2009
Spring, Summer, and Fall Avian and Bat Surveys

for the Groton Wind Project
in Groton, New Hampshire

Prepared for

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Executive Summary

During spring, summer, and fall 2009, Stantec Consulting (Stantec) conducted field surveys of bird and bat migration and breeding bird activity at the Groton Wind Project area in Groton, New Hampshire (Project). The surveys are part of the planning process by Groton Wind, LLC (Groton Wind) for a proposed wind Project, which will include the erection of up to 25 wind turbines and associated infrastructure (e.g., access roads, transmission lines, electrical substation, turbine lay-down/staging area, and operations and maintenance building). The turbines will likely be 2.0 Megawatt (MW) machines mounted on tubular steel towers with an approximate hub height of 78 meters (m; 256 feet [']) and a rotor diameter of 87 m (285'). The proposed turbines would have a maximum height of approximately 121 m (399').

This report details results of a late spring/early summer 2009 breeding bird survey, spring and fall 2009 diurnal raptor surveys and a fall 2009 acoustic bat survey, all of which provide information on seasonal migration activity and patterns as well as local breeding bird activity in the Project area during a period from late March through October 2009.

Breeding Bird Survey

The late spring/early summer 2009 breeding bird survey focused on documenting the occurrence of species of conservation concern, but considered all avian species visually or acoustically detected in the Project area. The survey provides baseline data for the species present in the Project area, their abundance, as well as the community structures among the different habitats present. Stantec biologists conducted breeding bird point-count surveys during two separate visits to the Project area. One round of breeding bird surveys was conducted in early to mid-June (June 10, 11 and 16), and one in mid to late June (June 17, 18 and 27). There were a total of 21 breeding bird point-count locations surveyed within the Project area and an additional 10 locations surveyed within the control areas.

A total of 34 species were observed within the Project area during point-count surveys, and two additional species, American robin (*Turdus migratorius*) and ruffed grouse (*Bonasa umbellus*), were observed incidentally between survey points, for a total of 36 species detected in the vicinity of the Project area. Within both the Project area and control areas, the most commonly observed birds included ovenbird (*Seiurus aurocapillus)*, black-throated blue warbler (*Dendroica caerulescens)*, hermit thrush (*Catharus guttatus)* and dark-eyed junco (*Junco hyemalis)*. There were no state-listed endangered, threatened or special concern species, or species of federal concern observed during the point-count surveys. A total of 33 species were observed within the control areas during the point-count surveys. Five additional species, [wood thrush (*Hylocichla mustelina*), eastern wood-pewee (*Contopus virens*), eastern phoebe (*Sayornis phoebe*), American robin and veery (*Catharus fuscescens*)] were observed incidentally between survey points, for a total of 38 species detected in the vicinity of the control areas. Using the results of the point-count surveys only, there were 27 species in common between the Project area and control areas.

Diurnal Raptor Surveys

The 2009 raptor migration studies were conducted to investigate use of the proposed Project area by migrating raptors and their flight behaviors. Spring and fall 2009 diurnal raptor surveys were based on Hawk Migration Association of North America (HMANA) methods (HMANA 2007). Spring surveys occurred from late March through late May with the initial survey dates intended to target early migrants such as golden eagles (*Aquila chrysaetos*). Fall surveys occurred from late August to late October, including the initial time period when outbound cool weather migrants such as golden and bald eagles begin to migrate. For several of the survey days, simultaneous surveys were coordinated by two observers located at different locations to maximize the amount of the Project area visible by observers.

Spring raptor migration surveys were conducted on 11 days from March 26 to May 23, 2009. Including those birds seen within and outside of the Project area, a total of 175 raptors representing 11 species were observed. Turkey vulture (*Cathartes aura*, n=99) and red-tailed hawk (*Buteo jamaicensis*, n=33) were the most frequently observed species. Spring passage rates ranged from 0 to 10 birds/h, with a seasonal average of 1.40 birds/hr. Seventy six birds observed (43%) were within the Project boundary. Of theses, a total of 43 birds, 25 percent of all observations, occurred in the Project area below the maximum rotor-swept zone of the proposed turbines.

The fall raptor survey occurred on 10 days between August 24 and October 26. A total of 696 raptor observations representing 14 species were observed during the fall 2009 surveys. Fall passage rates ranged from 0.56 to 15.81 birds/hr, with an average of 4.35 birds/hr. During the fall raptor survey, broad-winged hawks (*Buteo platypterus*), red-tailed hawks, turkey vultures, and sharp-shinned hawks (*Accipiter striatus*) were the most commonly observed species. A total of 232 birds, 33 percent of all observations, occurred in the Project area below the maximum rotor-swept zone of the proposed turbines.

Four bald eagles (*Haliaeetus leucocephalus*) were observed during spring 2009 raptor surveys at the Project, two of which were within the Project area. The bald eagle is designated as a threatened species in New Hampshire. In addition, six osprey, a New Hampshire Species of Special Concern, were observed during spring raptor surveys. All but one of these birds was within the project boundary. There were five observations of three individual bald eagles over Tenney Mountain during the fall survey. One northern harrier (*Circus cyaneus*) was observed outside the Project area. Two state species of special concern, osprey (*Pandion haliaetus*) and American kestrel (*Falco sparverius*), were also seen in the Project area during the fall raptor survey.

Acoustic Bat Survey

The objectives of acoustic surveys were to document bat activity patterns and general species composition from August through October across the Project area, and to document bat activity patterns in relation to weather factors such as wind speed and temperature. Eight Anabat SD1 detectors (Titley Electronics Pty Ltd.) were deployed

from August 11 to October 22 from 7:00 pm to 7:00 am for a total of 466 detector nights during the fall 2009 survey. Acoustic survey sites at Groton Wind Project were chosen based discussions with bat expert, Ed Arnett of Bat Conservation International (BCI) as well as Stantec's experience conducting these types of surveys. In order to document how bats might move across the Project area, acoustic bat detectors were deployed along each of the three ridgelines in the Project area proposed for wind turbines. Two detectors were deployed 15 meters high in portable towers on the southern end of the Fletcher Mountain ridgeline and the small subsidiary ridge to the north. Three detectors were deployed at the met tower in the middle of Tenney Ridge and three detectors were deployed at the met tower at the north end of Tenney Ridge. The intent of the acoustic surveys was to (1) document bat activity patterns and general species composition from April through October; and (2) document bat activity patterns in relation to weather factors including wind speed, temperature, and relative humidity. Recorded call files were analyzed to species guild and tallied by night.

Between August 11 and October 22, a total of 2,104 call files were recorded by the eight detectors, resulting in an overall detection rate of 4.5 calls per detector-night. Call sequences belonging to all five guilds were identified during the acoustic survey. Migratory species of the big brown-silver haired guild composed the greatest percentage of all calls recorded during the fall 2009 survey period (45.5%). The Tenney Middle met tower detector (22 m) recorded the most calls (38%, n=802) during the fall season. Approximately 84 percent of all calls were recorded during the month of August, when detection rates peaked for all detectors. Species composition varied across acoustic detector height. There was no strong correlation between wind speed and detection rates, although there was a weak correlation between bat activity and mean nightly temperature.

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[1] *This report was prepared by Stantec Consulting Services Inc. for Groton Wind, LLC. 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

This report provides a summary of the findings documented during 2009 late spring/early summer breeding bird surveys, 2009 spring and fall diurnal raptor surveys, and 2009 spring and fall bat acoustic surveys conducted at Groton Wind, LLC's Groton Wind Project (Project), in Groton New Hampshire (Figure 1-1). The Project will consist of up to 25 wind turbines and associated infrastructure (e.g., access roads, interconnection lines, electrical substation, turbine lay-down/staging area, and an operations and maintenance building). The turbines will likely be 2.0 Megawatt (MW) machines mounted on tubular steel towers with an approximate hub height of 78 meters (m; 256 feet [']) and a rotor diameter of 87 m (285'). At present, the proposed turbines would have a maximum height of 121 m (399').

In advance of permitting activities for the Project, Groton Wind contracted with Stantec Consulting (Stantec) to conduct spring baseline breeding bird surveys, spring and fall diurnal raptor surveys and fall bat acoustic surveys in 2009. Following is a brief description of the Project, a review of the methods used to conduct the biological use surveys, the results of those surveys, and a discussion of those results.

1.1 STUDY BACKGROUND

The proposed project was originally owned and proposed by WindWorks, LLC (WindWorks), and previous environmental studies were conducted in 2006 by Woodlot Alternatives[1] under contract to WindWorks. The results of these surveys are reported under a separate report cover; *Summer and Fall Wildlife Surveys at Tenney Mountain, New Hampshire 2006*. Under current ownership, Groton Wind, LLC, met with the New Hampshire Fish and Game Department (NHFGD) and USFWS on March 4, 2009 to discuss potential bird and bat concerns prior to initiating field surveys. Groton Wind presented the *Proposed Work Plan for Avian and Bat Studies at the proposed Groton Wind Project* (Iberdrola 2009) for agency feedback and comment. The work plan was developed based on two previous documents: Iberdrola's Avian and Bat Protection Plan (ABPP), which the USFWS has endorsed, and the Groton Wind Farm Phase 1 Avian Risk Assessment (ARA), which was produced by Curry & Kerlinger.

The survey protocols implemented were based on standard methods that are developing among the scientific community to help assess potential impacts in the wind power industry. In addition, the survey guidelines followed were outlined in the *Proposed Work Plan.* The survey protocols are consistent with several other studies conducted at

[1] Fieldwork and subsequent report filings performed prior to October 1, 2007, were done so as Woodlot Alternatives Inc. On October 1, 2007 Woodlot Alternatives Inc. was acquired by Stantec Consulting.

proposed wind projects recently in New Hampshire and throughout the Northeast region of the United States.

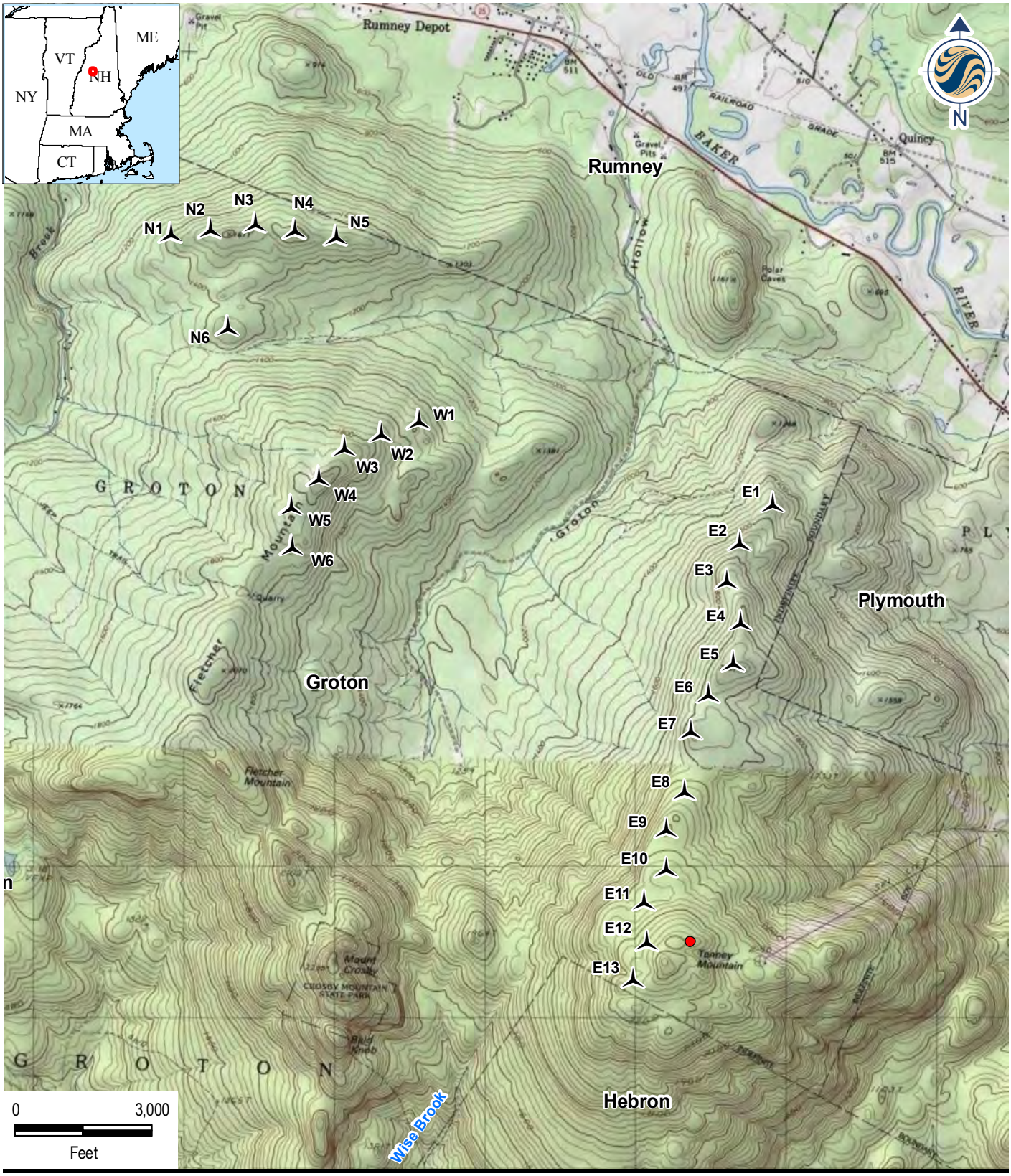
1.2 PROJECT AREA DESCRIPTION

The Project is located in Grafton County, New Hampshire within the Sunapee Uplands subsection as characterized by Sperduto and Nichols 2004 in *Natural Communities of New Hampshire*. This subsection of New Hampshire is classified by its moderate topography consisting of granite hills and peaks of shallow, nutrient poor soils interspersed with small lakes and narrow stream valleys (Sperduto and Nichols 2004).

More specifically, the Project is located on Tenney Mountain and the northwest extension of Fletcher Mountain in Groton, New Hampshire. Both Tenney and Fletcher mountains are oriented northeast/southwest, the northwest extension is oriented east to west. The peaks range in elevation from 549 m (1801') to 701 m (2300'). Due to its moderate elevation, the dominant tree species in the Project area include sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis)*, and American Beech (*Fagus grandifolia*), which are typical of northern hardwood – conifer forests. This forest community is the most common in the northern half of the State of New Hampshire. Some small pockets of red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*) are present, but are limited to the ridge summits. 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*).

As currently planned, the majority of the Project site (the northern two-thirds of Tenney Mountain) is located on lands owned by Green Acres Woodlands and managed by FORECO, a local forest management company. The Fletcher Mountain portion of the Project area is owned and managed by Wagner Forest Management. Both companies actively manage these lands for commercial forestry products. Consequently, human disturbances are evident across the majority of the Project site. Historically and presently, the land within and surrounding this area, including the summits of the ridgeline, has been used for commercial timber production. This is evident by the recent and past cuts as well as the presence of a network of haul roads that extend through the site. These forest management operations have resulted in a variation of forest age classes. Crosby Mountain State Park is located south of the Fletcher Mountain portion of the Project area. The 230-acre Park includes Jericho Lake and Mount Crosby (elevation 676 m [2,218 ft]). The Tenney Mountain downhill ski area abuts the Project area on the southeast side of the ridge, and includes approximately 48 cleared ski trails. At this location, trails and maintenance roads provide access to the summit for servicing ski trails and chairlifts. A microwave communication tower (communication tower) is also adjacent to the Project area on the summit of Tenney Mountain. The southern summit is the highest point of elevation within the Project area and is evidenced by a greater frequency of red spruce and balsam fir than the side slopes of the Project area ridgelines.

For the purposes of describing breeding bird, raptor, and bat activity within the Project area, the Project boundary or Project area refers to the proposed turbine areas as depicted in Figure 1-1 and does not include the lowlands where access roads, transmission corridors, and the substation are to be located.



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Legend

- Communication Tower
- Turbine Location (10-26-2009)

195600299

Client/Project

Groton Wind Project
Groton, New Hampshire

Figure No.
1-1

Title
Project Area Location Map
November 30, 2009

00299-F001-Locus.mxd

2.0 Breeding Bird Survey

2.1 METHODS

2.1.1 Breeding Bird Survey Point-counts

The breeding bird surveys focused on documenting the occurrence of species of conservation concern, but considered all avian species visually or acoustically detected in the Project area. Survey methods were conducted in accordance with the United States Geological Survey (USGS) North American Breeding Bird Survey methods (Sauer et al. 1997). The surveys provide baseline data for the species present in the Project area, their abundance, as well as the community structures among the different habitats present. Stantec biologists conducted breeding bird point-count surveys during two separate visits to the Project area. The first visit was completed during early to mid-June, and the second visit was completed during mid to late-June 2009.

Point-count locations were established within the proposed Project area using Global Positioning System (GPS) equipment (Figure 2-1). These locations were positioned to sample representative habitats that occur in the Project area and in proximity to the proposed turbine locations. Similarly, the GPS was also used to establish point-count locations within the control areas on Mount Crosby and Bald Knob and targeted habitat types similar to those present within the Project area. 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 would determine the location of previously recorded birds and track any movements within the count circle to avoid recounting birds. Other notes related to breeding behavior, weather conditions, and habitat descriptions were also recorded. In the case that rare, threatened or endangered birds were observed, observers digitally recorded them.

Observations of birds made before and after the point-count timeframes were recorded separately as incidental observations.

The habitats within the Project area were separated into five general community types: coniferous, deciduous, mixed coniferous and deciduous forest, clearing and rock outcrops. Habitats characterized as clearing occurred within meteorological (met) tower sites. Habitat types for each point-count were assigned based on the dominant vegetation cover present at each survey location; however these dominant habitats often had smaller inclusions of other habitat types. For example, some of the hardwood stands, although predominately hardwoods, included conifer species such as red spruce, eastern hemlock (*Tsuga canadensis*) and eastern white pine (*Pinus strobus*), or boulder outcrops. Habitats with similar characteristics were grouped wherever possible for statistical analysis purposes.

Quantitative data collected during point-counts were used to calculate the following statistics:

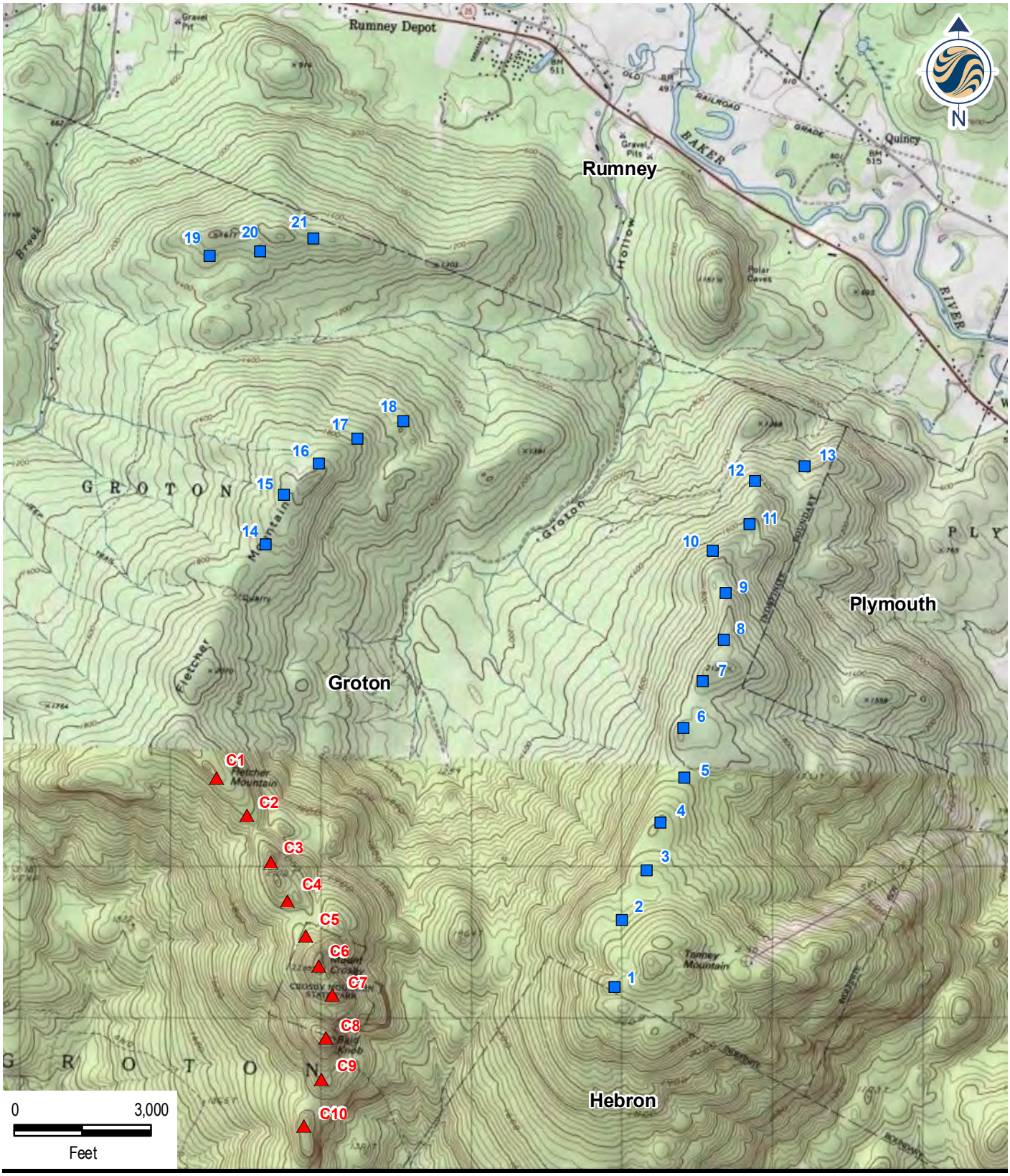
- Species richness (SR) is the total number of species detected at a specific point, within a habitat classification, or across the Project area.

- Relative abundance (RA) measures the number of individuals of a species within a habitat type or across the Project area. This calculation 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.

Because individuals recorded as beyond 100 m from the observer, as flyovers, or as incidental observations were less likely to be breeding within the vicinity of the point-count location, they were not included in the statistical analysis for relative abundance, species frequency, or community diversity. These data were used, however, to determine overall species richness and the total number of birds observed.



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Legend

BBS Points

- 1-21
- C1-C10

Client/Project

Groton Wind LLC
Groton Wind Project
Groton, New Hampshire

Figure No.

2-1

Title

Breeding Bird Survey Point Location Map
November 16, 2009

00299-F002-BBS-Point-Locations-Map.mxd

2.2 RESULTS

One round of breeding bird surveys was conducted in early to mid-June (June 10, 11 and 16), and one in mid to late June (June 17, 18 and 27). Surveys were conducted when wind or rain conditions did not adversely affect bird detection. Wind conditions generally ranged from <1 mph to approximately 7 mph (2 to 12 kph) and only reached 9 to 12 mph (20 to 29 kph) for a brief period of time on June 18. Weather conditions ranged from clear to overcast skies with five days that included fog and/or drizzle for a portion of the survey period. Temperatures during the surveys ranged from 10º to 21º C (50º to 70º F).

There were a total of 21 breeding bird point-count locations surveyed within the Project area and an additional 10 locations surveyed within the control areas. Each point was surveyed during the two separate site visits. The community type for two of the Project area point-count locations, Point-counts 7 and 9, changed significantly between the first and second site visits as a result of clearing for meteorological (met) tower construction. To account for this change, statistical analysis related to habitat use excludes data collected during the first site visit for these two point-count locations. Data for the second site visit to Points Counts 7 and 9 were analyzed separately under the habitat category of clearing. A skidder trail made through Point-count 8 changed this habitat to some degree, but the general habitat category remained the same and all observations were included in all the data analyses.

A total of 34 species were observed within the Project area during point-count surveys, and two additional species, American robin (*Turdus migratorius*) and ruffed grouse (*Bonasa umbellus*), were observed incidentally between survey points, for a total of 36 species detected in the vicinity of the Project area (Appendix A, Tables 1 and 2). A total of 33 species were observed within the control areas during the point-count surveys (Appendix A, Table 4). Five additional species, [wood thrush (*Hylocichla mustelina*), eastern wood-pewee (*Contopus virens*), eastern phoebe (*Sayornis phoebe*), American robin and veery (*Catharus fuscescens*)] were observed incidentally between survey points, for a total of 38 species detected in the vicinity of the control areas (Appendix A, Tables 4 and 5). Using the results of the point-count surveys only, there were 27 species in common between the Project area and control areas.

2.2.1 BBS Point-counts

2.2.1.1 Project Area:

Within the Project area, a total of 319 individual birds representing 34 species were documented during the point-count surveys. Observations were almost evenly divided between individuals detected within 50 m of the observer (n=149, 47%) and those detected between 50 and 100 m of the observer (n=141, 44%). Only 8 percent (n=26) of individuals were detected at more than 100 m from the observer and one percent (n=3)

were recorded as flyovers (Appendix A, Table 1). Including those birds detected within 100 m of the observer and those seen as flyovers, those species with the greatest numbers of individuals detected were ovenbird (*Seiurus aurocapillus*; n=49), black-throated blue warbler (*Dendroica caerulescens*; n=34), and hermit thrush (*Catharus guttatus*; n=32).

A total of 29 birds were detected at more than 100 m from the observer or as flying over head. Excluding these 29 detections, the RA of all birds was 6.69 and the SR was 32 (Table 2-1). The Shannon Diversity Index (SDI) for the Project area point-counts was 2.98 (Table 2-1).

Point-count data were analyzed to determine species richness, relative abundance, and diversity for each habitat type present within the Project area (Table 2-1). The deciduous forest habitat is the most commonly occurring habitat within the Project area and was the habitat type with the most point-count locations (n=9 points). The deciduous forest habitat had the greatest number of total birds observed (n=113) and the highest SR (SR=26). Relative abundance was highest for the clearing habitat category (RA=8.50); however the two point-count locations in this category were only surveyed once. Of the other three habitat types, the coniferous forest habitat had the highest RA (RA=7.63). The coniferous forest habitat also had the highest SDI (SDI=2.96) indicating that this habitat had the highest diversity of species and the most even distribution of species among the points sampled.

Table 2-1. Summary of Project area breeding bird point-count results by habitat type, excluding observations of birds >100m from the observer and flyovers.

Habitat Type	# BBS Points	Total Birds Observed	Relative Abundance	Species Richness	Shannon Diversity Index
Conifer	4	61	7.63	24	2.96
Mixed	6	90	7.50	24	2.54
Deciduous	9	113	6.28	26	2.80
Clearing*	2	17	8.50	11	2.23
All points	**21**	**281**	**6.69**	**32**	**2.98**

***The clearing point-count locations were only surveyed once where as the other locations were surveyed twice.

2.3 SPECIES RELATIVE ABUNDANCES AND FREQUENCIES AMONG HABITATS

The following are the values of relative abundances and frequencies for the most commonly detected species in the five habitat types surveyed within the Project area (reference Appendix A, Table 3).

2.3.1 Coniferous forest

The species with the greatest RA within coniferous forest habitats were dark-eyed junco (*Junco hyemalis*; RA=0.88), blackburnian warbler (*Dendroica fusca*; RA=0.75), and black-throated blue warbler (RA=0.63). The species with the greatest frequency of occurrence within the coniferous forest habitats was dark-eyed junco (Fr=100%). Thirteen of the 24 species had a frequency of occurrence of 50 percent.

2.3.2 Mixed forest

The species with the greatest RA and highest frequency of occurrence within mixed forest habitats were ovenbird (RA=1.08; Fr=83%), black-throated blue warbler (RA=1.08; Fr=100 percent), hermit thrush (RA=0.92; Fr=67%) and American redstart (*Setophaga ruticilla*; RA=0.58; Fr=67%).

2.3.3 Deciduous forest

The species with the greatest RA and highest frequency of occurrence within the deciduous forest habitats were ovenbird (RA=1.33; Fr=100%), black-throated blue warbler (RA=0.67; Fr=78%), and dark-eyed junco (RA=0.61; Fr=56%).

2.3.4 Clearing

Based upon the one survey visit in this habitat type, the species with the greatest RA within the clearings were ovenbird (RA=2.00), hermit thrush (RA=1.50) and chestnut-sided warbler (*Dendroica pensylvanica*; RA=1.00). Ovenbird was observed at both point-count locations and had the highest frequency of occurrence (Fr=100%) and 10 remaining species were recorded at only one of the point-count locations (Fr=50).

2.4 SPECIES RELATIVE ABUNDANCES AND FREQUENCIES AMONG HABITATS WITHIN CONTROL AREAS

Within the control areas, a total of 167 individual birds representing 33 species were documented during the point-count surveys. The greatest number of birds was recorded between 50 and 100 m of the observer (n=95; 57%). Thirty-five percent (n=58) of observations were recorded within 50 m of the observer, 8 percent (n=13) at more than 100 m from the observer and 1 percent (n=1) as flying overhead. Including those birds detected within 100 m of the observer and those seen as flyovers, those species with the greatest numbers of individuals detected were dark-eyed junco (n=24), hermit thrush (n=20) and ovenbird (n=15).

A total of 14 birds were detected at more than 100 m from the observer or as flying over head. Excluding these 14 individuals, the RA of all birds was 7.65 and the SR was 33. The SDI for the point-counts in the control areas was 3.03 (Table 2-2).

Point-count data were also analyzed to determine species richness, relative abundance, and diversity for each habitat type present within the control areas (Table 2-2). The four habitat types present in the control areas are conifer, mixed, deciduous, and rock outcrop. Within these habitat types survey points were evenly distributed across them. The coniferous forest habitat had the greatest number of total birds observed (n=46), but the mixed and deciduous forests had slightly higher SR (SR=18). Relative abundance was highest at the rock outcrop habitat (RA=9.25) and the SDI was highest in the mixed forest habitat (SDI=2.75). The SDI indicates that the mixed forest habitat had the highest diversity of species and the most even distribution of species among the points sampled, although it had the fewest total number of birds observed.

