Summer and Early-Fall 2009 Peregrine Falcon Use Surveys

for the Groton Wind Project
In Groton, New Hampshire

Prepared by Stantec Consulting Inc.

and

Audubon Society of New Hampshire

Conservation Department

Prepared for

Groton Wind, LLC
P.O. Box 326,
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December 2009

Executive Summary

During summer and early fall 2009, Stantec Consulting (Stantec) and the Audubon Society of New Hampshire Conservation Department (Audubon) conducted field surveys of peregrine falcon (*Falco peregrinus*) activity at the Groton Wind Project area in Groton, New Hampshire (Project area). The surveys were conducted, at the request of the New Hampshire Fish and Game Department (NHFG), as part of the site evaluation process by Groton Wind, LLC (Groton Wind) for a proposed wind energy project, which would include the installation 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').

Peregrine falcons are listed as threatened in New Hampshire, recently down-listed from endangered. Peregrine falcon nests (aeries) are typically located on cliffs or anthropogenic structures such as bridges and tall buildings. Peregrine falcons are known to nest at two cliff sites in the vicinity of the proposed Project: Bear Mountain in Hebron and Rattlesnake Mountain in Rumney, New Hampshire. The Bear Mountain aerie is approximately 5 miles south of the Project area and the Rattlesnake Mountain aerie is approximately 2 miles north of the Project area. In order to assess the use of the Project area by breeding and dispersing peregrine falcons from the two aerie sites, Groton Wind contracted with Stantec and New Hampshire Audubon to conduct field surveys during post-fledging (June 23 to August 11) and early fall migration (August 17 to September 10) periods in 2009. Additionally, Stantec worked with the Smithsonian Institution to identify peregrine falcon prey remain samples collected by Audubon at the Rattlesnake Mountain aerie over the past 16 years, in an effort to determine the likelihood of peregrine falcon foraging in the habitats that occur in the Project area. Although the focus of this study was to document peregrine falcon activity in the Study area, and particularly in the Project area, observers documented all raptor species detected from the four observation points.

Peregrine falcon surveys were conducted simultaneously by four biologists (two from Stantec and two from Audubon) on 20 days (10 two-day survey blocks) from June 23 to September 10. On each survey day, one biologist was positioned at each of four observation sites: Bald Knob, Tenney Mountain, Bear Mountain, and Rattlesnake Mountain.

For the purposes of this study, the Study area is considered the observable airspace as seen from these four observation sites. However, the Project area is considered the ridges of Tenney and Fletcher mountains on which turbines would be located. Bald Knob, Rattlesnake Mountain, and Bear Mountain are each outside of the Project area. The Bear Mountain and Rattlesnake Mountain sites were selected to provide observation of peregrine activity associated with the respective aeries; the Bald Knob site provided a view extending from Bear Mountain to the

northern end of Tenney Mountain; the Tenney Mountain site provided views of Fletcher Mountain, parts of the Tenney Mountain portion of the Project area, and of the Rattlesnake Mountain aerie.

Considering the number of hours when observers were present on-site and the number of hours when sky conditions were fair and did not restrict visibility, 11 percent of the daylight hours, during which peregrine falcons may been active over the course of the study period, were surveyed. Eighty-eight percent of the airspace above the Project area (22 of the 25 proposed turbine areas) was visible during surveys. The range of detection at observation sites overlapped and observers at each observation site documented all observations of raptors regardless if they were seen simultaneously from other sites. At Bald Mountain, 40 percent of observations of all raptors were simultaneous with other observers and at Tenney Mountain, 47 percent of observations of all raptors were simultaneous with other observers.

Unlike spring or fall raptor migration surveys conducted by the Hawk Migration Association of North America (HMANA), the peregrine surveys conducted from late-June through the beginning of September documented multiple observations of seasonally local raptors which were likely observed multiple times throughout survey days. However, the peregrine surveys, which extended into the early-fall migration period, documented a peak in broad-winged hawk migration activity. To distinguish raptor activity between the two time periods, results are reported separately for those survey dates during post-fledging (June 23 to August 11) and early fall migration (August 17 to September 10) periods. For the purposes of this report, daily count totals for each observation site included all observations or passes of birds observed throughout a survey day, regardless if they were suspected to be local birds seen multiple times during the day.

The Rattlesnake Mountain and Bear Mountain aeries successfully fledged 3 and 4 young, respectively. Fledging occurred six and seven days, respectively, before the onset of this study (NH Audubon unpubl. data). There was activity of both adult and fledged juvenile peregrine falcons at both aeries during the course of the surveys. Table E-1 summarizes the number of observation hours, peregrine falcon observations, and observation rates at the aerie and Project area observations sites.

Table E-1. Summary of survey effort and peregrine falcon observations during 2009 peregrine surveys

	post-fledging			early-fall		
obs location	**# survey hours**	**# PEFA obs**	**PEFA obs rate**	**# survey hours**	**# PEFA obs**	**PEFA obs rate**
Bear Mountain	110	32	0.29	48	5	0.1
Rattlesnake Mountain	109	50	0.46	48	31	0.65
Bald Knob	107	2	0.02	48	2	0.04
Tenney Mountain	108	2	0.02	48	2	0.04

The age and sex of the peregrine falcon observations made from Bald Knob were undetermined. None of the peregrine falcon observations detected from Bald Knob were observed within the Project area. Three of the peregrine falcon observations made from Tenney Mountain were of peregrines within the Project area (above the ridge of Tenney

Mountain), and these three observations occurred below the maximum height of the proposed turbines (121 m). Of the peregrine observations in the Project area, one was believed to be a juvenile, while the other two were adults. The other peregrine observation (a juvenile) was outside the Project area.

Table E-2 provides a summary of non-peregrine raptor activity observed during the peregrine surveys at the Study area.

Table E-2. Summary of survey effort and non-peregrine raptor observations during 2009 peregrine surveys

	post-fledging			early-fall		
obs location	**# survey hours**	**# raptor obs***	**raptor obs rate***	**# survey hours**	**# raptor obs***	**raptor obs rate***
Bear Mountain	110	154	1.4	48	114	2.38
Rattlesnake Mountain	109	126	1.16	48	140	2.92
Bald Knob	107	203	1.9	48	327	6.81
Tenney Mountain	108	160	1.48	48	260	5.42

*Peregrine falcon observations not included.

Forty-eight percent of raptor observations made from Bald Knob occurred within the Project area. Sixty-nine percent of these observations occurred below the maximum turbine height of 121 m. Eighty-seven percent of raptor observations made from Tenney Mountain occurred at some location over the Project area. Fifty-four percent of these raptor observations occurred below the maximum turbine height of 121 m.

