6	16		
08/16/10	1	1			1	1				2			**5**	6	18		
08/17/10	1									1			**1**	7	18		
08/18/10	1				1	1							**2**	3	19		
By Species		**160**	**16**	**0**	**7**	**58**	**5**	**1**	**12**	**65**	**291**	**0**	**615**				
By Guild		**176**			**7**	**58**	**18**			**356**							
		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 Braley Met High Detector – Wild Meadows, 2010

		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 (%)
04/08/10	1												0				
04/09/10	1												0				
04/10/10	1												0				
04/11/10	1												0				
04/12/10	1												0				
04/13/10	1												0				
04/14/10	1												0				
04/15/10	1												0	6	1		
04/16/10	1												0	0	-1		
04/17/10	1												0	1	0		
04/18/10	1												0	9	1		
04/19/10	1												0	8	7		
04/20/10	1												0	5	10		
04/21/10	1												0	5	10		
04/22/10	1												0	8	5		
04/23/10	1												0	8	6		
04/24/10	1												0	6	10		
04/25/10	1												0	2	7		
04/26/10	1												0	4	6		
04/27/10	1												0	8	-2		
04/28/10	1												0	12	2		
04/29/10	1												0	13	5		
04/30/10	1												0	6	11		
05/01/10	1												0	4	18		
05/02/10	1												0	5	21		
05/03/10	1			1									1	8	14		
05/04/10	1												0	10	9		
05/05/10	1												0	7	14		
05/06/10	1												0	11	7		
05/07/10	1												0	4	7		
05/08/10	1												0	11	2		
05/09/10	1												0	10	-1		
05/10/10	1												0	8	1		
05/11/10	1										1		1	2	7		
05/12/10	1												0	5	5		
05/13/10	1										1		1	3	8		
05/14/10	1												0	8	12		
05/15/10	1												0	7	9		
05/16/10	1												0	8	13		
05/17/10	1												0	3	13		
05/18/10	1												0	6	8		
05/19/10	1												0	7	10		
05/20/10	1												0	6	16		
05/21/10	1												0	3	12		
05/22/10	1				1								1	4	13		
05/23/10	1				1								1	7	16		
05/24/10	1												0	5	21		
05/25/10	1				1								1	8	23		
05/26/10	1										2		2	4	14		
05/27/10	0												0	3	12		
05/28/10	0												0	3	12		
05/29/10	1												0	7	15		
05/30/10	1										1		1	8	12		
05/31/10	1			1									1	6	16		
06/01/10	1												0	5	15		
06/02/10	1												0	5	18		
06/03/10	1												0	6	15		
06/04/10	1												0	3	17		
06/05/10	0												0	5	16		
06/06/10	1												0	10	9		
06/07/10	1												0	9	10		
06/08/10	0												0	7	10		
06/09/10	0												0	6	9		
06/10/10	0												0	2	9		
06/11/10	0												0	5	14		
06/12/10	0												0	2	12		
06/13/10	0												0	1	13		
06/14/10	0												0	8	12		
06/15/10	0												0	3	13		
06/16/10	0												0	5	14		
06/17/10	0												0	8	17		
06/18/10	0												0	6	20		
06/19/10	0												0	6	19		
06/20/10	0												0	5	18		
06/21/10	0												0	6	16		
06/22/10	0												0	4	16		
06/23/10	0												0	5	19		
06/24/10	1												0	9	15		
06/25/10	1												0	5	17		
06/26/10	1												0	5	15		
06/27/10	1												0	3	17		
06/28/10	1										1		1	8	20		
06/29/10	1	1									2		3	7	12		
06/30/10	1												0	7	11		
07/01/10	1												0	10	12		
07/02/10	1												0	5	16		
07/03/10	1												0	10	21		
07/04/10	1												0	8	22		
07/05/10	1												0	8	25		
07/06/10	1	1	1								5		7	4	25		
07/07/10	1		1										1	2	22		
07/08/10	1				1								1	7	21		
07/09/10	1												0	6	21		
07/10/10	1												0	3	19		
07/11/10	1										1		1	3	19		
07/12/10	1												0	5	20		
07/13/10	1												0	4	20		
07/14/10	1										2		2	1	19		
07/15/10	1												0	5	19		
07/16/10	1												0	7	20		
07/17/10	1												0	7	21		
07/18/10	1				1						1		2	5	19		
07/19/10	1		1								1		2	6	18		
07/20/10	1										1		1	3	19		
07/21/10	1												0	9	16		
07/22/10	0												0	7	18		
07/23/10	1												0	3	18		
07/24/10	1												0	6	21		
07/25/10	1												0	10	15		
07/26/10	1				1						1		2	9	17		
07/27/10	1												0	6	20		
07/28/10	1												0	7	20		
07/29/10	1												0	6	14		
07/30/10	1												0	5	11		
07/31/10	1												0	4	14		
08/01/10	1												0	3	15		
08/02/10	1												0	5	17		
08/03/10	1												0	8	20		
08/04/10	1												0	6	22		
08/05/10	1								1				1	8	19		
08/06/10	1												0	6	12		
08/07/10	1												0	5	14		
08/08/10	1									1			1	7	19		
08/09/10	1										1		1	7	18		
08/10/10	0												0	6	19		
08/11/10	0												0	4	17		
08/12/10	1												0	4	15		
08/13/10	1												0	5	15		
08/14/10	1												0	7	16		
08/15/10	1												0	6	16		
08/16/10	1										1		1	6	18		
08/17/10	1												0	7	18		
08/18/10	1												0	3	19		
08/19/10	1												0	7	18		
By Species		**2**	**3**	**2**	**6**	**0**	**0**	**0**	**1**	**1**	**22**	**0**	**37**				
By Guild		**7**			**6**	**0**	**1**			**23**							
		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 Braley Met Low Detector – Wild Meadows, 2010

		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 (%)
04/08/10	1												0				
04/09/10	1												0				
04/10/10	1												0				
04/11/10	1												0				
04/12/10	1												0				
04/13/10	1												0				
04/14/10	1												0				
04/15/10	1												0	6	1		
04/16/10	1												0	0	-1		
04/17/10	1												0	1	0		
04/18/10	1												0	9	1		
04/19/10	1												0	8	7		
04/20/10	1												0	5	10		
04/21/10	1												0	5	10		
04/22/10	1												0	8	5		
04/23/10	1												0	8	6		
04/24/10	1												0	6	10		
04/25/10	1												0	2	7		
04/26/10	1												0	4	6		
04/27/10	1												0	8	-2		
04/28/10	1												0	12	2		
04/29/10	1												0	13	5		
04/30/10	1												0	6	11		
05/01/10	1												0	4	18		
05/02/10	1												0	5	21		
05/03/10	1	1											1	8	14		
05/04/10	1												0	10	9		
05/05/10	1												0	7	14		
05/06/10	1												0	11	7		
05/07/10	1												0	4	7		
05/08/10	1												0	11	2		
05/09/10	1												0	10	-1		
05/10/10	1												0	8	1		
05/11/10	1			1									1	2	7		
05/12/10	1												0	5	5		
05/13/10	1										1		1	3	8		
05/14/10	1												0	8	12		
05/15/10	1												0	7	9		
05/16/10	1												0	8	13		
05/17/10	1			1									1	3	13		
05/18/10	1												0	6	8		
05/19/10	1												0	7	10		
05/20/10	1												0	6	16		
05/21/10	1												0	3	12		
05/22/10	1										1		1	4	13		
05/23/10	1										1		1	7	16		
05/24/10	1												0	5	21		
05/25/10	1										1		1	8	23		
05/26/10	1			1									1	4	14		
05/27/10	1												0	3	12		
05/28/10	1												0	3	12		
05/29/10	1	1									1		2	7	15		
05/30/10	1												0	8	12		
05/31/10	1										1		1	6	16		
06/01/10	1			1							1		2	5	15		
06/02/10	1				1								1	5	18		
06/03/10	1												0	6	15		
06/04/10	1										2		2	3	17		
06/05/10	1												0	5	16		
06/06/10	1												0	10	9		
06/07/10	1												0	9	10		
06/08/10	1												0	7	10		
06/09/10	1												0	6	9		
06/10/10	1												0	2	9		
06/11/10	1										2		2	5	14		
06/12/10	1												0	2	12		
06/13/10	1												0	1	13		
06/14/10	1	1											1	8	12		
06/15/10	1												0	3	13		
06/16/10	1												0	5	14		
06/17/10	1												0	8	17		
06/18/10	1									1			1	6	20		
06/19/10	1												0	6	19		
06/20/10	1	1	1										2	5	18		
06/21/10	1										3		3	6	16		
06/22/10	1		1										1	4	16		
06/23/10	1												0	5	19		
06/24/10	1												0	9	15		
06/25/10	1												0	5	17		
06/26/10	1												0	5	15		
06/27/10	1									1	1		2	3	17		
06/28/10	1	2									1		3	8	20		
06/29/10	1				1						1		2	7	12		
06/30/10	1												0	7	11		
07/01/10	1												0	10	12		
07/02/10	1	1											1	5	16		
07/03/10	1												0	10	21		
07/04/10	1		1										1	8	22		
07/05/10	1	1									1		2	8	25		
07/06/10	1	5	1								5		11	4	25		
07/07/10	1	3	2								2		7	2	22		
07/08/10	1										1		1	7	21		
07/09/10	1										1		1	6	21		
07/10/10	1												0	3	19		
07/11/10	1	1	1								2		4	3	19		
07/12/10	1												0	5	20		
07/13/10	1												0	4	20		
07/14/10	1	1		1	1						1		4	1	19		
07/15/10	1										1		1	5	19		
07/16/10	1	1											1	7	20		
07/17/10	1												0	7	21		
07/18/10	1	1									1		2	5	19		
07/19/10	1		1										1	6	18		
07/20/10	1										1		1	3	19		
07/21/10	1												0	9	16		
07/22/10	1				1								1	7	18		
07/23/10	1				1								1	3	18		
07/24/10	1												0	6	21		
07/25/10	1												0	10	15		
07/26/10	1										1		1	9	17		
07/27/10	1	1											1	6	20		
07/28/10	1												0	7	20		
07/29/10	1												0	6	14		
07/30/10	1												0	5	11		
07/31/10	1										1		1	4	14		
08/01/10	1												0	3	15		
08/02/10	1									1			1	5	17		
08/03/10	1												0	8	20		
08/04/10	1								1	1			2	6	22		
08/05/10	1												0	8	19		
08/06/10	1												0	6	12		
08/07/10	1												0	5	14		
08/08/10	1	1											1	7	19		
08/09/10	1	1									1		2	7	18		
08/10/10	1												0	6	19		
08/11/10	1			1							1		2	4	17		
08/12/10	1												0	4	15		
08/13/10	1										1		1	5	15		
08/14/10	1												0	7	16		
08/15/10	1												0	6	16		
08/16/10	1										1		1	6	18		
08/17/10	1												0	7	18		
08/18/10	1												0	3	19		
08/19/10	1												0	7	18		
By Species		**23**	**8**	**6**	**5**	**0**	**0**	**0**	**1**	**4**	**39**	**0**	**86**				
By Guild		**37**			**5**	**0**	**1**			**43**							
		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 Melvin Met Ground Detector – Wild Meadows, 2010