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

Habitat Type	# BBS Points	Total Birds Observed	Relative Abundance	Species Richness	Shannon Diversity Index
Conifer	3	46	7.67	17	2.59
Mixed	2	33	8.25	18	2.75
Deciduous	3	37	6.17	18	2.61
Rock Outcrop	2	37	9.25	12	2.19
All points	**10**	**153**	**7.65**	**33**	**3.03**

The following are the values of relative abundances and frequencies for the most commonly detected species in the five habitat types surveyed within the control areas (reference Appendix A, Table 6).

2.4.1 Coniferous forest

The species with the greatest RA within coniferous forest habitat were dark-eyed junco (RA=1.2), hermit thrush (RA=1.2), and golden-crowned kinglet (*Regulus satrapa*; RA=0.80). The species with the greatest frequency of occurrence within the coniferous forest habitat were hermit thrush, golden-crowned kinglet and black-capped chickadee (*Poecile atricapillus*), which were documented at each of the three point-count locations (Fr=100%).

2.4.2 Mixed forest

The species with the greatest RA within mixed forest habitat were golden-crowned kinglet (RA=1.00), ovenbird (RA=0.80), dark-eyed junco (RA=0.80), black-throated blue warbler (RA=0.80), American redstart (RA=0.80) and hermit thrust (RA=0.80). The species with the highest frequency of occurrence among survey points in mixed forest habitat were dark-eyed junco, American redstart, hermit thrush and yellow-bellied sapsucker, which were documented in both of the point-count locations (Fr=100%).

2.4.3 Deciduous forest

The species with the greatest RA within the deciduous forest habitat were ovenbird (RA=1.20), black-throated blue warbler (RA=1.0), dark-eyed junco (RA=0.50), hermit

thrush (RA=0.50) and red-eyed vireo (*Vireo olivaceus*; RA=0.50). The species with the highest frequency of occurrence was black-throated blue warbler (Fr=100%). In addition, ovenbird, dark-eyed junco, hermit thrush, red eyed vireo and black-and-white warbler each were recorded at two of the three point-count locations (Fr=67%).

2.4.4 Rock Outcrop

The species with the greatest RA associated with the rock outcrop habitat were dark-eyed junco (RA=2.75), Nashville warbler (*Vermivora ruficapilla*; RA=1.25) and chestnut-sided warbler (RA=1.00). Four species were recorded at both of the point-count locations and had a frequency of occurrence of 100 percent: chestnut-sided warbler, dark-eyed junco, Nashville warbler and winter wren (*Troglodytes troglodytes*).

2.5 DISCUSSION

The 2009 breeding bird 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 detection of vocalizing birds. The methods employed for these surveys are relatively standard and comparable to methods used to conduct other breeding bird surveys in this region of the country. The intent of the 2009 surveys was specifically to document the occurrence of species of conservation concern as well as to provide baseline data. Because development is not allowed within the state forest, data collected at the control sites can help assess whether future changes in the Project area breeding bird community reflect the effects of the proposed wind power project or other environmental influences.

During the 2009 point-count surveys, 34 species were documented within the vicinity of the Project area and 33 species were detected within the control areas. Of these species, 27 were common between the Project area and control areas. All of the documented species are generally common and regionally abundant species; and representative of the habitats in which they were detected. Within both the Project area and control areas, the most commonly observed birds included ovenbird, black-throated blue warbler, hermit thrush and dark-eyed junco. The ovenbird is more typically associated with interior forests and the dark-eyed junco with forest edge habitats. The other two species will commonly occur in either forest interior or along the forest edge.

There were no state-listed endangered, threatened or special concern species, or species of federal concern observed during the point-count surveys. In addition to those species documented during the point-count surveys, incidental observations recorded two additional species within the Project area and five additional species within the control areas. These species are considered commonly occurring and regionally abundant.

Within the Project area, all point-count locations are located along the summits of the Project Ridgelines in proximity to the proposed turbine locations. Nine of these point-count locations occur within the deciduous forest habitats as compared to four and six point-count locations, respectively, in the conifer and mixed forest habitats. The

deciduous forest habitats had the most total birds observed, which reflects, at least in the part, the greater number of point-count locations. The deciduous forests also had a slightly higher SR than the other forested habitats (26 versus 24 in the coniferous and mixed forests), but it was the coniferous forest habitat that had the highest species diversity (SDI =2.96) and the most even distribution of species across the points sampled. Because the clearing habitats were only sampled once, a direct comparison to the other habitats cannot be made, but data collected in 2009 can form a comparative baseline in regard to species composition at these locations.

Within the control areas, point-count locations were evenly distributed between the four community types in an effort to target comparable habitats to those being surveyed in the Project area. The total number of birds observed in each of the four habitat types was relatively similar with the coniferous forest habitats having a slightly higher number of observations. The three forested habitats all had similar SR with the rock outcrop habitat type having the lowest richness. The mixed forest habitats had the highest species diversity and the most even distribution of species across the points sampled.

The results of the breeding bird surveys yielded commonly occurring species throughout the surveyed habitats in both the Project area and the control areas. Due to the differences in land use between the two sites, the results of the Project area and control area surveys were not expected to produce the same results. However, there were some similar statistics within and between these two data sets. Such statistics were conducted to provide a baseline for documenting changes within the breeding bird community at the Project area, which may aid in assessing whether future changes in composition at the Project are the result of project development or other influences.

- When compared within their own data sets, the SR for the three forested communities were nearly the same.
- When compared between data sets, the RA of the coniferous forest habitats were very similar (RA= 7.63 and 7.67).
- When compared between data sets, the SDI for all point surveyed were very similar (SDI=2.89 and 3.03).
- When compared between data sets, the forested community types had at least one bird in common in regard to the species with the highest RA and Fr. For example, the ovenbird, black-throated blue warbler and dark-eyed junco had the highest RA within the deciduous forest type in both the Project area and control areas.

3.0 Diurnal Raptor Surveys

3.1 DATA COLLECTION METHODS

3.1.1 Field Surveys

The 2009 raptor migration studies were conducted to investigate use of the proposed Project area by migrating raptors. These surveys were conducted to document diurnal raptor migration activity at a central and prominent location within the Project area or from two locations in the Project area and were intended to:

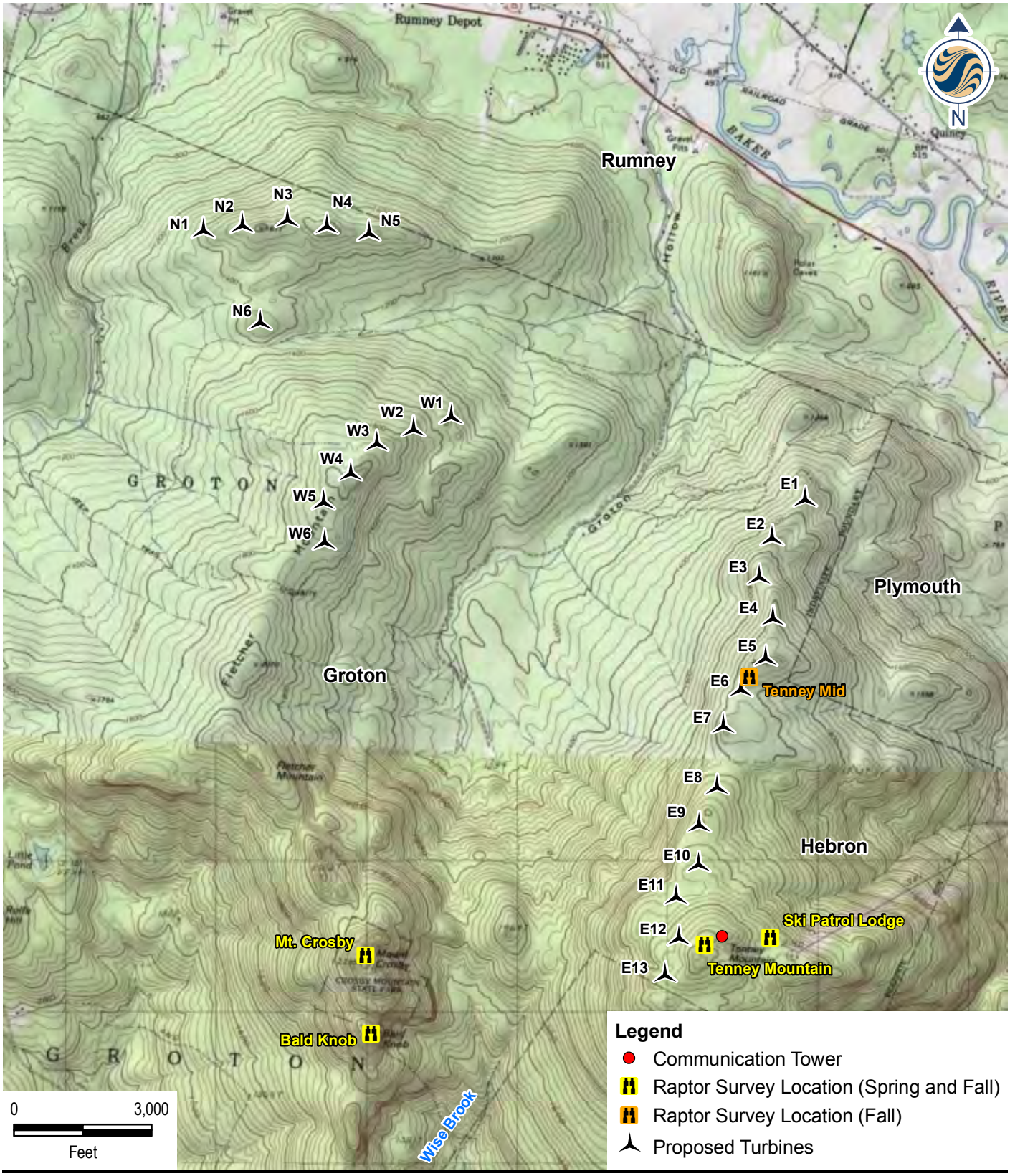
- document species of raptors that occur in the vicinity of the Project;
- document the specific flight heights and flight path locations of migrating raptors; and
- document other raptor flight behaviors (e.g., turkey vultures or other diurnally migrating bird species) within or in the vicinity of the Project.

Survey methods and objectives were based on Hawk Migration Association of North America (HMANA; HMANA 2007) and Northeast Hawk Watch methods. Spring surveys occurred from late March through late May with the initial survey dates intended to target early migrants such as golden eagles (*Aquila chrysaetos*). Fall surveys occurred from late August to late October, including the initial time period when outbound cool weather migrants such as eagles begin to migrate in fall. Surveys were conducted on days with optimal migration weather, which typically included fair days with thermal development and winds generally from a southwesterly direction in spring and a northerly direction in fall. Additionally, days with headwinds or crosswinds were sampled as some raptors' flight behaviors differ in moderate to strong headwinds and crosswinds.

Surveys were generally conducted for eight consecutive hours between 9 am to 5 pm, during the peak hours of thermal development and raptor movement. During surveys, observers scanned the sky and surrounding landscape with binoculars or a spotting scope. Some survey days in spring and all survey days in fall occurred simultaneously surveys with two observers located at different locations to provide more visible coverage of the Project area. Frequent communication by cell phone occurred between the two observers to determine which individual raptors were seen by both observers. Hourly weather observations, including wind speed and direction, temperature, sky conditions, percent cloud cover, and relative cloud height and type were recorded. Detailed information for each observation was recorded on datasheets and Project area maps, including:

- Observation date and time;
- Species, number of individuals, and, if possible, relative age;
- If the raptor occurred within the Project boundary (as depicted in Figure 1-1 and 3-1);
- The flight positions of each bird in relation to topography of the area;
- The flight height (above ground) or flight height range of each bird (within each different topographical flight position if the bird changed position);
- The specific flight behaviors of each bird;
- The general flight direction of each bird; and
- If the bird was actively migrating as well as other notes describing the general activity of each bird.

Topographical flight positions of birds observed within and outside of the Project boundary were summarized into categories relative to the landscape surrounding the observation site. For the purposes of data analysis, the Project area was specifically defined as the three ridgeline areas where turbines are proposed to be located. Fletcher Mountain includes both the Fletcher Mountain ridge and the un-named ridge located north of Fletcher Mountain (Figure 3-1).



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Client/Project

Groton Wind Project
Groton, New Hampshire

Figure No.
3-1

Title
Raptor Map Spring and Fall 09
November 16, 2009

00299-F003-Raptor.mxd

The flight position categories were: A1) parallel to ridge, A2) perpendicular to ridge, A3) over saddle, B) flight path over upper slope of ridge, C) flight path over lower slope of ridge, and D) flight path over a valley (see Figure 3-2 below). As individual birds traveled through or in the vicinity of the Project, all position categories in which a bird occurred were recorded.

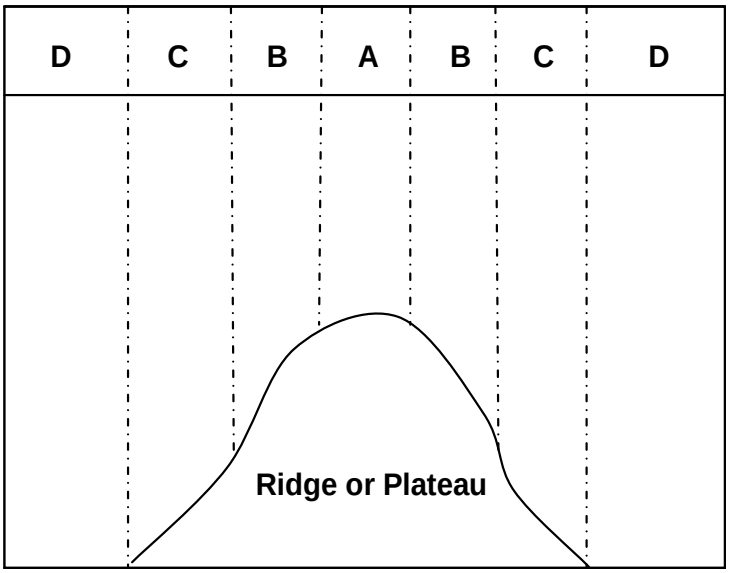


Figure 3-2. Raptor flight position categories in relation to the topography of the Project area and surrounding area.

Flight height estimates were based on an observer's professional opinion and used nearby objects of known heights, such as meteorological (met) towers, tree canopies, and other man-made structures such as the tower on Tenney Mountain, to gauge flight height.

Flight behaviors where categorized as: circle soaring, linear soaring (straight-line soaring or slow gliding in a 'thermal street' formed between updrafts), gliding (with wings partially closed and bent wrists), powered flight (flapping wings), banking (breaking with fully extended wings and tail fanned), diving (wings partially to mostly closed while in descent), kiting (using wind current to kite with partially closed wings and tail), hovering (maintaining a stationary altitude with some flapping and fanned tail while hunting and looking downward), aerial feeding (eating prey in flight while in a soar or slow glide), aerial hunting low over the ground, aerial display (territorial or courtship aerial display), or perched. These behaviors as well as the bird's flight direction were used to describe birds as either actively migrating or not-actively migrating.

Birds that flew too rapidly or were too far to accurately identify were recorded as unidentified to their genus or, if the identification of genus was not possible, unidentified raptor. Priority was given to raptor observations; however, observers collected incidental

data for other avian species observed including passerines and water birds while at the raptor observation sites.

3.2 DATA ANALYSIS METHODS

The raptor observation data was summarized by survey day and for the entire survey period. Analysis included a summary of:

- The total number of individuals per species observed each survey day, and for the entire survey period;
- Daily passage rates (birds per hour) calculated for each survey day, as well as for the entire survey period;
- Analysis of raptor observations by Project area ridge;
- Hourly observation totals per species;
- The percentage of birds within each topographical flight position category;
- The average minimum flight height of birds within each topographical flight position category;
- The percentage of all birds that occurred within the Project boundary;
- For all birds observed within the Project boundary, flight heights were categorized as less than or greater than 121 m (399') above ground for analysis;
- The percentage of birds believed to be actively migrating; and
- A summary of the flight behaviors of all birds observed.

Results were compared to spring and fall 2009 hawk watch sites in Maine, New Hampshire, and Massachusetts (HMANA 2009). The hawk watch sites compared with the Project area are listed in Table 1 in Appendix B. In addition, results were compared to baseline data from other publicly-available raptor studies conducted recently at similar wind development sites in the region (Appendix B, Table 2).

3.2.1 Survey Locations

The spring 2009 raptor surveys were conducted from two different locations on the eastern and western sides of the Project area. On the eastern side, two locations on Tenney Mountain were used, including Tenney Mountain at the communication tower clearing (7 days) and the top of the Tenney Mountain ski lift (1 day). The communication tower clearing provides clear views along the Tenney Mountain ridgeline, Fletcher Mountain and the valley between these ridgelines. The ski lift site allowed for views of the eastern portion of Tenney Mountain as well as areas to the south and east. Surveys also were conducted from Mount Crosby (6 days) and Bald Knob (1 day), which are located to the south and southeast of the Project area ridgelines. Mount Crosby and Bald Knob both provide views north into the Project area including line-of-sight along

both Tenney Mountain and Fletcher Mountain and the valley between these ridgelines. It should be noted that the Bald Knob and Mount Crosby observation locations are outside of the Project area; therefore, birds directly over Bald Knob or Mount Crosby were considered outside of the Project area. However, at this location nearly the entire Project area was visible.

The fall 2009 raptor surveys were also conducted from the eastern and western sides of the Project area. On Tenney Mountain, all 10 survey days were conducted from a newly cleared met tower opening on the north-central spine of Tenney ridge. From this point, 180 degree views to the southwest including most of the Project ridgelines and proposed turbine locations, were possible. Views included both ridges of Fletcher Mountain south to Mount Crosby and Bald Knob, the summit of Tenney Mountain and east to some eastern aspects of Tenney Mountain. Bald Knob (7 days) and Mount Crosby (3 days) were also used in the Fall, on the western side of the Project area (Figure 3-1).

3.3 RESULTS

3.3.1 Spring Surveys

Spring raptor migration surveys were conducted on 11 days from March 26 to May 23, 2009. A total of 125 survey hours were completed with only one day, April 5, yielding no raptor observations. There were five days during which surveys were conducted simultaneously from two different locations; one location from the eastern portion of the Project area and one on the western portion of the Project area. Winds were variable during the course of the surveys, but were most often out of the south, northeast, northwest or southeast. Wind speeds were typically at or below 7 mph (12 kph), but for brief periods on six days (3/26, 4/15, 4/16, 4/29, 4/30, and 5/12) wind speeds were between 9-12 mph (14-19 kph) and on two days (4/29 and 4/30) there were brief periods when wind speeds were between 13-18 mph (21-29 kph). Sky conditions generally ranged from clear to overcast, with only brief periods of fog, drizzle or showers on March 27, May 6 and May 23 when visibility was somewhat restricted.

Basic survey results are summarized in Table 3-1 and more detailed survey results are tabulated in Appendix B (Tables 3-7).

Table 3-1. A summary of the Spring 2009 raptor surveys conducted at the Groton Wind Project in Groton, New Hampshire.	
Survey hours	125
Total number of raptor species detected	11
Total number of raptors detected	175
Overall survey passage rate (birds/hour)	1.40
Total number of raptors detected in the Project area (percent of total detections)	76 (43%)
Total number of raptors detected over theTenney Mountain portion of the Project area (percent of total detections)[1]	48 (27%)
Total number of raptors detected over the Fletcher Mountain portion of the Project area (percent of total detections)	31 (18%)
Total number of raptors detected in the Project area and in potential rotor zone (percent of total detections)	43 (25%)
Overall passage rate in Project area (birds/hour)	0.61

[1]Three observations involved birds that passed over both Tenney and Fletcher Mountain.

Including those birds seen within and outside of the Project area from both observation sites combined, a total of 175 raptors representing 11 species were observed during 11 survey days between April 26 and May 23, 2009 (Figures 3-3, 3-4). Turkey vulture (*Cathartes aura*; n=99) and red-tailed hawk (*Buteo jamaicensis,* ;n=33) were the most frequently observed species. The highest number of observations occurred on April 16 when 41 raptors were observed from the Tenney Mountain survey location (Appendix B; Table 3). This day was cold, and clear with moderate north and west winds. The day with the second highest number of observations occurred on 4/30 and included counts from observations at the two survey locations combined that were conducted simultaneously. A total of 33 raptors were detected on April 30 (Appendix B; Table 3). This day was relatively mild with moderate to strong southerly winds. Of the total number of raptors detected during the entire survey effort, 43 percent was observed in the Project area.

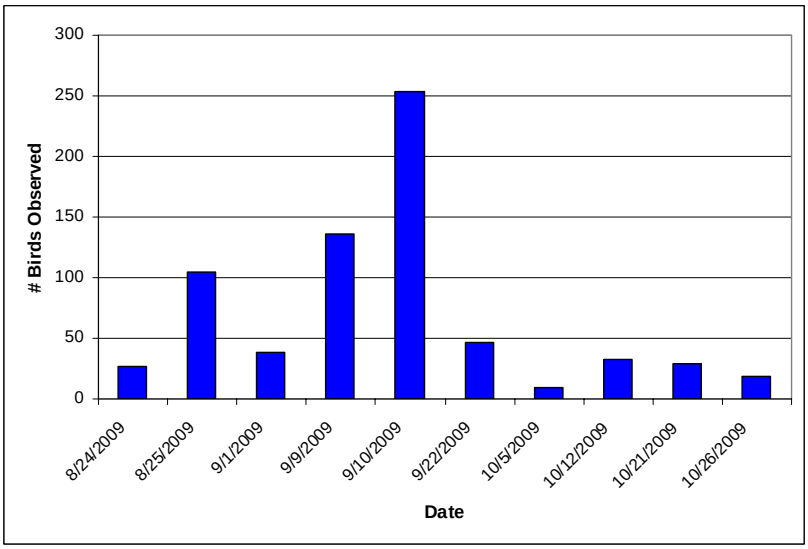


Figure 3-3. Number of individuals per survey day observed at the Groton Wind Project in Groton, New Hampshire during Spring 2009. Includes individuals observed both within and outside the Project area.

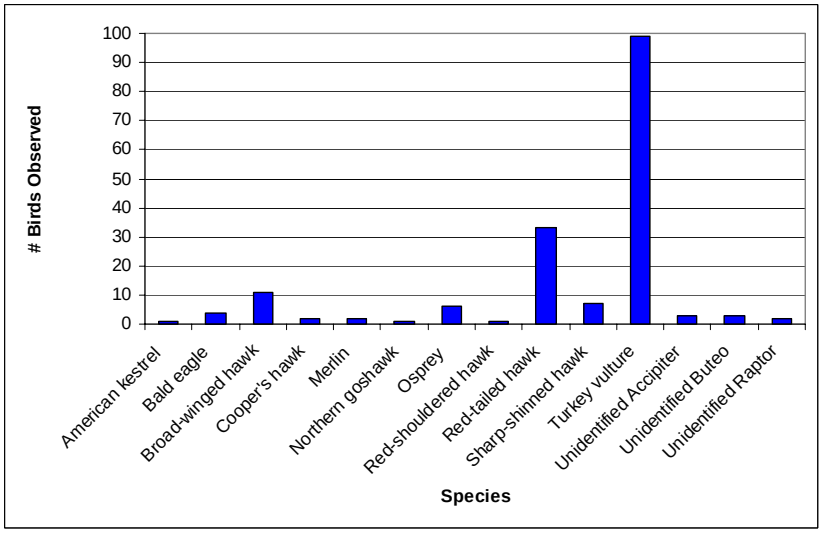


Figure 3-4. Number of individuals per species observed at the Groton Wind Project in Groton, New Hampshire during Spring 2009. Includes individuals observed both within and outside the Project area.

On a daily basis, the majority of observations occurred between 10:00 AM and 2:00 PM with the peak hourly activity period between 11:00 AM and 12:00 PM (Figure 3-5; Appendix B, Table 4).

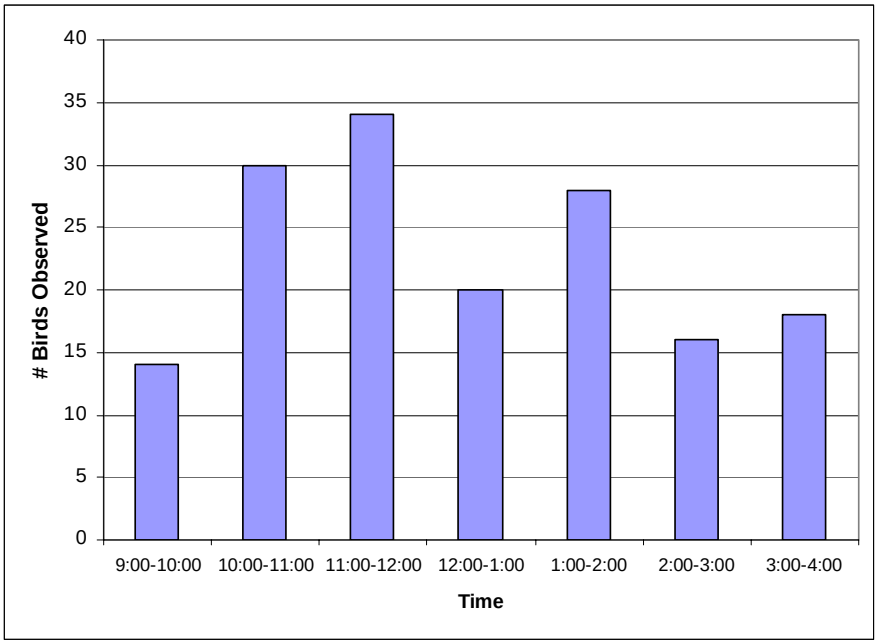


Figure 3-5. Number of observations per survey hour during Spring 2009 at the Groton Wind Project in Groton, New Hampshire.

Within the Project area, the species most commonly observed passing over Tenney Mountain were red-tailed hawk (n=19) and turkey vulture (n=12) (Table 3-2). Turkey vulture (n=19) was the most commonly observed species passing over Fletcher Mountain portion of the Project area (Table 3-2).

Table 3-2. Number of individuals per species observed within the Project area at the Groton Wind Project in Groton, New Hampshire during Spring 2009.

Species	Tenney Mountain	Fletcher Mountain
American kestrel (*Falco sparverius*)	1	0
bald eagle (*Haliaeetus leucocephalus*)	2	0
broad-winged hawk (*Buteo platypterus*)	5	2
Cooper's hawk *(Accipiter cooperii)*	1	1
merlin *(Falco columbarius)*	1	0
osprey (*Pandion haliaetus*)	3	3
red-tailed hawk	19	4
sharp-shinned hawk (*Accipiter striatus*)	2	1
turkey vulture	12	19
unidentified accipiter	1	1
unidentified buteo	1	0
unidentified raptor	0	0
Total	**48**	**31**

Of the birds passing over Tenney Mountain portion of the Project area, the highest percentage of birds were either flying along/parallel to the ridge (n=20; 26 %) or along the upper slope (n=23; 30 %) (Table 3-3). Of the birds passing over Fletcher Mountain portion of the Project area, the highest percentage of birds occurred over the valley (n=21; 43%) (Table 3-4).

Table 3-3. Number of observations and average flight heights for each position category for birds observed within the Tenney Mountain portion of the Project area, Spring 2009

	A1) flight along or parallel to ridge	A2) crossed ridge	A3) flight crossed depression or saddle	B) upper slope	C) lower slope	D) over valley
No. of position observations[1]	20	10	0	23	12	12
Average minimum flight height (m)	100	109	N/A	129	141	133

[1] Position observations will be greater than the number of raptors counted as each raptor could have been detected at more than one position.

Table 3-4. Number of observations and average flight heights for each position category for birds within the Fletcher Mountain portion of the Project area, Spring 2009**.**

	A1) flight along or parallel to ridge	A2) crossed ridge	A3) flight crossed depression or saddle	B) upper slope	C) lower slope	D) over valley
No. of position observations[1]	3	12	0	7	6	21
Average minimum flight height (m)	78	105	N/A	124	200	270

[1] Position observations will be greater than the number of raptors counted as each raptor could have been detected at more than one position.

Based on the proposed turbine locations, it was determined that those birds flying over the valley (Flight position category D) were outside of the immediate influence of the turbine structures. Based on the proposed turbine height of 121 m (399'), those raptors observed in flight position A, B and C therefore were categorized as flying either above or below 121 m. Four of the 48 birds observed in the Tenney Mountain portion of the Project area were documented as only occurring over the valley and not within any of the other flight positions. Excluding the four birds documented as occurring only over the valley, 33 birds (75 %) were flying at less than 121 m for a portion of their flight over Tenney Mountain (Figure 3-6a; Appendix B, Table 5). Eight of the 31 birds documented as occurring within the Fletcher Mountain portion of the Project area were documented

as only occurring over the valley and not within any of the other flight positions. Excluding these eight birds, 10 birds (43 %) flew at less than 121 m for a portion of their passage over Fletcher Mountain (Figure 3-6b; Appendix B, Table 6). Within the Tenney Mountain portion of the Project area, red-tailed hawk (n=12) was the species most commonly observed flying at less than 121 m. For both portions of the Project area, turkey vulture, which was the most commonly occurring species, was typically seen flying at less than 121 m.