Table of Contents

Figures

Tables

Appendices

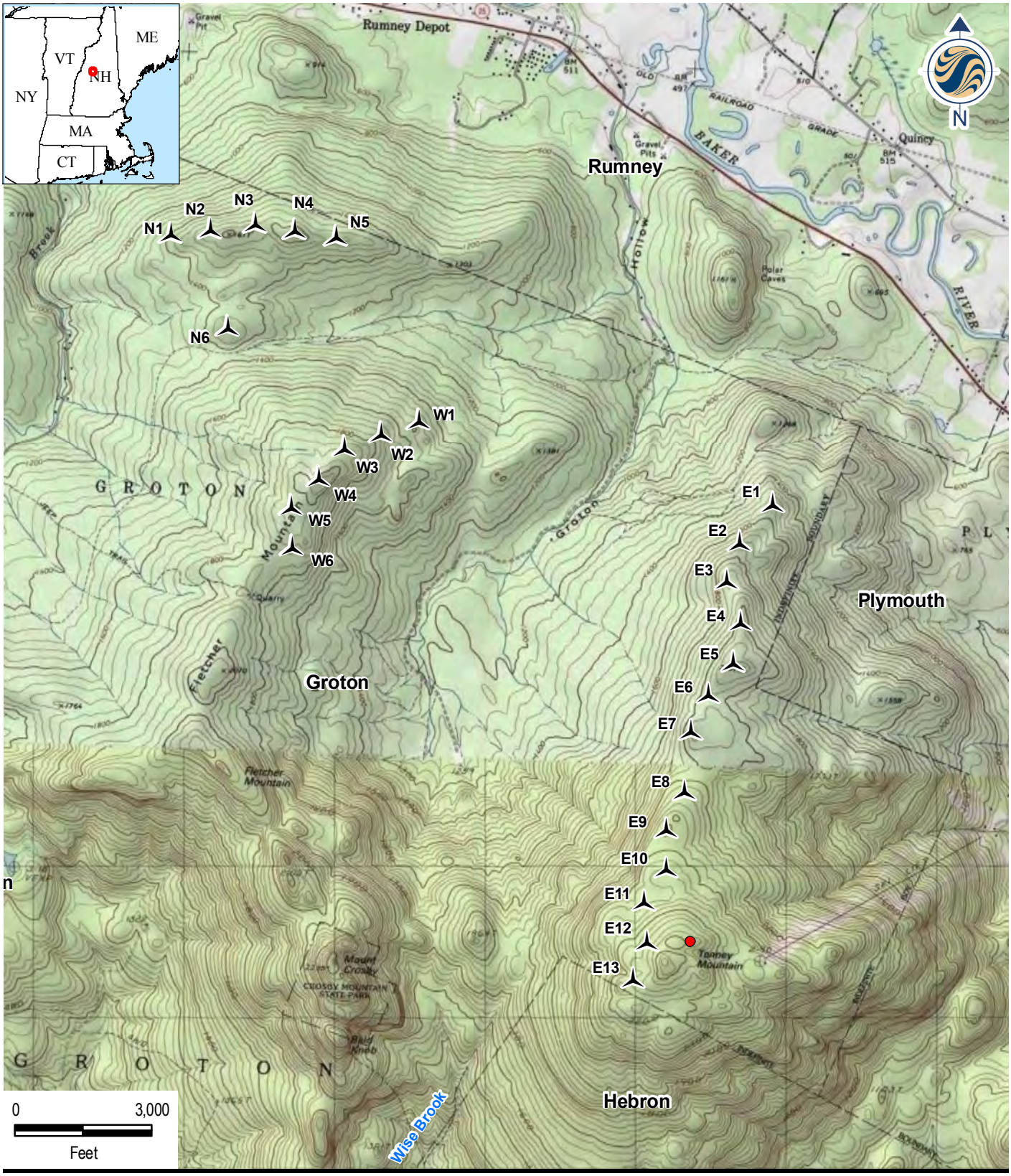
1.0 Background and Introduction

Groton Wind, LLC (Groton Wind) is considering construction of a wind development located in Groton, New Hampshire (Figure 1-1). The Groton Wind Project (Project) would consist of up to 25 wind turbines and associated infrastructure (e.g., access roads, transmission 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'). The proposed turbines would have a maximum height of 121 m (410').

Peregrine falcons (*Falco peregrinus*) are listed as threatened in New Hampshire, recently down-listed from endangered. Peregrine falcon nests (aeries) are typically located on cliffs or anthropogenic structures such as bridges and tall buildings. Peregrine falcons are known to nest at two cliff sites in the vicinity of the proposed Project: Bear Mountain in Hebron and Rattlesnake Mountain in Rumney, New Hampshire. The Bear Mountain aerie is approximately 5 miles south of the Project area and the Rattlesnake Mountain aerie is approximately 2 miles north of the Project area. In order to assess the use of the Project area by breeding and dispersing peregrine falcons, Groton Wind contracted with Stantec Consulting (Stantec) and New Hampshire Audubon, at the recommendation of New Hampshire Fish and Game, to conduct observation surveys during post-fledging (June 23 to August 11) and early fall migration (August 17 to September 10) periods in 2009.

The 2009 peregrine falcon use study (peregrine survey) is part of a combination of wildlife surveys that have been conducted for the Project including an acoustic bat survey and a pilot peregrine use study in 2006, a spring and fall 2008 nocturnal radar migration study, a fall 2009 acoustic bat study, and a spring/summer 2009 breeding bird study. The 2006 pilot peregrine falcon survey was conducted on four days during the post-fledging period and early-fall migration period. The 2006 surveys were conducted from Rattlesnake Mountain where the peregrine falcon nest failed that year. On two occasions, a falcon was observed over the lower slopes of Fletcher Mountain (after leaving the aerie and crossing route 25); peregrines were repeatedly seen flying over the Baker River Valley and along Rattlesnake Mountain's south-facing cliffs (Woodlot 2006). The 2006 pilot study was limited by a small number of survey days; however, the results and implications of the study led to a more robust work plan for the 2009 study.

The scope of 2009 peregrine falcon surveys was based on methods that are developing among the scientific community to help assess potential impacts in the wind power industry. At the request of New Hampshire Fish and Game, a meeting between Stantec, New Hampshire Audubon, Fish and Game and Groton Wind was held on April 15, 2009 to initiate development of a work plan. At this meeting, the use of visual observation surveys or a satellite transmitter study were considered.