		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 (%)
04/08/10	1												**0**				
04/09/10	1												**0**				
04/10/10	1												**0**				
04/11/10	1												**0**				
04/12/10	1												**0**				
04/13/10	1												**0**				
04/14/10	1												**0**				
04/15/10	1												**0**	6	1		
04/16/10	1												**0**	0	-1		
04/17/10	1												**0**	1	0		
04/18/10	1												**0**	9	1		
04/19/10	1												**0**	8	7		
04/20/10	1												**0**	5	10		
04/21/10	1										1		**1**	5	10		
04/22/10	1												**0**	8	5		
04/23/10	1												**0**	8	6		
04/24/10	1												**0**	6	10		
04/25/10	1												**0**	2	7		
04/26/10	1												**0**	4	6		
04/27/10	1												**0**	8	-2		
04/28/10	1												**0**	12	2		
04/29/10	1												**0**	13	5		
04/30/10	1												**0**	6	11		
05/01/10	1												**0**	4	18		
05/02/10	1												**0**	5	21		
05/03/10	1												**0**	8	14		
05/04/10	1												**0**	10	9		
05/05/10	1												**0**	7	14		
05/06/10	1												**0**	11	7		
05/07/10	1												**0**	4	7		
05/08/10	1												**0**	11	2		
05/09/10	1												**0**	10	-1		
05/10/10	1												**0**	8	1		
05/11/10	1												**0**	2	7		
05/12/10	1												**0**	5	5		
05/13/10	1												**0**	3	8		
05/14/10	1					1				2			**3**	8	12		
05/15/10	1												**0**	7	9		
05/16/10	1												**0**	8	13		
05/17/10	1												**0**	3	13		
05/18/10	1												**0**	6	8		
05/19/10	1												**0**	7	10		
05/20/10	1				2								**2**	6	16		
05/21/10	1												**0**	3	12		
05/22/10	1	1											**1**	4	13		
05/23/10	1												**0**	7	16		
05/24/10	1												**0**	5	21		
05/25/10	1												**0**	8	23		
05/26/10	1				1								**1**	4	14		
05/27/10	1			1									**1**	3	12		
05/28/10	1												**0**	3	12		
05/29/10	1			1									**1**	7	15		
05/30/10	1	1								1			**2**	8	12		
05/31/10	1												**0**	6	16		
06/01/10	1	1											**1**	5	15		
06/02/10	1	1	1		1					1			**4**	5	18		
06/03/10	1				1								**1**	6	15		
06/04/10	1		1										**1**	3	17		
06/05/10	1				1					2			**3**	5	16		
06/06/10	1												**0**	10	9		
06/07/10	1												**0**	9	10		
06/08/10	1												**0**	7	10		
06/09/10	1												**0**	6	9		
06/10/10	1												**0**	2	9		
06/11/10	1					1				1			**2**	5	14		
06/12/10	1												**0**	2	12		
06/13/10	1									1			**1**	1	13		
06/14/10	1												**0**	8	12		
06/15/10	1									1			**1**	3	13		
06/16/10	1									1			**1**	5	14		
06/17/10	1												**0**	8	17		
06/18/10	1					4			1	1			**6**	6	20		
06/19/10	1	2				1				1			**4**	6	19		
06/20/10	1					6				5			**11**	5	18		
06/21/10	1					3				1			**4**	6	16		
06/22/10	1												**0**	4	16		
06/23/10	1					3				1			**4**	5	19		
06/24/10	1					1							**1**	9	15		
06/25/10	1					3							**3**	5	17		
06/26/10	1					2					1		**3**	5	15		
06/27/10	1												**0**	3	17		
06/28/10	1	1	1		1	8				1	1		**13**	8	20		
06/29/10	1	1											**1**	7	12		
06/30/10	1												**0**	7	11		
07/01/10	1												**0**	10	12		
07/02/10	1	6	1			8				8			**23**	5	16		
07/03/10	1	2				7				3	1		**13**	10	21		
07/04/10	1	46	1			13				5	1		**66**	8	22		
07/05/10	1	1				21				4			**26**	8	25		
07/06/10	1	4	1			2				10	1		**18**	4	25		
07/07/10	1	2	1			3				8			**14**	2	22		
07/08/10	1					6				2			**8**	7	21		
07/09/10	1	2								1			**3**	6	21		
07/10/10	1	1				3				5	1		**10**	3	19		
07/11/10	1					3				6			**9**	3	19		
07/12/10	1	1				6				4			**11**	5	20		
07/13/10	1									1			**1**	4	20		
07/14/10	1					1				3			**4**	1	19		
07/15/10	1	1				1				2	1		**5**	5	19		
07/16/10	1	1				1					1		**3**	7	20		
07/17/10	1	1				1				2			**4**	7	21		
07/18/10	1					1	1			3			**5**	5	19		
07/19/10	1						1			1	1		**3**	6	18		
07/20/10	1						28			7	2		**37**	3	19		
07/21/10	1						10						**10**	9	16		
07/22/10	1					2	4	1	18	12			**37**	7	18		
07/23/10	1						1						**1**	3	18		
07/24/10	1					1			3	2			**6**	6	21		
07/25/10	1				1		4		5				**10**	10	15		
07/26/10	1					1	13		8	7			**29**	9	17		
07/27/10	1					1	6		1	2			**10**	6	20		
07/28/10	1					2	7		5	7			**21**	7	20		
07/29/10	1									1			**1**	6	14		
07/30/10	1						1						**1**	5	11		
07/31/10	1						1						**1**	4	14		
08/01/10	1									1			**1**	3	15		
08/02/10	1						1		2	10			**13**	5	17		
08/03/10	1	1	1										**2**	8	20		
08/04/10	1	5								1			**6**	6	22		
08/05/10	1					1			4	13			**18**	8	19		
08/06/10	1						1						**1**	6	12		
08/07/10	1				1	4	3		10	8			**26**	5	14		
08/08/10	1									1			**1**	7	19		
08/09/10	1									3			**3**	7	18		
08/10/10	1								4	3			**7**	6	19		
08/11/10	1	1								1			**2**	4	17		
08/12/10	1				1						1		**2**	4	15		
08/13/10	1						5			1			**6**	5	15		
08/14/10	1			1			2		2	1			**6**	7	16		
08/15/10	1									1			**1**	6	16		
08/16/10	1						5		9	21			**35**	6	18		
08/17/10	1						16		23	23			**62**	7	18		
08/18/10	1			1			20		5	8			**34**	3	19		
08/19/10	1												**0**	7	18		
By Species		**83**	**8**	**4**	**10**	**122**	**130**	**1**	**100**	**222**	**13**	**0**	**693**				
By Guild		**95**			**10**	**122**	**231**			**235**							
		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 Melvin Met High Detector – Wild Meadows, 2010