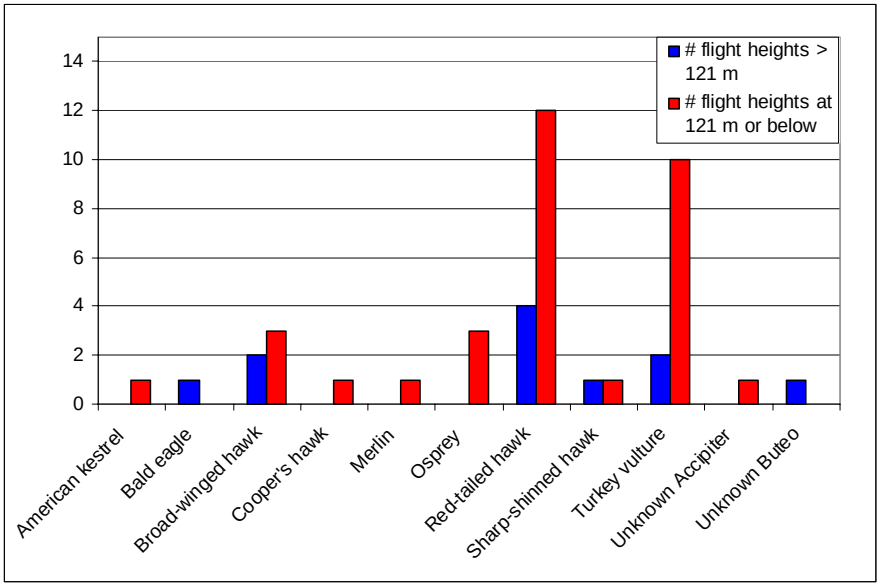


Figure 3-6a. Number of individual of raptors observed flying along the summit and upper-and mid-slopes of Tenney Mountain during Spring 2009. Diagram distinguishes those raptors observed flying above and below the maximum height of the turbine.

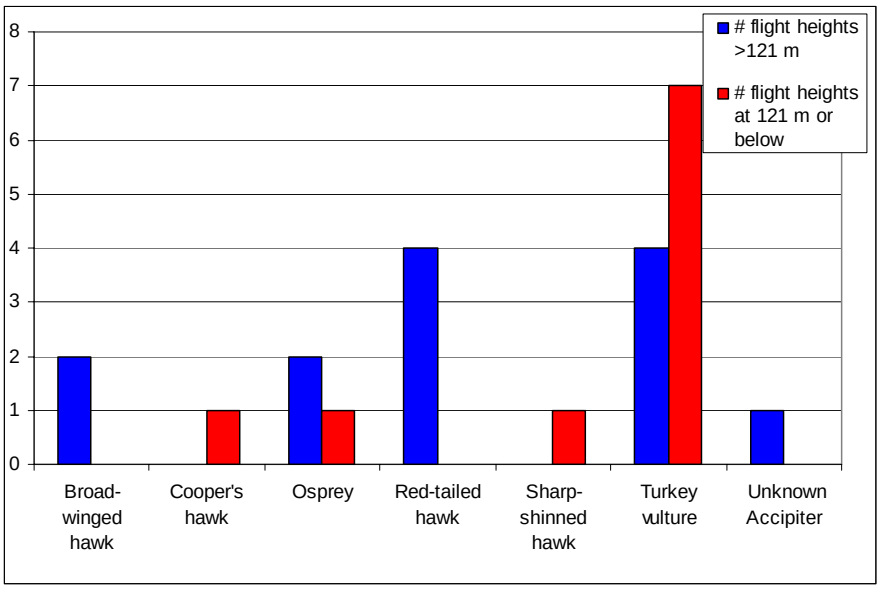


Figure 3-6b. Number of individual of raptors observed flying along the summit and upper-and mid-slopes of Fletcher Mountain during Spring 2009. Diagram distinguishes those raptors observed flying above and below the maximum height of the turbine.

Based on their flight behaviors, 31 percent of the birds documented within the Tenney Mountain portion of the Project area and 81 percent of the birds within the Fletcher Mountain portion of the Project area were thought to be migrating. The raptor flight behaviors observed in the Project area are summarized in Figure 3-7 below. All behaviors displayed by any one individual bird was recorded, therefore, behavioral observations exceed the total number of birds observed. The behavior most commonly observed was of birds circle soaring (n=36; 38 %) followed by birds gliding (n=22; 23 %) (Figure 3-7; Appendix B, Table 7).

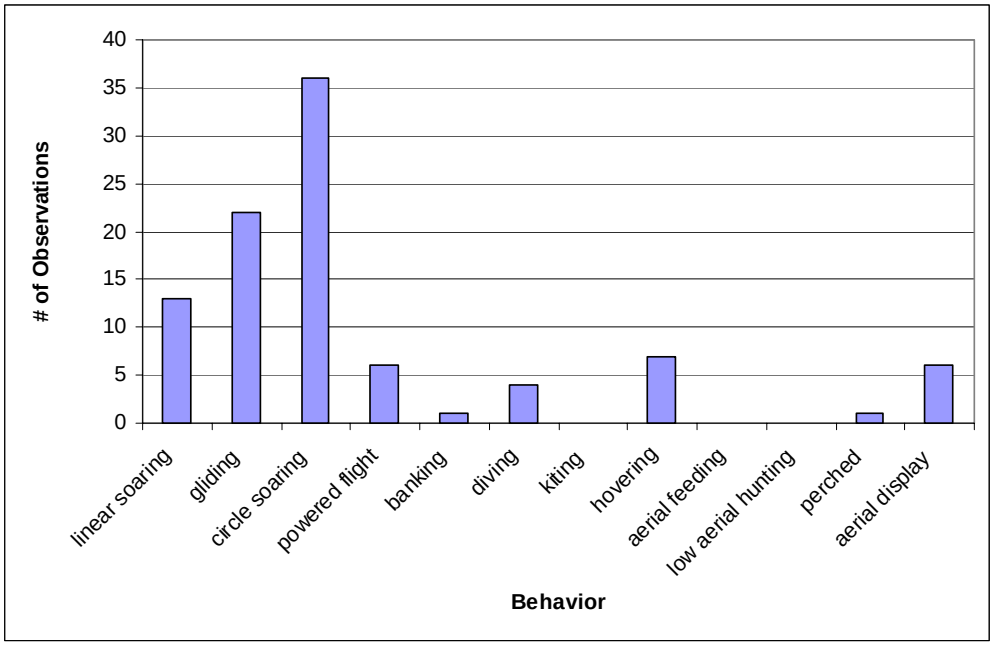


Figure 3-7. Flight behaviors exhibited by raptors observed over the Tenney and Fletcher Mountain portions of the Project area during Spring 2009.

3.3.2 Spring surveys – RTE Species

The bald eagle is designated as a threatened species in New Hampshire. During the raptor surveys, four bald eagles were observed and one of these eagles was within the Project area. One sub-adult was observed on March 26 and was circle-soaring east of Tenney Mountain while moving steadily north. On April 15, an adult circled over the northern end of Tenney Mountain but outside of the project area before heading east to the Pemigewasset Valley. On May 13, a sub-adult bald eagle crossed the Tenney Mountain ridge within the project area just north of the communication tower heading in a southerly direction. It was soaring in a linear fashion, and its estimated flight height was 200 meters above ground level (AGL).

Osprey, a New Hampshire Species of Special Concern, were observed during the raptor surveys (n=6). All but one of these birds was observed within the project boundary.

3.3.3 Spring surveys – Incidental bird observations

A total of 38 species of non-raptors were documented as incidental observations during the course of the spring 2009 raptor surveys (Table 3-5). These incidental observations included a common loon (*Gavia immer*), which is a state-listed threatened species. This bird was observed on May 6 and circled 5 or 6 times just southwest of Tenney Mountain before flying due north over the ridgeline. The general impression was that this bird was migrating.

Table 3-5. Incidental species observed within the Project area of the Groton Wind Power Project, Spring, 2009

Common name	*Scientific name*
American crow	*Corvus brachyrhynchos*
American robin	*Turdus migratorius*
black-and-white warbler	*Mniotilta varia*
black-capped chickadee	*Poecile atricapilla*
blue jay	*Cyanocitta cristata*
brown creeper	*Certhia americana*
black-throated blue warbler	*Dendroica caerulescens*
black-throated green warbler	*Dendroica virens*
Canada goose	*Branta canadensis*
Cape May warbler	*Dendroica tigrina*
common grackle	*Quiscalus quiscula*
common loon	*Gavia immer*
common raven	*Corvus corax*
common yellowthroat	*Geothlypis trichas*
chestnut-sided warbler	*Dendroica pensylvanica*
double-crested cormorant	*Phalacrocorax auritus*
dark-eyed junco	*Junco hyemalis*
eastern bluebird	*Sialia sialis*
eastern phoebe	*Sayornis phoebe*
golden-crowned kinglet	*Regulus satrapa*
hairy woodpecker	*Picoides villosus*
hermit thrush	*Catharus guttatus*
magnolia warbler	*Dendroica magnolia*
Nashvile warbler	*Vermivora ruficapilla*
northern flicker	*Colaptes auratus*
ovenbird	*Seiurus aurocapillus*
pine siskin	*Carduelis pinus*
purfle finch	*Carpodacus purpureus*
rose-breasted grosbeak	*Pheucticus ludovicianus*
red-breasted nuthatch	*Sitta canadensis*
ruby-crowned kinglet	*Regulus calendula*
red-tailed hawk	*Buteo jamaicensis*
ruby-throated hummingbird	*Archilochus colubris*
ruffed grouse	*Bonasa umbellus*
Unidentified passerine	*Passerine sp.*
Unidentified waterfowl	*Waterfowl sp.*
Unidentified woodpecker	*Woodpecker sp.*
winter wren	*Troglodytes troglodytes*
wood thrush	*Hylocichla mustelina*
white-throated sparrow	*Zonotrichia albicollis*
yellow-bellied sapsucker	*Sphyrapicus varius*
yellow-rumped warbler	*Dendroica coronata*

3.3.4 Fall Surveys

Fall raptor migration surveys were conducted on 10 days from August 24 to October 26, 2009, with two observers at different observation locations. A total of 157 survey hours were completed. Winds were variable during the course of the surveys, but were most often out of the north and northwest. Wind speeds were typically on average at or below 7 mph (12 kph), but there were brief periods during some days when wind speeds increased. Wind speeds increased for brief periods on eight days (8/24, 8/25, 9/10, 9/22, 10/5, 10/12, 10/21, and 10/26) to 9-12 mph (14-19 kph), on four days (8/25, 9/10, 10/5, 10/26) to 13-18 mph (21-29 kph), and two days (9/10 and 10/5) up to 19-24 mph (31- 39 kph). Sky conditions generally ranged from clear to overcast, with only brief periods of morning valley fog, drizzle or showers on August 24 and October 5 when visibility would have been somewhat restricted.

Basic survey results are summarized in Table 3-6 and more detailed survey results are tabulated in Appendix B (Tables 8-12).

Table 3-6. A general summary of the Fall 2009 raptor surveys conducted at the Groton Wind Project in Groton, New Hampshire.

Survey hours	157
Total number of raptor species detected	14
Total number of raptors detected	696
Overall survey passage rate (birds/hour)	4.43
Total number of raptors detected in the Project area (percent of total detections)	417 (59.9%)
Total number of raptors detected over the Tenney Mountain portion of the Project area (percent of total detections)[1]	370 (53.2%)
Total number of raptors detected over the Fletcher Mountain portion of the Project area (percent of total detections)	17 (2.4%)
Total number of raptors detected in the Project area and in potential rotor zone (percent of total detections)	222 (39.1%)
Overall passage rate in Project area (birds/hour)	3.21

[1]Two observations involved birds that passed over both Tenney and Fletcher Mountain.

Including those birds seen within and outside the Project area from both observation sites combined, a total of 696 raptors representing 14 species were observed during 10 survey days between August 24 and October 26, 2009 (Figures 3-8, 3-9). Broad-winged hawk (n=330) and red-tailed hawk (n=100) were the most frequently observed species. The highest number of observations occurred on September 10 (n=253) and September

9 (n=136), with passage rates of 8.5 and 15.8 raptors/hour respectively. (Appendix B, Table 8). Of the total number of raptors observed during the entire survey effort, 60 percent was observed in the Project area.

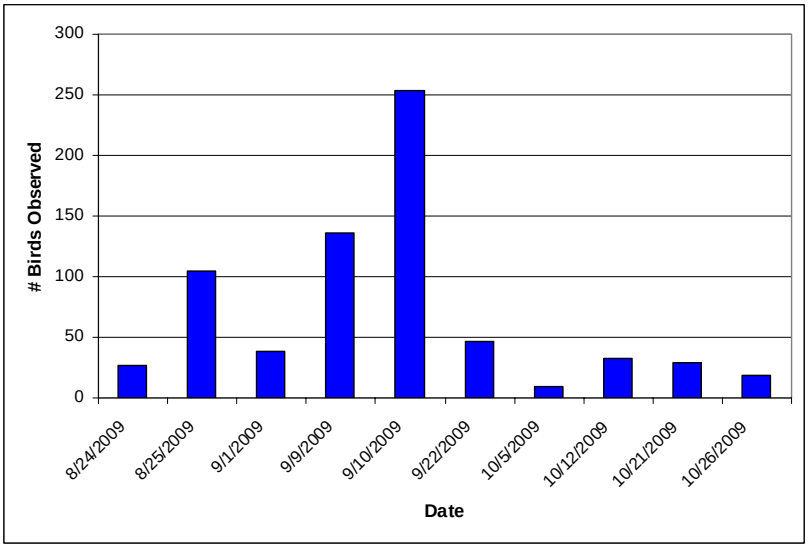


Figure 3-8. Number of individuals per survey day observed at the Groton Wind Project in Groton, New Hampshire during Fall 2009. Includes individuals observed both within and outside the Project area.

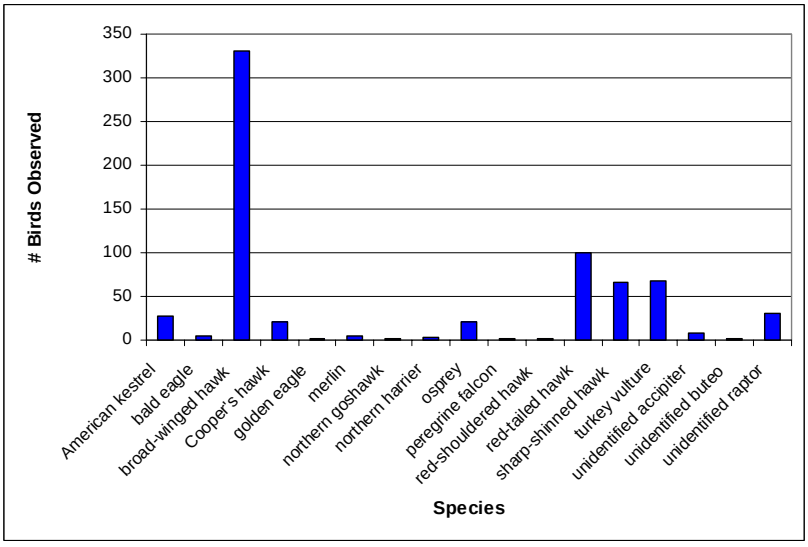


Figure 3-9. Number of individuals per species observed at the Groton Wind Project in Groton, New Hampshire during Fall 2009. Includes individuals observed both within and outside the Project area.

On a daily basis, the majority of observations occurred between 10:00 AM and 11:00 AM (Figure 3-10; Appendix B, Table 9).

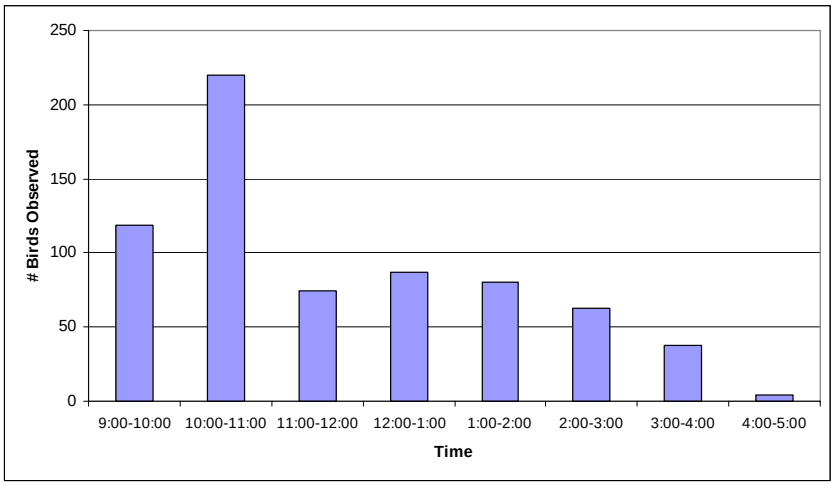


Figure 3-10. Number of individuals observed per survey hour during Fall 2009 at the Groton Wind Project in Groton, New Hampshire.

More birds were observed flying inside the Project area over the Tenney Mountain ridge (n=370) than over the Fletcher Mountain ridge (n=17) (Table 3-7) as observed from the two observation locations on Tenney Mountain and on Mt. Crosby. If compared to observation site rather than portion of the Project area, the results of both observation locations were similar at Tenney and Mount Crosby (n= 326 and n=370 respectively).

Table 3-7. Number of individuals per species observed within the Project area at the Groton Wind Project in Groton, New Hampshire during Fall 2009.

Species	Tenney Mountain	Fletcher Mountain
American kestrel	15	1
bald eagle	5	
broad-winged hawk	168	5
Cooper's hawk	11	2
merlin	4	
osprey	12	
peregrine falcon *(Falco peregrinus)*	1	
red-tailed hawk	72	1
sharp-shinned hawk	31	
turkey vulture	28	2
unidentified accipiter	4	2
unidentified buteo	1	
unidentified raptor	18	4
Total	**370**	**17**

Of the birds passing over the Tenney Mountain portion of the Project area, the highest percentage of birds were either flying along/parallel to ridge (n=187; 33 %) or along the upper slope (n=154; 28 %) (Table 3-8). Of the birds passing over the Fletcher Mountain portion of the Project area, the highest percentage of birds occurred along or parallel to the ridge (n=9, 33%) (Table 3-9).

Table 3-8. Number of observations and average flight heights for each position category for birds observed within the Tenney Mountain portion of the Project area, Fall 2009

	A1) flight along or parallel to ridge	A2) crossed saddle	A3) flight crossed depression or saddle	B) upper slope	D) lower slope	D) over valley
No. of position observations (will be greater than no. individuals)	187	40	12	154	57	105
Average minimum flight height (m)	131	105	57	125	189	342

Table 3-9. Number of observations and average flight heights for each position category for birds observed within the Fletcher Mountain portion of the Project area, Fall 2009

	A1) flight along or parallel to ridge	A2) crossed saddle	A3) flight crossed depression or saddle	B) upper slope	D) lower slope	D) over valley
No. of position observations (will be greater than no. individuals)	9	2	0	7	6	3
Average minimum flight height (m)	91	75	N/A	254	271	292

As with the spring survey and based upon the proposed turbine locations, it was determined that those birds flying over the valley were outside of the immediate influence of the turbine structures. Based on the proposed turbine height of 121 m (399'), those raptors observed in flight position A, B and C therefore were categorized as flying either above or below 121 m (Appendix B, Tables 10 and 11). Thirty-seven of the 370 birds observed in the Tenney Mountain portion of the Project area were documented as only occurring over the valley and not within any of the other flight positions. Excluding these birds, 222 birds (67 %) were flying at less than 121 m for a portion of their flight over Tenney Mountain (Figure 3-11). Five of the 22 birds documented as occurring within the Fletcher Mountain portion of the Project area were documented as only occurring over the valley and not within any of the other flight positions. Excluding these birds, 10 birds (59 %) flew at less than 121 m for a portion of their passage over

Fletcher Mountain (Figure 3-12). Within the Tenney and Fletcher Mountain portions of the Project area, the broad-winged hawk (n=149, n=5) was the species most commonly observed flying at heights less than 121 m.

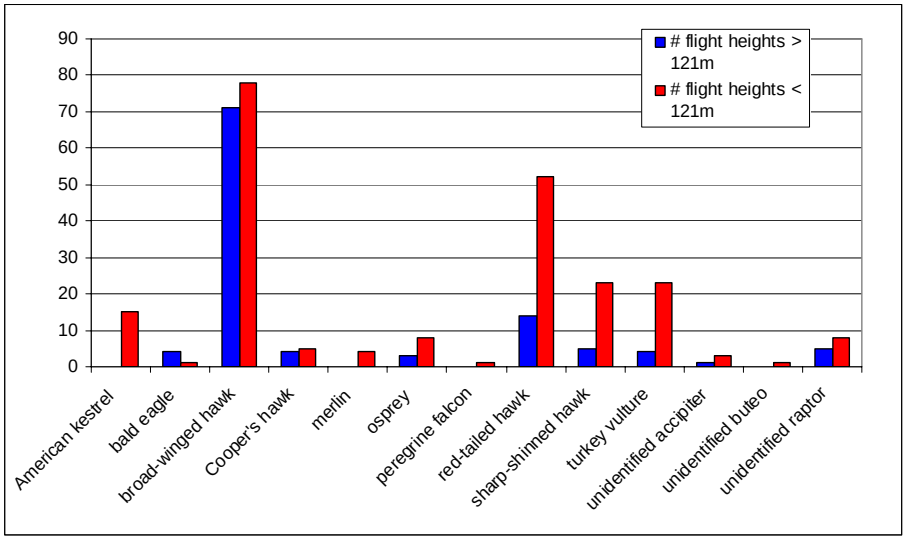


Figure 3-11. Number of individual of raptors observed flying along the summit and upper-and mid-slopes of Tenney Mountain during Fall 2009. Diagram distinguishes those raptors observed flying above and below the maximum height of the turbine.

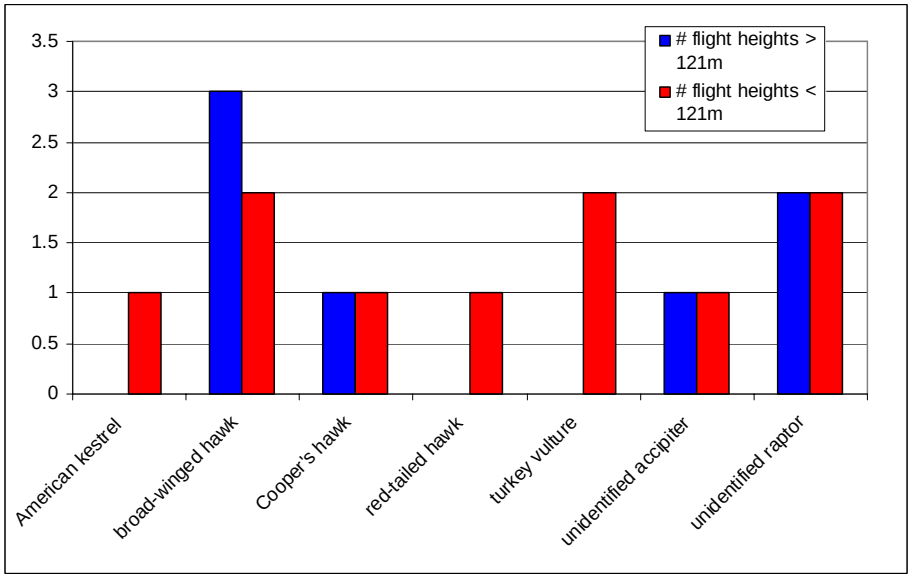


Figure 3-12. Number of individual of raptors observed flying along the summit and upper-and mid-slopes of Fletcher Mountain during Fall 2009. Diagram distinguishes those raptors observed flying above and below the maximum height of the turbine.

Based upon their flight behaviors, 52 percent of birds documented in the Tenney Mountain portion of the Project area and 76 percent of birds within the Fletcher Mountain portion of the Project area were thought to be migrating. The raptor flight behaviors observed in the Project area are summarized in Figure 3-13 below. All behaviors displayed by any one individual bird was recorded therefore, behavioral observations exceed number of birds observed. The behavior most commonly observed was circle soaring (n=434; 64 %) followed by linear soaring (n=250; 23 %) (Figure 3-13; Appendix B, Table 12).

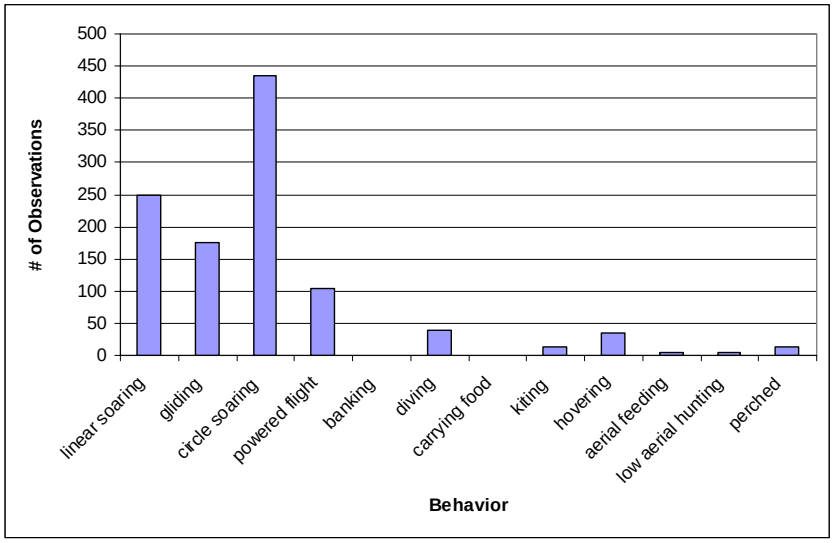


Figure 3-13. Number of flight behaviors exhibited by raptors observed during Fall 2009 surveys at the Groton Wind Project in Groton, New Hampshire.

3.3.5 Fall Surveys – RTE species

During the fall survey, two state endangered raptor species were observed including golden eagle and northern harrier (*Circus cyaneus*), however neither observation occurred inside the Project area. There were five observations of the state threatened species bald eagle. These observations likely represent three different birds, two adults and a sub-adult, moving at multiple elevations over Tenney Mountain. Based on communication between simultaneous observers, two of these observations were likely of the same bird but observed from each observation site and counted twice. Two state species of special concern, osprey and American kestrel were also seen in the Project area. See Appendix B for observation details.

3.3.6 Fall Surveys – Incidental bird observations

A total of 19 species were documented as incidental observations during the course of the raptor surveys (Table 3-10). These incidental observations included non-raptors

observed in the Project area before, during and after raptor surveys, as well as raptors observed outside the formal survey hours. No listed species were observed incidentally.

Table 3-10. Incidental species observed within the Project area of the Groton Wind Power Project, Fall 2009

Common name	Species
barred owl	*Strix varia*
black-capped chickadee	*Poecile atricapillus*
blue jay	*Cyanocitta cristata*
Canada goose	*Branta canadensis*
cedar waxwing	*Bombycilla cedrorum*
Cooper's hawk	*Accipiter cooperii*
common raven	*Corvus corax*
dark-eyed junco	*Junco hyemalis*
downy woodpecker	*Picoides pubescens*
golden-crowned kinglet	*Regulus satrapa*
great-horned owl	*Bubo virginianus*
northern flicker	*Colaptes auratus*
red-breasted nuthatch	*Sitta canadensis*
red-tailed hawk	*Buteo jamaicensis*
ruffed grouse	*Bonasa umbellus,*
unidentified raptor	Raptor sp.
unidentified thrush	*Turdus* sp.
unidentified warbler	Warbler sp.
yellow-rumped warbler	*Dendroica coronata*

3.4 DISCUSSION

During migration, raptors may shift and use different ridgelines and cross different valleys from year to year or season to season; and flight paths and flight behaviors may vary daily during localized raptor flights (Richardson 1998). Consequently, simultaneous raptor surveys with two observers were conducted at the Project in order to document the use of the various ridges in the Project area by migrating raptors.

During the spring raptor season between March 26 and May 23, a total of 175 raptors representing 11 different species were observed during surveys. Spring passage rates ranged from 0 to 10 birds/hr, with a seasonal average of 1.40 birds/hr. Turkey vultures and red-tailed hawks were the most commonly observed species. Thirty one percent of the birds documented within the Tenney Mountain portion of the Project area and 81 percent of the birds within the Fletcher Mountain portion of the Project area were suspected to be actively migrating. The discrepancy between these observations may have been influenced by the fact that raptors are more easily detected within closer distances to the observer. Remaining birds were suspected to be seasonally local to the Project area or stopping over in the area during migration. 76 birds observed (43%)

were within the Project boundary (and within zones A, B, and C). The majority of flight positions occurred above the upper and lower slopes of ridges in the vicinity of the Project. A total of 43 birds (25% of all observations), occurred in the Project area below the maximum rotor-swept zone of the proposed turbines.

During the fall raptor survey between August 24 and October 26, a total of 696 raptors representing 14 species were observed during surveys. Fall passage rates ranged from 0.56 to 15.81 birds/hr, with a seasonal average of 4.35 birds/hr. Broad-winged hawks, red-tailed hawks, turkey vultures, and sharp-shinned hawks were the most commonly observed species. Fifty two percent of the birds documented within the Tenney Mountain portion of the Project area and 76 percent of the birds within the Fletcher Mountain portion of the Project area were suspected to be actively migrating. The majority of all birds observed (60%) were within the Project boundary (and within zones A, B, and C). A total of 232 birds, 33 percent of all observations, occurred in the Project area below the maximum rotor-swept zone of the proposed turbines.

It should be noted that four bald eagles were observed during spring raptor surveys at the Project, two of which were within the Project area. The bald eagle is designated as a threatened species in New Hampshire. In addition, six osprey observations, a New Hampshire Species of Special Concern, was documented during spring raptor surveys. All but one of these observations occurred within the project boundary. During the fall survey, one golden eagle and one northern harrier were seen, although neither observation occurred inside the Project area. There were five observations of three individual bald eagles over Tenney Mountain during the fall survey. Two state species of special concern, osprey and American kestrel, were also seen in the Project area during the fall raptor survey.

Passage rates during spring raptor surveys at the Project were much lower than at HMANA sites in the region, and passage rates during fall raptor surveys at the Project were among the lower rates reported at HMANA sites in the region. (Appendix A, Table 1). The spring 2009 raptor passage rate detected at the Project is also at the lower end of the range reported for most other publicly-available pre-construction raptor surveys conducted at proposed wind projects in the northeast (Appendix B, Table 2). Overall spring passage rates among available studies in the northeast range from 0.1 to 15.4 raptors/hour. Fall 2009 raptor passage rates at the Project are among the moderate rates when all rates reported from other fall projects are considered; passage rates among available pre-construction fall studies in the northeast range from 0 to 12.72 raptors/hour. It is important, however, to use caution when comparing survey results from site to site as the level of effort and number of observers can affect such comparisons. In particular, HMANA protocol specifies only one observer. In addition to observer effort, seasonal weather patterns, topography, and biological factors may affect differences in passage rates between seasons at the same site as well as between sites.