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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

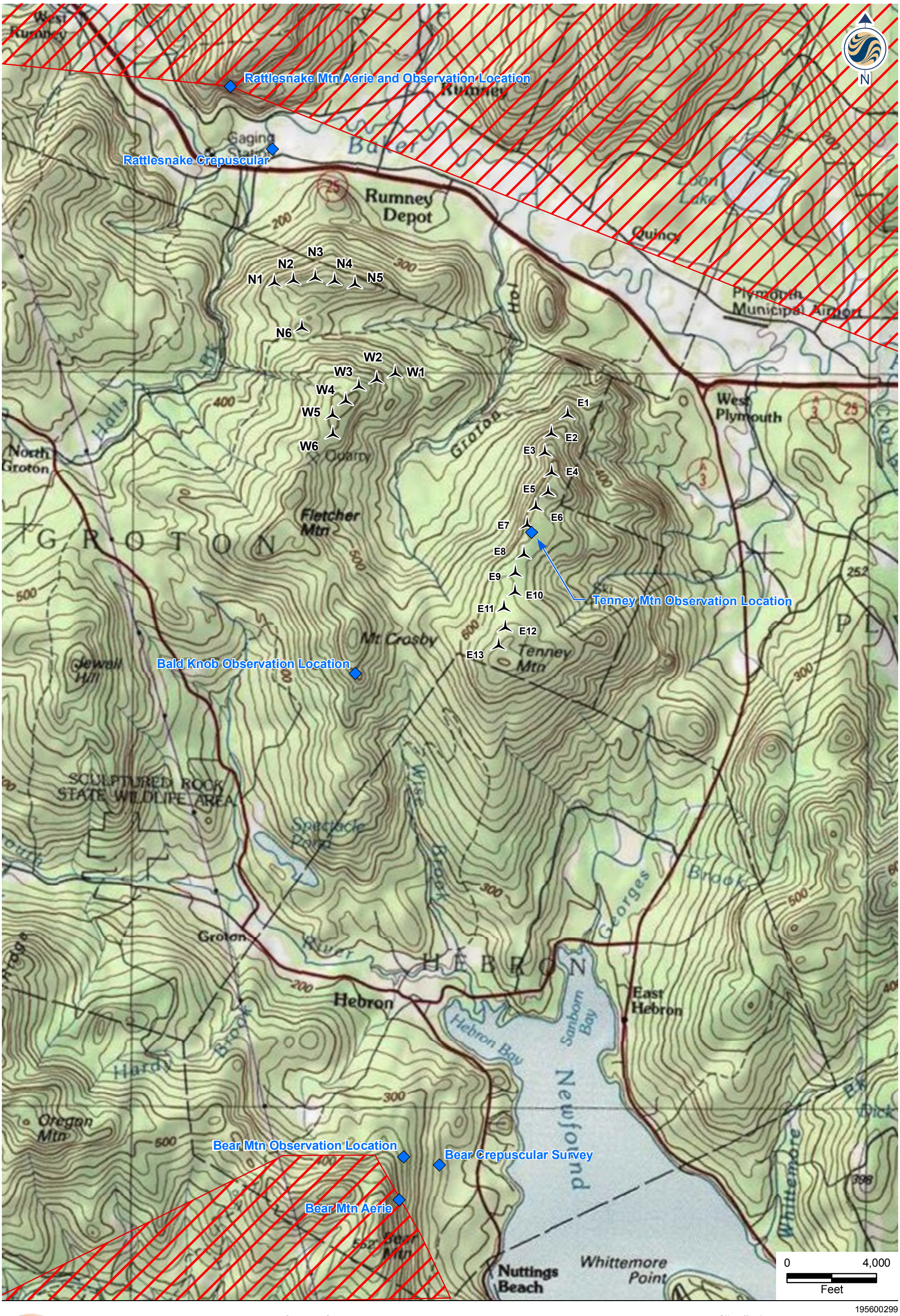
00299-F001-Locus.mxd

Visual and satellite transmitter survey methods both have strengths and limitations and both methods were considered for this study. Use of satellite tracking devices would provide location information during the entire time a peregrine was wearing a transmitter. However only location information for tagged individuals would be available; and satellite telemetry could not provide flight height information. Visual surveys could provide location information for all peregrines observed, as well as flight height and other flight behavior information. However, location information could only be obtained when observers were present at observation sites and during periods of good visibility. Additionally, there are limitations due to range of detection during visual surveys. The final work plan of the 2009 study was geared toward documenting the presence or absence of peregrine falcons within the Project area, as well as their flight behaviors, flight heights, and flight paths; thus visual surveys were decided to be the appropriate study method. It was determined that visual surveys would take place simultaneously at multiple observation sites in order to confirm the identification and location of birds in a broader Study area. Four observation sites were chosen: The Bear Mountain and Rattlesnake Mountain sites were selected to provide observation of peregrine activity associated with the respective aeries; the Bald Knob site provided a view extending from Bear Mountain to the northern end of Tenney Mountain; the Tenney Mountain site provided views of Fletcher Mountain, parts of the Tenney Mountain portion of the Project area, and of the Rattlesnake Mountain aerie (Figure 1-2a and b). For the purposes of this study, the Study area is considered the observable airspace as seen from these four observation sites, while the Project area is considered the ridges of Tenney and Fletcher mountains on which turbines are to be located (it does not include the lowlands where access roads, transmission corridors, and the substation are to be located). Bald Knob, Rattlesnake Mountain, and Bear Mountain are each outside of the Project area.

These study protocols were approved by NH Fish and Game, Audubon, and Stantec on June 2, 2009. Survey effort focused on peregrine falcons but also included documentation of the occurrence and flight behaviors of all raptors observed. Therefore, the Results and Discussion sections of this report first describe the activity of peregrine falcons, then separately report the activity of all raptors observed. Additionally, a supplemental study was conducted in 2009 to identify peregrine falcon prey remain samples collected by Audubon field biologists over the past 16 years at the Rattlesnake Mountain aerie. Stantec has worked with the Smithsonian Institution to identify avian remains for other unrelated wind projects. Stantec requested that the Smithsonian identify samples collected at the aerie, using feather or DNA identification, in an effort to determine the likelihood of peregrine falcon foraging in the habitats that occur in the Project area. This effort was not part of the work plan initially developed with NH Fish and Game, but was initiated by Stantec and Audubon to provide supplemental information to identify species that peregrine falcon typically forage on, and if these species' habitats occur in the Project area. The results of the supplemental analysis are included in the Results and Discussion sections of this report.

The purpose of the 2009 peregrine falcon study was to observe peregrine falcons in the Study area and to investigate whether peregrine falcons use the Project area during the post-fledging (June 23 to August 11) and early fall migration (August 17 to September 10) periods, and if they

do, how and when. This timeframe was of interest because local juvenile peregrine falcon and adults begin to disperse from aeries, and migrant adults and juveniles may also occur in the area during this time. The 2009 study was geared toward documenting peregrine falcon activity; however, data is included in this report for all species of raptors observed during the peregrine surveys, as well as other avian species seen incidentally during on-site visits. The surveys will provide biological use data to help assess the potential risk for the proposed Project to impact seasonally local and migrant peregrine falcons and other raptor species.