		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 (%)
05/12/10	1												0	5	5		
05/13/10	1												0	3	8		
05/14/10	1			1									1	8	12		
05/15/10	1												0	7	9		
05/16/10	1												0	8	13		
05/17/10	1			1									1	3	13		
05/18/10	1												0	6	8		
05/19/10	1												0	7	10		
05/20/10	1												0	6	16		
05/21/10	1												0	3	12		
05/22/10	1				1								1	4	13		
05/23/10	1				1								1	7	16		
05/24/10	1												0	5	21		
05/25/10	1												0	8	23		
05/26/10	1										1		1	4	14		
05/27/10	1			1									1	3	12		
05/28/10	1												0	3	12		
05/29/10	1												0	7	15		
05/30/10	1												0	8	12		
05/31/10	1												0	6	16		
06/01/10	1												0	5	15		
06/02/10	1												0	5	18		
06/03/10	1												0	6	15		
06/04/10	1												0	3	17		
06/05/10	1				2						1		3	5	16		
06/06/10	1												0	10	9		
06/07/10	1												0	9	10		
06/08/10	1												0	7	10		
06/09/10	1												0	6	9		
06/10/10	1												0	2	9		
06/11/10	1												0	5	14		
06/12/10	1												0	2	12		
06/13/10	1												0	1	13		
06/14/10	1												0	8	12		
06/15/10	1												0	3	13		
06/16/10	1												0	5	14		
06/17/10	1				1								1	8	17		
06/18/10	1												0	6	20		
06/19/10	1										1		1	6	19		
06/20/10	1												0	5	18		
06/21/10	1												0	6	16		
06/22/10	1												0	4	16		
06/23/10	1												0	5	19		
06/24/10	1												0	9	15		
06/25/10	1												0	5	17		
06/26/10	1												0	5	15		
06/27/10	1												0	3	17		
06/28/10	1				1						2		3	8	20		
06/29/10	1												0	7	12		
06/30/10	1												0	7	11		
07/01/10	1												0	10	12		
07/02/10	1												0	5	16		
07/03/10	1												0	10	21		
07/04/10	1												0	8	22		
07/05/10	1												0	8	25		
07/06/10	1												0	4	25		
07/07/10	1				1								1	2	22		
07/08/10	1												0	7	21		
07/09/10	1												0	6	21		
07/10/10	1												0	3	19		
07/11/10	1												0	3	19		
07/12/10	1												0	5	20		
07/13/10	1												0	4	20		
07/14/10	1				1								1	1	19		
07/15/10	1												0	5	19		
07/16/10	1				1								1	7	20		
07/17/10	1				1								1	7	21		
07/18/10	1												0	5	19		
07/19/10	1												0	6	18		
07/20/10	1										1		1	3	19		
07/21/10	1												0	9	16		
07/22/10	1												0	7	18		
07/23/10	1												0	3	18		
07/24/10	1												0	6	21		
07/25/10	1												0	10	15		
07/26/10	1	1											1	9	17		
07/27/10	1												0	6	20		
07/28/10	1												0	7	20		
07/29/10	1				1						1		2	6	14		
07/30/10	1												0	5	11		
07/31/10	1												0	4	14		
08/01/10	1												0	3	15		
08/02/10	1												0	5	17		
08/03/10	1												0	8	20		
08/04/10	1										1		1	6	22		
08/05/10	1												0	8	19		
08/06/10	1												0	6	12		
08/07/10	1				1								1	5	14		
08/08/10	1												0	7	19		
08/09/10	1				2								2	7	18		
08/10/10	1				1						1		2	6	19		
08/11/10	1	1		1									2	4	17		
08/12/10	1				2								2	4	15		
08/13/10	1										1		1	5	15		
08/14/10	1												0	7	16		
08/15/10	1												0	6	16		
08/16/10	1				1		1				1		3	6	18		
08/17/10	1			1	1					1			3	7	18		
08/18/10	1	2					1			1			4	3	19		
08/19/10	1												0	7	18		
By Species		**4**	**0**	**5**	**19**	**0**	**2**	**0**	**0**	**2**	**11**	**0**	**43**				
By Guild		**9**			**19**	**0**	**2**			**13**							
		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 Melvin Met Low Detector – Wild Meadows, 2010

		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 (%)
04/08/10	1												0				
04/09/10	1												0				
04/10/10	1												0				
04/11/10	1												0				
04/12/10	1												0				
04/13/10	1												0				
04/14/10	1												0				
04/15/10	1												0	6	1		
04/16/10	1												0	0	-1		
04/17/10	1												0	1	0		
04/18/10	1												0	9	1		
04/19/10	1												0	8	7		
04/20/10	1												0	5	10		
04/21/10	1												0	5	10		
04/22/10	1												0	8	5		
04/23/10	1												0	8	6		
04/24/10	1												0	6	10		
04/25/10	1												0	2	7		
04/26/10	1												0	4	6		
04/27/10	1												0	8	-2		
04/28/10	1												0	12	2		
04/29/10	1												0	13	5		
04/30/10	1												0	6	11		
05/01/10	1												0	4	18		
05/02/10	1	1		1									2	5	21		
05/03/10	1												0	8	14		
05/04/10	1												0	10	9		
05/05/10	1									1			1	7	14		
05/06/10	1												0	11	7		
05/07/10	1												0	4	7		
05/08/10	1												0	11	2		
05/09/10	1												0	10	-1		
05/10/10	1												0	8	1		
05/11/10	1												0	2	7		
05/12/10	1												0	5	5		
05/13/10	1												0	3	8		
05/14/10	1												0	8	12		
05/15/10	1												0	7	9		
05/16/10	1												0	8	13		
05/17/10	1										1		1	3	13		
05/18/10	1												0	6	8		
05/19/10	1												0	7	10		
05/20/10	1										1		1	6	16		
05/21/10	1												0	3	12		
05/22/10	1												0	4	13		
05/23/10	1										1		1	7	16		
05/24/10	1												0	5	21		
05/25/10	1												0	8	23		
05/26/10	1												0	4	14		
05/27/10	1			1									1	3	12		
05/28/10	1												0	3	12		
05/29/10	1												0	7	15		
05/30/10	1	1											1	8	12		
05/31/10	1												0	6	16		
06/01/10	1												0	5	15		
06/02/10	1												0	5	18		
06/03/10	1												0	6	15		
06/04/10	1												0	3	17		
06/05/10	1				1								1	5	16		
06/06/10	1												0	10	9		
06/07/10	1												0	9	10		
06/08/10	1												0	7	10		
06/09/10	1												0	6	9		
06/10/10	1												0	2	9		
06/11/10	1												0	5	14		
06/12/10	1												0	2	12		
06/13/10	1												0	1	13		
06/14/10	1												0	8	12		
06/15/10	1												0	3	13		
06/16/10	1												0	5	14		
06/17/10	1	1											1	8	17		
06/18/10	1												0	6	20		
06/19/10	1												0	6	19		
06/20/10	1												0	5	18		
06/21/10	1												0	6	16		
06/22/10	1												0	4	16		
06/23/10	1												0	5	19		
06/24/10	1												0	9	15		
06/25/10	1												0	5	17		
06/26/10	1												0	5	15		
06/27/10	1									1			1	3	17		
06/28/10	1	1											1	8	20		
06/29/10	1												0	7	12		
06/30/10	1												0	7	11		
07/01/10	1												0	10	12		
07/02/10	1												0	5	16		
07/03/10	1												0	10	21		
07/04/10	1	1											1	8	22		
07/05/10	1												0	8	25		
07/06/10	1		1										1	4	25		
07/07/10	1										1		1	2	22		
07/08/10	1												0	7	21		
07/09/10	1												0	6	21		
07/10/10	1												0	3	19		
07/11/10	1												0	3	19		
07/12/10	1												0	5	20		
07/13/10	1												0	4	20		
07/14/10	1						1						1	1	19		
07/15/10	1	1							1				2	5	19		
07/16/10	1	1								1	1		3	7	20		
07/17/10	1				1					1			2	7	21		
07/18/10	1												0	5	19		
07/19/10	1												0	6	18		
07/20/10	1				1								1	3	19		
07/21/10	1						1						1	9	16		
07/22/10	1												0	7	18		
07/23/10	1												0	3	18		
07/24/10	1	1											1	6	21		
07/25/10	1				1								1	10	15		
07/26/10	1		1										1	9	17		
07/27/10	1												0	6	20		
07/28/10	1												0	7	20		
07/29/10	1										2		2	6	14		
07/30/10	1												0	5	11		
07/31/10	1												0	4	14		
08/01/10	1												0	3	15		
08/02/10	1												0	5	17		
08/03/10	1												0	8	20		
08/04/10	1	1											1	6	22		
08/05/10	1	1											1	8	19		
08/06/10	1						1						1	6	12		
08/07/10	1												0	5	14		
08/08/10	1												0	7	19		
08/09/10	1										1		1	7	18		
08/10/10	1								1				1	6	19		
08/11/10	1	1								1	1		3	4	17		
08/12/10	1				2						1		3	4	15		
08/13/10	1												0	5	15		
08/14/10	1												0	7	16		
08/15/10	1												0	6	16		
08/16/10	1						1			1	1		3	6	18		
08/17/10	1												0	7	18		
08/18/10	1	1											1	3	19		
08/19/10	1												0	7	18		
By Species		**12**	**2**	**2**	**6**	**0**	**4**	**0**	**2**	**6**	**11**	**0**	**45**				
By Guild		**16**			**6**	**0**	**6**			**17**							
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**				