Additionally, the percentage of raptors observed below the proposed maximum rotor-swept zone at this Project for both spring and fall is moderate compared to results at other wind power development sites in the region; the percentage of raptors observed

below the proposed turbine height(s) range from 3 to 94.7 percent for both spring and fall studies (Appendix B, Table 2).

The low to moderate passage rates observed at the Project area during both the spring and fall 2009 surveys respectively, suggests that raptor activity does occur in the Project area, however the magnitude of migration is similar to that found at other proposed wind power projects and lower than that observed at established HMANA hawk watch sites in the region . This pre-construction raptor studies provides baseline data regarding the species of raptor that occur and the general flight behaviors of birds. However, currently there is no clear relationship between pre-construction and post-construction data for the prediction of raptor collision risk at wind sites. That is, at existing wind farms, the passage rates and percentages of birds below turbine height determined during pre-construction surveys have not been directly correlated to the actual number of raptors that have been found during post-construction mortality studies.

4.0 Acoustic Bat Surveys

4.1 INTRODUCTION

Acoustic sampling of bat activity has become a standard aspect of pre-construction surveys for proposed wind-energy developments (Kunz *et al*. 2007b). Pre-construction acoustic bat surveys are designed to collect baseline information on bat activity levels and general species composition. Acoustic surveys allow for simultaneous data collection at multiple locations, at varying heights above ground level, and across longer time periods, and as a result, acoustic surveys can provide insight into seasonal patterns of activity levels.

Eight species of bats occur in New Hampshire, based upon their normal geographical range. These are the little brown bat (*Myotis lucifugus*), northern long-eared bat, (*M. septentrionalis*), eastern small-footed bat (*M. leibii*), silver-haired bat (*Lasionycteris noctivagans*), tri-colored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), and hoary bat (*L. cinereus*) (Whitaker and Hamilton, eds 1998). Of these, the small-footed bat is a state-listed endangered species.

The objectives of acoustic surveys at the Groton Wind Project were to (1) document bat activity patterns and general species composition from August through October across the Project area; and (2) document bat activity patterns in relation to weather factors such as wind speed and temperature.

4.2 DATA COLLECTION METHODS

Anabat SD1 detectors (Titley Electronics Pty Ltd.) were used for the duration of the spring 2009 acoustic bat survey. Anabat detectors are frequency division detectors, dividing the frequency of echolocation sounds made by bats by a factor of 16, and recording these sounds for subsequent analysis. The audio sensitivity setting of each Anabat system was set between six and seven (on a scale of one to ten) to maximize sensitivity while limiting ambient background noise and interference. The sensitivity of individual detectors was then tested using an ultrasonic Bat Chirp (Reno, NV) to ensure that the detectors would be able to detect bats up to a distance of at least 10 m (33'). Detectors were programmed to passively record data between 7:00 pm and 7:00 am via the internal clock on the SD1 detector, and data was stored on removable 1 to 2 GB compact flash cards. Anabat detectors were selected based upon their widespread use for this type of survey, their ability to be deployed for long periods of time, and their ability to detect a broad frequency range, which allows detection of all species of bats that could occur in the Project area.

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 curved section of PVC was fitted to the microphone. This set up allows the microphone to record the airspace horizontally in front of the detector and is the method of weatherproofing that result in the best quality data.

Acoustic surveys at the Groton Wind Project were designed based on discussions with Ed Arnett of Bat Conservation International (BCI) as well as Stantec's experience conducting these surveys at proposed wind projects in the northeast. The survey design included a total of 8 acoustic detectors that were deployed from 7:00 pm to 7:00 am between August 11 to October 22. At the request of USFWS, the detectors were deployed at various positions and heights across the proposed project area in order to characterize bat activity in two portions (east and west ridge) of the project area where wind turbines are proposed. Because met towers were not available, two detectors were deployed 15 meters high in portable towers; one on the southern end of the Fletcher Mountain ridgeline and one on the small subsidiary ridge to the north (Photo 1-2 and Figure 4-1).

Photo 1: Fletcher Mountain North Portable Tower Detector

The Fletcher Mountain north detector was located within a disturbed deciduous forest stand with patches of second growth red spruce, and regenerating hardwood with red raspberry *(Rubus idaeus)* understory. Elevation is approximately 1500'.

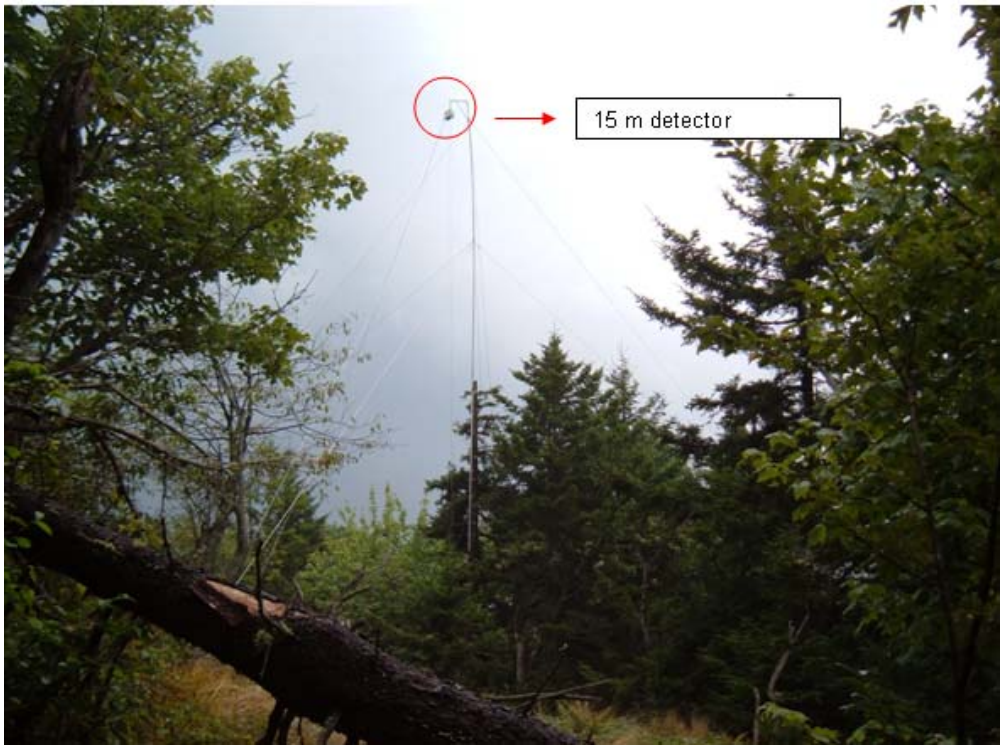


Photo 2: Fletcher Mountain South Portable Tower Detector

Habitat at the Fletcher mountain south detector location was dominantly northern hardwood – conifer at various age classes with moderately open forest. Grassy openings and bedrock outcroppings are common with sugar maple, yellow birch and red spruce as dominant canopy species. Elevation is approximately 2000' (Figure 4-1).

Three detectors were deployed at the met tower in the middle of Tenney Ridge and three detectors were deployed at the met tower at the north end of Tenney Ridge (Figure 4-1). Both met tower deployment sites on the Tenney Ridgeline had detectors at elevations of 45 m, 22 m and 2 m (Photo 3).

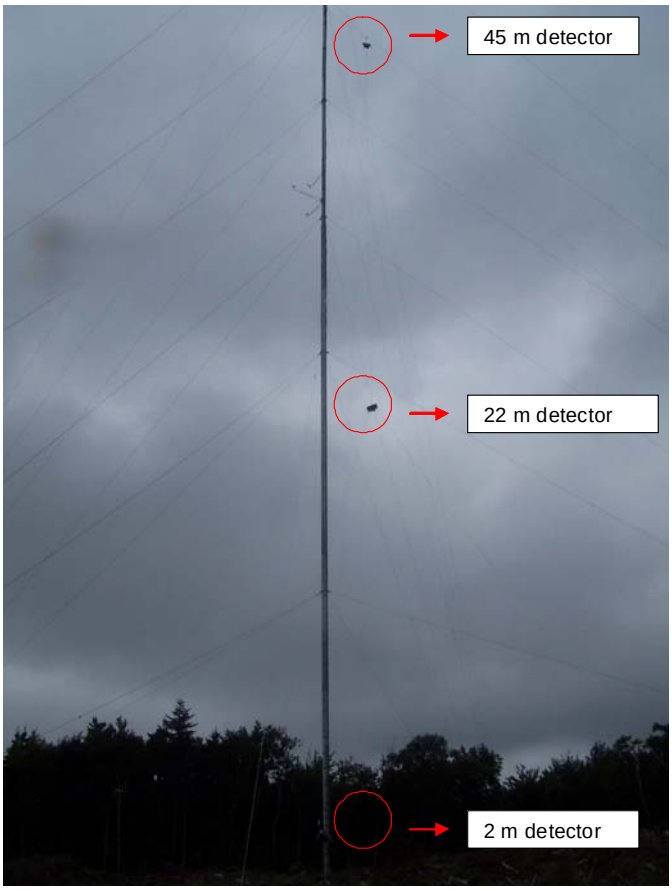
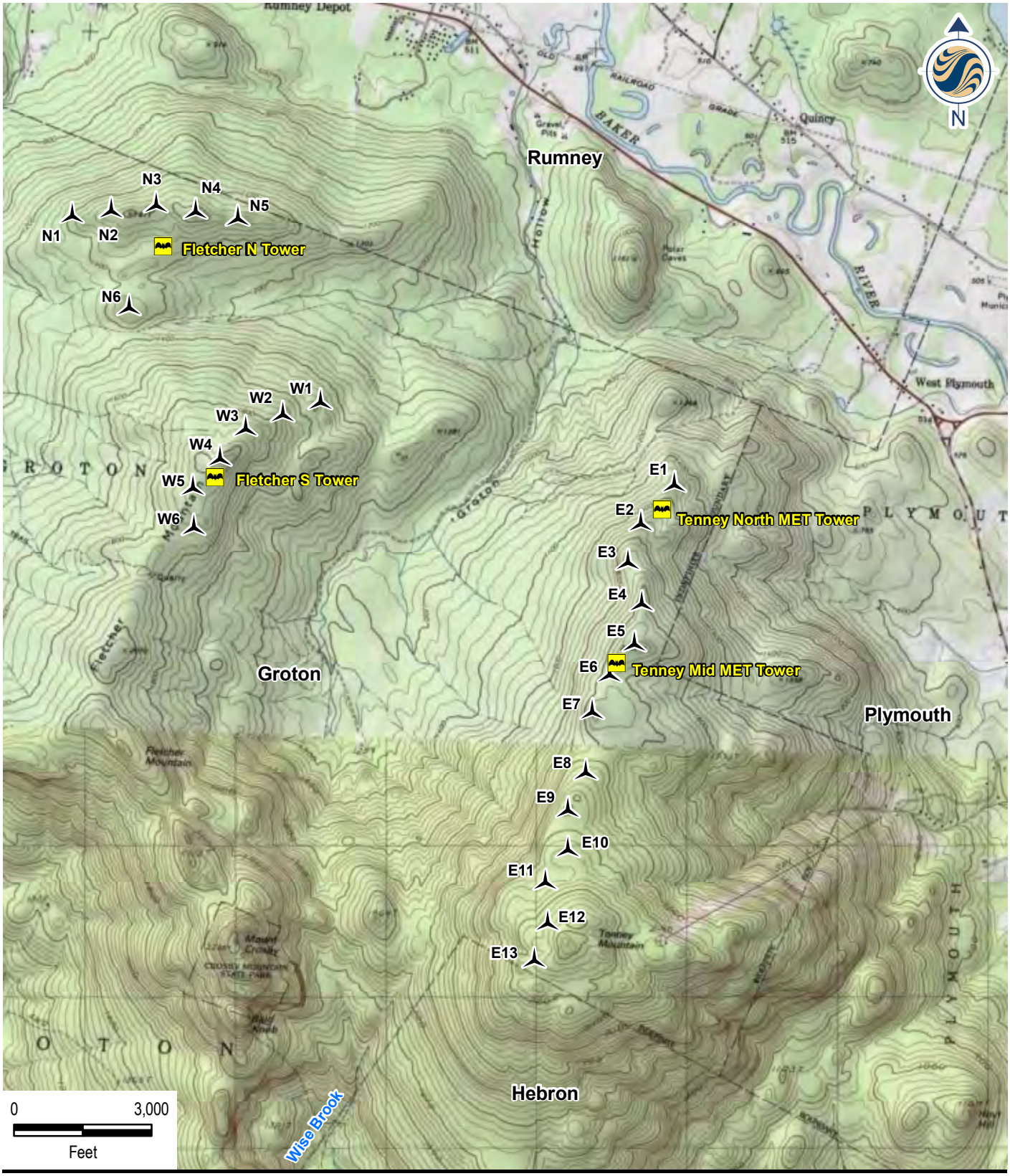


Photo 3: Met tower detectors

The Tenney Middle met tower is within a stand dominantly of second growth northern hardwood forest with a relatively closed canopy. Forest composition includes sugar maple, yellow birch, beech and red spruce, with hobblebush and fern understory, and small grassy openings with exposed bedrock. Elevation is approximately 2100'. Habitat around Tenney North met tower is mixed coniferous-deciduous forest, with a greater proportion of spruce on the steep northern end of the Tenney Mountain ridge. Forest understory is cool and moist with fern, moss and regenerating canopy species. Elevation is approximately 1700'. It is important to note that the installation of the met towers required a clearing approximately 120 meters in diameter within the habitats described above, therefore, the habitat within the detection zone of the acoustic detectors sampled airspace over the met tower clearing and forest edge as well as at heights above tree canopy.



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www.stantec.com

Legend

- Bat Detector
- Proposed Turbines

Client/Project

Groton Wind Project
Groton, New Hampshire

Figure No.
4-1

Title
Bat Detector Map
November 16, 2009

00299-F004-Bat-Detector.mxd

4.3 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. 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 northeastern 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 bats calls were included in the data set. Insect activity, wind, and interference can all 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. 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, and other bat researchers. However, due to similarity of call signatures between several species, all classified calls have been categorized into five guilds[2] reflecting the bat community in the region of the Project area, 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

[2] Gannon *et al.* 2003 categorized bats into guilds based upon similar minimum frequency and call shape. These guilds were: Unidentified, Myotis, LABO-PESU 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.

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 (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. Since some species sometimes produce calls unique only to that species, all calls were identified to the lowest possible taxonomic level before being grouped into the listed guilds. Tables and figures in the body of this report will reflect those guilds. However, since species-specific identification did occur in some cases, each guild will also be briefly discussed with respect to potential species composition of recorded call sequences.

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

4.3.1 Weather Data

Two 60 meter met towers on the north and middle sections of Tenney Ridgeline recorded weather data through the fall 2009 acoustic surveys. The mean temperature and wind speed were calculated for each night of survey and used during data analysis.

4.4 RESULTS

4.4.1 Detector Call Analysis – Fall 2009

Data for all detectors are tabulated in Appendix C, Tables 1-8. Eight detectors were deployed starting on August 11, 2009 and continued to record data through October 22, 2009 for a total survey period of 466 detector nights. The range of dates that each detector was deployed is summarized in Table 4-1. Five of the eight detectors recorded for the entire survey period without interruption however, three detectors suffered equipment malfunction causing occasional lapses in data collection. These include Fletcher North Portable Tower detector, Tenney Middle Met 2 m detector, and the Tenney North Met 2 m detector. Overall, the eight detectors combined operated successfully for 87% of the survey period. The Tenney Middle met tower detector (22 m) recorded thirty eight percent of all the calls recorded during the fall season (n=802). The Fletcher North and South Portable tower detectors recorded five percent and four percent (n=108, n=79; Table 4-1).

Table 4-1. Summary of fall (August 11 - October 22) bat detector field survey effort and results.

Location	Dates Deployed	Calendar Nights	Detector-Nights*	Recorded Sequences	Detection Rate **	Maximum Sequences recorded ***
Fletcher North Portable Tower	8/22 to 10/17	57	41	108	3	20
Fletcher South Portable Tower	8/21 to 10/22	63	63	79	1	14
Tenney Middle Met 45m	8/11 to 10/21	72	72	184	3	28
Tenney Middle Met 22m	8/13 to 10/21	70	70	802	11	362
Tenney Middle Met 2m	8/13 to 10/20	69	39	253	6	96
Tenney North Met 45m	8/13 to 10/22	71	71	231	3	30
Tenney North Met 22m	8/13 to 10/21	70	70	231	3	28
Tenney North Met 2m	8/18 to 10/21	65	40	216	5	58
Overall Results		***537***	***466***	***2104***	***4.5***	--

* One detector-night is equal to a one detector successfully operating throughout the night.

** Number of bat echolocation sequences recorded per detector-night across the entire survey period.

*** Maximum number of bat passes recorded from any single detector for a detector-night.

Both the Tenney Met North 45 m and 22 m detectors yielded the same overall detection rate, which is in contrast to the Tenney Middle met tower which documented a detection rate at the 22 m detector nearly four times the detection rate of the 45 m detector.

Over a period of 466 detector-nights from August 11 and October 22, a total of 2,104 call files were recorded by the eight detectors in the Project area combined, yielding an overall detection rate of 4.5 calls per detector-night. Approximately 84 percent of all calls were recorded during the month of August, when detection rates peaked for all detectors (Figure 4-2).

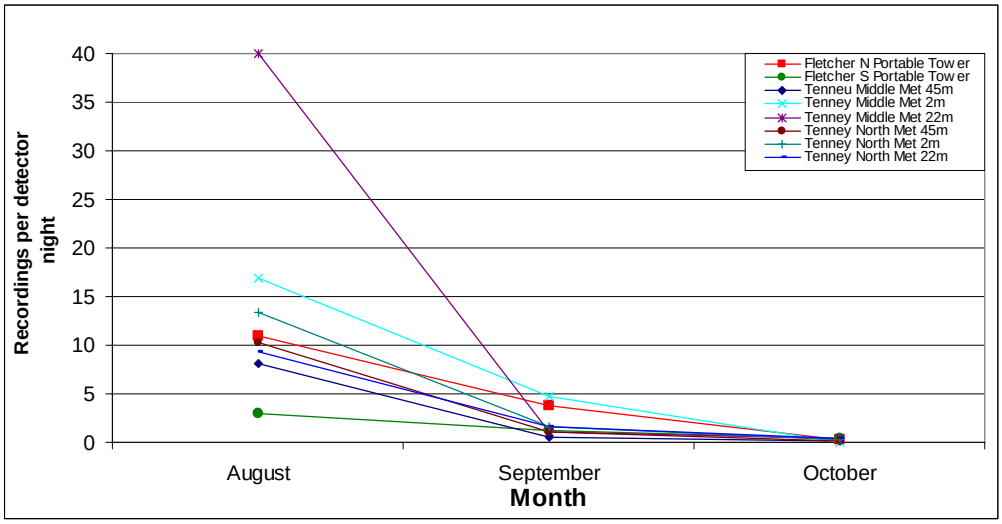

Figure 4-2. Monthly detection rates for all detectors during Fall 2009.

Activity across the survey period, measured as the number of call sequences recorded per night, was variable and somewhat pulsed. In general, activity remained highest through the month of August then decreased through the remainder of the survey period (Figure 4-3).

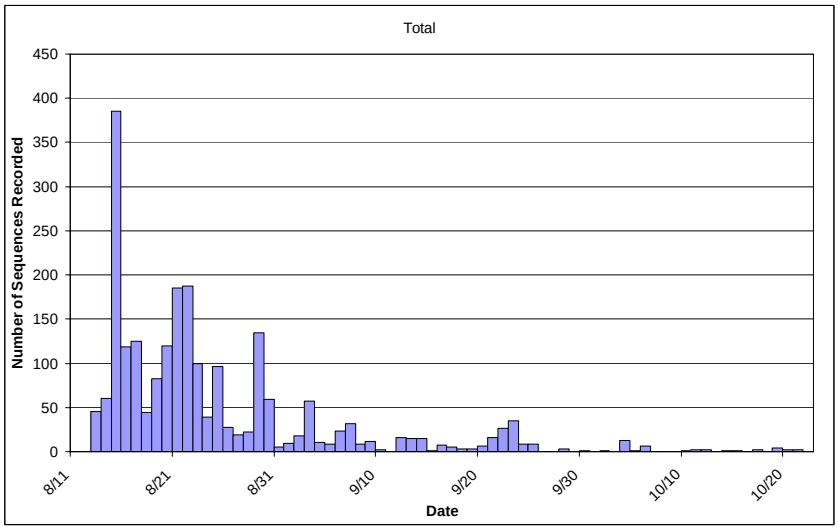

Figure 4-3: Total nightly bat call sequence detections during Fall 2009.

Seasonal activity, measured as the number of call sequences recorded each month, varied across detectors (Figure 4-4a - c). Each month except for October, the Fletcher North Portable Tower detector recorded more call sequences than the Fletcher South portable Tower detector. The North and Middle met tower detectors also showed similar trends by month and peaked in August. Detection rates between the towers were also consistent with each other by month and detector. However, one exception was the Tenney Middle met tower 22m detector which recorded far greater recordings than any other met tower detector. Excluding the 22 m detector at the Tenney Middle met tower; in general, detectors deployed closest to or below the tree canopy at the met tower locations recorded greater call sequences (Figure 4-4b).

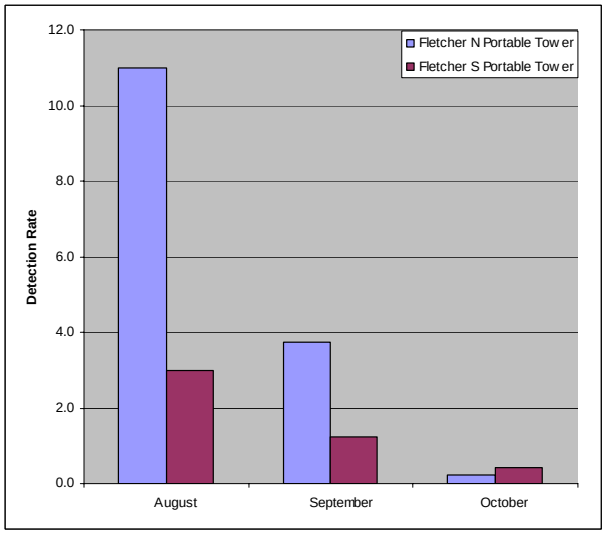

Figure 4-4a: Detection rates by month for Fletcher Portable Tower Detectors during Fall 2009.

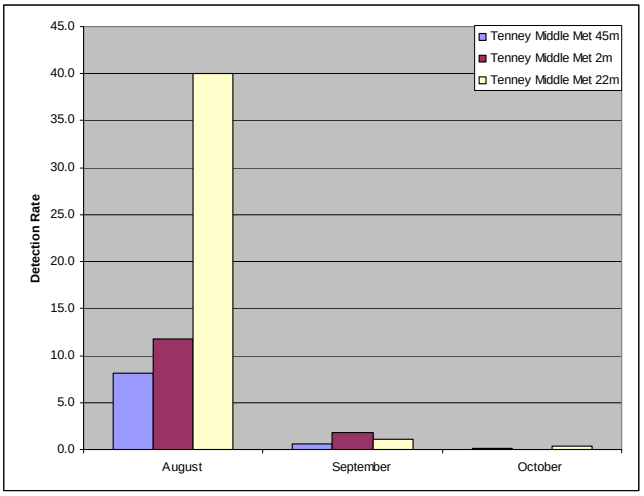

Figure 4-4b: Detection rates by month for Tenney Middle Met Tower Detectors during Fall 2009.

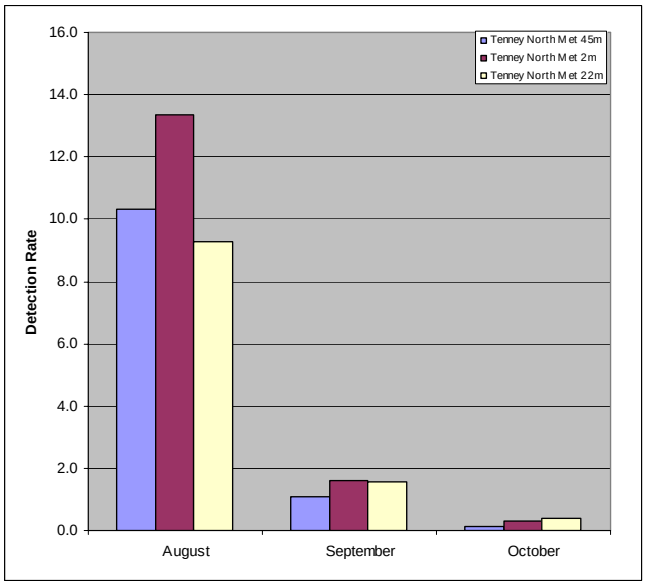

Figure 4-4c: Detection rates by month for Tenney North Met Tower Detectors for Fall 2009.

Nightly activity, measured as the number of call sequences recorded within each hour after sunset, varied by ridgeline and location (Figure 4-5a-c). Overall, nightly activity at the Fletcher portable tower detectors combined peaked twice within a night. The first peak occurred one hour after sunset and the second was four hours after sunset. The Tenney Middle met tower detectors peaked during the seventh hour after sunset and the Tenney North met tower detectors peaked during the sixth hour after sunset.

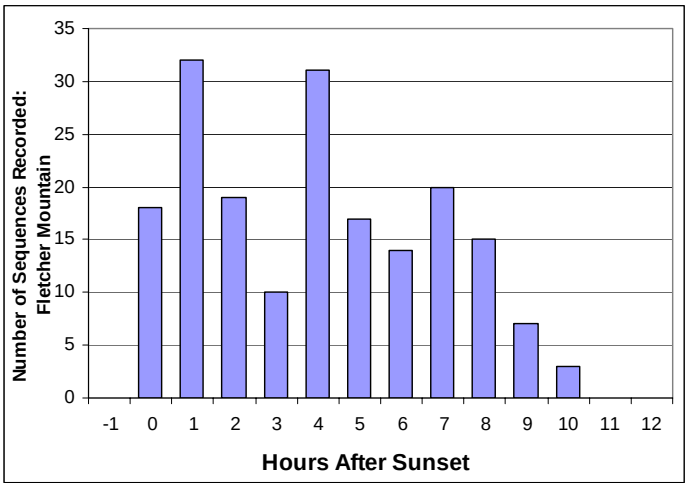

Figure 4-5a: Number of bat sequences per hour at Fletcher Portable Tower Detectors during Fall 2009.

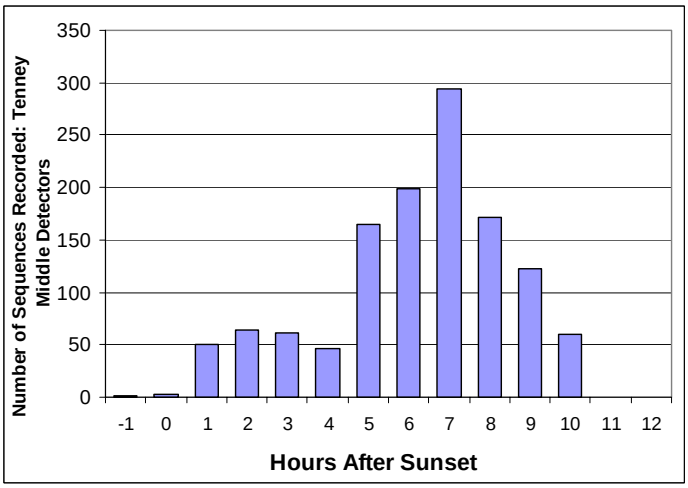

Figure 4-5b: Number of bat sequences per hour at Tenney Middle Met Tower Detectors during Fall 2009.

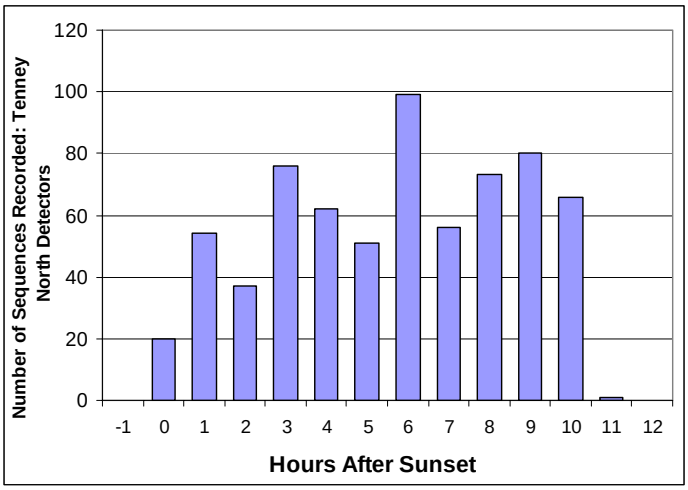

Figure 4-5c: Number of bat sequences per hour at Tenney North Met Tower Detectors during Fall 2009.

Call sequences belonging to all five guilds were identified during the acoustic survey (Table 4-2). The majority of recorded sequences belonged to the BBSH (big brown bat/silver-haired bat) guild (46%) followed by the UNKN (unknown) guild (29%). These files were labeled as UNKN because they either contained less than five pulses or the recording was not of sufficient quality to assign them to a species guild. However, further broken down by frequency range the majority (21%) of the UNKN guild was categorized as LFUN while the remaining eight percent were recorded call sequences identified as HFUN. The call sequences assigned as LFUN likely belonged to the BBSH guild based on the known frequency range of this group.