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Legend

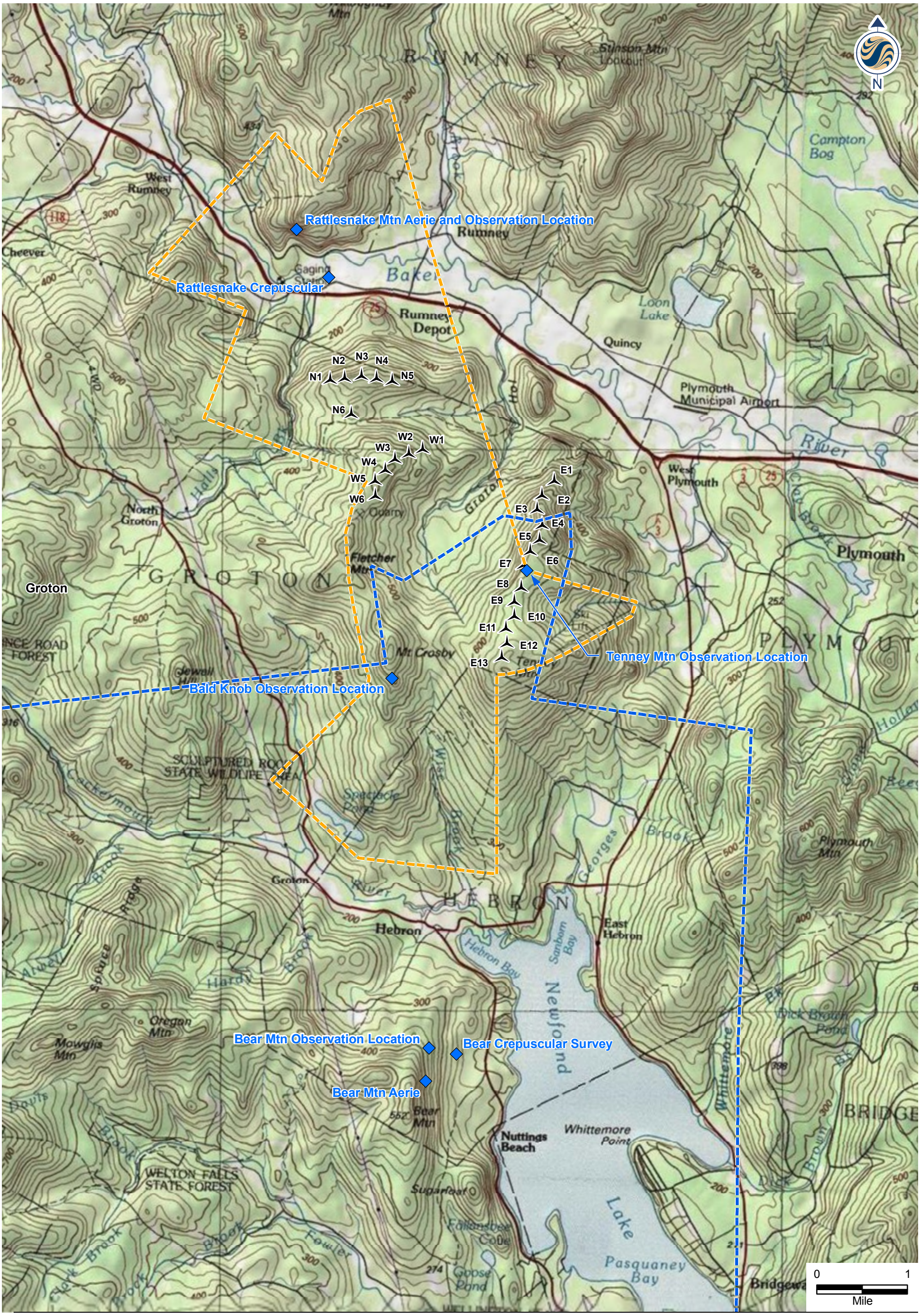
- Observation Location
- Proposed Turbines
- Area not visible from Bear & Rattlesnake Mtn

Client/Project
Groton Wind LLC
Groton Wind Project
Groton, New Hampshire

Figure No.
1-2A

Title
Observation Location Map
November 16, 2009

00299-F001-2A-Observation-Location-Map.mxd



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00299-F001-2B-Observation-Location-Map.mxd

Legend

- Observation Location
- Proposed Turbines

Area visible from Bear & Rattlesnake Mtn

- View from Bald Knob
- View from Tenney Mountain

Client/Project
Groton Wind LLC
Groton Wind Project
Groton, New Hampshire

Figure No.
1-2B

Title
Observation Location Map
November 16, 2009

1.1 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 ridgelines, 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 diversity 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']). 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 telecommunication 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 relatively high frequency of red spruce and balsam fir.

For the purposes of this study, the Study area is considered the observable airspace as seen from these four observation sites, while the Project area is considered the ridges of Tenney and Fletcher mountains on which turbines are to be located (it does not include the lowlands where

access roads, transmission corridors, and the substation are to be located). Bald Knob, Rattlesnake Mountain, and Bear Mountain are each outside of the Project area.

Study area viewshed (as seen from each observation site)

The rocky outcroppings on the summit of Bald Knob provided 200 degree views to the east and south. The viewshed from Bald Knob included the summit of Mount Crosby directly to the north, Groton Hollow and the length of Tenney Mountain to the northeast, Newfound Lake and Bear Mountain to the south, and west as far as Mount Cardigan. It should be noted that the Bald Knob observation site is outside of, but overlooks, the Project area; therefore, birds directly over Bald Knob or Mount Crosby were considered outside of the Project area. However, birds observed over any part of the Project area from that site were included in the analysis of raptor use of the Project. For locations within the Project area specifically, the proposed turbine areas on Fletcher Mountain could not be seen from Bald Knob; however, 10 of the 13 proposed turbine locations on Tenney Mountain could be seen. The northern most 3 turbines were not visible (Figure 1-2a).

The meteorological (met) tower clearing from the center of Tenney Mountain provided 180 degree views to the southwest -- from the northern extension of Fletcher Mountain south to Mount Crosby and Bald Knob, the summit of Tenney Mountain and some eastern aspects of Tenney Mountain. Trees and topography obscured views to the northeast and northwest along Tenney Mountain; however, a temporary tree stand was built to provide clear views of the northern portion of Fletcher Mountain, Baker River valley, and the Rattlesnake Mountain aerie (Figure 1-2a). For locations within the Project area specifically, all proposed turbine locations associated with Fletcher Mountain, the east-to-west oriented ridge just north of Fletcher, and the saddle between Fletcher and this ridge were visible from the tree stand. The seven southern turbines on Tenney Mountain were visible from the observation site on Tenney Mountain (Figure 1-2a).

The view from the Bear Mountain observation site included Bald Knob and Tenney Mountain to the north and Newfound Lake to the northeast and east. From specific vantage points in the observation clearing, views of the Bear Mountain aerie cliffs could be seen (Figure 1-2b).