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

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Appendix B Table 7. Summary of acoustic bat data and weather during each survey night at the Tinkham Met Ground Detector – Wild Meadows, 2010

		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 (%)
04/08/10	1												**0**				
04/09/10	1												**0**				
04/10/10	1												**0**				
04/11/10	1												**0**				
04/12/10	1												**0**				
04/13/10	1												**0**				
04/14/10	1									1			**1**				
04/15/10	1												**0**	6	1		
04/16/10	1												**0**	0	-1		
04/17/10	1												**0**	1	0		
04/18/10	1												**0**	9	1		
04/19/10	1												**0**	8	7		
04/20/10	1												**0**	5	10		
04/21/10	1												**0**	5	10		
04/22/10	1												**0**	8	5		
04/23/10	1												**0**	8	6		
04/24/10	1												**0**	6	10		
04/25/10	1												**0**	2	7		
04/26/10	1												**0**	4	6		
04/27/10	1												**0**	8	-2		
04/28/10	1												**0**	12	2		
04/29/10	1												**0**	13	5		
04/30/10	1												**0**	6	11		
05/01/10	1					1					2		**3**	4	18		
05/02/10	1												**0**	5	21		
05/03/10	1												**0**	8	14		
05/04/10	1												**0**	10	9		
05/05/10	1	1											**1**	7	14		
05/06/10	1	1											**1**	11	7		
05/07/10	1												**0**	4	7		
05/08/10	1												**0**	11	2		
05/09/10	1												**0**	10	-1		
05/10/10	1												**0**	8	1		
05/11/10	1												**0**	2	7		
05/12/10	1												**0**	5	5		
05/13/10	1	1											**1**	3	8		
05/14/10	1												**0**	8	12		
05/15/10	1												**0**	7	9		
05/16/10	1												**0**	8	13		
05/17/10	1												**0**	3	13		
05/18/10	1												**0**	6	8		
05/19/10	1												**0**	7	10		
05/20/10	1												**0**	6	16		
05/21/10	1										1		**1**	3	12		
05/22/10	1												**0**	4	13		
05/23/10	1										1		**1**	7	16		
05/24/10	1												**0**	5	21		
05/25/10	1												**0**	8	23		
05/26/10	1												**0**	4	14		
05/27/10	1												**0**	3	12		
05/28/10	1	1			1								**2**	3	12		
05/29/10	1			1	1								**2**	7	15		
05/30/10	1				1								**1**	8	12		
05/31/10	1												**0**	6	16		
06/01/10	1				1								**1**	5	15		
06/02/10	1				1						1		**2**	5	18		
06/03/10	1												**0**	6	15		
06/04/10	1	2				2				2	1		**7**	3	17		
06/05/10	1	2				1					1		**4**	5	16		
06/06/10	1												**0**	10	9		
06/07/10	1												**0**	9	10		
06/08/10	1												**0**	7	10		
06/09/10	1					1							**1**	6	9		
06/10/10	1												**0**	2	9		
06/11/10	1					1							**1**	5	14		
06/12/10	1					1					1		**2**	2	12		
06/13/10	1												**0**	1	13		
06/14/10	1												**0**	8	12		
06/15/10	1									3			**3**	3	13		
06/16/10	1												**0**	5	14		
06/17/10	1	1											**1**	8	17		
06/18/10	1												**0**	6	20		
06/19/10	1									1			**1**	6	19		
06/20/10	1	2	1		2								**5**	5	18		
06/21/10	1												**0**	6	16		
06/22/10	1												**0**	4	16		
06/23/10	1	1											**1**	5	19		
06/24/10	1												**0**	9	15		
06/25/10	1												**0**	5	17		
06/26/10	1												**0**	5	15		
06/27/10	1												**0**	3	17		
06/28/10	1	1	1										**2**	8	20		
06/29/10	1	1											**1**	7	12		
06/30/10	1												**0**	7	11		
07/01/10	1												**0**	10	12		
07/02/10	1	1											**1**	5	16		
07/03/10	1												**0**	10	21		
07/04/10	1					1				1			**2**	8	22		
07/05/10	1									1			**1**	8	25		
07/06/10	1	1			1	1					2		**5**	4	25		
07/07/10	1	1											**1**	2	22		
07/08/10	1												**0**	7	21		
07/09/10	1												**0**	6	21		
07/10/10	1	173				3					99		**275**	3	19		
07/11/10	1					1							**1**	3	19		
07/12/10	1	4											**4**	5	20		
07/13/10	1										1		**1**	4	20		
07/14/10	1	2											**2**	1	19		
07/15/10	1					2					1		**3**	5	19		
07/16/10	1	1									1		**2**	7	20		
07/17/10	1												**0**	7	21		
07/18/10	1				1	1							**2**	5	19		
07/19/10	1	1				1	1						**3**	6	18		
07/20/10	1									1			**1**	3	19		
07/21/10	1												**0**	9	16		
07/22/10	1					3				1			**4**	7	18		
07/23/10	1												**0**	3	18		
07/24/10	1						1				4		**5**	6	21		
07/25/10	1									3			**3**	10	15		
07/26/10	1												**0**	9	17		
07/27/10	1	1			1	1				1			**4**	6	20		
07/28/10	1												**0**	7	20		
07/29/10	1									1			**1**	6	14		
07/30/10	1												**0**	5	11		
07/31/10	1												**0**	4	14		
08/01/10	1									1			**1**	3	15		
08/02/10	1									1			**1**	5	17		
08/03/10	1	1								1			**2**	8	20		
08/04/10	1	2											**2**	6	22		
08/05/10	1									2	1		**3**	8	19		
08/06/10	1												**0**	6	12		
08/07/10	1												**0**	5	14		
08/08/10	1												**0**	7	19		
08/09/10	1												**0**	7	18		
08/10/10	1					1							**1**	6	19		
08/11/10	1												**0**	4	17		
08/12/10	1												**0**	4	15		
08/13/10	1	1											**1**	5	15		
08/14/10	1									1			**1**	7	16		
08/15/10	1												**0**	6	16		
08/16/10	1						1						**1**	6	18		
08/17/10	1				1						1		**2**	7	18		
08/18/10	1						2			2			**4**	3	19		
08/19/10	1												**0**	7	18		
By Species		**203**	**2**	**1**	**11**	**22**	**5**	**0**	**0**	**24**	**118**	**0**	**386**				
By Guild		**206**			**11**	**22**	**5**			**142**							
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**				

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

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Appendix B Table 8. Summary of acoustic bat data and weather during each survey night at the Tinkham Met High Detector – Wild Meadows, 2010

		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 (%)
05/12/10	1												0	5	5		
05/13/10	1												0	3	8		
05/14/10	1												0	8	12		
05/15/10	1												0	7	9		
05/16/10	1												0	8	13		
05/17/10	1												0	3	13		
05/18/10	1												0	6	8		
05/19/10	1												0	7	10		
05/20/10	1												0	6	16		
05/21/10	1												0	3	12		
05/22/10	1												0	4	13		
05/23/10	1				1								1	7	16		
05/24/10	1												0	5	21		
05/25/10	1				2						1		3	8	23		
05/26/10	1												0	4	14		
05/27/10	1												0	3	12		
05/28/10	1										1		1	3	12		
05/29/10	1												0	7	15		
05/30/10	1									1			1	8	12		
05/31/10	1												0	6	16		
06/01/10	1												0	5	15		
06/02/10	1												0	5	18		
06/03/10	0												0	6	15		
06/04/10	0												0	3	17		
06/05/10	0												0	5	16		
06/06/10	0												0	10	9		
06/07/10	0												0	9	10		
06/08/10	1												0	7	10		
06/09/10	1												0	6	9		
06/10/10	0												0	2	9		
06/11/10	0												0	5	14		
06/12/10	0												0	2	12		
06/13/10	0												0	1	13		
06/14/10	0												0	8	12		
06/15/10	0												0	3	13		
06/16/10	0												0	5	14		
06/17/10	0												0	8	17		
06/18/10	0												0	6	20		
06/19/10	0												0	6	19		
06/20/10	0												0	5	18		
06/21/10	0												0	6	16		
06/22/10	0												0	4	16		
06/23/10	0												0	5	19		
06/24/10	1												0	9	15		
06/25/10	1												0	5	17		
06/26/10	1												0	5	15		
06/27/10	1												0	3	17		
06/28/10	1												0	8	20		
06/29/10	1												0	7	12		
06/30/10	1												0	7	11		
07/01/10	1												0	10	12		
07/02/10	1												0	5	16		
07/03/10	1												0	10	21		
07/04/10	1												0	8	22		
07/05/10	1												0	8	25		
07/06/10	1												0	4	25		
07/07/10	1												0	2	22		
07/08/10	1												0	7	21		
07/09/10	1												0	6	21		
07/10/10	1												0	3	19		
07/11/10	1												0	3	19		
07/12/10	1									1			1	5	20		
07/13/10	1										1		1	4	20		
07/14/10	1												0	1	19		
07/15/10	1												0	5	19		
07/16/10	1												0	7	20		
07/17/10	1												0	7	21		
07/18/10	1												0	5	19		
07/19/10	1										1		1	6	18		
07/20/10	1				1								1	3	19		
07/21/10	1												0	9	16		
07/22/10	1												0	7	18		
07/23/10	1												0	3	18		
07/24/10	1										1		1	6	21		
07/25/10	1				1								1	10	15		
07/26/10	1												0	9	17		
07/27/10	1												0	6	20		
07/28/10	1												0	7	20		
07/29/10	1												0	6	14		
07/30/10	1												0	5	11		
07/31/10	1												0	4	14		
08/01/10	1									1			1	3	15		
08/02/10	1												0	5	17		
08/03/10	1								1				1	8	20		
08/04/10	1												0	6	22		
08/05/10	1												0	8	19		
08/06/10	1						1						1	6	12		
08/07/10	1												0	5	14		
08/08/10	1												0	7	19		
08/09/10	1												0	7	18		
08/10/10	1												0	6	19		
08/11/10	1			2							1		3	4	17		
08/12/10	1				2						1		3	4	15		
08/13/10	1												0	5	15		
08/14/10	1												0	7	16		
08/15/10	1				1								1	6	16		
08/16/10	1									1			1	6	18		
08/17/10	1										1		1	7	18		
08/18/10	1										1		1	3	19		
08/19/10	1												0	7	18		
By Species		**0**	**0**	**2**	**8**	**0**	**1**	**0**	**1**	**4**	**9**	**0**	**25**				
By Guild			**2**		**8**	**0**		**2**			**13**						
			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 9. Summary of acoustic bat data and weather during each survey night at the Tinkham Met Low Detector – Wild Meadows, 2010