Table 4-2. Distribution of Fall detections (August 11 - October 22) by guild.						
Detector	**Guild**					**Total**
	BBSH	**HB**	**MYSP**	**RBTB**	**UNKN**	
Fletcher North Portable Tower	62	7	10	5	24	108
Fletcher South Portable Tower	33	6	4	4	32	79
Tenney Middle Met 45m	80	52	0	1	51	184
Tenney Middle Met 22m	470	75	6	11	240	802
Tenney Middle Met 2m	53	90	33	17	60	253
Tenney North Met 45m	117	40	3	3	68	231
Tenney North Met 22m	111	22	14	11	73	231
Tenney North Met 2m	32	16	97	4	67	216
Total	**958**	**308**	**167**	**56**	**615**	**2,104**
Guild Composition %	**46%**	**15%**	**8%**	**3%**	**29%**	

Species composition also varied across acoustic detector heights (Figure 4-6a-d). The Fletcher portable tower detectors and the Tenney 45m and 22m met tower detectors recorded a greater percentage of big brown bat/silver-haired bat calls, while the Tenney 2m met detectors recorded more myotis and high frequency unknown recordings than any other species.

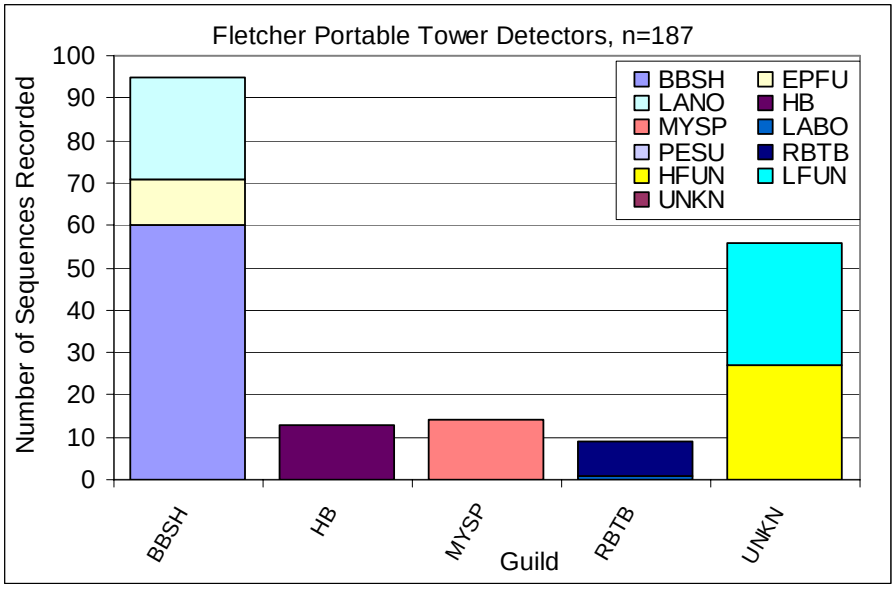

Figure 4-6a: Species composition at Fletcher Portable Tower Detectors during Fall 2009.

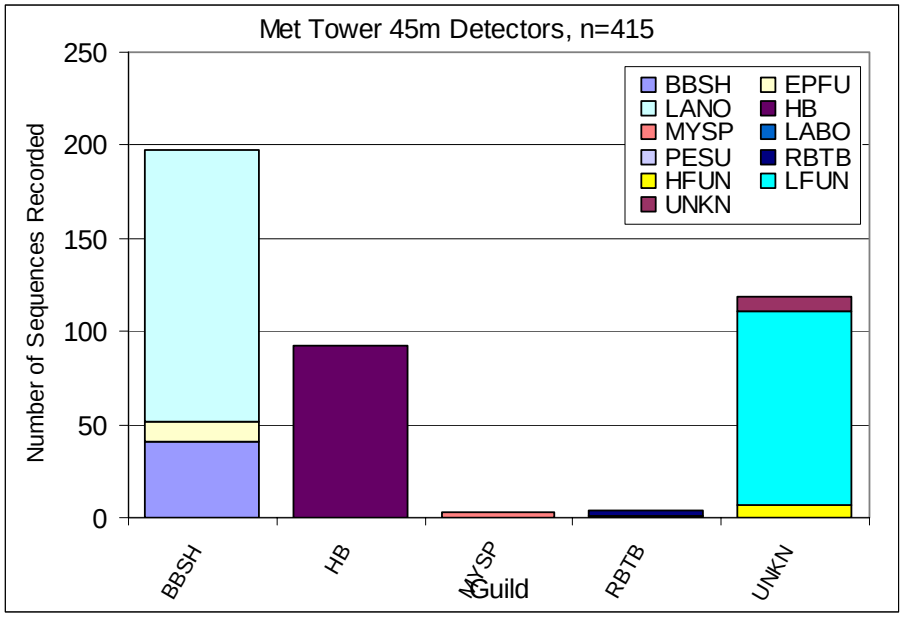

Figure 4-6b: Species composition at Tenney Met Tower 45m Detectors during Fall 2009.

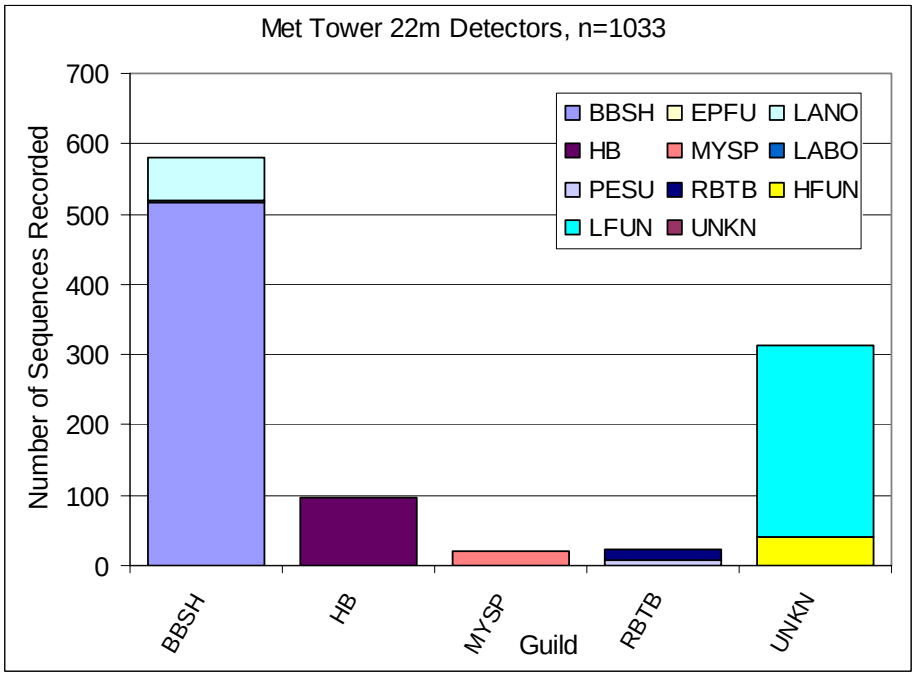

Figure 4-6c: Species composition at Tenney Met Tower 22m Detectors during Fall 2009.

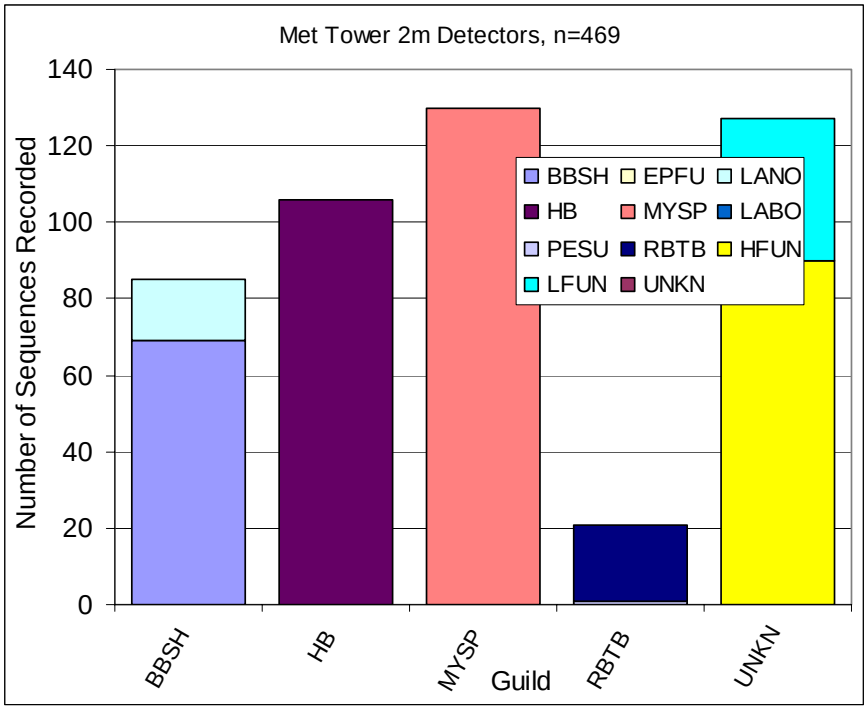

Figure 4-6d: Species composition at Tenney Met Tower 2m Detectors during Fall 2009.

4.4.2 Weather Data – Fall 2009

Mean nightly wind speeds in the Groton Wind Project area from August 11 through October 22, 2009 varied between 2.6 and 17.2 m/s, with an overall mean of 6.4 m/s. Mean nightly temperatures varied between 2.5ºC and 23.3ºC, with an overall mean of 10.7ºC. A scatter plot of mean nightly wind speeds and nightly bat call sequence detections indicates that there was no strong correlation between wind speed and detection rates (Figure 4-7), although there was a weak correlation between bat activity and mean nightly temperature (Figure 4-8).

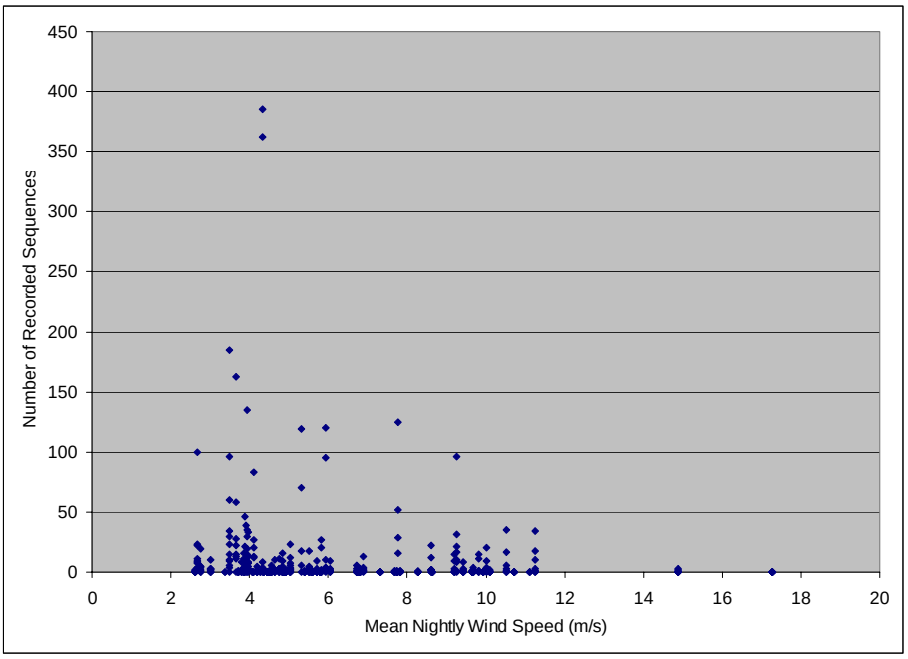

Figure 4-7. Nightly mean wind speed (m/s) and bat call detections during Fall 2009.

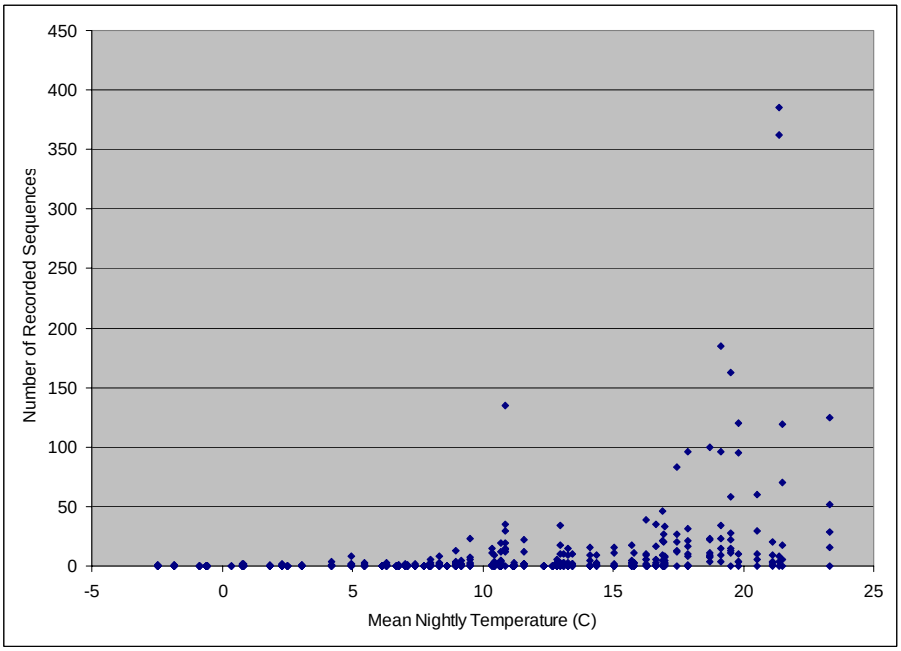

Figure 4-8. Nightly mean temperature (Celsius) and bat detections during Fall 2009.

4.5 DISCUSSION

Bat activity was variable among detector heights and locations during the fall 2009 migration season. However, some trends were observed. Call volumes varied month to month, although peaked early in the season (84% of call sequences were detected in August). Call volumes then declined through the month of September; during October, all detectors declined to a monthly average of less than .5 calls per detector night. The overall detection rate for all eight detectors was 4.5 calls per detector night. The overall detection rate by detectors at the Groton Wind Project when compared to other pre-construction acoustic bat surveys conducted at other proposed wind projects in the northeast was consistent. For the most part each detector at the Project area was at the low end of the range found at other sites (Appendix C, Table 12). The Tenney Middle met tower 22m detector recorded the highest average monthly detection rate of all eight detectors during the month of August, 2009 (40 bat call sequences per night), the majority of which were from the BBSH guild and LFUN guilds. It is important to use caution, however, when comparing detection rates across detectors and sites because detector location and height can significantly affect detection rates, therefore its best to compare similar detector heights and habitats when making these comparisons.

Bat calls were identified to guild within this report, although calls were provisionally categorized by species when possible during analysis. Certain species, such as the eastern red bat and hoary bat, have easily identifiable calls, whereas other species, such as the big brown bat and silver-haired bat, are difficult to distinguish acoustically. Similarly, certain members of the Myotis genus, such as the little brown bat, are far more common and have slightly more distinguishable calls than other species. A total of 167 Myotis call sequences (8% of total call sequences recorded) were detected at the Project in fall 2009.

The RBTB guild includes the tri-colored bat and eastern red bat. 56 call sequences, three percent of total call sequences recorded by detectors during the fall survey, belonged to the RBTB guild. Eastern red bats have relatively unique calls which span a wide range of frequency and have a characteristic hooked shape and variable minimum frequency. Tri-colored bats tend to have relatively uniform calls, with a constant minimum frequency and a sharply curved profile.

The BBSH guild includes the big brown bat and silver-haired bat, both of which produce search-phase calls with minimum frequencies in the 25-30 kHz range. Migratory species of the BBSH guild composed the greatest percentage of all calls recorded during the fall 2009 survey period (46%, n=958). Certain types of calls by each species are easily distinguishable from the other based on minimum frequency and call profile, but other calls in this range have overlapping characteristics and are difficult to distinguish. Whereas the big brown bat would be expected to occur in the Project area throughout the summer and fall, the silver-haired bat is a long-distance migratory species and would likely be present particularly during the fall migration period.

The HB guild consists of the hoary bat, the largest bat species in the northeast; 308 (15%) of call sequences belonged to the hoary bat at the Project. Hoary bat calls are generally distinguishable from all other species in the region and are characterized by highly variable minimum frequencies often extending below 20 kHz, and a hooked profile similar to the eastern red bat.

The height of a detector may determine the number of call sequences it records as well as the species it records. Six of the eight detectors deployed during the fall 2009 survey were above canopy height and recorded a higher percentage of migratory species, (e.g., big brown bats and silver-haired bats) than the two 2m met tower detectors, which detected more Myotis call sequences. This may be due to the fact that long-distance migratory species are more likely to be recorded at detectors deployed above canopy height, however detectors in and around canopy height often detect foraging individuals passing by the detector multiple times (Arnett *et al.* 2006). Detectors at higher altitudes may often record lower detection rates since bats aren't remaining in those areas for long periods of time. A similar trend was observed across the project area in 2009 for all detectors except the Tenney Middle met tower 22 m, which recorded four times the number of call sequences than the Tenney Middle met tower 45m detector, and is therefore comparable to both 2 meter met tower detectors.

Recent studies have found that bat activity patterns are influenced by weather conditions (Arnett *et al*. 2006, Arnett *et al*. 2008, Reynolds 2006). Acoustic surveys have documented a decrease in bat activity rates as wind speed increase and temperatures decrease, and bat activity has been shown to correlate negatively to low nightly mean temperatures (Hayes 1997, Reynolds 2006). Similarly, weather factors appeared related to bat collision mortality rates documented at two facilities in the southeastern United States, with mortality rates negatively correlated with both wind speed and relative humidity, and positively correlated to barometric pressure (Arnett *et al*. 2005). These patterns suggest that bats are more likely to migrate on nights with low wind speeds (less than 4 to 6 m/s) and generally warm temperatures. Thus, several weather variables can individually affect bat activity, as does the interaction among variables (i.e., warm nights with low wind speeds). On site met tower wind speed data collected at the time of the fall 2009 survey indicated that there was not a strong correlation between mean nightly wind speed and nightly bat call sequences. However, temperature data gathered from the same met tower indicates that there was a slight correlation between temperature changes and detection rates, with little activity on nights with mean temperatures below 10° C.

When considering the level of activity documented at the Groton Wind Project during fall 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. 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.

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Appendix A

2009 Breeding Bird Survey Data

Appendix A Table 1. Total number of species and individuals detected, and distance from observer at point count locations during Spring 2009 Project area surveys. These number largely represent singing males, but also include males and females that were observed visually.[1]

Common name	Scientific name	0-50 m	50-100 m	> 100 m	Flyovers	Grand Total
American Crow	*Corvus brachyrhynchos*			1		1
American Redstart	*Setophaga ruticilla*	11	7			18
Black-and-White Warbler	*Mniotilta varia*	3	3			6
Black-capped Chickadee	*Poecile atricapilla*	7	5			12
Blackburnian Warbler	*Dendroica fusca*	9	7			16
Black-throated Blue Warbler*	*Dendroica caerulescens*	14	17	3		34
Black-throated Green Warbler	*Dendroica virens*	3	7	1		11
Blue-headed Vireo	*Vireo solitarius*	2	4			6
Blue Jay	*Cyanocitta cristata*	4	1		1	6
Brown Creeper	*Certhia americana*		1			1
Chestnut-sided Warbler	*Dendroica pensylvanica*	10	5			15
Common Yellowthroat	*Geothlypis trichas*	2	2			4
Dark-eyed Junco	*Junco hyemalis*	12	14	2		28
Downy Woodpecker	*Picoides pubescens*				2	2
Golden-crowned Kinglet	*Regulus satrapa*	3	2	1		6
Hairy Woodpecker	*Picoides villosus*	2	1			3
Hermit Thrush	*Catharus guttatus*	10	12	10		32
Magnolia Warbler	*Dendroica magnolia*	1				1
Mourning Warbler	*Oporornis philadelphia*	2	1			3
Nashville Warbler	*Vermivora ruficapilla*	6	1			7
Northern Flicker	*Colaptes auratus*		2			2
Northern Parula	*Parula americana*	2	3			5
Ovenbird	*Seiurus aurocapillus*	25	21	3		49
Palm Warbler	*Dendroica palmarum*	4				4
Purple Finch	*Carpodacus purpureus*		1			1
Red-breasted Nuthatch	*Sitta canadensis*	2	7	1		10
Red-eyed Vireo	*Vireo olivaceus*	5	3			8
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		1	1		2
Scarlet Tanager	*Piranga olivacea*		2			2
Veery	*Catharus fuscescens*		1			1
White-throated Sparrow	*Zonotrichia albicollis*	2	2	3		7
Winter Wren	*Troglodytes troglodytes*	3	3			6
Yellow-bellied Sapsucker	*Sphyrapicus varius*	1				1
Yellow-rumped Warbler	*Dendroica coronata*	4	5			9
Grand Total		149	141	26	3	319

*One black-throated blue warbler was observed, but is not included in this table because its relative distance from the observer was not recorded.

[1]These totals include nine indiviudals from seven species recorded during the first survey effort at Point Counts 7 and 9. These two point count locations were subsequently cleared for construction of meterological towers, changing the habitat type. These indiviudals are excluded from other analyses.

Appendix A Table 2. Birds observed incidentally in the vicinity of the Project area.

Common name	Scientific name
American Robin*	*Turdus migratorius*
Black-capped Chickadee	*Poecile atricapilla*
Blue Jay	*Cyanocitta cristata*
Brown Creeper	*Certhia americana*
Chestnut-sided Warbler	*Dendroica pensylvanica*
Common Yellowthroat	*Geothlypis trichas*
Dark-eyed Junco	*Junco hyemalis*
Downy Woodpecker	*Picoides pubescens*
Hermit Thrush	*Catharus guttatus*
Ovenbird	*Seiurus aurocapillus*
Red-eyed Vireo	*Vireo olivaceus*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Ruffed Grouse*	*Bonasa umbellus*
Veery	*Catharus fuscescens*
White-throated Sparrow	*Zonotrichia albicollis*
Yellow-rumped Warbler	*Dendroica coronata*

*Species not detected during point count surveys

Appendix A Table 3. Total number of observations, relative abundance, and frequency of species at Project area point-count locations during three survey periods - Spring 2009

	Conifer							Mixed									Deciduous												Clearing				
	Point Count				Total # Birds	Relative Abundance	Frequency (%)	Point Count						Total # Birds	Relative Abundance	Frequency (%)	Point Count									Total # Birds	Relative Abundance	Frequency (%)	Point Count		Total # Birds	Relative Abundance	Frequency (%)
	1	3	10	13				6	12	14	15	18	19				2	4	5	8	11	16	17	20	21				7	9			
Common name																																	
American Redstart			1	2	3	0.38	50	3	1	1		2		7	0.58	67		1			3			2	1	7	0.39	44	1		1	0.50	50
Black-and-White Warbler	1				1	0.13	25	2	1	1				4	0.33	50	1									1	0.06	11			0	0.00	0
Black-capped Chickadee	2	1			3	0.38	50					2		2	0.17	17		1				1	2		2	6	0.33	44			0	0.00	0
Blue-headed Vireo			2	2	4	0.50	50							0	0.00	0					1		1			2	0.11	22			0	0.00	0
Blackburnian Warbler			2	4	6	0.75	50		2	1				3	0.25	33					4			2		6	0.33	22			0	0.00	0
Blue Jay					0	0.00	0			1	1			2	0.17	33			1				1	1		3	0.17	33			0	0.00	0
Brown Creeper	1				1	0.13	25							0	0.00	0										0	0.00	0			0	0.00	0
Black-throated Blue Warbler*	3	2			5	0.63	50	3	2	1	3	2	2	13	1.08	100	1	2	2	1		2	1	2	1	12	0.67	78	1		1	0.50	50
Black-throated Green Warbler	1			1	2	0.25	50			1		2	2	5	0.42	50	1								2	3	0.17	22			0	0.00	0
Common Yellowthroat		1			1	0.13	25			1				1	0.08	17			1						1	2	0.11	22			0	0.00	0
Chestnut-sided Warbler		1	1		2	0.25	50			2	1		1	4	0.33	50		1				1		4	1	7	0.39	44		2	2	1.00	50
Dark-eyed Junco	2	2	2	1	7	0.88	100		2		2	1		5	0.42	50			1	1	3	4	1	1		11	0.61	56		1	1	0.50	50
Golden-crowned Kinglet		2	2		4	0.50	50				1			1	0.08	17										0	0.00	0			0	0.00	0
Hairy Woodpecker	1				1	0.13	25							0	0.00	0							1			1	0.06	11	1		1	0.50	50
Hermit Thrush		1	1		2	0.25	50			4	2	1	4	11	0.92	67					2		2	1	1	6	0.33	44		3	3	1.50	50
Magnolia Warbler					0	0.00	0							0	0.00	0								1		1	0.06	11			0	0.00	0
Mourning Warbler					0	0.00	0			2	1			3	0.25	33										0	0.00	0			0	0.00	0
Nashville Warbler	1		3		4	0.50	50						1	1	0.08	17						1		1		2	0.11	22			0	0.00	0
Northern Flicker					0	0.00	0	1						1	0.08	17										0	0.00	0			0	0.00	0
Northern Parula	1				1	0.13	25		1					1	0.08	17	1						1			2	0.11	22	1		1	0.50	50
Ovenbird		1	3		4	0.50	50	2	1	5		3	2	13	1.08	83	4	2	2	2	2	4	4	1	3	24	1.33	100	3	1	4	2.00	100
Palm Warbler		1			1	0.13	25	1						1	0.08	17										0	0.00	0			0	0.00	0
Purple Finch					0	0.00	0							0	0.00	0	1									1	0.06	11			0	0.00	0
Rose-breasted Grosbeak					0	0.00	0							0	0.00	0							1			1	0.06	11			0	0.00	0

(*continued*)

Appendix A Table 3 (*cont.*)

Red-breasted Nuthatch	2			1	3	0.38	50		1		1		2	4	0.33	50						1				1	0.06	11			0	0.00	0
Red-eyed Vireo			1		1	0.13	25					2	1	3	0.25	33				1					2	3	0.17	22	1		1	0.50	50
Scarlet Tanager	1				1	0.13	25							0	0.00	0								1		1	0.06	11			0	0.00	0
Veery					0	0.00	0						1	1	0.08	17										0	0.00	0			0	0.00	0
Winter Wren	1				1	0.13	25				1			1	0.08	17						2		1		3	0.17	22		1	1	0.50	50
White-throated Sparrow	1				1	0.13	25				1			1	0.08	17	1	1								2	0.11	22			0	0.00	0
Yellow-bellied Sapsucker					0	0.00	0							0	0.00	0								1		1	0.06	11			0	0.00	0
Yellow-rumped Warbler	1		1		2	0.25	50			1	1			2	0.17	33	1		2				1			4	0.22	33	1		1	0.50	50
	19	12	19	11	**61**			12	11	21	15	15	16	**90**			11	8	9	5	15	16	16	19	14	**113**			9	8	**17**		

*One black-throated blue warbler was observed, but its relationship to the observer was not recorded therefore it was not included in this analysis.

Appendix A Table 4. Total number of species and individuals detected, and distance from observer at point count locations during Spring 2009 control areas surveys. These number largerly represent singing males, but also include males and females that were observed visually.

Common name	Scientific name	0-50 m	50-100 m	> 100 m	Flyovers	Grand Total
American Crow	*Corvus brachyrhynchos*		1			1
American Redstart	*Setophaga ruticilla*	3	4			7
Black-and-White Warbler	*Mniotilta varia*	3	1			4
Black-capped Chickadee	*Poecile atricapilla*	2	1			3
Blackburnian Warbler	*Dendroica fusca*	1	1	2		4
Black-throated Blue Warbler	*Dendroica caerulescens*	2	8			10
Black-throated Green Warbler	*Dendroica virens*	2	1	1		4
Blue-headed Vireo	*Vireo solitarius*		1			1
Blue Jay	*Cyanocitta cristata*	4	1			5
Brown Creeper	*Certhia americana*		1			1
Chestnut-sided Warbler	*Dendroica pensylvanica*	2	2			4
Dark-eyed Junco	*Junco hyemalis*	20	4			24
Golden-crowned Kinglet*	*Regulus satrapa*	8	4			12
Hermit Thrush	*Catharus guttatus*	2	14	4		20
Least Flycatcher	*Empidonax minimus*		1			1
Magnolia Warbler	*Dendroica magnolia*		2	1		3
Mourning Dove	*Zenaida macroura*		1	1	1	3
Nashville Warbler	*Vermivora ruficapilla*	3	3			6
Northern Parula	*Parula americana*		1			1
Ovenbird	*Seiurus aurocapillus*	1	13	1		15
Pine Siskin	*Carduelis pinus*		1			1
Pileated Woodpecker	*Dryocopus pileatus*		1			1
Purple Finch	*Carpodacus purpureus*	1				1
Red-breasted Nuthatch	*Sitta canadensis*	1	4			5
Red-eyed Vireo	*Vireo olivaceus*		7	2		9
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		3			3
Scarlet Tanager	*Piranga olivacea*		2			2
Warbling Vireo	*Vireo gilvus*		1			1
White-throated Sparrow	*Zonotrichia albicollis*		2			2
Wild Turkey	*Meleagris gallopavo*	1				1
Winter Wren	*Troglodytes troglodytes*		4	1		5
Yellow-bellied Sapsucker	*Sphyrapicus varius*	1	2			3
Yellow-rumped Warbler	*Dendroica coronata*	1	3			4
Grand Total		58	95	13	1	167

*One golden-crown kinglet was observed, but is not included in this table because its relative distance from the observer was not recorded.

Appendix A Table 5. Birds observed incidentally in the vicinity of the control areas.