The view from the Rattlesnake Mountain observation site afforded excellent views of the Project area to the south, the Baker River valley to the east, Mount Cardigan to the southwest, and portions of the aerie cliffs to the north. From this location, all of Fletcher Mountain and the northern extension of Fletcher, as well as the northern portion of Tenney Mountain, were visible (Figure 1-2b).

Combining the turbine areas visible from both Bald Knob and Tenney Mountain, the airspace above 22 out of 25 proposed turbine locations was visible; therefore, 88 percent of the Project area was surveyed during the study.

1.2 DATA COLLECTION METHODS

1.2.1 Field Surveys

Peregrine falcon surveys were conducted simultaneously by four biologists (two from Stantec and two from Audubon) on 20 days (10 two-day survey blocks) during the post-fledging (June 23 to August 11) and early fall migration (August 17 to September 10) periods in 2009. On each survey day, one biologist was positioned at each of the four observation sites: Bald Knob, Tenney Mountain, Bear Mountain, and Rattlesnake Mountain.

Visual observation survey methods were based on modified Hawk Migration Association of North America (HMANA) (HMANA 2007) and Northeast Hawk Watch methods. Surveys were generally conducted for eight consecutive hours between 8 am to 4 pm, during the peak hours of thermal development and raptor movement. However, for some survey days with periods of unstable weather, the timing of surveys was adjusted by all four observers to start either earlier or later according to when weather would be optimal for visibility. Surveys were conducted from 8 am to 4 pm on 14 days, from 7 am to 3 pm on 2 survey days, and from 6 am to 1 pm, 9 am to 5 pm, 11 am to 7 pm, and 10 am to 6 pm on single survey days. Incidentally, the adjustment of survey hours on some days allowed for surveying peregrine activity during different times of the day, including periods near dawn and dusk when peregrines are active. Surveys were generally conducted simultaneously at all four sites. However, due to travel logistics there was minor variability in survey hours among the observation sites. There were approximately 155 survey hours conducted at Bald Knob, 156 hours at Tenney Mountain, 158 hours at Bear Mountain, and 157 survey hours conducted at Rattlesnake Mountain.

During surveys, observers at the four observation sites scanned the sky and surrounding landscape by naked eye or with binoculars for the duration of each 8 hour survey. Spotting scopes were sometimes used, but not consistently. Throughout each survey day, observers from Tenney Mountain or Bald Knob recorded hourly weather conditions, wind speed and direction, temperature, sky conditions, percent cloud cover, and relative cloud height and type.

Each peregrine falcon or other raptor observation, or pass, was documented. Each time a bird was observed it was recorded. Therefore, daily count totals for each observation site included all observations, or passes, of birds observed throughout a survey day regardless if they were suspected to be local birds seen multiple times during the day. Detailed information for each observation was recorded on standardized datasheets (copies available in Appendix A), including:

- Observation date and time;
- Species[1], number of individuals, and age (if possible);
- The location of each bird depicted on a topographical map;

[1] 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.

- The specific flight behaviors of each bird;
- The general flight direction of each bird; and
- If the observation was simultaneous with the observer at another observation site.

Additionally, observations of non-raptor species including passerines and water birds were often documented by observers at both the Project and aerie observation sites; however, this data was not collected uniformly or systematically.

Additional data collection methods were specialized for the observers at the Project observation sites (Bald Knob and Tenney Mountain) and observers at the aerie sites (Bear Mountain and Rattlesnake Mountain). The data collection methods for the aerie sites were geared toward collecting presence or absence data for the adults and juveniles at each breeding location. The data collection methods for the Project area sites were geared toward collecting presence or absence data, but also flight height, flight path, and other flight behaviors in relation to the location and dimensions of the proposed turbines. At the aerie sites, for some birds, flight height and flight direction were recorded; however, this information was not collected for all observed birds. The additional data parameters collected at the Project observation sites and not at the aerie sites included:

- Where the bird occurred in the Study area, particularly whether or not the bird occurred in the Project area;
- The flight positions of each bird in relation to topography of the area;
- The flight height above ground of each bird (within each different topographical flight position); and
- If the raptor was suspected to be actively migrating or not.

Nearby objects with known heights, such as met towers, telecommunication towers, and trees, were used to estimate flight height. Flight paths were categorized with respect to local topography as follows: 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 1-3 below). As individual birds traveled through or in the vicinity of the Project, all position categories in which a bird occurred were recorded.

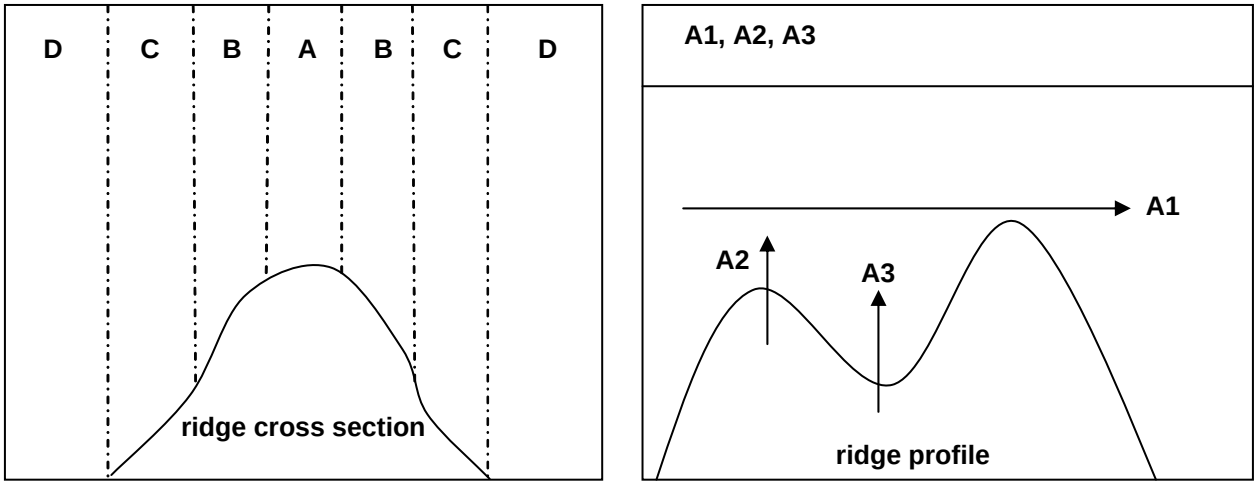

Figure 1-3. Raptor flight position categories in relation to the topography of the Study area (not just the Project area)

Observers at Bald Knob and Tenney Mountain frequently communicated via cell phone to confirm simultaneous observations from multiple survey sites; confirmation of simultaneous observations with the observers at Bald Knob and Bear Mountain, and Tenney Mountain and Rattlesnake were made, but less frequently. During the course of the surveys, simultaneous observations from survey sites were used to help determine the maximum distance at which observers could detect individual birds and to determine the detection range of raptors in the Study area. Simultaneous observations indicated that the areas of detection overlapped between observations sites. Observers at each observation site documented all birds seen regardless if they were seen simultaneously at other observation sites.