		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 (%)
04/08/10	1												0				
04/09/10	1												0				
04/10/10	1												0				
04/11/10	1												0				
04/12/10	1												0				
04/13/10	1												0				
04/14/10	1												0				
04/15/10	1												0	6	1		
04/16/10	1												0	0	-1		
04/17/10	1												0	1	0		
04/18/10	1												0	9	1		
04/19/10	1												0	8	7		
04/20/10	1												0	5	10		
04/21/10	1												0	5	10		
04/22/10	1												0	8	5		
04/23/10	1												0	8	6		
04/24/10	1												0	6	10		
04/25/10	1												0	2	7		
04/26/10	1												0	4	6		
04/27/10	1												0	8	-2		
04/28/10	1												0	12	2		
04/29/10	1												0	13	5		
04/30/10	1							1		1			2	6	11		
05/01/10	1												0	4	18		
05/02/10	1	1											1	5	21		
05/03/10	1												0	8	14		
05/04/10	1										1		1	10	9		
05/05/10	1	1											1	7	14		
05/06/10	1	1											1	11	7		
05/07/10	1												0	4	7		
05/08/10	1												0	11	2		
05/09/10	1												0	10	-1		
05/10/10	1												0	8	1		
05/11/10	1												0	2	7		
05/12/10	1												0	5	5		
05/13/10	1												0	3	8		
05/14/10	1												0	8	12		
05/15/10	1												0	7	9		
05/16/10	1												0	8	13		
05/17/10	1									1			1	3	13		
05/18/10	1												0	6	8		
05/19/10	1												0	7	10		
05/20/10	1												0	6	16		
05/21/10	1										1		1	3	12		
05/22/10	1												0	4	13		
05/23/10	1												0	7	16		
05/24/10	1												0	5	21		
05/25/10	1				2						1		3	8	23		
05/26/10	1												0	4	14		
05/27/10	1												0	3	12		
05/28/10	1				1								1	3	12		
05/29/10	1				1								1	7	15		
05/30/10	1												0	8	12		
05/31/10	1		1										1	6	16		
06/01/10	1												0	5	15		
06/02/10	1												0	5	18		
06/03/10	1												0	6	15		
06/04/10	1										2		2	3	17		
06/05/10	1												0	5	16		
06/06/10	1												0	10	9		
06/07/10	1												0	9	10		
06/08/10	1												0	7	10		
06/09/10	1												0	6	9		
06/10/10	1												0	2	9		
06/11/10	1												0	5	14		
06/12/10	1												0	2	12		
06/13/10	1			3							2		5	1	13		
06/14/10	1												0	8	12		
06/15/10	1												0	3	13		
06/16/10	1												0	5	14		
06/17/10	1												0	8	17		
06/18/10	1												0	6	20		
06/19/10	1												0	6	19		
06/20/10	1		1								1		2	5	18		
06/21/10	1												0	6	16		
06/22/10	1												0	4	16		
06/23/10	1												0	5	19		
06/24/10	1												0	9	15		
06/25/10	1												0	5	17		
06/26/10	1												0	5	15		
06/27/10	1										1		1	3	17		
06/28/10	1										1		1	8	20		
06/29/10	1												0	7	12		
06/30/10	1												0	7	11		
07/01/10	1												0	10	12		
07/02/10	1												0	5	16		
07/03/10	1												0	10	21		
07/04/10	1												0	8	22		
07/05/10	1										2		2	8	25		
07/06/10	1										1		1	4	25		
07/07/10	1												0	2	22		
07/08/10	1												0	7	21		
07/09/10	1												0	6	21		
07/10/10	1												0	3	19		
07/11/10	1												0	3	19		
07/12/10	1										2		2	5	20		
07/13/10	1												0	4	20		
07/14/10	1												0	1	19		
07/15/10	1												0	5	19		
07/16/10	1												0	7	20		
07/17/10	1												0	7	21		
07/18/10	1	1											1	5	19		
07/19/10	1												0	6	18		
07/20/10	1												0	3	19		
07/21/10	1												0	9	16		
07/22/10	1												0	7	18		
07/23/10	1												0	3	18		
07/24/10	1	2							1				3	6	21		
07/25/10	1				1								1	10	15		
07/26/10	1												0	9	17		
07/27/10	1				1						1		2	6	20		
07/28/10	1												0	7	20		
07/29/10	1								1				1	6	14		
07/30/10	1												0	5	11		
07/31/10	1										1		1	4	14		
08/01/10	1									1			1	3	15		
08/02/10	1												0	5	17		
08/03/10	1										1		1	8	20		
08/04/10	1							1			1		2	6	22		
08/05/10	1						1				1		2	8	19		
08/06/10	1												0	6	12		
08/07/10	1												0	5	14		
08/08/10	1												0	7	19		
08/09/10	1												0	7	18		
08/10/10	1												0	6	19		
08/11/10	1				1								1	4	17		
08/12/10	1												0	4	15		
08/13/10	1		1										1	5	15		
08/14/10	1												0	7	16		
08/15/10	1										1		1	6	16		
08/16/10	1						1						1	6	18		
08/17/10	1				1								1	7	18		
08/18/10	1												0	3	19		
08/19/10	1												0	7	18		
By Species		**6**	**3**	**3**	**8**	**0**	**2**	**2**	**2**	**3**	**21**	**0**	**50**				
By Guild		**12**			**8**	**0**	**6**			**24**							
		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 10. Summary of available spring bat detector surveys conducted at meterological (Met) tow ers in forest habitat in the East (results reported for individual detectors)