Common name	Scientific name
American Robin*	*Turdus migratorius*
Black-and-White Warbler	*Mniotilta varia*
Blackburnian Warbler	*Dendroica fusca*
Black-capped Chickadee	*Poecile atricapilla*
Black-throated Blue Warbler	*Dendroica caerulescens*
Black-throated Green Warbler	*Dendroica virens*
Blue Jay	*Cyanocitta cristata*
Brown Creeper	*Certhia americana*
Eastern Phoebe*	*Sayornis phoebe*
Eastern Wood-pewee*	*Contopus virens*
Hermit Thrush	*Catharus guttatus*
Least Flycatcher	*Empidonax minimus*
Ovenbird	*Seiurus aurocapillus*
Red-eyed Vireo	*Vireo olivaceus*
Scarlet Tanager	*Piranga olivacea*
Veery*	*Catharus fuscescens*
White-throated Sparrow	*Zonotrichia albicollis*
Winter Wren	*Troglodytes troglodytes*
Wood thrush*	*Hylocichla mustelina*
*Species not detected during point count surveys	

Appendix A Table 6. Total number of observations, relative abundance, and frequency of species at control areas point-count locations during three survey periods - Spring 2009

	Conifer						Mixed					Deciduous						Rock Outcrop				
	Point Count			Total # Birds	Relative Abundance	Frequency (%)	Point Count		Total # Birds	Relative Abundance	Frequency (%)	Point Count			Total # Birds	Relative Abundance	Frequency (%)	Point Count		Total # Birds	Relative Abundance	Frequency (%)
	CP1	CP7	CP10				CP2	CP3				CP4	CP5	CP9				CP6	CP8			
Common name																						
American Crow			1	1	0.2	33			0	0.0	0				0	0	0			0	0	0
American Redstart	2	1		3	0.5	67	1	2	3	0.8	100		1		1	0.2	33			0	0	0
Black-and-White Warbler				0	0.0	0		2	2	0.5	50	1	1		2	0.3	67			0	0	0
Black-capped Chickadee	1	1	1	3	0.5	100			0	0.0	0				0	0.0	0			0	0	0
Blackburnian Warbler				0	0.0	0		1	1	0.3	50				0	0.0	0			0	0	0
Black-throated Blue Warbler	1			1	0.2	33		1	1	0.3	50				0	0.0	0			0	0	0
Black-throated Green Warbler	4			4	0.7	33		1	1	0.3	50				0	0.0	0			0	0	0
Blue-headed Vireo				0	0.0	0	1		1	0.3	50				0	0.0	0			0	0	0
Blue Jay	1			1	0.2	33	3		3	0.8	50	1	4	1	6	1.0	100			0	0	0
Brown Creeper			2	2	0.3	33			0	0.0	0			1	1	0.2	33			0	0	0
Chestnut-sided Warbler				0	0.0	0			0	0.0	0				0	0.0	0	1	3	4	1	100
Dark-eyed Junco	1	6		7	1.2	67	2	1	3	0.8	100		1	2	3	0.5	67	3	8	11	2.75	100
Golden-crowned Kinglet*	3	1	1	5	0.8	100		4	4	1.0	50			1	1	0.2	33	2		2	0.5	50
Hermit Thrush	3	3	1	7	1.2	100	1	2	3	0.8	100	1		2	3	0.5	67	3		3	0.75	50
Least Flycatcher			1	1	0.2	33			0	0.0	0				0	0.0	0			0	0	0
Magnolia Warbler				0	0.0	0			0	0.0	0				0	0.0	0	2		2	0.5	50
Mourning Dove				0	0.0	0			0	0.0	0				0	0.0	0	1		1	0.25	50
Nashville Warbler		1		1	0.2	33			0	0.0	0				0	0.0	0	3	2	5	1.25	100
Northern Parula				0	0.0	0			0	0.0	0	1			1	0.2	33			0	0	0
Ovenbird	1		3	4	0.7	67	3		3	0.8	50	3	4		7	1.2	67			0	0	0
Pine Siskin				0	0.0	0			0	0.0	0			1	1	0.2	33			0	0	0
Pileated Woodpecker				0	0.0	0		1	1	0.3	50				0	0.0	0			0	0	0
Purple Finch				0	0.0	0	1		1	0.3	50				0	0.0	0			0	0	0
Red-breasted Nuthatch				0	0.0	0		1	1	0.3	50	1			1	0.2	33	1		1	0.25	50
Red-eyed Vireo	2			2	0.3	33	1		1	0.3	50			2	2	0.3	33			0	0	0
Rose-breasted Grosbeak	1		1	2	0.3	67		1	1	0.3	50	1		2	3	0.5	67		1	1	0.25	50
Scarlet Tanager			1	1	0.2	33			0	0.0	0			1	1	0.2	33			0	0	0
Warbling Vireo				0	0.0	0			0	0.0	0		1		1	0.2	33			0	0	0
White-throated Sparrow				0	0.0	0	1		1	0.3	50				0	0.0	0			0	0	0
Wild Turkey				0	0.0	0			0	0.0	0		1		1	0.2	33	2	1	3	0.75	100
Winter Wren				0	0.0	0			0	0.0	0		1		1	0.2	33		1	1	0.25	50
Yellow-bellied Sapsucker				0	0.0	0	1	1	2	0.5	100	1			1	0.2	33			0	0	0
Yellow-rumped Warbler	1			1	0.2	33			0	0.0	0				0	0.0	0	3		3	0.75	50
	21	13	12	**46**			15	18	**33**			10	14	13	**37**			21	16	**37**		

Appendix B

2009 Raptor Survey Data

Appendix B Table 1. Summary of Regional Spring 2009 (February - May) Migration Surveys*

Location	Observation Hours	Black vulture	Turkey vulture	Osprey	Bald eagle	Northern harrier	Sharp-shinned hawk	Cooper's hawk	Northern goshawk	Red-shouldered hawk	Broad-winged hawk	Red-tailed hawk	Rough-legged hawk	Golden eagle	American kestrel	Merlin	Peregrine falcon	Swainson's hawk	Mississippi kite	Eurasian kestrel	Swallow-tailed kite	Unidentified raptor	Unidentified buteo	Unidentified Accipiter	Unidentifed falcon	Unidentifed eagle	TOTAL	BIRDS/ HOUR
Groton Wind Farm; Groton, NH	125	0	100	6	4	0	7	2	1	1	11	33	0	0	1	2	0	0	0	0	0	2	3	3	0	0	176	1.41
Barre Falls; Barre, MA	118.25	0	64	66	19	14	100	10	1	11	593	78	0	0	67	2	1	0	0	0	0	8	0	0	0	0	1034	8.74
Poquonock; Poquonock, CT	378	15	242	75	22	15	111	35	2	36	634	172	1	2	30	6	3	0	1	0	0	23	2	1	1	0	1429	3.78
Plum Island; Newburyport, MA	136.25	0	44	35	5	121	141	18	0	0	1	5	4	0	672	79	21	0	0	1	0	3	0	2	2	0	1154	8.47
Pilgrim Heights, North Truro, MA	304	1	703	94	13	20	353	63	2	22	137	81	2	0	404	42	10	0	0	0	0	0	1	3	3	0	1954	6.43
Bradbury Mt. State Park, Pownal, ME	442.75	1	280	321	46	114	747	56	6	92	1652	273	0	1	394	68	6	1	0	0	1	21	22	12	0	2	4116	9.30

* Data obtained from http://hawkcount.org; accessed 28 May 2009.

Summary of Regional Fall 2009 (August -October) Migration Surveys**

Location	Observation Hours	Black vulture	Turkey vulture	Osprey	Bald eagle	Northern harrier	Sharp-shinned hawk	Cooper's hawk	Northern goshawk	Red-shouldered hawk	Broad-winged hawk	Red-tailed hawk	Rough-legged hawk	Golden eagle	American kestrel	Merlin	Peregrine falcon	Unidentified raptor	Unidentified buteo	Unidentified Accipiter	Unidentified falcon	Unidentifed eagle	TOTAL	BIRDS/ HOUR
Groton Wind Farm; Groton, NH	157	0	68	21	5	4	66	21	1	2	330	100	0	2	28	5	2	31	2	8	0	0	696	4.35
Barre Falls; Barre, MA	230.75	0	347	146	72	30	1219	145	6	22	2680	180	0	1	224	21	3	42	0	0	0	0	5138	22.27
Poquonock; Poquonock, CT	490	48	198	36	49	24	91	24	5	16	951	47	0	0	43	15	15	22	3	1	2	0	1597	3.26
Interlakes Elementary School, NH	5	0	25	1	1	1	12	3	0	0	75	1	0	0	1	0	0	0	1	0	0	0	121	24.2
Little Blue Job, NH	10	0	15	1	0	1	0	0	0	0	2	0	0	0	0	0	0	8	1	0	1	0	29	2.9
Little Round Top, NH	151.17	0	23	75	56	8	114	55	2	0	2376	25	0	0	34	2	0	78	8	8	0	1	2865	18.95
Pack Monadnock, NH	384.5	0	71	182	50	76	1173	123	22	60	4322	328	0	6	135.00	55	30	71	14	7	8	2	6735	17.52

Appendix B Table 2. Summary of available spring and fall raptor data at proposed wind sites in the East 1999-2008

Project Site	Landscape	Survey Period	# of Survey Days	# of Survey Hours	Total # Observed	# of Species Observed	Seasonal Passage Rate (raptors/hr)	(Turbine Ht) and % Raptors Below Turbine Height	Full citation
Spring 1999									
Wethersfield, Wyoming Cty, NY	Agricultural plateau	April 20 - May 24	24	97	348	12	3.6	n/a (23 m mean flight height)	Cooper, B.A., and T.J. Mabee. 1999. Bird migration near proposed wind turbine sites at Wethersfield and Harrisburg, New York. Unpublished report prepared for Niagara–Mohawk Power Corporation, Syracuse, NY, by ABR, Inc., Forest Grove, OR. 46 pp.
Spring 2003									
Westfield Chautauqua Cty, NY	Great Lakes Shore	April 16 - May 15	50	100.7	2,578	17	25.6	n/a (278 m mean flight height)	Cooper, B.A., A.A. Stickney, J.J. Mabee. 2004. A visual and radar study of 2003 spring bird migration at the proposed Chautauqua wind energy facility, New York. 2004. Final Report prepared by ABR Inc. Chautauqua Windpower LLC.
Spring 2005									
Churubusco, Clinton Cty, NY	Great Lakes plain/ADK foothills	Spring 2005	10	60	170	11	2.83	(120 m) 69%	Woodlot Alternatives, Inc. 2005b. 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.
Clinton/Ellenburg, Clinton Cty, NY	Great Lakes plain/ADK foothills	April 18 to April 20	3	21	(2 non-migrant BWHA)	1	0.1***	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Dairy Hills, Clinton Cty, NY	Great Lakes Shore	April 15 to April 26	5	20	50	6	2.5	125 m (94.7%)*	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Altona, Clinton Cty, NY	Great Lakes plain/ADK foothills	May 5 to May 6	3	21	(4 non-migrant TUVU)	1	0.19***	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Bliss Wind Park, Eagle, Wyoming Cty, NY	Agricultural and wooded plateau	April 21, 26, 28	3	21	19	3	0.9	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Alabama, Genesee Cty, NY	Great Lakes plain/ADK foothills	April 16-April 29	5	20	177	8	9	(125 m) 84.5%*	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
High Sheldon, Wyoming Cty, NY	Agricultural and wooded plateau	April 2 to May 14	7	37	119	7	3.2	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Wethersfield, Wyoming Cty, NY	Agricultural and wooded plateau	April 22 to April 29	3	21	5	3	0.1	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
New Grange, Chautauqua Cty, NY	Great Lakes plain/ADK foothills	April 16 to May	5	20	55	8	4.37	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Stockton, Chautauqua Cty, NY	Great Lakes plain/ADK foothills	April 16 to May 15	5	20	122	8	4.65	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Clayton, Jefferson Cty, NY	Agricultural plateau	March 30 - May 7	10	58	700	14	12.1	(150 m) 61%	Woodlot Alternatives, Inc. 2005a. 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.
Prattsburgh, Steuben Cty, NY	Agricultural plateau	Spring 2005	10	60	314	15	5.23	(125 m) 83%	Woodlot Alternatives, Inc. 2005c. 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.
Cohocton, Steuben Cty, NY	Agricultural plateau	Spring 2005	10	60	164	11	2.73	(125 m) 77%	Woodlot Alternatives, Inc. 2005. Avian and Bat Information Summary and Risk Assessment for the Proposed Cohocton Wind Power Project in Cohocton, New York. Prepared for UPC Wind Management, LLC.
Munnsville, Madison Cty, NY	Agricultural plateau	April 5 to May 16	10	60	375	12	6.25	(118 m) 78%	Woodlot Alternatives, Inc. 2005d. 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.

(*continued*)

Appendix B Table 2 (*cont.*)

Moresville, Delaware County, NY	Forested ridge	March 28 to May 10	8	45	170	6	3.8	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Sheffield, Caledonia Cty, VT	Forested ridge	April to May	10	60	98	10	1.63	(125 m) 69%	Woodlot Alternatives, Inc. 2006b. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Power Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
Deerfield, Bennington Cty, VT (Existing facility)	Forested ridge	April 9 to April 29	7	42	44	11 (for both sites combined)	1.05	(125 m) 83% (at both sites combined)	Woodlot Alternatives, Inc. 2005e. 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.
Deerfield, Bennington Cty, VT (Western expansion)	Forested ridge	April 9 to April 29	7	42	38	11 (for both sites combined)	0.9	(125 m) 83% (at both sites combined)	Woodlot Alternatives, Inc. 2005e. 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.
Spring 2006									
Mars Hill, Aroostook Cty, ME	Forested ridge	April 12 to May 18	10	60.25	64	9	1.06	(120 m) 48%	Woodlot Alternatives, Inc. 2006c. 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.
Lempster, Sullivan County, NH	Forested ridge	Spring 2006	10	78	102	n/a	1.3	125 m (18%)	Woodlot Alternatives, Inc. 2007a. 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.
Howard, Steuben Cty, NY	Agricultural plateau	April 3 to May 19	9	52.5	260	11	4.95	(125 m) 64%	Woodlot Alternatives, Inc. 2006d. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Howard Wind Power Project in Howard, New York. Prepared for Everpower Global.
Chateaugay, Franklin Cty, NY	Great Lakes plain/ADK foothills	April 19 to April 28	3	21	47	12	1.9	(121 m) 3%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
St. Lawrence, Jefferson Cty, NY	Great Lakes Shore	April 14 to May 12	4	12	91	8	7.5	(125 m) 81%**	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Cape Vincent, Jefferson Cty, NY	Great Lakes Shore	April 14 to May 12	4	12	79	10	6.5	(125 m) 72%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Stockton, Chautauqua Cty, NY	Great Lakes plain/ADK foothills	n/a	n/a	n/a	n/a	n/a	4.65	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Spring 2007									
St Lawrence, Jefferson Cty, NY	Great Lakes Shore	March 21 to May 1	7	21	232	8	15.4	(125 m) 81%**	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Cape Vincent, Jefferson Cty, NY	Great Lakes Shore	March 21 to May 1	7	21	205	9	9.8	(125 m) 72%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
New Grange, Chautauqua Cty, NY	Great Lakes plain/ADK foothills	April 26 to May 22	5	n/a	n/a	n/a	4.37	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Jericho Rise, Franklin Cty, NY	Great Lakes plain/ADK foothills	April 4 to May 28	8	32	112	10	3	(125 m) 74.6%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Stetson, Penobscot Cty, ME	Forested ridge	April 26 to May 4	9	59	34	10	0.6	(125 m) 65%	Woodlot Alternatives, Inc. 2007b. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Laurel Mountain, Preston Cty, WV	Forested ridge	March 30 to May 17	10	63.75	266	12	4.17	(125 m) 55%	Stantec Consulting. 2008b. 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 – November 2007. Prepared for AES Laurel Mountain, LLC.

(*continued*)

Appendix B Table 2 (*cont.*)

Spring 2008									
Oakfield, Aroostock Cty, ME	Agricultural plateau	April 25- May 30	12	79	58	9	0.7	(120 m) 80%	Stantec Consulting. 2008c. 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.
Roxbury, Oxford Cty, ME	Forested ridge	March 11 to May 27	15	97	118	12	1.2	n/a	Stantec Consulting. 2008d. Spring 2008 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.
Lincoln, Penobscot Cty, ME	Forested ridge	April 3 to June 3	15	108	122	12	1.1	(125 m) 76%	Stantec Consulting. 2008e. 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.
Greenland, Grant Cty, WV	Forested ridge	March 21 to May 14	10	68	212	9	3.12	(125 m) 68%	Stantec Consulting. 2008f. Spring, Summer, and Fall 2008 Bird and Bat Migration Survey Report Visual, Radar, and Acoustic Bat Surveys for the New Creek Mountain Project West Virginia. Prepared for AES New Creek, LLC.
Fall 1996									
Searsburg, Bennington County, VT	Forested ridge	Sept. 11 - Nov. 3	20	80	430	12	5.38	n/a	Kerlinger, Paul. 1996. A Study of Hawk Migration at Green Mountain Power Corporation's Searsburg, Vermont, Wind Powewer Site: Autumn 1996. Prepared for the Vermont Public Service Board, Green Mountain Power, National Renewable Ener gy Laboratory, VERA.
Fall 1998									
Harrisburg, Lewis County, NY	Great Lakes plain/ADK foothills	Sept. 2 - Oct. 1	13	68	554	12	8.1	n/a (48 m mean flight height)	Cooper, B.A., and T.J. Mabee. 1999. Bird migration near proposed wind turbine sites at Wethersfield and Harrisburg, New York. Unpublished report prepared for Niagara–Mohawk Power Corporation, Syracuse, NY, by ABR, Inc., Forest Grove, OR. 46 pp.
Wethersfield, Wyoming Cty, NY	Agricultural plateau	Sept. 2 - Oct. 1	24	107	256	12	2.4	n/a (47 m mean flight height)	Cooper, B.A., and T.J. Mabee. 1999. Bird migration near proposed wind turbine sites at Wethersfield and Harrisburg, New York. Unpublished report prepared for Niagara–Mohawk Power Corporation, Syracuse, NY, by ABR, Inc., Forest Grove, OR. 46 pp.
Fall 2004									
Prattsburgh, Steuben Cty, NY	Agricultural plateau	Sept. 2 - Oct. 28	13	73	220	10	3.01	(125 m) 62%	Woodlot Alternatives, Inc. .2005b. A Fall 2004 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.
Cohocton, Stueben, Cty, NY	Agricultural plateau	Sept. 2 - Oct. 28	8	41.3	128	8	3.1	(125 m) 80%	Woodlot Alternatives, Inc. 2005. Avian and Bat Information Summary and Risk Assessment for the Proposed Cohocton Wind Power Project in Cohocton, New York. Prepared for UPC Wind Management, LLC.
Deerfield, Bennington Cty, VT (Existing Facility)	Forested ridge	Sept. 2 - Oct. 31	10	60	147	11 for both sites combined	2.45	(100 m) 9% for both sites combined	Woodlot Alternatives, Inc. 2005c. Fall 2004 Avian Migration Surveys at the Proposed Deerfield Wind/Searsburg Expansion Project in Searsburg and Readsboro, Vermont. Prepared for Deerfield Wind, LLC and Vermont Environmental Research Associates.
Deerfield, Bennington Cty, VT (Western Expansion)	Forested ridge	Sept. 2 - Oct. 31	10	57	725	11 for both sites combined	12.72	(100 m) 9% for both sites combined	Woodlot Alternatives, Inc. 2005c. Fall 2004 Avian Migration Surveys at the Proposed Deerfield Wind/Searsburg Expansion Project in Searsburg and Readsboro, Vermont. Prepared for Deerfield Wind, LLC and Vermont Environmental Research Associates.
Sheffield, Caledonia Cty, VT	Forested ridge	Sept. 11 - Oct. 14	10	60	193	10	3.2	(125 m) 31%	Woodlot Alternatives, Inc. 2006a. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Power Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
Fall 2005									
Alabama, Genesee Cty, NY	Great Lakes plain/ADK foothills	Sept. 11 - Oct. 10	5	19	148	4	8	(125 m) 84.5%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
High Sheldon, Wyoming Cty, NY	Agricultural and wooded plateau	Aug. 29 - Nov. 4	8	53.5	168	9	3.1	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Wethersfield, Wyoming Cty, NY	Agricultural plateau	Sept. 13 - Sept. 18	3	21	0	0	0	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Wethersfield, Wyoming Cty, NY	Agricultural plateau	Sept. 21 - Nov. 1	3	21	231	11	9.7	(122 m) 27%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.

(*continued*)

Appendix B Table 2 (*cont.*)

Bliss, Wyoming Cty, NY	Agricultural and wooded plateau	Sept. 12 - Sept. 17	2	21	0	0	0	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Cohocton, Stueben, Cty, NY	Agricultural plateau	Sept. 7 - Oct. 1	7	40.12	131	10	3.27	(125 m) 63%	Woodlot Alternatives, Inc. 2005. Avian and Bat Information Summary and Risk Assessment for the Proposed Cohocton Wind Power Project in Cohocton, New York. Prepared for UPC Wind Management, LLC.
West Hill, Maidson Cty, NY	Agricultural plateau	Sept. 6 - Oct. 31	11	65	369	14	5.68	(118 m) 51%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Clinton / Ellenburg, Clinton Cty, NY	Agricultural plateau	Sept. 23 - Sept. 28	3	21	0	0	0	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Altona, Clinton Cty, NY	Great Lakes plain/ADK foothills	Sept. 24 - Sept. 30	3	21	0	0	0	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Marble River, Clinton Cty, NY	Great Lakes plain/ADK foothills	Sept. 6 - Nov. 2	10	60	217	15	3.62	(120 m) 69%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Clayton, Jefferson Cty, NY	Great Lakes plain/ADK foothills	Sept. 9 - Oct. 16	11	63.5	575	13	9.1	(150 m) 89%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
New Grange, Chautauqua Cty, NY	Forested ridge	Sept. 17 - Oct. 15*	6	18	49	5	4.37	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Moresville, Deleware Cty, NY	Forested ridge	Aug. 31 - Nov. 3	11	72	228	11	3.2	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Churubusco, Clinton Cty, NY	Great Lakes plain/ADK foothills	Sept. 6 - Oct. 22	10	60	217	15	3.62	(120 m) 69%	Woodlot Alternatives, Inc. 2005l. A Fall 2005 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.
Dairy Hills, Wyoming Cty, NY	Agricultural plateau	Sept. 11 - Oct. 10	4	16	48	6	3	(125 m) 94.7%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Howard, Steuben Cty, NY	Agricultural plateau	Sept. 1 - Oct. 28	10	57	206	12	3.6	(91 m) 65%	Woodlot Alternatives, Inc. 2005o. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Howard Wind Power Project in Howard, New York. Prepared for Everpower Global.
Munnsville, Madison Cty, NY	Agricultural plateau	Sept. 6 - Oct. 31	11	65	369	14	5.68	(118 m) 51%	Woodlot Alternatives, Inc. 2005r. Summer and Fall 2005 Bird and Bat Surveys at the Proposed Munnsville Wind Project in Munnsville, New York. Prepared for AES-EHN NY Wind, LLC.
Mars Hill, Aroostook Cty, ME	Forested ridge	Sept. 9 - Oct. 13	8	42.5	115	13	1.52	(120 m) 42%	Woodlot Alternatives, Inc. 2005t. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Mars Hill Wind Project in Mars Hill, Maine. Prepared for UPC Wind Management, LLC.
Lempster, Sullivan County, NH	Forested ridge	Fall 2005	10	80	264	10	3.3	(125 m) 40%	Woodlot Alternatives, Inc. 2007c. Lempster Wind Farm Wildlife Habitat Summary and Assessment. Prepared for Lempster Wind, LLC.
Clayton, Jefferson Cty, NY	Agricultural plateau	Sept. 9 - Oct. 16	11	63.5	575	13	9.1	(150 m) 89%	Woodlot Alternatives, Inc. 2005m. A Fall 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.
Fall 2006									
Stetson, Penobscot Cty, ME	Forested ridge	Sept. 14 - Oct. 26	7	42	86	11	2.05	(125 m) 63%	Woodlot Alternatives, Inc. 2007b. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Mountain Wind Power Project in Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Lincoln, Penobscot Cty, ME	Forested ridge	Sept. 13 - Oct. 16	12	89	144	12	1.8	(120 m) 82%	Woodlot Alternatives, Inc. 2007. Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Wind Power Project in Washington County, Maine. Prepared for Evergreen Wind V.

(*continued*)

Appendix B Table 2 (*cont.*)

Wethersfield, Wyoming Cty, NY	Agricultural plateau	Sept. 21 - Nov. 11	3	21?	231	11	9.7	(122 m) 27%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Chateaugay, Franklin Cty, NY	Great Lakes plain/ADK foothills	Sept. 6 - Oct. 26	2	24	42	5	1.6	(122 m) 31%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
St. Lawrence, Jefferson Cty, NY	Agricultural plateau	Sept. 23 - Nov. 11	10	30	288	10	9.6	(125 m) 81%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Cape Vincent, Jefferson Cty, NY	Great Lakes plain/ADK foothills	Sept. 23 - Nov. 11	10	30	165	10	5.5	(125 m) 72%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Jordanville, Herkimer Cty, NY	Agricultural plateau	Oct. 13 - Nov. 30	44	234.7	629	12	2.7	(125 m) 67%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Fall 2007									
Roxbury, Oxford Cty, ME	Forested ridge	Sept. 3 - Oct. 15	14	86	96	12	1.1	n/a	Stantec Consulting. 2008. Fall 2007 Migration Survey Report Visual, Acoustic, and Radar Surveys of Bird and Bat Migration conducted at the proposed Record Hill Wind Project In Roxbury, Maine. Prepared for Independence Wind, LLC.
Errol, Coos Cty, NH	Forested ridge	Sept. 5 - Oct. 16	11	68	44	9	0.7	n/a	Stantec Consulting. 2007. Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Power, LLC. Prepared for Granite Reliable Power, LLC.
Laurel Mountain, Preston Cty, WV	Forested ridge	Sept. 12 - Dec. 1	24	147	769	12	5.2	(125 m) 65%	Stantec Consulting Services Inc. 2007. A Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Laurel Mountain Wind Energy Project near Elkins, West Virginia. Prepared for AES Laurel Mountain, LLC.
Greenland, Grant Cty, WV	Forested ridge	Sept. 12 - Dec. 1	27		858	13	5.9	(125 m) 67%	Stantec Consulting Services Inc. 2008. A Fall 2007 Survey of Bird and Bat Migration at the New Creek Wind Project,West Virginia. Prepared for AES New Creek, LLC.
New Grange, Chautauqua Cty, NY	Forested ridge	Sept. 21 - Oct. 28	6	n/a	n/a	n/a	4.37	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Allegany, Cattaraugus Cty, NY	Forested ridge	Sept. 8 - Oct. 11	11	63.78	125	10	1.96	(150 m) 78%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Jericho Rise, Franklin Cty, NY	Great Lakes plain/ADK foothills	Sept. 12 - Oct. 26	7	28	59	7	2	(125 m) 74.6%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Fall 2008									
Oakfield, Aroostook Cty, ME	Agricultural plateau	Sept. 26 - Oct. 14	12	84	60	8	0.7	(120 m) 67%	Woodlot Alternatives, Inc. 2008. A Fall 2008 Survey of Bird and Bat Migration at the Oakfield Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.

*Calculated for spring and fall combined.

**Calculated for spring and fall 2006 and 2007 combined.

***Non-migrants were not included in seasonal passage rates in NYSDEC 2008 table but were included in passage rates here.