It should also be noted that two separate crepuscular peregrine falcon surveys were conducted by Stantec biologists at Rattlesnake Mountain and Bear Mountain on July 14 and July 28, respectively. These surveys were not part of the original work plan; however, Stantec biologists were able to conduct these supplemental observations while in the area. The Rattlesnake Mountain crepuscular survey was conducted from a parking area off Route 25 (1,220 m; 4,000') (Figure 1-2b) between 5:45 am and 6:45 am. The location provided a view of the Rattlesnake Mountain aerie cliff. The Bear Mountain crepuscular survey was conducted between 7:30 pm and 8:30 pm from below the aerie cliffs at the end of Bear Mountain Road (763 m, 2,500') (Figure 1-2b).

1.3 DATA ANALYSIS METHODS

The peregrine falcon data and raptor observation data were summarized by survey day and for the entire survey period for each of the four observation sites. Data analysis for both peregrines and raptors included a summary of:

- The total number of individuals per species observed within the Study area during each survey day, and for the survey period[2];
- Hourly observation totals as compared to daytime hours surveyed for the survey period;
- Daily observation rates (birds observed per hour) calculated for each survey day, as well as for each seasonal period (post-fledging and early-fall migration); and
- A summary flight behaviors (the percentage of observations per behavior).

For the Bald Knob and Tenney Mountain data, the analysis also included a summary of:

- The percentage of birds suspected to be actively migrating;
- 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 observed which occurred within the Project area; and
- For all birds observed within the Project area, flight heights were categorized as less than or greater than 121 m (399') above ground, the maximum height of the proposed turbines.

1.4 AERIE PREY REMAINS ANALYSIS

NH Audubon biologists have collected feather, bone, and pellet remains at peregrine falcon aeries in New Hampshire since 1990. Prey remains were available from the Rattlesnake Mountain aerie from 1994, 1995, 1998, 1999, 2000, 2001, 2002, 2004, 2005, 2007, 2008, and 2009. At some point during the breeding season during each of these years, NH Audubon biologists gathered the prey remains present at the aerie into a single sample bag for each year. NH Audubon and Massachusetts Division of Fisheries and Wildlife (MassWildlife) personnel identified some of the remains from the Rattlesnake aerie from 1994, 1995, 2008, and 2009; those remains that were not previously identified were provided to Stantec for further analysis. Stantec worked with the Smithsonian Institution to identify as many species as possible from the 12 years of prey remain samples. Smithsonian Institution personnel used a catalogue of North American avian species (feathers and carcasses) for positive identification when possible.

The objectives of the analysis were to 1) identify the prey species in each of the 12 sample years, 2) to determine whether habitats of prey species occur within the Project area, and 3) to determine whether identified prey species have been documented in the Project area during the 2009 breeding bird surveys or other site visits. This information may indicate the likelihood of peregrine falcons foraging in the immediate vicinity of the proposed Groton Wind Project.

[2] Daily count totals represent the total number of observations in a day and may include multiple observations of individual birds seen throughout each survey day.

2.0 Results

2.1 WEATHER, SURVEY EFFORT, AND RANGE OF DETECTION

Temperatures during surveys ranged from 9 to 33 degrees Celsius (48.2 to 91.4 degrees Fahrenheit). Sky conditions were generally clear to overcast; however, periods of fog, mist, or drizzle periodically reduced visibility during eight of the 20 surveys. Wind direction was variable among survey days and wind speeds ranged from calm to 13-18 mph (20-29 kph).

Surveys were conducted on 20 days out of 80 total days within the period of interest from June 23 to September 10. There were a total of 1,120 daylight hours during this 80 day period (based on approximately 14 hours of sunlight per day during which peregrine falcons may be active). Therefore, observers were present at each observation site for 14 percent of the total daylight hours during this timeframe. Out of the total survey hours (155 at Bald Knob, 156 at Tenney Mountain, 158 at Bear Mountain, and 157 at Rattlesnake Mountain), there were 28 hours during which either fog/mist or drizzle/rain conditions limited visibility. Excluding periods of reduced visibility, the observable airspace in the Study area was visible and surveyed for approximately 11 percent of the total daylight hours during the post-fledging and early-fall migration period.

Long-distance observation detection ranges varied from 3,050 m (1.9 miles) to 6,710 m (4.2 miles). Simultaneous observations of both large and small raptors, occurring over either Bald Knob or Tenney Mountain, were regularly made between the observers at both sites by binocular or spotting scope, indicating raptors could be detected at distances of at least 3,050 m (1.9 miles) from these sites. On July 8, the observer at Tenney Mountain saw a flash of motion on the cliff of Rattlesnake Mountain while using a spotting scope; the Stantec biologist was on the phone with the observer at Rattlesnake Mountain who indicated this may have been the juvenile peregrine falcon coming to perch on the cliff. The observer at Tenney would not have identified the observation as a raptor had he not been in communication with the observer at Rattlesnake Mountain. However, this observation suggested the maximum distance at which raptors could be seen with cooperative effort between multiple observers; the Rattlesnake Mountain cliff is approximately 6,710 m (4.2 miles) from the observation site on Tenney Mountain. On July 14, the observer at Rattlesnake Mountain indicated that he could see a turkey vulture over the valley between Rattlesnake Mountain and Tenney Mountain; the bird's location was approximately 5,490 m (3.4 miles) from Rattlesnake Mountain. Also on July 14, the observer at Rattlesnake Mountain could see a group of common ravens flying over the Polar Caves peak north of Tenney Mountain, at a distance of 4,880 m (3 miles). On July 28, the observer at Rattlesnake Mountain could see a group of turkey vultures over Tenney Mountain at a distance of approximately 6,710 m (4.2 miles). On July 8, the observer from Bear Mountain indicated that she could see the red and white umbrella of the observer on Bald Knob from her location with her binoculars; Bear Mountain is approximately 5,490 m (3.4 miles) from Bald Knob. On July 20, the observer from Bear Mountain indicated that she could see a broad-

winged hawk flying high and heading over the valley between Bald Knob and Tenney Mountain; this bird was roughly 5,490 m (3.4 miles) from Bear Mountain.

Because ranges of detection from observation points overlapped, many of the observations from the Project sites were simultaneous with other observers (Appendix B, Table 1a-b). At Bald Mountain, 40 percent (n = 211 of 534) of observations of all raptors (including peregrine falcons) were simultaneous with other observers; 38 percent were simultaneous with the observers at Tenney Mountain, and the remaining were simultaneous with observers at Bear Mountain. At Tenney Mountain, 47 percent (n = 201 of 424) of observations of all raptors were simultaneous with other observers; 46 percent were simultaneous with the observers at Bald Mountain and the remaining were simultaneous with observers at Rattlesnake Mountain. Refer to Appendix B, Table 1a-b for the list of species and individuals that were simultaneous observations.