Year	Project	Project Location	Habitat	Height (m)	Detector Nights	Start	End	Calls	Rate	Reference
2005	Liberty Gap	Franklin, Pendleton Cty, WV	forest edge	30	21	4/17	6/7	2	0.1	Woodlot Alternatives, Inc. 2005. A Spring 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.
2005	Liberty Gap	Franklin, Pendleton Cty, WV	forest edge	15	21	4/17	6/7	19	0.9	Woodlot Alternatives, Inc. 2005. A Spring 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.
2005	Horse Creek	Clayton, Jefferson Cty, NY	forest edge	20	42	4/20	5/31	55	1.3	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Clayton Wind Project in Clayton, New York. Prepared for PPM Atlantic Renew able.
2005	Horse Creek	Clayton, Jefferson Cty, NY	forest edge	15	36	4/20	5/31	12	0.3	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Clayton Wind Project in Clayton, New York. Prepared for PPM Atlantic Renew able.
2005	Moresville	Stamford, Delaw are Cty, NY	forest edge	30	27	4/12	5/8	8	0.3	Woodlot. 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.
2005	Deerfield	Deerfield, Bennington Cty, VT	forest edge	15	40	4/19	6/15	4	0.1	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy/Deerfield Wind, LLC.
2005	Sheffield	Sheffield, Caledonia Cty, VT	forest edge	20	31	5/1	5/31	6	0.2	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Pow er Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
2006	Deerfield	Deerfield, Bennington Cty, VT	forest edge	35	60	4/14	6/13	4	0.1	Woodlot Alternatives, Inc. 2006. Spring 2006 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
2006	Deerfield	Deerfield, Bennington Cty, VT	forest edge	15	47	4/14	5/31	0	0	Woodlot Alternatives, Inc. 2006. Spring 2006 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
2006	Deerfield	Deerfield, Bennington Cty, VT	forest edge	30	29	4/14	5/20	0	0	Woodlot Alternatives, Inc. 2006. Spring 2006 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
2006	Deerfield	Deerfield, Bennington Cty, VT	forest edge	15	21	4/14	5/16	7	0.3	Woodlot Alternatives, Inc. 2006. Spring 2006 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
2006	Sheffield	Sheffield, Caledonia Cty, VT	forest edge	31	36	4/24	6/13	5	0.14	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Pow er Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
2006	Kibby	Kibby, Franklin Cty, ME	forest edge	50	14	5/4	6/19	0	0	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Pow er Project in Kibby and Skinner Tow nships, Maine. Prepared for TransCanada Maine Wind Development, Inc.
2006	Kibby	Kibby, Franklin Cty, ME	forest edge	50	24	5/4	6/19	0	0	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Pow er Project in Kibby and Skinner Tow nships, Maine. Prepared for TransCanada Maine Wind Development, Inc.
2006	Kibby	Kibby, Franklin Cty, ME	forest edge	20	35	5/4	6/19	31	0.7	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Pow er Project in Kibby and Skinner Tow nships, Maine. Prepared for TransCanada Maine Wind Development, Inc.
2006	Kibby	Kibby, Franklin Cty, ME	forest edge	50	35	5/4	6/19	0	0	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Pow er Project in Kibby and Skinner Tow nships, Maine. Prepared for TransCanada Maine Wind Development, Inc.
2006	Lempster	Lempster, Sullivan Cty, NH	forest edge	40	60	4/5	6/12	7	0.1	Woodlot Alternatives, Inc. 2006. Summary of spring 2006 Lempster bat survey. Memorandum to Jeff Keeler (CEI) from Bob Roy (Woodlot Alternatives, Inc.) dated July 26, 2006.
2006	Lempster	Lempster, Sullivan Cty, NH	forest edge	20	50	4/5	6/12	3	0.1	Woodlot Alternatives, Inc. 2006. Summary of spring 2006 Lempster bat survey. Memorandum to Jeff Keeler (CEI) from Bob Roy (Woodlot Alternatives, Inc.) dated July 26, 2006.
2007	Stetson	Stetson, Penobscot Cty, ME	forest edge	30	47	4/24	6/18	52	1.1	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
2007	Stetson	Stetson, Penobscot Cty, ME	forest edge	30	56	4/24	6/18	235	4.2	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
2007	Stetson	Stetson, Penobscot Cty, ME	forest edge	30	56	4/24	6/18	36	0.6	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
2007	Coos	Coos Cty, NH	forest edge	50	37	4/26	6/1	8	0.2	Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Pow er, LLC. Prepared for Granite Reliable Pow er, LLC.
2007	Coos	Coos Cty, NH	forest edge	20	19	4/30	6/1	5	0.3	Stantec Consulting Inc. 2007. Spring 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Pow er, LLC. Prepared for Granite Reliable Pow er, LLC.
2007	Coos	Coos Cty, NH	forest edge	30	35	4/28	6/1	8	0.2	Stantec Consulting Inc. 2007. Spring 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Pow er, LLC. Prepared for Granite Reliable Pow er, LLC.
2007	Coos	Coos Cty, NH	forest edge	15	35	4/28	6/1	12	0.3	Stantec Consulting Inc. 2007. Spring 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Pow er, LLC. Prepared for Granite Reliable Pow er, LLC.
2008	Rollins	Rollins, Penobscot Cty, ME	forest edge	20	23	4/23	6/14	40	1.7	Stantec Consulting Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind Management, LLC.
2008	Rollins	Rollins, Penobscot Cty, ME	forest edge	40	23	5/22	6/14	3	0.1	Stantec Consulting Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind Management, LLC.
2008	Rollins	Rollins, Penobscot Cty, ME	forest edge	20	23	5/22	6/14	3	0.1	Stantec Consulting Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind Management, LLC.
2008	Rollins	Rollins, Penobscot Cty, ME	forest edge	40	53	4/22	6/14	166	3.1	Stantec Consulting Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind Management, LLC.
2008	Rollins	Rollins, Penobscot Cty, ME	forest edge	20	53	4/22	6/14	106	2.0	Stantec Consulting Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind Management, LLC.
2008	New Creek	New Creek, Grant Cty, WV	forest edge	40	34	4/11	5/14	13	1.9	Stantec Consulting Services Inc. 2008. Spring, Summer, and Fall 2008 Bird and Bat Migration Survey Report: Visual, Radar, and Acoustic Bat Surveys for the New Creek Mountain Project. Prepared for AES New Creek, LLC
2008	New Creek	New Creek, Grant Cty, WV	forest edge	20	28	4/11	5/14	25	4.5	Stantec Consulting Services Inc. 2008. Spring, Summer, and Fall 2008 Bird and Bat Migration Survey Report: Visual, Radar, and Acoustic Bat Surveys for the New Creek Mountain Project. Prepared for AES New Creek, LLC
2008	Allegany	Allegany, Cattaraugus Cty, NY	forest edge	40	59	4/2	5/31	8	1.5	Stantec Consulting Services Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar, and Acoustic Bat Surveys for the Allegany Wind Project. Prepared for EverPow er Renew ables
2008	Allegany	Allegany, Cattaraugus Cty, NY	forest edge	20	59	4/2	5/31	13	1.8	Stantec Consulting Services Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar, and Acoustic Bat Surveys for the Allegany Wind Project. Prepared for EverPow er Renew ables

continued

Appendix B Table 10 *cont*.