Appendix B Table 3. Daily totals of raptor species observed and daily passage rates at Groton Wind Project during Spring 2009.												
Species	**3/26**	**3/27**	**4/5**	**4/15**	**4/16**	**4/29**	**4/30**	**5/6**	**5/12**	**5/13**	**5/23**	**Entire Season**
American kestrel				1								**1**
Bald eagle	1			1					1	1		**4**
Broad-winged hawk						1	5		1	4		**11**
Cooper's hawk				1				1				**2**
Merlin					1					1		**2**
Northern goshawk									1			**1**
Osprey						1	5					**6**
Red-shouldered hawk				1								**1**
Red-tailed hawk	2			5	6	4	7	4		2	3	**33**
Sharp-shinned hawk					3	1	1			1	1	**7**
Turkey vulture		9		4	29	2	14	9	17	10	5	**99**
Unidentified Accipiter				1	1		1					**3**
Unidentified Buteo					1					2		**3**
Unidentified Raptor								1		1		**2**
Daily Totals	**3**	**9**	**0**	**14**	**41**	**9**	**33**	**15**	**20**	**22**	**9**	**175**

Appendix B Table 4. Hourly summary of raptor observations at Groton Wind Project during Spring 2009.									
Species	**9:00-10:00**	**10:00-11:00**	**11:00-12:00**	**12:00-1:00**	**1:00-2:00**	**2:00-3:00**	**3:00-4:00**	**4:00-5:00**	**Grand Total**
AMKE			1						1
BAEA		3			1				4
BWHA	1	3	1	2	3	1			11
COHA			1				1		2
MERL		2							2
NOGO					1				1
OSPR		1	2	3					6
RSHA		1							1
RTHA	3	5	7	6	4	2	2	4	33
SSHA	4			2	1				7
TUVU	6	13	21	6	16	13	14	10	99
Unidentified Accipiter		1	1	1					3
Unidentified Buteo		1			1		1		3
Unidentified Raptor					1	1			2
Hourly totals	**14**	**30**	**34**	**20**	**28**	**16**	**18**	**14**	**175**

Appendix B Table 5. Number of individuals of species observed within the Tenney Mountain portion of the Project area and within proposed turbine areas (flight positions A, B, and C) above or below 121 m

Species	121 m or greater	less than 121 m
American kestrel		1
Bald eagle	1	
Broad-winged hawk	2	3
Cooper's hawk		1
Merlin		1
Osprey		3
Red-tailed hawk	4	12
Sharp-shinned hawk	1	1
Turkey vulture	2	10
Unknown Accipiter		1
Unknown Buteo	1	
TOTAL	**11**	**33**

Appendix B Table 6. Number of individuals of species observed within Project boundary in proposed turbine areas (flight positions A, B, and C) above or below 121 m

Species	121 m or greater	less than 121 m
Broad-winged hawk	2	
Cooper's hawk		1
Osprey	2	1
Red-tailed hawk	4	
Sharp-shinned hawk		1
Turkey vulture	4	7
Unknown Accipiter	1	
TOTAL	**13**	**10**

Appendix B Table 7. Summary of raptor flight behaviors within the Groton Wind Project area Spring 2009**.**													
Species	linear soaring	gliding	circle soaring	powered flight	banking	diving	kiting	hovering	aerial feeding	low aerial hunting	perched	aerial display	**Grand Total**
AMKE		1	1	1									3
BAEA	1	1	1										3
BWHA		3	4			1							8
COHA				1									1
MERL	1			1									2
OSPR	2	4	3										9
RTHA	1	9	12		1	3		7					33
SSHA	1			1									2
TUVU	7	3	15	1							1	6	33
Unidentified Accipiter				1									1
Unidentified Buteo		1											1
Behavior totals	13	22	36	6	1	4	0	7	0	0	1	6	96

Appendix B Table 8. Species composition of raptors observed at Groton Wind Project area during Fall, 2009											
Species	**8/24/2009**	**8/25/2009**	**9/1/2009**	**9/9/2009**	**9/10/2009**	**9/22/2009**	**10/5/2009**	**10/12/2009**	**10/21/2009**	**10/26/2009**	**Grand Total for Season**
American kestrel		1		7	14	4	1		1		28
bald eagle		4		1							5
broad-winged hawk	7	44	18	49	204	7	1				330
Cooper's hawk			2	5	3			9		2	21
golden eagle				2							2
merlin		3	1					1			5
northern goshawk									1		1
northern harrier				1	1	2					4
osprey	4	1	2	2	7	4	1				21
peregrine falcon				1			1				2
red-shouldered hawk									1	1	2
red-tailed hawk	7	5	6	11	2	22	1	15	22	9	100
sharp-shinned hawk	4	11	6	17	7	8	3	4	3	3	66
turkey vulture	4	27	2	26	8			1			68
unidentified accipiter		2	1	3				1		1	8
unidentified buteo					1		1				2
unidentified raptor	1	7		11	6			2	1	3	31
Daily Totals	27	105	38	136	253	47	9	33	29	19	696
Daily Passage Rates	1.69	6.56	2.38	8.50	15.81	2.94	0.56	2.06	1.81	1.19	4.35

Appendix B Table 9. Hourly summary of raptor observations at Groton Wind Project area during Fall, 2009											
Species	**7:00-8:00**	**8:00-9:00**	**9:00-10:00**	**10:00-11:00**	**11:00-12:00**	**12:00-1:00**	**1:00-2:00**	**2:00-3:00**	**3:00-4:00**	**4:00-5:00**	**Grand Total**
American kestrel		3	2	10	2	5	2	2	2		28
bald eagle							1	2	2		5
broad-winged hawk		1	85	151	28	23	19	13	9	1	330
Cooper's hawk			8	5	5		2	1			21
golden eagle				2							2
merlin					2		1	2			5
northern goshawk						1					1
northern harrier			1			1		1	1		4
osprey			4	7	1		3	4	2		21
peregrine falcon				1					1		2
red-shouldered hawk								1		1	2
red-tailed hawk			7	6	20	26	20	16	4	1	100
sharp-shinned hawk		3	4	19	5	12	13	5	4	1	66
turkey vulture		3		7	6	13	13	14	12		68
unidentified accipiter				3		3	2				8
unidentified buteo	1		1								2
unidentified raptor			7	9	5	3	4	2	1		31
Hourly totals	**1**	**10**	**119**	**220**	**74**	**87**	**80**	**63**	**38**	**4**	**696**

Appendix B Table 10. Number of individuals of species observed over Tenney mountain in proposed turbine areas (flight positions A, B, and C) above or below 121 m

Species	121 m or greater	less than 121 m
American kestrel		15
bald eagle	4	1
broad-winged hawk	71	78
Cooper's hawk	4	5
merlin		4
osprey	3	8
peregrine falcon		1
red-tailed hawk	14	52
sharp-shinned hawk	5	23
turkey vulture	4	23
unidentified accipiter	1	3
unidentified buteo		1
unidentified raptor	5	8
TOTAL	**111**	**222**

Appendix B Table 11. Number of individuals of species observed over Fletcher ridge, within Project boundary, and in proposed turbine areas (flight positions A, B and C) above or below 121 m

Species	121 m or greater	less than 121 m
American kestrel		1
broad-winged hawk	3	2
Cooper's hawk	1	1
red-tailed hawk		1
turkey vulture		2
unidentified accipiter	1	1
unidentified raptor	2	2
TOTAL	**7**	**10**

Appendix B Table 12. Summary of raptor flight behaviors for Groton Wind Project, Fall 2009

Species	linear soaring	gliding	circle soaring	powered flight	banking	diving	carrying food	kiting	hovering	aerial feeding	low aerial hunting	perched	aerial display	ariel chase	vocalization	Grand Total
American kestrel	9	10	2	19	0	2	1	1	3	2	0	6	2	0	0	57
bald eagle	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	7
broad-winged hawk	95	104	265	9	0	4	0	1	3	0	1	1	7	2	3	495
Cooper's hawk	9	3	12	10	0	2	0	0	0	0	1	1	1	0	0	39
golden eagle	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	4
merlin	2	0	0	4	0	2	0	0	0	1	0	0	0	1	0	10
northern goshawk	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
northern harrier	1	1	3	1	0	1	0	0	0	0	1	0	0	0	0	8
osprey	9	5	14	3	0	0	0	1	1	1	0	0	0	0	0	34
peregrine falcon	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	3
red-shouldered hawk	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4
red-tailed hawk	44	21	65	13	1	13	0	9	26	0	1	1	1	0	2	197
sharp-shinned hawk	25	18	20	27	0	12	0	0	1	0	0	2	1	7	0	113
turkey vulture	35	3	31	2	0	0	0	0	0	0	0	1	1	0	0	73
unidentified accipiter	2	1	4	6	0	2	0	0	0	0	0	1	2	0	0	18
unidentified buteo	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	4
unidentified raptor	13	5	12	4	0	2	0	0	0	0	0	0	3	0	0	39
Behavior totals	250	176	434	103	1	40	1	12	35	4	4	14	18	10	5	

Appendix C

2009 Acoustic Bat Survey Data

Appendix C Table 1. Summary of acoustic bat data and weather during each survey night at the Fletcher North Portable Tower detector – Fall, 2009

		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/	Temperature (c
08/22/09	1	4	1	1	1	2				1	1		**11**	4	20
08/23/09	1	1			4	4				1	1		**11**	3	19
08/24/09	0												**0**	4	16
08/25/09	0												**0**	9	18
08/26/09	0												**0**	10	10
08/27/09	0												**0**	3	11
08/28/09	0												**0**	9	12
08/29/09	0												**0**	4	11
08/30/09	0												**0**	11	13
08/31/09	0												**0**	4	9
09/01/09	0												**0**	3	13
09/02/09	0												**0**	6	16
09/03/09	0												**0**	4	17
09/04/09	0												**0**	5	16
09/05/09	0												**0**	6	10
09/06/09	0												**0**	5	10
09/07/09	0												**0**	5	13
09/08/09	0												**0**	6	14
09/09/09	1					1				1			**2**	5	11
09/10/09	1												**0**	5	8
09/11/09	1												**0**	6	12
09/12/09	1	2	2	4					1	1	1		**11**	4	15
09/13/09	1	6				1				1	3		**11**	10	10
09/14/09	1	1	3	1					1		3		**9**	9	13
09/15/09	1					1							**1**	4	11
09/16/09	1								1				**1**	n/a	n/a
09/17/09	1	3									1		**4**	n/a	n/a
09/18/09	1	1	1										**2**	15	5
09/19/09	1	1											**1**	7	6
09/20/09	1	2								1			**3**	5	13
09/21/09	1				1				2	2			**5**	5	14
09/22/09	1	17	1			1					1		**20**	6	17
09/23/09	1	5	1										**6**	11	17
09/24/09	1									1	2		**3**	9	8
09/25/09	1	1			1								**2**	4	5
09/26/09	1												**0**	7	8
09/27/09	1												**0**	9	13
09/28/09	1									1			**1**	7	11
09/29/09	1												**0**	10	9
09/30/09	1												**0**	8	2
10/01/09	1												**0**	4	2
10/02/09	1												**0**	8	7
10/03/09	1												**0**	4	11
10/04/09	1	1											**1**	7	9
10/05/09	1	1											**1**	10	7
10/06/09	1												**0**	7	8
10/07/09	1												**0**	17	6
10/08/09	1												**0**	4	7
10/09/09	1												**0**	6	9
10/10/09	1	1											**1**	8	3
10/11/09	1												**0**	10	1
10/12/09	1									1			**1**	3	2
10/13/09	1												**0**	11	-1
10/14/09	1												**0**	5	-2
10/15/09	1												**0**	8	-2
10/16/09	1												**0**	5	-1
10/17/09	1												**0**	6	1
By Species		**47**	**9**	**6**	**7**	**10**	**0**	**0**	**5**	**11**	**13**	**0**	**108**		
By Guild		**62**			**7**	**10**	**5**			**24**					
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**		

Appendix C Table 2. Summary of acoustic bat data and weather during each survey night at the Fletcher South Portable Tower detector – Fall, 2009

		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/	Temperature (c
08/21/09	1	1			1					1	1		**4**	3	19
08/22/09	1												**0**	4	20
08/23/09	1	1			2					1			**4**	3	19
08/24/09	1			1							1		**2**	4	16
08/25/09	1				1								**1**	9	18
08/26/09	1	1								1			**2**	10	10
08/27/09	1								1				**1**	3	11
08/28/09	1					1					1		**2**	9	12
08/29/09	1			12							2		**14**	4	11
08/30/09	1	1								1	1		**3**	11	13
08/31/09	1												**0**	4	9
09/01/09	1			1	1								**2**	3	13
09/02/09	1												**0**	6	16
09/03/09	1			1						1	1		**3**	4	17
09/04/09	1												**0**	5	16
09/05/09	1									1	1		**2**	6	10
09/06/09	1	1											**1**	5	10
09/07/09	1												**0**	5	13
09/08/09	1			1									**1**	6	14
09/09/09	1	1				1					1		**3**	5	11
09/10/09	1					1							**1**	5	8
09/11/09	1												**0**	6	12
09/12/09	1												**0**	4	15
09/13/09	1		1										**1**	10	10
09/14/09	1	1		1						1			**3**	9	13
09/15/09	1												**0**	4	11
09/16/09	1								1				**1**	n/a	n/a
09/17/09	1												**0**	n/a	n/a
09/18/09	1									1			**1**	15	5
09/19/09	1									1			**1**	7	6
09/20/09	1								1	2			**3**	5	13
09/21/09	1			1	1					2	5		**9**	5	14
09/22/09	1	1											**1**	6	17
09/23/09	1	1											**1**	11	17
09/24/09	1	1									1		**2**	9	8
09/25/09	1									1			**1**	4	5
09/26/09	1												**0**	7	8
09/27/09	1												**0**	9	13
09/28/09	1												**0**	7	11
09/29/09	1												**0**	10	9
09/30/09	1												**0**	8	2
10/01/09	1												**0**	4	2
10/02/09	1									1			**1**	8	7
10/03/09	1												**0**	4	11
10/04/09	1		1				1				1		**3**	7	9
10/05/09	1												**0**	10	7
10/06/09	1	2				1							**3**	7	8
10/07/09	1												**0**	17	6
10/08/09	1												**0**	4	7
10/09/09	1												**0**	6	9
10/10/09	1												**0**	8	3
10/11/09	1												**0**	10	1
10/12/09	1									1			**1**	3	2
10/13/09	1												**0**	11	-1
10/14/09	1												**0**	5	-2
10/15/09	1												**0**	8	-2
10/16/09	1												**0**	5	-1
10/17/09	1	1											**1**	6	1
10/18/09	1												**0**	5	-1
10/19/09	1												**0**	5	4
10/20/09	1												**0**	7	7
10/21/09	1												**0**	4	7
10/22/09	1												**0**	11	0
By Species		**13**	**2**	**18**	**6**	**4**	**1**	**0**	**3**	**16**	**16**	**0**	**79**		
By Guild		**33**			**6**	**4**	**4**			**32**					
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**		

Appendix C Table 3. Summary of acoustic bat data and weather during each survey night at the Tenney Middle Met Tower 45m detector – Fall, 2009

		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/	Temperature (c
08/11/09	1												**0**	3	18
08/12/09	0												**0**	4	16
08/13/09	1	1		3	2						3		**9**	4	17
08/14/09	1			1	3						2		**6**	3	21
08/15/09	1				4						4		**8**	4	21
08/16/09	1				3						3		**6**	5	22
08/17/09	1	2		1	7						6		**16**	8	23
08/18/09	1				1								**1**	10	21
08/19/09	1	3		19							5		**27**	4	17
08/20/09	1			3	1								**4**	6	20
08/21/09	1	3		3	2						7		**15**	3	19
08/22/09	1			3	17						8		**28**	4	20
08/23/09	1	1			3						3		**7**	3	19
08/24/09	1			4							2		**6**	4	16
08/25/09	1	1		1	6						2		**10**	9	18
08/26/09	1												**0**	10	10
08/27/09	1			1	1								**2**	3	11
08/28/09	1				2								**2**	9	12
08/29/09	1	1		12						1	1		**15**	4	11
08/30/09	1												**0**	11	13
08/31/09	1	1											**1**	4	9
09/01/09	1	1		2									**3**	3	13
09/02/09	1	1											**1**	6	16
09/03/09	1			2									**2**	4	17
09/04/09	1												**0**	5	16
09/05/09	1			2									**2**	6	10
09/06/09	1	1		1							1		**3**	5	10
09/07/09	1										1		**1**	5	13
09/08/09	1												**0**	6	14
09/09/09	1												**0**	5	11
09/10/09	1			1									**1**	5	8
09/11/09	1												**0**	6	12
09/12/09	1												**0**	4	15
09/13/09	1								1				**1**	10	10
09/14/09	1												**0**	9	13
09/15/09	1												**0**	4	11
09/16/09	1	1		1							1		**3**	n/a	n/a
09/17/09	1												**0**	n/a	n/a
09/18/09	1												**0**	15	5
09/19/09	1												**0**	7	6
09/20/09	1												**0**	5	13
09/21/09	1												**0**	5	14
09/22/09	1												**0**	6	17
09/23/09	1												**0**	11	17
09/24/09	1												**0**	9	8
09/25/09	1	1											**1**	4	5
09/26/09	1												**0**	7	8
09/27/09	1												**0**	9	13
09/28/09	1												**0**	7	11
09/29/09	1												**0**	10	9
09/30/09	1												**0**	8	2
10/01/09	1												**0**	4	2
10/02/09	1												**0**	8	7
10/03/09	1												**0**	4	11
10/04/09	1	1											**1**	7	9
10/05/09	1												**0**	10	7
10/06/09	1												**0**	7	8
10/07/09	1												**0**	17	6
10/08/09	1												**0**	4	7
10/09/09	1												**0**	6	9
10/10/09	1												**0**	8	3
10/11/09	1												**0**	10	1
10/12/09	1												**0**	3	2
10/13/09	1												**0**	11	-1
10/14/09	1		1										**1**	5	-2
10/15/09	1												**0**	8	-2
10/16/09	1												**0**	5	-1
10/17/09	1												**0**	6	1
10/18/09	1												**0**	5	-1
10/19/09	1												**0**	5	4
10/20/09	1										1		**1**	7	7
10/21/09	1												**0**	4	7
By Species		**19**	**1**	**60**	**52**	**0**	**0**	**0**	**1**	**1**	**50**	**0**	**184**		
By Guild		**80**			**52**	**0**	**1**			**51**			**Total**		
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**					

Appendix C Table 4. Summary of acoustic bat data and weather during each survey night at the Tenney Middle Met Tower 22m detector – Fall, 2009

		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/	Temperature (c
08/13/09	1	14		2	1					1	3		**21**	4	17
08/14/09	1	12		4	1						13		**30**	3	21
08/15/09	1	275		1	9	1					76		**362**	4	21
08/16/09	1	30			7				1	2	30		**70**	5	22
08/17/09	1	15			15				1	1	20		**52**	8	23
08/18/09	1	3			4					1	1		**9**	10	21
08/19/09	1	4		10	2			1			3		**20**	4	17
08/20/09	1	44		2	9					2	38		**95**	6	20
08/21/09	1	6			14				1	1	12		**34**	3	19
08/22/09	1	1		1	7						4		**13**	4	20
08/23/09	1				3				1		5		**9**	3	19
08/24/09	1			1									**1**	4	16
08/25/09	1	7			2						8		**17**	9	18
08/26/09	1												**0**	10	10
08/27/09	1	2		2									**4**	3	11
08/28/09	1	1									1		**2**	9	12
08/29/09	1	2		7	1		1		2	2	4		**19**	4	11
08/30/09	1	1											**1**	11	13
08/31/09	1	1											**1**	4	9
09/01/09	1	3											**3**	3	13
09/02/09	1	1						1		1			**3**	6	16
09/03/09	1	5		1		1					1		**8**	4	17
09/04/09	1	2											**2**	5	16
09/05/09	1												**0**	6	10
09/06/09	1	3						1			2		**6**	5	10
09/07/09	1												**0**	5	13
09/08/09	1										1		**1**	6	14
09/09/09	1					2			1	1			**4**	5	11
09/10/09	1												**0**	5	8
09/11/09	1												**0**	6	12
09/12/09	1			1									**1**	4	15
09/13/09	1	1											**1**	10	10
09/14/09	1										1		**1**	9	13
09/15/09	1												**0**	4	11
09/16/09	1										1		**1**	n/a	n/a
09/17/09	1					1							**1**	n/a	n/a
09/18/09	1												**0**	15	5
09/19/09	1	1											**1**	7	6
09/20/09	1												**0**	5	13
09/21/09	1												**0**	5	14
09/22/09	1												**0**	6	17
09/23/09	1										1		**1**	11	17
09/24/09	1												**0**	9	8
09/25/09	1												**0**	4	5
09/26/09	1												**0**	7	8
09/27/09	1												**0**	9	13
09/28/09	1												**0**	7	11
09/29/09	1												**0**	10	9
09/30/09	1												**0**	8	2
10/01/09	1												**0**	4	2
10/02/09	1												**0**	8	7
10/03/09	1												**0**	4	11
10/04/09	1	2									2		**4**	7	9
10/05/09	1												**0**	10	7
10/06/09	1									1			**1**	7	8
10/07/09	1												**0**	17	6
10/08/09	1												**0**	4	7
10/09/09	1												**0**	6	9
10/10/09	1												**0**	8	3
10/11/09	1	1											**1**	10	1
10/12/09	1												**0**	3	2
10/13/09	1												**0**	11	-1
10/14/09	1												**0**	5	-2
10/15/09	1					1							**1**	8	-2
10/16/09	1												**0**	5	-1
10/17/09	1												**0**	6	1
10/18/09	1												**0**	5	-1
10/19/09	1		1										**1**	5	4
10/20/09	1												**0**	7	7
10/21/09	1												**0**	4	7
By Species		**437**	**1**	**32**	**75**	**6**	**1**	**3**	**7**	**13**	**227**	**0**	**802**		
By Guild		**470**			**75**	**6**	**11**			**240**					
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**		

Appendix C Table 5. Summary of acoustic bat data and weather during each survey night at the Tenney Middle Met Tower 2m detector – Fall, 2009

		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/	Temperature (c
08/13/09	1												**0**	4	17
08/14/09	1												**0**	3	21
08/15/09	1												**0**	4	21
08/16/09	1												**0**	5	22
08/17/09	1												**0**	8	23
08/18/09	1	2				1				1			**4**	10	21
08/19/09	1	3		3	2					4	1		**13**	4	17
08/20/09	1	1		1	1	6				1			**10**	6	20
08/21/09	1	4		1	83				2	3	3		**96**	3	19
08/22/09	1	1		1	3	1			2	2	5		**15**	4	20
08/23/09	1	3		1		1					3		**8**	3	19
08/24/09	1	1				4				1			**6**	4	16
08/25/09	1	7			1	5			4	5	9		**31**	9	18
08/26/09	1					1							**1**	10	10
08/27/09	1	1				2				1	1		**5**	3	11
08/28/09	1					1			1	10			**12**	9	12
08/29/09	1	1		5		1			2	2	1		**12**	4	11
08/30/09	1	1				5			3	1			**10**	11	13
08/31/09	1												**0**	4	9
09/01/09	1	2											**2**	3	13
09/02/09	1	2				1			2				**5**	6	16
09/03/09	1	1		1		2			1		2		**7**	4	17
09/04/09	1	2		1									**3**	5	16
09/05/09	1												**0**	6	10
09/06/09	1	4		1						1	1		**7**	5	10
09/07/09	1									1	1		**2**	5	13
09/08/09	1	2				1							**3**	6	14
09/09/09	0												**0**	5	11
09/10/09	0												**0**	5	8
09/11/09	0												**0**	6	12
09/12/09	0												**0**	4	15
09/13/09	0												**0**	10	10
09/14/09	0												**0**	9	13
09/15/09	0												**0**	4	11
09/16/09	0												**0**	n/a	n/a
09/17/09	0												**0**	n/a	n/a
09/18/09	0												**0**	15	5
09/19/09	0												**0**	7	6
09/20/09	0												**0**	5	13
09/21/09	0												**0**	5	14
09/22/09	0												**0**	6	17
09/23/09	1												**0**	11	17
09/24/09	1					1							**1**	9	8
09/25/09	1												**0**	4	5
09/26/09	1												**0**	7	8
09/27/09	1												**0**	9	13
09/28/09	1												**0**	7	11
09/29/09	1												**0**	10	9
09/30/09	1												**0**	8	2
10/01/09	1												**0**	4	2
10/02/09	1												**0**	8	7
10/03/09	1												**0**	4	11
10/04/09	1												**0**	7	9
10/05/09	0												**0**	10	7
10/06/09	0												**0**	7	8
10/07/09	0												**0**	17	6
10/08/09	0												**0**	4	7
10/09/09	0												**0**	6	9
10/10/09	0												**0**	8	3
10/11/09	0												**0**	10	1
10/12/09	0												**0**	3	2
10/13/09	0												**0**	11	-1
10/14/09	0												**0**	5	-2
10/15/09	0												**0**	8	-2
10/16/09	0												**0**	5	-1
10/17/09	0												**0**	6	1
10/18/09	0												**0**	5	-1
10/19/09	0												**0**	5	4
10/20/09	0												**0**	7	7
By Species		**38**	**0**	**15**	**90**	**33**	**0**	**0**	**17**	**33**	**27**	**0**	**253**		
By Guild		**53**			**90**	**33**	**17**			**60**					
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**		

Appendix C Table 6. Summary of acoustic bat data and weather during each survey night at the Tenney North Met Tower 45m detector – Fall, 2009

		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/	Temperature (c
08/13/09	1			2	3								**5**	4	17
08/14/09	1	1	2	4	1						2		**10**	3	21
08/15/09	1		1		2				1				**4**	4	21
08/16/09	1	1	1	12	1	1					2		**18**	5	22
08/17/09	1	6	4	9	2					2	6		**29**	8	23
08/18/09	1				2						1		**3**	10	21
08/19/09	1	1		4	6						1		**12**	4	17
08/20/09	1				3						1		**4**	6	20
08/21/09	1	1		3	1				1		3		**9**	3	19
08/22/09	1			3	12					1	6		**22**	4	20
08/23/09	1	1		10	4						8		**23**	3	19
08/24/09	1							1			2	6	**9**	4	16
08/25/09	1			2	2	1					3		**8**	9	18
08/26/09	1												**0**	10	10
08/27/09	1			5									**5**	3	11
08/28/09	1			1							1		**2**	9	12
08/29/09	1	1		18						2	9		**30**	4	11
08/30/09	1	1											**1**	11	13
08/31/09	1	1									1		**2**	4	9
09/01/09	1												**0**	3	13
09/02/09	1	1	1		1								**3**	6	16
09/03/09	1	1		2		1					1		**5**	4	17
09/04/09	1	2		1									**3**	5	16
09/05/09	1			2							1		**3**	6	10
09/06/09	1	2											**2**	5	10
09/07/09	1			1							1		**2**	5	13
09/08/09	1										1		**1**	6	14
09/09/09	1											2	**2**	5	11
09/10/09	1												**0**	5	8
09/11/09	1												**0**	6	12
09/12/09	1			2									**2**	4	15
09/13/09	1										1		**1**	10	10
09/14/09	1												**0**	9	13
09/15/09	1												**0**	4	11
09/16/09	1												**0**	n/a	n/a
09/17/09	1												**0**	n/a	n/a
09/18/09	1												**0**	15	5
09/19/09	1												**0**	7	6
09/20/09	1												**0**	5	13
09/21/09	1									1			**1**	5	14
09/22/09	1			2									**2**	6	17
09/23/09	1										3		**3**	11	17
09/24/09	1												**0**	9	8
09/25/09	1			2									**2**	4	5
09/26/09	1												**0**	7	8
09/27/09	1												**0**	9	13
09/28/09	1												**0**	7	11
09/29/09	1												**0**	10	9
09/30/09	1												**0**	8	2
10/01/09	1												**0**	4	2
10/02/09	1												**0**	8	7
10/03/09	1												**0**	4	11
10/04/09	1	1											**1**	7	9
10/05/09	1												**0**	10	7
10/06/09	1												**0**	7	8
10/07/09	1												**0**	17	6
10/08/09	1												**0**	4	7
10/09/09	1												**0**	6	9
10/10/09	1												**0**	8	3
10/11/09	1	1											**1**	10	1
10/12/09	1												**0**	3	2
10/13/09	1												**0**	11	-1
10/14/09	1												**0**	5	-2
10/15/09	1												**0**	8	-2
10/16/09	1												**0**	5	-1
10/17/09	1												**0**	6	1
10/18/09	1												**0**	5	-1
10/19/09	1		1										**1**	5	4
10/20/09	1												**0**	7	7
10/21/09	1												**0**	4	7
10/22/09	1												**0**	11	0
By Species		**22**	**10**	**85**	**40**	**3**	**0**	**1**	**2**	**6**	**54**	**8**	**231**		
By Guild		**117**			**40**	**3**	**3**			**68**			**Total**		
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**					

Appendix C Table 7. Summary of acoustic bat data and weather during each survey night at the Tenney North Met Tower 22m detector – Fall, 2009

		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/	Temperature (c
08/13/09	1	3		1	2	5							**11**	4	17
08/14/09	1	1		3		1			1	5	3		**14**	3	21
08/15/09	1	2		3	1					2	3		**11**	4	21
08/16/09	1	9		3				1	4	6	2		**25**	5	22
08/17/09	1	16		1		1			1	2	7		**28**	8	23
08/18/09	1	1			1						1		**3**	10	21
08/19/09	1	1		1	3	2				3	1		**11**	4	17
08/20/09	1	3			1						3		**7**	6	20
08/21/09	1	1								1	2		**4**	3	19
08/22/09	1	3		1	7						5		**16**	4	20
08/23/09	1	4		3	5						4		**16**	3	19
08/24/09	1	1			2						2		**5**	4	16
08/25/09	1	5		1					1		1		**8**	9	18
08/26/09	1							1					**1**	10	10
08/27/09	1	1		1									**2**	3	11
08/28/09	1									1	1		**2**	9	12
08/29/09	1	1		4		2				2	1		**10**	4	11
08/30/09	1									1			**1**	11	13
08/31/09	1	1											**1**	4	9
09/01/09	1												**0**	3	13
09/02/09	1	2				2				2			**6**	6	16
09/03/09	1	3				1				1	2		**7**	4	17
09/04/09	1												**0**	5	16
09/05/09	1			1							1		**2**	6	10
09/06/09	1	3									1		**4**	5	10
09/07/09	1	2							1				**3**	5	13
09/08/09	1	1											**1**	6	14
09/09/09	1										1		**1**	5	11
09/10/09	1												**0**	5	8
09/11/09	1												**0**	6	12
09/12/09	1			2									**2**	4	15
09/13/09	1												**0**	10	10
09/14/09	1	1						1					**2**	9	13
09/15/09	1												**0**	4	11
09/16/09	1	1											**1**	n/a	n/a
09/17/09	1												**0**	n/a	n/a
09/18/09	1												**0**	15	5
09/19/09	1												**0**	7	6
09/20/09	1												**0**	5	13
09/21/09	1	1											**1**	5	14
09/22/09	1	1		2							1		**4**	6	17
09/23/09	1	6									1		**7**	11	17
09/24/09	1	2											**2**	9	8
09/25/09	1			1							1		**2**	4	5
09/26/09	1												**0**	7	8
09/27/09	1												**0**	9	13
09/28/09	1										1		**1**	7	11
09/29/09	1												**0**	10	9
09/30/09	1	1											**1**	8	2
10/01/09	1												**0**	4	2
10/02/09	1												**0**	8	7
10/03/09	1												**0**	4	11
10/04/09	1										1		**1**	7	9
10/05/09	1												**0**	10	7
10/06/09	1									1			**1**	7	8
10/07/09	1												**0**	17	6
10/08/09	1												**0**	4	7
10/09/09	1												**0**	6	9
10/10/09	1												**0**	8	3
10/11/09	1												**0**	10	1
10/12/09	1												**0**	3	2
10/13/09	1												**0**	11	-1
10/14/09	1												**0**	5	-2
10/15/09	1												**0**	8	-2
10/16/09	1												**0**	5	-1
10/17/09	1			1									**1**	6	1
10/18/09	1												**0**	5	-1
10/19/09	1	2											**2**	5	4
10/20/09	1	1											**1**	7	7
10/21/09	1	1	1										**2**	4	7
By Species		**81**	**1**	**29**	**22**	**14**	**0**	**3**	**8**	**27**	**46**	**0**	**231**		
By Guild		**111**			**22**	**14**	**11**			**73**					
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**		

Appendix C Table 8. Summary of acoustic bat data and weather during each survey night at the Tenney North Met Tower 2m detector – Fall, 2009