2.2 PEREGRINE FALCON ACTIVITY DOCUMENTED AT AERIE OBSERVATION SITES

The Bear Mountain and Rattlesnake Mountain aeries successfully fledged 4 and 3 young, respectively, within the week prior to the initiation of this study (the Bear Mountain aerie had fledged before June 16 and the Rattlesnake Mountain aerie had fledged before June 17; NH Audubon, unpub. data). Audubon observers documented activity of both adult and fledged juvenile peregrine falcons at both aeries during the course of the surveys (Appendix B, Table 2).

At Bear Mountain, peregrine falcon adults and juveniles were observed on 50% of (10 of 20) survey days. During the post-fledging period from June 23 to August 11, there were a total of 110 survey hours at Bear Mountain. Thirty-two peregrine falcon observations were made for an observation rate of 0.29 peregrines per hour (peregrines/hr). During the early-fall migration period from August 17 to September 10, there were a total of 48 survey hours at Bear Mountain. There were 5 observations of peregrine falcon for an observation rate of 0.10 peregrines/hr. The greatest number of individual birds observed on a survey day at Bear Mountain was on July 7 when the four juveniles and one adult from the nest were seen. The four juveniles were not seen together again at the Bear Mountain aerie during consecutive surveys; however, 2 juveniles were occasionally seen together.

From Rattlesnake Mountain, peregrine falcon adults and juveniles were observed on 85% of (17 of 20) survey days. During the post-fledging period, there were a total of 109 observation hours at Rattlesnake Mountain. During this time, a total of 50 observations of peregrine falcon were made for an observation rate of 0.46 peregrines/hr. During the early-fall migration period, there were at total of 48 observation hours. During this time, a total of 31 peregrine falcon observations were made for an observation rate of 0.65 peregrines/hr. All five individual birds from the aerie (2 adults and 3 juveniles) were observed at Rattlesnake Mountain on June 23 and 24. The juveniles remained in the vicinity of the aerie throughout the day, the female was

observed perched throughout most of the day, and the male was observed returning with prey on both days. The last time all 3 juveniles were observed at the aerie together was on July 8.

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2.3 SUMMARY OF PEREGRINE FALCON OBSERVATIONS FROM PROJECT AREA OBSERVATION SITES

During the post-fledging period, there were a total of 107 survey hours at Bald Knob. During this time, there were 2 observations of peregrine falcon for an observation rate of 0.02 peregrines/hour. During the early-fall migration period, there were a total of 48 survey hours. During this time, two peregrine observations were made for an observation rate of 0.04 peregrines/hour. Stantec biologists documented four peregrine falcon observations from Bald Knob during the course of the study. None of these sightings occurred within the Project area. Two falcons were heard on July 20th but since they were out of sight of the observer, flight height and flight position were not determined. The birds were heard for approximately one minute, it sounded as though they were moving northward over the western slope of Bald Knob. Two other peregrines were observed from Bald Knob: the bird seen on August 17th flew over Mount Crosby in position A1 at 100 m, then flew over the valley at 300 m heading to the northwest; the bird seen on August 18th flew just west of Bald Knob, at 80 m in position A1, then continued to the north. None of the falcon observations from Bald Knob were simultaneous with other observers and none of the falcons observed from Bald Knob were suspected to be actively migrating.

During the post-fledging period, there were a total of 108 survey hours at Tenney Mountain. During this time, there were 2 peregrine falcon observations made with an observation rate of 0.02 peregrines/hr. During the early-fall migration period, there were a total of 48 survey hours at Tenney Mountain. During this time, there were 2 peregrine falcon observations made with an observation rate of 0.04 peregrines/hr. Stantec biologists documented four peregrine falcon observations from Tenney Mountain during the course of the study. The first was a long-distance observation of a possible juvenile peregrine falcon landing on the cliff at the Rattlesnake aerie on July 8th. The observers at Tenney Mountain and Rattlesnake Mountain confirmed this simultaneous observation by cell phone. This was the only simultaneous observation of a peregrine falcon made from Tenney Mountain. Three peregrine falcon sightings were recorded over the Tenney Mountain Project area. Each of these birds was seen below 121 m, the height of the proposed turbines. On July 28th, a falcon crossed the ridge perpendicularly from east to west, occurring in flight positions A2 and B, at 70 to 80 m. On August 17th, a falcon was observed circle soaring in the vicinity of the observation met tower then continued north; it was seen in flight position A1 at 60 to 80 m. On September 9th, a falcon was seen flying at 25 to 160 m as it crossed the Tenney ridge in position A2 and position B; it was moving east to west perpendicular to the ridge. The bird continued over Groton Hollow at 200 m. This peregrine was suspected to be actively migrating due to its direct flight behavior and the seasonal timing of the observation; however, this was speculation and it is unknown if this bird was from one of the nearby aeries. No other peregrines observed from Tenney were

suspected to be actively migrating. Each bird observed in the Tenney Project area moved quickly through the area and no perching or direct hunting behaviors were seen.

Figure 2-1 provides a seasonal timeline of observations of peregrine falcons made from the Project and aerie observation sites. Table 2-1 and Figure 2-2 summarize the peregrine falcon observations as seen from the Project area observation sites.