2008	Allegany	Allegany, Cattaraugus Cty, NY	forest edge	12	50	4/2	5/31	28	5.1	Stantec Consulting Services Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar, and Acoustic Bat Surveys for the Allegany Wind Project. Prepared for EverPower Renewables
2008	Oakfield	Oakfield, Penobscot Cty, ME	forest edge	22	36	4/25	5/31	2	0.1	Stantec Consulting Services Inc. 2009. Spring and Summer 2008 Bird and Bat Migration Survey Report: Visual, Radar, and Acoustic Bat Surveys for the Oakfield Wind Project in Oakfield, Maine. Prepared for First Wind Management, LLC.
2008	Oakfield	Oakfield, Penobscot Cty, ME	forest edge	11	36	4/25	5/31	2	0.4	Stantec Consulting Services Inc. 2009. Spring and Summer 2008 Bird and Bat Migration Survey Report: Visual, Radar, and Acoustic Bat Surveys for the Oakfield Wind Project in Oakfield, Maine. Prepared for First Wind Management, LLC.
2008	Record Hill	Record Hill, Oxford Cty, ME	forest edge	45	45	5/1	6/16	8	0.6	Stantec Consulting Services Inc. 2008. Spring 2009 Bird and Bat Migration Survey Report: Breeding Bird, Raptor, and Acoustic Bat Surveys for the Record Hill Wind Project, Roxbury, Maine. Prepared for Record Hill Wind, LLC.
2008	Record Hill	Record Hill, Oxford Cty, ME	forest edge	20	47	5/1	6/16	5	1.0	Stantec Consulting Services Inc. 2008. Spring 2009 Bird and Bat Migration Survey Report: Breeding Bird, Raptor, and Acoustic Bat Surveys for the Record Hill Wind Project, Roxbury, Maine. Prepared for Record Hill Wind, LLC.
2008	Record Hill	Record Hill, Oxford Cty, ME	forest edge	45	45	5/1	6/16	2	0.1	Stantec Consulting Services Inc. 2008. Spring 2009 Bird and Bat Migration Survey Report: Breeding Bird, Raptor, and Acoustic Bat Surveys for the Record Hill Wind Project, Roxbury, Maine. Prepared for Record Hill Wind, LLC.
2008	Record Hill	Record Hill, Oxford Cty, ME	forest edge	20	37	5/1	6/16	4	0.7	Stantec Consulting Services Inc. 2008. Spring 2009 Bird and Bat Migration Survey Report: Breeding Bird, Raptor, and Acoustic Bat Surveys for the Record Hill Wind Project, Roxbury, Maine. Prepared for Record Hill Wind, LLC.
2009	Highland	Highland, Somerset Cty, ME	forest edge	40	73	4/23	8/13	3	0.3	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys. Prepared for Highland Wind LLC.
2009	Highland	Highland, Somerset Cty, ME	forest edge	20	112	4/23	8/13	6	0.5	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys. Prepared for Highland Wind LLC.
2009	Highland	Highland, Somerset Cty, ME	forest edge	40	117	4/23	8/17	3	0.3	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys. Prepared for Highland Wind LLC.
2009	Highland	Highland, Somerset Cty, ME	forest edge	20	74	4/23	8/17	3	0.3	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys. Prepared for Highland Wind LLC.
2009	Highland	Highland, Somerset Cty, ME	forest edge	40	110	4/24	8/17	3	0.2	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys. Prepared for Highland Wind LLC.
2009	Highland	Highland, Somerset Cty, ME	forest edge	20	67	4/24	8/17	4	0.3	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys. Prepared for Highland Wind LLC.
2010	Groton	Groton Wind, Grafton Cty, NH	forest edge	10	132	4/9	8/18	689	5.2	Stantec Consulting Services Inc. 2010. Spring and Summer 2010 Acoustic Bat Survey Report for the Groton Wind Project Grafton County, New Hampshire. Prepared for Groton Wind, LLC.
2010	Groton	Groton Wind, Grafton Cty, NH	forest edge	10	119	4/10	8/19	332	2.8	Stantec Consulting Services Inc. 2010. Spring and Summer 2010 Acoustic Bat Survey Report for the Groton Wind Project Grafton County, New Hampshire. Prepared for Groton Wind, LLC.
2010	Groton	Groton Wind, Grafton Cty, NH	forest edge	2	120	4/11	8/20	1777	14.8	Stantec Consulting Services Inc. 2010. Spring and Summer 2010 Acoustic Bat Survey Report for the Groton Wind Project Grafton County, New Hampshire. Prepared for Groton Wind, LLC.
2010	Groton	Groton Wind, Grafton Cty, NH	forest edge	45	132	4/12	8/21	220	1.7	Stantec Consulting Services Inc. 2010. Spring and Summer 2010 Acoustic Bat Survey Report for the Groton Wind Project Grafton County, New Hampshire. Prepared for Groton Wind, LLC.
2010	Groton	Groton Wind, Grafton Cty, NH	forest edge	22	132	4/13	8/22	212	1.6	Stantec Consulting Services Inc. 2010. Spring and Summer 2010 Acoustic Bat Survey Report for the Groton Wind Project Grafton County, New Hampshire. Prepared for Groton Wind, LLC.
2010	Groton	Groton Wind, Grafton Cty, NH	forest edge	2	132	4/14	8/23	1167	8.8	Stantec Consulting Services Inc. 2010. Spring and Summer 2010 Acoustic Bat Survey Report for the Groton Wind Project Grafton County, New Hampshire. Prepared for Groton Wind, LLC.
2010	Groton	Groton Wind, Grafton Cty, NH	forest edge	45	87	4/15	8/24	61	0.7	Stantec Consulting Services Inc. 2010. Spring and Summer 2010 Acoustic Bat Survey Report for the Groton Wind Project Grafton County, New Hampshire. Prepared for Groton Wind, LLC.
2010	Groton	Groton Wind, Grafton Cty, NH	forest edge	22	132	4/16	8/25	1898	14.4	Stantec Consulting Services Inc. 2010. Spring and Summer 2010 Acoustic Bat Survey Report for the Groton Wind Project Grafton County, New Hampshire. Prepared for Groton Wind, LLC.
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	45	112	4/8	8/19	37	0.3	*this report*
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	15	134	4/8	8/19	86	0.6	*this report*
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	2	134	4/8	8/19	615	4.6	*this report*
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	45	100	5/12	8/19	43	0.4	*this report*
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	15	134	4/8	8/19	45	0.3	*this report*
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	2	134	4/8	8/19	693	5.2	*this report*
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	45	81	5/12	8/19	25	0.3	*this report*
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	15	134	4/8	8/19	50	0.4	*this report*
2010	Wild Meadows	Wild Meadows, Grafton and Merrimack Cty, NH	forest edge	2	134	4/8	8/19	386	2.9	*this report*
2011	Antrim	Antrim, Hillsborough Cty,NH	forest edge	15	55	4/7	5/31	95	1.7	Stantec Consulting Services. 2011. Spring 2011 Radar and Acoustic Bat Survey Report for the Antrim Wind Energy Project in Antrim, New Hampshire. Prepared for Eolian Renewable Energy.
2011	Antrim	Antrim, Hillsborough Cty,NH	forest edge	30	38	4/7	5/31	5	0.1	Stantec Consulting Services. 2011. Spring 2011 Radar and Acoustic Bat Survey Report for the Antrim Wind Energy Project in Antrim, New Hampshire. Prepared for Eolian Renewable Energy.

Appendix C

Breeding bird survey results

Appendix C Table 1. Total number of species and individuals detected and distances from observer at 21 point count locations and 6 control points during two survey periods - Summer 2010

		BBS Point Counts					Control Points			
Common name	**Scientific name**	**0-50m**	**50-100m**	**>100m**	**flyover**	**TOTAL**	**0-50m**	**50-100m**	**>100m**	**TOTAL**
American crow	*Corvus brachyrhynchos*	1	1			2				
American kestrel	*Falco sparverius*				1	1				
black-and-white warbler	*Mniotilta varia*	9	4			13	1		1	2
blackburnian warbler	*Dendroica fusca*	1				1	1			1
black-capped chickadee	*Poecile atricapilla*	2	1			3	1		2	3
blackpoll warbler	*Dendroica striata*						2	1		3
black-throated blue warbler	*Dendroica caerulescens*	4	18	5		27		1		1
black-throated green warbler	*Dendroica virens*		1			1				
blue jay	*Cyanocitta cristata*	1	4	1		6				
blue-headed vireo	*Vireo solitarius*		1			1	1		1	2
Canada warbler	*Wilsonia canadensis*	2	3			5				
Cape May warbler	*Dendroica tigrina*						2			2
cedar waxwing	*Bombycilla cedrorum*	7	1		8	16	3			3
chestnut-sided warbler	*Dendroica pensylvanica*	16	12	1		29	3	2		5
common yellowthroat	*Geothlypis trichas*	1	6		1	8		1		1
common raven	*Corvus corax*		1			1				
dark-eyed junco	*Junco hyemalis*	15	24			39	8	9	1	18
golden-crowned kinglet	*Regulus satrapa*	3				3	3			3
hairy woodpecker	*Picoides villosus*				1	1				
hermit thrush	*Catharus guttatus*	4	7	7		18	5	6	12	23
Magnolia warbler	*Dendroica magnolia*	1		1		2		2		2
mourning dove	*Zenaida macroura*			1		1	1		2	3
mourning warbler	*Oporornis philadelphia*	5	5	1		11				
Nashville warbler	*Vermivora ruficapilla*	7	8			15	2	3		5
ovenbird	*Seiurus aurocapillus*	5	23	8	1	37			2	2
pileated woodpecker	*Dryocopus pileatus*			1		1				
red-breasted nuthatch	*Sitta canadensis*		4	1		5		2	1	3
red-eyed vireo	*Vireo olivaceus*	2	6	1		9		2		2
rose-breasted grosbeak	*Pheucticus ludovicianus*	1	2			3				
Swainson's thrush	*Catharus ustulatus*								3	3
unidentified passerine	n/a			3	2	5				
veery	*Catharus fuscescens*	1	1			2		2	1	3
warbling vireo	*Vireo gilvus*	1				1		1		1
white-throated sparrow	*Zonotrichia albicollis*	3	19	6		28	3	7	2	12
Wilson's warbler	*Wilsonia pusilla*	1	2	1		4	1	3		4
winter wren	*Troglodytes troglodytes*		1	2		3			3	3
yellow warbler	*Dendroica petechia*	1				1				
yellow-bellied sapsucker	*Sphyrapicus varius*		1			1		1	1	2
yellow-rumped warbler	*Dendroica coronata*	4	7			11	1	2		3
	TOTAL	**98**	**163**	**40**	**14**	**315**	**38**	**45**	**32**	**115**

Appendix C Table 2. Species observed incidentally between point count locations during breeding bird surveys

Common name	Species Name
American robin	*Turdus migratorius*
barred owl	*Strix varia*
black-and-white warbler	*Mniotilta varia*
blackpoll warbler	*Dendroica striata*
black-throated blue warbler	*Black-throated blue warbler*
blue-headed vireo	*Vireo solitarius*
Cape May warbler	*Dendroica tigrina*
chestnut-sided warbler	*Dendroica pensylvanica*
common yellowthroat	*Geothlypis trichas*
dark-eyed junco	*Junco hyemalis*
hermit thrush	*Catharus guttatus*
least flycatcher	*Empidonax minimus*
Magnolia warbler	*Dendroica magnolia*
mourning warbler	*Oporornis philadelphia*
ovenbird	*Seiurus aurocapillus*
pileated woodpecker	*Dryocopus pileatus*
pine siskin	*Carduelis pinus*
red-eyed vireo	*Vireo olivaceus*
rose-breasted grosbeak	*Pheucticus ludovicianus*
warbling vireo	*Vireo gilvus*
white-throated sparrow	*Zonotrichia albicollis*
Wilson's warbler	*Wilsonia pusilla*
winter wren	*Troglodytes troglodytes*
yellow warbler	*Dendroica petechia*
yellow-rumped warbler	*Dendroica coronata*

Appendix C Table 3. Total number of observations, relative abundance, and frequency of species at point count locations during two survey periods - Summer 2010