		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/	Temperature (c
08/18/09	1												**0**	10	21
08/19/09	1												**0**	4	17
08/20/09	1												**0**	6	20
08/21/09	1	4				15				3	1		**23**	3	19
08/22/09	1	2			11	33			1	11			**58**	4	20
08/23/09	1				3	12			1	4	2		**22**	3	19
08/24/09	1	1			2	1				5	1		**10**	4	16
08/25/09	1	3				6		1	1	8	2		**21**	9	18
08/26/09	1												**0**	10	10
08/27/09	1												**0**	3	11
08/28/09	1												**0**	9	12
08/29/09	1			1		22				11	1		**35**	4	11
08/30/09	1					5				13			**18**	11	13
08/31/09	1												**0**	4	9
09/01/09	1												**0**	3	13
09/02/09	1												**0**	6	16
09/03/09	1									1			**1**	4	17
09/04/09	1	3											**3**	5	16
09/05/09	1												**0**	6	10
09/06/09	1												**0**	5	10
09/07/09	1	1				1							**2**	5	13
09/08/09	1					1					1		**2**	6	14
09/09/09	0												**0**	5	11
09/10/09	0												**0**	5	8
09/11/09	0												**0**	6	12
09/12/09	0												**0**	4	15
09/13/09	0												**0**	10	10
09/14/09	0												**0**	9	13
09/15/09	0												**0**	4	11
09/16/09	0												**0**	n/a	n/a
09/17/09	0												**0**	n/a	n/a
09/18/09	0												**0**	15	5
09/19/09	0												**0**	7	6
09/20/09	0												**0**	5	13
09/21/09	0												**0**	5	14
09/22/09	0												**0**	6	17
09/23/09	1	16									1		**17**	11	17
09/24/09	1												**0**	9	8
09/25/09	1												**0**	4	5
09/26/09	1												**0**	7	8
09/27/09	1												**0**	9	13
09/28/09	1					1							**1**	7	11
09/29/09	1												**0**	10	9
09/30/09	1												**0**	8	2
10/01/09	1												**0**	4	2
10/02/09	1												**0**	8	7
10/03/09	1												**0**	4	11
10/04/09	1	1									1		**2**	7	9
10/05/09	1												**0**	10	7
10/06/09	1									1			**1**	7	8
10/07/09	1												**0**	17	6
10/08/09	1												**0**	4	7
10/09/09	1												**0**	6	9
10/10/09	1												**0**	8	3
10/11/09	0												**0**	10	1
10/12/09	0												**0**	3	2
10/13/09	0												**0**	11	-1
10/14/09	0												**0**	5	-2
10/15/09	0												**0**	8	-2
10/16/09	0												**0**	5	-1
10/17/09	0												**0**	6	1
10/18/09	0												**0**	5	-1
10/19/09	0												**0**	5	4
10/20/09	0												**0**	7	7
10/21/09	0												**0**	4	7
By Species		**31**	**0**	**1**	**16**	**97**	**0**	**1**	**3**	**57**	**10**	**0**	**216**		
By Guild		**32**			**16**	**97**	**4**			**67**					
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**		

Appendix C Table 9. Summary of species during each survey night at the high detector (35 m) – Fall 2006

		BIG BROWN GUILD				RBFP		MYSP				UNKN	
Night of	Operated Okay	big brown bat	hoary bat	silver-haired bat	silver-haired/big brown	eastern pipistrelle	eastern red bat	little brown bat	*Myotis* spp.	northern myotis	small-footed myotis	unknown	Total
7/27/2006	Y												**0**
7/28/2006	Y				1								**1**
7/29/2006	Y												**0**
7/30/2006	Y												**0**
7/31/2006	Y												**0**
8/1/2006	Y												**0**
8/2/2006	Y											1	**1**
8/3/2006	Y												**0**
8/4/2006	Y												**0**
8/5/2006	Y												**0**
8/6/2006	Y												**0**
8/7/2006	Y												**0**
8/8/2006	Y												**0**
8/9/2006	Y												**0**
8/23/2006	Y											1	**1**
8/24/2006	Y												**0**
8/25/2006	Y				1								**1**
8/26/2006	Y												**0**
8/27/2006	Y												**0**
8/28/2006	Y												**0**
8/29/2006	Y												**0**
8/30/2006	Y												**0**
8/31/2006	Y												**0**
9/1/2006	Y												**0**
9/2/2006	Y												**0**
9/3/2006	Y												**0**
9/4/2006	Y												**0**
9/5/2006	Y												**0**
9/6/2006	Y												**0**
9/7/2006	Y												**0**
9/8/2006	Y												**0**
9/9/2006	Y												**0**
9/10/2006	Y												**0**
9/11/2006	Y												**0**
9/12/2006	Y												**0**
9/13/2006	Y												**0**
9/14/2006	Y												**0**
9/15/2006	Y												**0**
9/16/2006	Y												**0**
9/17/2006	Y												**0**
9/18/2006	Y												**0**
9/19/2006	Y											1	**1**
9/20/2006	Y												**0**
9/21/2006	Y											1	**1**
9/22/2006	Y												**0**
9/23/2006	Y												**0**
9/24/2006	Y												**0**
9/25/2006	Y												**0**
9/26/2006	Y												**0**
9/27/2006	Y												**0**
9/28/2006	Y												**0**
9/29/2006	Y												**0**
9/30/2006	Y												**0**
10/1/2006	Y												**0**
10/2/2006	Y												**0**
10/3/2006	Y											1	**1**
10/4/2006	Y												**0**
10/5/2006	Y												**0**
10/6/2006	Y												**0**
10/7/2006	Y												**0**
10/8/2006	Y				1							1	**2**
10/9/2006	Y												**0**
10/10/2006	Y												**0**
10/11/2006	Y												**0**
10/12/2006	Y												**0**
10/13/2006	Y												**0**
10/14/2006	Y												**0**
10/15/2006	Y												
By Species		**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**9**
By Guild		**3**				**0**		**0**				**6**	
		BIG BROWN GUILD				**RBFP**		**MYSP**				**UNKN**	**Total**

n/o - indicates that detector was not operating on that night

Appendix C Table 10. Summary of species during each survey night at the low detector (15 m) – Fall 2006

		BIG BROWN GUILD				RBFP		MYSP				UNK	
Night of	Operated Okay	big brown bat	hoary bat	silver-haired bat	silver-haired/big brown	eastern pipistrelle	eastern red bat	little brown bat	*Myotis* spp.	northern myotis	small-footed myotis	unknown	Total
7/27/2006													**0**
7/28/2006									1			1	**2**
7/29/2006												1	**1**
7/30/2006													**0**
7/31/2006												1	**1**
8/1/2006													**0**
8/2/2006													**0**
8/3/2006												1	**1**
8/4/2006													**0**
8/5/2006												1	**1**
8/6/2006													**0**
8/7/2006													**0**
8/8/2006													**0**
8/9/2006													**0**
8/23/2006												2	**2**
8/24/2006												1	**1**
8/25/2006												1	**1**
8/26/2006													**0**
8/27/2006													**0**
8/28/2006													**0**
8/29/2006													**0**
8/30/2006												1	**1**
8/31/2006													**0**
9/1/2006													**0**
9/2/2006													**0**
9/3/2006													**0**
9/4/2006													**0**
9/5/2006													**0**
9/6/2006													**0**
9/7/2006													**0**
9/8/2006													**0**
9/9/2006													**0**
9/10/2006													**0**
10/7/2006													**0**
10/8/2006												1	**1**
10/9/2006													**0**
10/10/2006													**0**
10/11/2006													**0**
10/12/2006												1	**1**
10/13/2006													**0**
10/14/2006													**0**
10/15/2006													**0**
By Species		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**12**	**13**
By Guild		**0**				**0**		**1**				**12**	

	BIG BROWN GUILD	RBFP	MYSP	UNK	Total

n/o - indicates that detector was not operating on that night

Appendix C Table 11. Summary of species during each survey night at the tree line detector (5m) – Fall 2006

		BIG BROWN GUILD				RBFP		MYSP				UNKN	
Night of	Operated Okay	big brown bat	hoary bat	silver-haired bat	silver-haired/big brown	eastern pipistrelle	eastern red bat	little brown bat	*Myotis* spp.	northern myotis	small-footed myotis	unknown	Total
7/27/2006									1			2	3
7/28/2006													0
7/29/2006					1							2	3
7/30/2006					1							2	3
7/31/2006			1						2			2	5
8/1/2006												1	1
8/2/2006							1						1
8/3/2006									2			2	4
8/4/2006							1	1				2	4
8/5/2006									1			1	2
8/6/2006									1				1
8/7/2006									2			3	5
8/8/2006												1	1
8/9/2006													0
8/23/2006													0
8/24/2006													0
8/25/2006													0
8/26/2006													0
8/27/2006													0
8/28/2006													0
8/29/2006													0
8/30/2006													0
8/31/2006													0
9/1/2006													0
9/2/2006													0
9/3/2006													0
9/4/2006													0
9/5/2006													0
9/6/2006			1						1			1	3
9/7/2006												1	1
9/8/2006									1	1			2
9/9/2006													0
9/10/2006													0
9/11/2006												1	1
10/7/2006													0
10/8/2006													0
10/9/2006													0
10/10/2006													0
10/11/2006													0
10/12/2006													0
10/13/2006													0
10/14/2006													0
10/15/2006													0
By Species		**0**	**2**	**0**	**2**	**0**	**2**	**1**	**11**	**1**	**0**	**21**	**40**
By Guild		**4**				**2**		**13**				**21**	

BIG BROWN GUILD	RBFP	MYSP	UNKN	Total

n/o - indicates that detector was not operating on that night

Appendix C Table 12. Summary of available fall bat detector surveys (results reported for individual detectors)

Year	Project	Project Location	Habitat	Height (m)	Detector Nights	Start	End	Calls	Rate	Reference
Tree or Low Tower detectors (10 m or below)										
2007	Rollins	Rollins, Penobscot Cty, ME	forest edge	3	114	7/12	11/2	12291	107.8	Stantec Consulting Services Inc. 2007. Fall 2007 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for FirstWind Management, LLC.
2007	Rollins	Rollins, Penobscot Cty, ME	forest edge	3	53	8/2	10/16	5360	101.1	Stantec Consulting Services Inc. 2007. Fall 2007 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for FirstWind Management, LLC.
2007	Rollins	Rollins, Penobscot Cty, ME	forest edge	3	107	7/12	11/2	8996	84.1	Stantec Consulting Services Inc. 2007. Fall 2007 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for FirstWind Management, LLC.
2005	Lempster	Lempster, Sullivan Cty, NH	forest edge	7.5	34	9/20	10/31	27	0.8	Woodlot Alternatives, Inc. 2005. Summary of fall 2005 Lempster bat survey. Memorandum to Jeff Keeler (CEI) from Bob Roy (Woodlot Alternatives, Inc.) dated November 18, 2005.
2005	Lempster	Lempster, Sullivan Cty, NH	forest edge	2	42	9/20	10/31	2	0	Woodlot Alternatives, Inc. 2005. Summary of fall 2005 Lempster bat survey. Memorandum to Jeff Keeler (CEI) from Bob Roy (Woodlot Alternatives, Inc.) dated November 18, 2005.
2006	Lempster	Lempster, Sullivan Cty, NH	forest edge	10	29	9/9	10/24	2	0.1	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Lempster Mountain Wind Power Project in Lempster, New Hampshire. Prepared for Lempster Wind, LLC.
2006	Lempster	Lempster, Sullivan Cty, NH	forest edge	3	44	9/9	10/24	384	8.7	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Lempster Mountain Wind Power Project in Lempster, New Hampshire. Prepared for Lempster Wind, LLC.
2005	High Sheldon	Sheldon, Wyoming Cty, NY	field	2	49	8/1	10/4	5535	113	Woodlot Alternatives, Inc. 2006. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed High Sheldon Wind Project in Sheldon, New York. Prepared for Invenergy.
2005	Howard	Howard, Steuben Cty, NY	field	2	25	8/3	8/27	1493	51.5	Woodlot Alternatives, Inc. 2005. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Howard Wind Power Project in Howard, New York. Prepared for Everpower Global.
2005	Jordanville	Jordanville, Herkimer Cty, NY	field	2	34	8/12	9/22	124	4.4	Woodlot Alternatives, Inc. 2005. A Fall 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.
2005	Marble River	Churubusco, Clinton Cty, NY	field	10	34	8/1	10/11	150	4.4	Woodlot Alternatives, Inc. 2005. A Fall 2005 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.
2005	Marble River	Churubusco, Clinton Cty, NY	field	2	18	8/1	10/11	113	6.3	Woodlot Alternatives, Inc. 2005. A Fall 2005 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.
2005	Top Notch	Fairfield, Herkimer Cty, NY	field	2	34	8/19	9/21	44	1.3	Woodlot Alternatives, Inc. 2005. A Summer and Fall 2005 Radar and Acoustic Surveys of Bird and Bat Migration at the Proposed Top Notch Wind Project in Fairfield, New York. Prepared for PPM Atlantic Renewable.
2005	West Hill	Munnsville, Madison Cty, NY	field	2	30	8/1	10/21	10	0.3	Woodlot Alternatives, Inc. 2005. Summer and Fall 2005 Bird and Bat Surveys at the Proposed Munnsville Wind Project in Munnsville, New York. Prepared for AES-EHN NY Wind, LLC.
2005	Horse Creek	Clayton, Jefferson Cty, NY	forest edge	2	33	8/19	9/20	154	4.7	Woodlot Alternatives, Inc. 2005. A Fall 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.
2005	Moresville	Stamford, Delaware Cty, NY	forest edge	2	58	8/15	10/15	280	4.8	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.
2007	Record Hill	Roxbury, Oxford Cty, ME	forest edge	2	13	8/9	8/21	148	11.4	Stantec Consulting Services Inc. 2007. Fall 2007 Migration Report: Visual, Acoustic and Radar Surveys of Bird and Bat Migration Conducted at the Proposed Record Hill Wind Project in Roxbury, Maine. Prepared for Independence Wind, LLC.
2007	Record Hill	Roxbury, Oxford Cty, ME	forest edge	5	4	8/9	8/21	1	0.3	Stantec Consulting Services Inc. 2007. Fall 2007 Migration Report: Visual, Acoustic and Radar Surveys of Bird and Bat Migration Conducted at the Proposed Record Hill Wind Project in Roxbury, Maine. Prepared for Independence Wind, LLC.
2007	Record Hill	Roxbury, Oxford Cty, ME	forest edge	3	13	8/9	8/21	524	40.3	Stantec Consulting Services Inc. 2007. Fall 2007 Migration Report: Visual, Acoustic and Radar Surveys of Bird and Bat Migration Conducted at the Proposed Record Hill Wind Project in Roxbury, Maine. Prepared for Independence Wind, LLC.
2007	Record Hill	Roxbury, Oxford Cty, ME	forest edge	10	13	8/9	8/21	1576	121.2	Stantec Consulting Services Inc. 2007. Fall 2007 Migration Report: Visual, Acoustic and Radar Surveys of Bird and Bat Migration Conducted at the Proposed Record Hill Wind Project in Roxbury, Maine. Prepared for Independence Wind, LLC.
MET Tower Detectors										
2007	Ball Hill	Villenova, Chautauqua Cty, NY	field	40	77	7/30	10/14	246	3.2	Stantec Consulting Services Inc. 2008. A Fall 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, Inc.

(*continued***)**

Appendix C Table 12 (*cont.*)

2007	Ball Hill	Villenova, Chautauqua Cty, NY	field	20	77	7/30	10/14	295	3.8	Stantec Consulting Services Inc. 2008. A Fall 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, Inc.
2007	Record Hill	Roxbury, Oxford Cty, ME	forest edge	45	46	8/22	10/18	7	0.2	Stantec Consulting Services Inc. 2007. Fall 2007 Migration Report: Visual, Acoustic and Radar Surveys of Bird and Bat Migration Conducted at the Proposed Record Hill Wind Project in Roxbury, Maine. Prepared for Independence Wind, LLC.
2007	Record Hill	Roxbury, Oxford Cty, ME	forest edge	20	58	8/22	10/18	93	1.6	Stantec Consulting Services Inc. 2007. Fall 2007 Migration Report: Visual, Acoustic and Radar Surveys of Bird and Bat Migration Conducted at the Proposed Record Hill Wind Project in Roxbury, Maine. Prepared for Independence Wind, LLC.
2007	Record Hill	Roxbury, Oxford Cty, ME	forest edge	45	59	8/22	10/19	18	0.4	Stantec Consulting Services Inc. 2007. Fall 2007 Migration Report: Visual, Acoustic and Radar Surveys of Bird and Bat Migration Conducted at the Proposed Record Hill Wind Project in Roxbury, Maine. Prepared for Independence Wind, LLC.
2007	Record Hill	Roxbury, Oxford Cty, ME	forest edge	20	59	8/22	10/19	252	5.1	Stantec Consulting Services Inc. 2007. Fall 2007 Migration Report: Visual, Acoustic and Radar Surveys of Bird and Bat Migration Conducted at the Proposed Record Hill Wind Project in Roxbury, Maine. Prepared for Independence Wind, LLC.
2005	Dans Mountain	Loarville, Allegany Cty, MD	forest edge	11	53	8/1	9/22	574	10.8	Woodlot Alternatives, Inc. 2005. Fall 2005 Bat Echolocation Surveys at the Proposed Dan's Mountain Wind Project in Frostburg, Maryland. Prepared for US Wind Force.
2005	Dans Mountain	Loarville, Allegany Cty, MD	forest edge	23	31	8/1	9/22	388	12.5	Woodlot Alternatives, Inc. 2005. Fall 2005 Bat Echolocation Surveys at the Proposed Dan's Mountain Wind Project in Frostburg, Maryland. Prepared for US Wind Force.
2007	Rollins	Rollins, Penobscot Cty, ME	forest edge	40	95	7/12	11/2	66	0.7	Stantec Consulting Services Inc. 2007. Fall 2007 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for FirstWind Management, LLC.
2007	Rollins	Rollins, Penobscot Cty, ME	forest edge	20	106	7/12	11/2	155	1.5	Stantec Consulting Services Inc. 2007. Fall 2007 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for FirstWind Management, LLC.
2006	Kibby	Kibby, Franklin Cty, ME	forest edge	45	72	6/20	10/25	18	0.3	Woodlot Alternatives, Inc. 2006. Summer/Fall 2006 Survey of Bat Activity at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine Wind Development Inc.
2006	Kibby	Kibby, Franklin Cty, ME	forest edge	45	76	6/20	10/25	0	0	Woodlot Alternatives, Inc. 2006. Summer/Fall 2006 Survey of Bat Activity at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine Wind Development Inc.
2006	Kibby	Kibby, Franklin Cty, ME	forest edge	20	44	6/20	10/25	4	0.1	Woodlot Alternatives, Inc. 2006. Summer/Fall 2006 Survey of Bat Activity at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine Wind Development Inc.
2006	Kibby	Kibby, Franklin Cty, ME	forest edge	45	20	6/20	10/25	0	0	Woodlot Alternatives, Inc. 2006. Summer/Fall 2006 Survey of Bat Activity at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine Wind Development Inc.
2006	Redington	Redington, Franklin Cty, ME	forest edge	15	21	8/10	10/24	0	0	Woodlot Alternatives, Inc. 2006. Fall 2006 Bat Detector Surveys at the Proposed Redington Wind Project. Prepared for Maine Mountain Power.
2006	Redington	Redington, Franklin Cty, ME	forest edge	15	48	8/10	10/24	0	0	Woodlot Alternatives, Inc. 2006. Fall 2006 Bat Detector Surveys at the Proposed Redington Wind Project. Prepared for Maine Mountain Power.
2006	Redington	Redington, Franklin Cty, ME	forest edge	30	29	8/10	10/24	0	0	Woodlot Alternatives, Inc. 2006. Fall 2006 Bat Detector Surveys at the Proposed Redington Wind Project. Prepared for Maine Mountain Power.
2006	Redington	Redington, Franklin Cty, ME	forest edge	30	37	8/10	10/24	0	0	Woodlot Alternatives, Inc. 2006. Fall 2006 Bat Detector Surveys at the Proposed Redington Wind Project. Prepared for Maine Mountain Power.
2006	Stetson	Stetson, Penobscot Cty, ME	forest edge	30	73	6/28	10/16	8	0.1	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Mountain Wind Power Project in Washington County, Maine. Prepared for Evergreen Wind V, LLC.
2006	Stetson	Stetson, Penobscot Cty, ME	forest edge	30	76	6/28	10/16	170	2.2	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Mountain Wind Power Project in Washington County, Maine. Prepared for Evergreen Wind V, LLC.
2006	Stetson	Stetson, Penobscot Cty, ME	forest edge	15	105	6/28	10/16	108	1	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Mountain Wind Power Project in Washington County, Maine. Prepared for Evergreen Wind V, LLC.
2006	Stetson	Stetson, Penobscot Cty, ME	forest edge	15	107	6/28	10/16	651	6.1	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Mountain Wind Power Project in Washington County, Maine. Prepared for Evergreen Wind V, LLC.
2005	Lempster	Lempster, Sullivan Cty, NH	forest edge	15	42	9/20	10/31	14	0.3	Woodlot Alternatives, Inc. 2005. Summary of fall 2005 Lempster bat survey. Memorandum to Jeff Keeler (CEI) from Bob Roy (Woodlot Alternatives, Inc.) dated November 18, 2005.
2006	Lempster	Lempster, Sullivan Cty, NH	forest edge	40	43	9/9	10/24	16	0.4	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Lempster Mountain Wind Power Project in Lempster, New Hampshire. Prepared for Lempster Wind, LLC.
2006	Brandon	Brandon, Franklin, Cty, NY	field	12	62	7/25	10/4	1287	20.8	Woodlot Alternatives, Inc. 2006. Fall 2006 Bat Detector Surveys at the Proposed Brandon and Chateaugay Windparks in Western New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.

(*continued*)

Appendix C Table 12 (*cont.*)

2005	High Sheldon	Sheldon, Wyoming Cty, NY	field	15	65	8/1	10/4	335	5.2	Woodlot Alternatives, Inc. 2006. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed High Sheldon Wind Project in Sheldon, New York. Prepared for Invenergy.
2005	High Sheldon	Sheldon, Wyoming Cty, NY	field	30	58	8/1	10/4	137	2.4	Woodlot Alternatives, Inc. 2006. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed High Sheldon Wind Project in Sheldon, New York. Prepared for Invenergy.
2005	Howard	Howard, Steuben Cty, NY	field	30	13	8/3	8/19	30	2.3	Woodlot Alternatives, Inc. 2005. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Howard Wind Power Project in Howard, New York. Prepared for Everpower Global.
2005	Howard	Howard, Steuben Cty, NY	field	27	15	8/3	8/14	30	2	Woodlot Alternatives, Inc. 2005. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Howard Wind Power Project in Howard, New York. Prepared for Everpower Global.
2005	Jordanville	Jordanville, Herkimer Cty, NY	field	15	34	8/12	9/22	143	4.2	Woodlot Alternatives, Inc. 2005. A Fall 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.
2005	Jordanville	Jordanville, Herkimer Cty, NY	field	30	41	8/12	9/22	255	6.2	Woodlot Alternatives, Inc. 2005. A Fall 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.
2005	Marble River	Churubusco, Clinton Cty, NY	field	20	39	8/1	10/11	243	6.2	Woodlot Alternatives, Inc. 2005. A Fall 2005 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.
2005	Top Notch	Fairfield, Herkimer Cty, NY	field	15	34	8/19	9/21	30	0.9	Woodlot Alternatives, Inc. 2005. A Summer and Fall 2005 Radar and Acoustic Surveys of Bird and Bat Migration at the Proposed Top Notch Wind Project in Fairfield, New York. Prepared for PPM Atlantic Renewable.
2005	Top Notch	Fairfield, Herkimer Cty, NY	field	30	34	8/19	9/21	99	3	Woodlot Alternatives, Inc. 2005. A Summer and Fall 2005 Radar and Acoustic Surveys of Bird and Bat Migration at the Proposed Top Notch Wind Project in Fairfield, New York. Prepared for PPM Atlantic Renewable.
2005	West Hill	Munnsville, Madison Cty, NY	field	15	47	8/1	10/21	179	3.8	Woodlot Alternatives, Inc. 2005. Summer and Fall 2005 Bird and Bat Surveys at the Proposed Munnsville Wind Project in Munnsville, New York. Prepared for AES-EHN NY Wind, LLC.
2005	West Hill	Munnsville, Madison Cty, NY	field	30	52	8/1	10/21	106	2	Woodlot Alternatives, Inc. 2005. Summer and Fall 2005 Bird and Bat Surveys at the Proposed Munnsville Wind Project in Munnsville, New York. Prepared for AES-EHN NY Wind, LLC.
2006	Steuben	Hartsville, Steuben Cty, NY	field	15	76	7/26	10/10	119	1.6	Environmental Design and Research (RD&R). 2006. Draft Environmental Impact Statement for the Cohocton Wind Power Project. Town of Cohocton, Steuben County, New York, Prepared for Canandaigua Wind Partners, LLC.
2006	Steuben	Hartsville, Steuben Cty, NY	field	30	49	7/26	10/10	84	1.7	Environmental Design and Research (RD&R). 2006. Draft Environmental Impact Statement for the Cohocton Wind Power Project. Town of Cohocton, Steuben County, New York, Prepared for Canandaigua Wind Partners, LLC.
2006	Wethersfield	Wethersfield, Wyoming Cty, NY	field	15	54	7/25	10/9	0	0	Woodlot Alternatives, Inc. 2006. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Centerville and Wethersfield Windparks in Centerville and Wethersfield, New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.
2006	Wethersfield	Wethersfield, Wyoming Cty, NY	field	30	26	7/25	10/9	22	0.8	Woodlot Alternatives, Inc. 2006. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Centerville and Wethersfield Windparks in Centerville and Wethersfield, New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.
2006	Brandon	Brandon, Franklin, Cty, NY	field	25	72	7/25	10/4	464	6.4	Woodlot Alternatives, Inc. 2006. Fall 2006 Bat Detector Surveys at the Proposed Brandon and Chateaugay Windparks in Western New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.
2006	Centerville	Centerville, Allegany Cty, NY	field	15	48	7/25	10/10	2	0	Woodlot Alternatives, Inc. 2006. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Centerville and Wethersfield Windparks in Centerville and Wethersfield, New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.
2006	Centerville	Centerville, Allegany Cty, NY	field	35	41	7/25	10/10	3	0.1	Woodlot Alternatives, Inc. 2006. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Centerville and Wethersfield Windparks in Centerville and Wethersfield, New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.
2006	Chateaugay	Chateaugay, Franklin Cty, NY	field	40	58	7/25	10/4	173	3	Woodlot Alternatives, Inc. 2006. Fall 2006 Bat Detector Surveys at the Proposed Brandon and Chateaugay Windparks in Western New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.
2006	Chateaugay	Chateaugay, Franklin Cty, NY	field	20	44	7/25	10/4	345	7.8	Woodlot Alternatives, Inc. 2006. Fall 2006 Bat Detector Surveys at the Proposed Brandon and Chateaugay Windparks in Western New York. Prepared for Ecology and Environment, Inc. and Noble Power, LLC.
2006	Cohocton/Dutch Hill	Cohocton, Steuben Cty, NY	field	15	43	8/12	10/11	46	1.1	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Cohocton Wind Power Project in Cohocton, New York. Prepared for UPC Wind Management, LLC.
2006	Cohocton/Dutch Hill	Cohocton, Steuben Cty, NY	field	30	47	8/12	10/11	57	1.2	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Cohocton Wind Power Project in Cohocton, New York. Prepared for UPC Wind Management, LLC.
2005	Clayton	Clayton, Jefferson Cty, NY	forest edge	30	0	8/19	9/20	0	0	Woodlot Alternatives, Inc. 2005. A Fall 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.

(*continued*)

Appendix C Table 12 (*cont.*)

2005	Munnsville	Munnsville, Madison Cty, NY	field	23	67	7/31	10/16	280	0.2	Woodlot Alternatives, Inc. 2005. Summer and Fall 2005 Bird and Bat Surveys at the Proposed Munnsville Wind Project in Munnsville, New York. Prepared for AES-EHN NY Wind, LLC.
2005	Munnsville	Munnsville, Madison Cty, NY	field	15	67	7/31	10/16	210	0.3	Woodlot Alternatives, Inc. 2005. Summer and Fall 2005 Bird and Bat Surveys at the Proposed Munnsville Wind Project in Munnsville, New York. Prepared for AES-EHN NY Wind, LLC.
2005	Moresville	Stamford, Delaware Cty, NY	forest edge	15	43	8/15	10/15	293	6.8	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	Moresville	Stamford, Delaware Cty, NY	forest edge	30	54	8/15	10/15	285	5.3	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.
2004	Liberty Gap	Franklin, Pendleton Cty, WV	forest edge	15	14	Sep	Nov	168	0.35	Woodlot Alternatives, Inc. 2005. A Radar and Acoustic Survey of Bird and Bat Migration at the Proposed Liberty Gap Wind Project in Franklin, West Virginia – Fall 2004. Prepared for US Wind Force, LLC.
2004	Liberty Gap	Franklin, Pendleton Cty, WV	forest edge	30	14	Sep	Nov	165	0.19	Woodlot Alternatives, Inc. 2005. A Radar and Acoustic Survey of Bird and Bat Migration at the Proposed Liberty Gap Wind Project in Franklin, West Virginia – Fall 2004. Prepared for US Wind Force, LLC.
2004	Sheffield	Sheffield, Caledonia Cty, VT	forest edge	15	6	9/10	9/15	30	0.23	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.
2004	Sheffield	Sheffield, Caledonia Cty, VT	forest edge	30	5	10/17	10/21	0	0	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.
2005	Mars Hill	Mars Hill, Aroostook Cty, ME	forest edge	20	22	8/31	9/21	25	n/a	Woodlot Alternatives, Inc. 2005. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Mars Hill Wind Project in Mars Hill, Maine. Prepared for UPC Wind Management, LLC.
2005	Mars Hill	Mars Hill, Aroostook Cty, ME	forest edge	20	22	8/31	9/21	25	n/a	Woodlot Alternatives, Inc. 2005. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Mars Hill Wind Project in Mars Hill, Maine. Prepared for UPC Wind Management, LLC.