Common name	conifer forest (4 points)			hardwood forest (11 points)			mixed forest (4 points)		
	Total[a]	Relative abundance[b]	Frequency[c]	Total[a]	Relative abundance[b]	Frequency[c]	Total[a]	Relative abundance[b]	Frequency[c]
American crow		0.00	0%	2	0.09	18%		0.00	0%
American kestrel		0.00	0%		0.00	0%		0.00	0%
black-and-white warbler	2	0.25	50%	5	0.23	45%	6	0.75	75%
blackburnian warbler		0.00	0%		0.00	0%	1	0.13	25%
black-capped chickadee		0.00	0%	1	0.05	9%	2	0.25	50%
blackpoll warbler		0.00	0%		0.00	0%		0.00	0%
black-throated blue warbler		0.00	0%	16	0.73	73%	3	0.38	50%
black-throated green warbler	1	0.13	25%		0.00	0%		0.00	0%
blue jay		0.00	0%	4	0.18	27%	1	0.13	25%
blue-headed vireo		0.00	0%	1	0.05	9%		0.00	0%
Canada warbler	1	0.13	25%	1	0.05	9%		0.00	0%
Cape May warbler		0.00	0%		0.00	0%		0.00	0%
cedar waxwing	2	0.25	50%		0.00	0%		0.00	0%
chestnut-sided warbler	5	0.63	75%	13	0.59	82%	8	1.00	75%
common yellowthroat		0.00	0%	4	0.18	18%	3	0.38	50%
common raven		0.00	0%	1	0.05	9%		0.00	0%
dark-eyed junco	9	1.13	100%	12	0.55	55%	12	1.50	100%
golden-crowned kinglet	2	0.25	50%		0.00	0%	1	0.13	25%
hairy woodpecker		0.00	0%		0.00	0%		0.00	0%
hermit thrush	3	0.38	25%	6	0.27	36%		0.00	0%
Magnolia warbler		0.00	0%	1	0.05	9%		0.00	0%
mourning dove		0.00	0%		0.00	0%		0.00	0%
mourning warbler		0.00	0%	5	0.23	36%	3	0.38	50%
Nashville warbler	3	0.38	50%	2	0.09	9%	5	0.63	75%
ovenbird	2	0.25	50%	22	1.00	91%	2	0.25	50%
pileated woodpecker		0.00	0%		0.00	0%		0.00	0%
red-breasted nuthatch		0.00	0%	2	0.09	18%	2	0.25	50%
red-eyed vireo	1	0.13	25%	6	0.27	36%	1	0.13	25%
rose-breasted grosbeak	1	0.13	25%	1	0.05	9%	1	0.13	25%
Swainson's thrush		0.00	0%		0.00	0%		0.00	0%
unidentified passerine		0.00	0%		0.00	0%		0.00	0%
veery	1	0.13	25%		0.00	0%	1	0.13	25%
warbling vireo	1	0.13	25%		0.00	0%		0.00	0%
white-throated sparrow	2	0.25	50%	10	0.45	45%	7	0.88	50%
Wilson's warbler	3	0.38	50%		0.00	0%		0.00	0%
winter wren		0.00	0%	1	0.05	9%		0.00	0%
yellow warbler		0.00	0%		0.00	0%		0.00	0%
yellow-bellied sapsucker		0.00	0%	1	0.05	9%		0.00	0%
yellow-rumped warbler	8	1.00	100%	1	0.05	9%	2	0.25	50%
Total	**47**			**118**			**61**		
Relative abundance	**5.88**			**5.36**			**7.63**		
Species richness	**17**			**23**			**18**		
SDI	**2.54**			**2.64**			**2.56**		

a Total number of individuals detected (mainly singing males, also any bird observed visually) < 100 m from observers, excluding flyovers.
b Mean number of birds observed.
c Percentage of survey points at which the species was observed.

Appendix C Table 4. Total number of observations, relative abundance, and frequency of species at point count locations during two survey periods - Summer 2010

Common name	natural clearing (1 point)			man-made clearing (1 point)		
	Total[a]	Relative abundance[b]	Frequency[c]	Total[a]	Relative abundance[b]	Frequency[c]
American crow		0.00			0.00	
American kestrel		0.00			0.00	
black-and-white warbler		0.00			0.00	
blackburnian warbler		0.00			0.00	
black-capped chickadee		0.00			0.00	
blackpoll warbler		0.00			0.00	
black-throated blue warbler	1	0.50	100%	2	1.00	100%
black-throated green warbler		0.00			0.00	
blue jay		0.00			0.00	
blue-headed vireo		0.00			0.00	
Canada warbler	3	1.50	100%		0.00	
Cape May warbler		0.00			0.00	
cedar waxwing		0.00		6	3.00	100%
chestnut-sided warbler		0.00		2	1.00	100%
common yellowthroat		0.00			0.00	
dark-eyed junco	3	1.50	100%	3	1.50	100%
golden-crowned kinglet		0.00			0.00	
hairy woodpecker		0.00			0.00	
hermit thrush	2	1.00	100%		0.00	
Magnolia warbler		0.00			0.00	
mourning dove		0.00			0.00	
mourning warbler		0.00		2	1.00	100%
Nashville warbler	2	1.00	100%	3	1.50	100%
ovenbird	2	1.00	100%		0.00	
pileated woodpecker		0.00			0.00	
red-breasted nuthatch		0.00			0.00	
red-eyed vireo		0.00			0.00	
rose-breasted grosbeak		0.00			0.00	
Swainson's thrush		0.00			0.00	
unidentified passerine		0.00			0.00	
veery		0.00			0.00	
warbling vireo		0.00			0.00	
white-throated sparrow		0.00		3	1.50	100%
Wilson's warbler		0.00			0.00	
winter wren		0.00			0.00	
yellow warbler	1	0.50	100%		0.00	
yellow-bellied sapsucker		0.00			0.00	
yellow-rumped warbler		0.00			0.00	
Total	**14**			**21**		
Relative abundance	**7.00**			**10.50**		
Species richness	**7**			**7**		
SDI	**1.87**			**1.86**		

a Total number of individuals detected (mainly singing males, also males and females that were visually
b Mean number of birds observed.
c Percentage of survey points at which the species was observed.

Appendix C Table 5. Total number of observations, relative abundance, and frequency of species at control points during two survey periods - Summer 2010

Common name	control conifer (3 points)			control mixed (1 point)			control natural clearing (2points)		
	Total[a]	Relative abundance[b]	Frequency[c]	Total[a]	Relative abundance[b]	Frequency[c]	Total[a]	Relative abundance[b]	Frequency[c]
American crow		0.00			0			0.00	
American kestrel		0.00			0			0.00	
black-and-white warbler	1	0.17	100%		0			0.00	
blackburnian warbler	1	0.17	100%		0			0.00	
black-capped chickadee		0.00			0		1	0.25	100%
blackpoll warbler		0.00			0		3	0.75	100%
black-throated blue warbler	1	0.17	100%		0			0.00	
black-throated green warbler		0.00			0			0.00	
blue jay		0.00			0			0.00	
blue-headed vireo	1	0.17	100%		0			0.00	
Canada warbler		0.00			0			0.00	
Cape May warbler		0.00			0		2	0.50	100%
cedar waxwing	3	0.50	100%		0			0.00	
chestnut-sided warbler	4	0.67	100%	1	0.5	100%		0.00	
common yellowthroat		0.00			0		1	0.25	100%
dark-eyed junco	10	1.67	100%		0		7	1.75	100%
golden-crowned kinglet	1	0.17	100%	2	1	100%		0.00	
hairy woodpecker		0.00			0			0.00	
hermit thrush	5	0.83	100%	1	0.5	100%	5	1.25	100%
Magnolia warbler	1	0.17	100%	1	0.5	100%		0.00	
mourning dove	1	0.17	100%		0			0.00	
mourning warbler		0.00			0			0.00	
Nashville warbler	3	0.50	100%		0		2	0.50	100%
ovenbird		0.00			0			0.00	
pileated woodpecker		0.00			0			0.00	
red-breasted nuthatch	1	0.17	100%	1	0.5	100%		0.00	
red-eyed vireo	2	0.33	100%		0			0.00	
rose-breasted grosbeak		0.00			0			0.00	
Swainson's thrush		0.00			0			0.00	
unidentified passerine		0.00			0			0.00	
veery		0.00			0		2	0.50	100%
warbling vireo		0.00			0		1	0.25	100%
white-throated sparrow	4	0.67	100%		0		6	1.50	100%
Wilson's warbler	2	0.33	100%	1	0.5	100%	1	0.25	100%
winter wren		0.00			0			0.00	
yellow warbler		0.00			0			0.00	
yellow-bellied sapsucker	1	0.17	100%		0			0.00	
yellow-rumped warbler	1	0.17	100%	1	0.5	100%	1	0.25	100%
Total	**43**			**8**			**32**		
Relative abundance	**7.17**			**4.00**			**8.00**		
Species richness	**18**			**7**			**12**		
SDI	**2.56**			**1.9**			**2.22**		

a Total number of individuals detected (mainly singing males, also males and females that were visually observed).
b Mean number of birds observed.
c Percentage of survey points at which the species was observed.