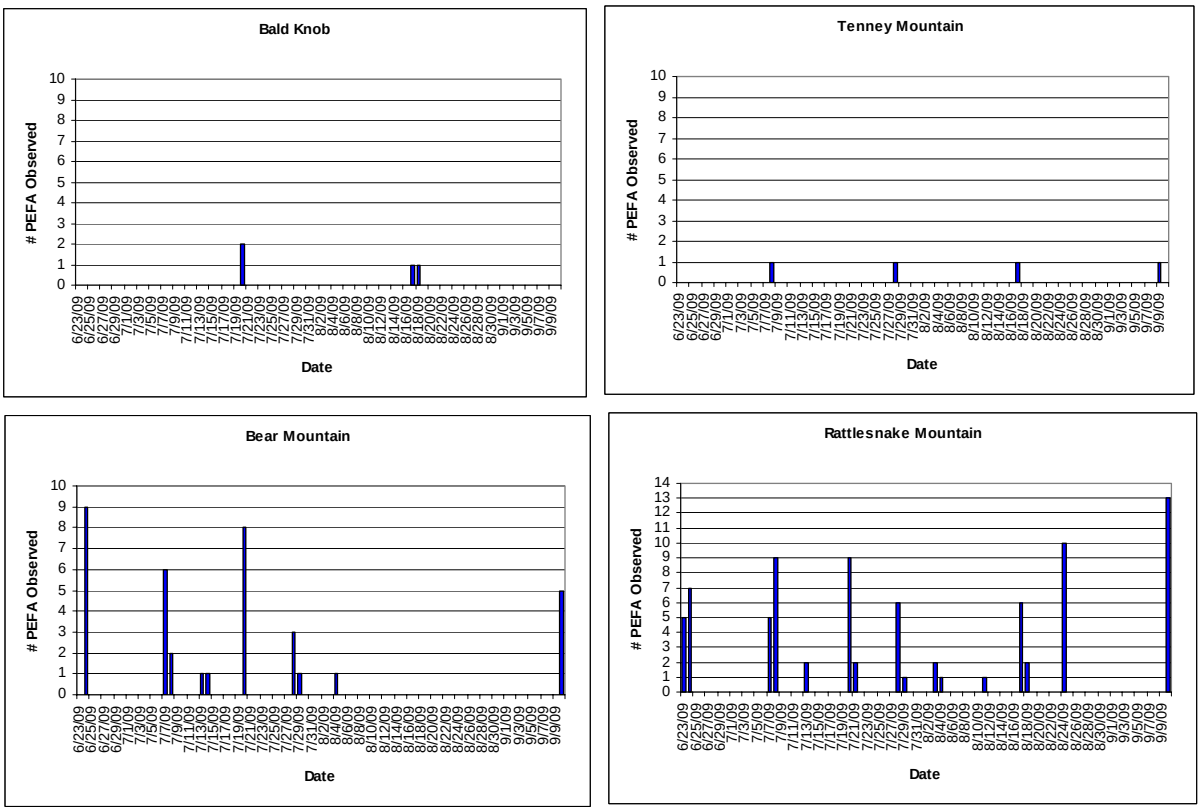
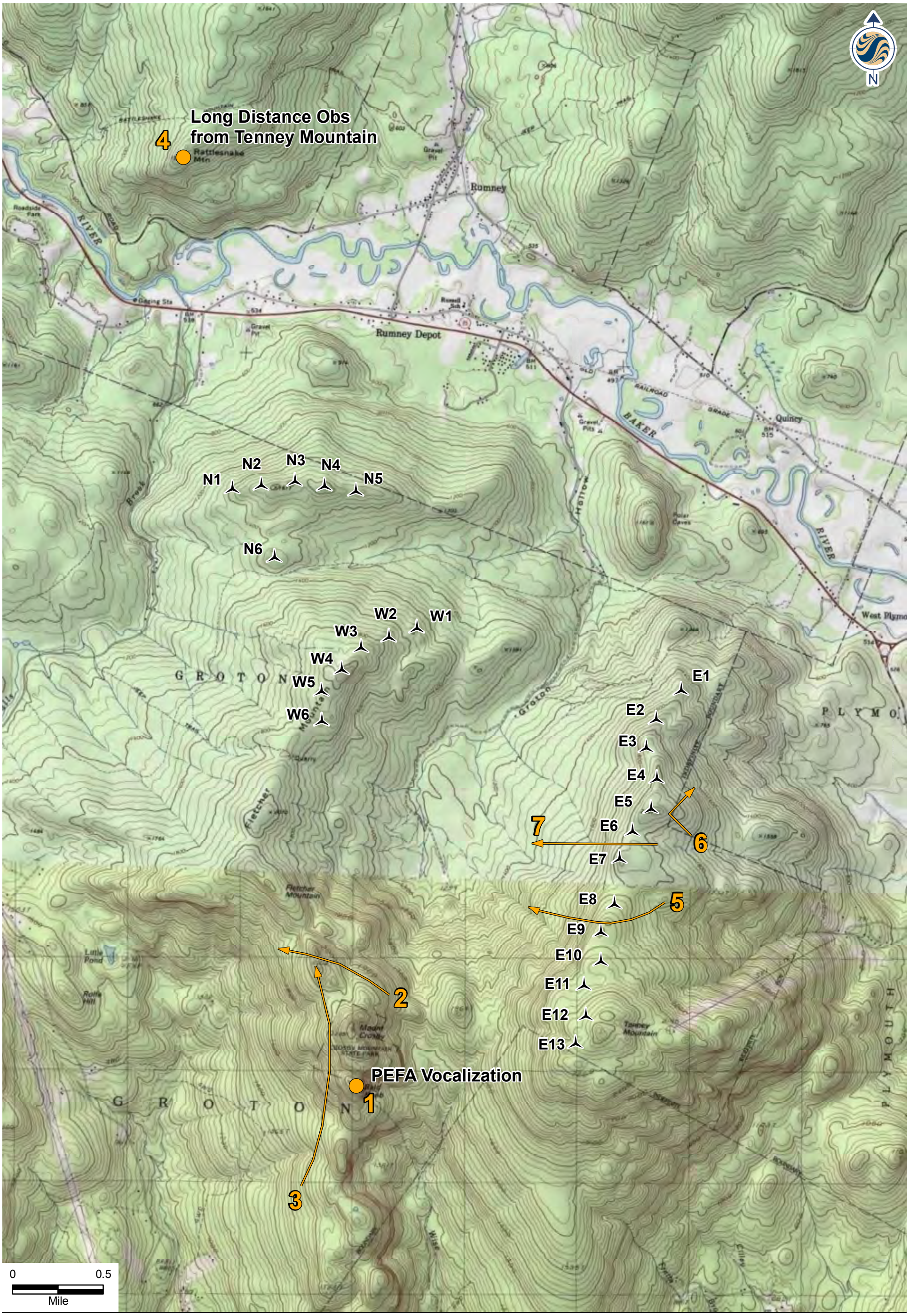


Figure 2-1 a-d (left to right). Daily observation totals of peregrine falcon (daily count totals represent the total number of observations in a day and may include multiple observations of individual birds) during the 2009 surveys from Bald Knob, Tenney Mountain, Bear Mountain, and Rattlesnake Mountain.

Table 2-1. Summary of peregrine falcon observations from the Bald Knob and Tenney Mountain observation sites during the 2009 surveys

							A1		A2		A3		B		C		D		
Map #	**Date**	**Obs. site**	**Time**	**# birds**	**Age**	**Within Project area?**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	**Observers' Notes:**
1	20-Jul	Bald	12:00-1:00	2	unknown, likely at least one juvenile	N							??		??				**heard 1-2 birds--possible juv wailing; west side Bald Knob--couldn't see beyond trees; calling for ~1 min in same locale; no vis obs; fast repetitive crying/wailing
2	17-Aug	Bald	4:00-5:00	1	unknown	N		100									300		flew over Crosby to NW
3	18-Aug	Bald	11:00-12:00	1	unknown	N	80												flew just to west of Bald Knob to the north
4	8-Jul	Tenney	2:00-3:00	1	J	N													long dist obs of Rattlesnake Mtn; verified by Rattlesnake observer CM, possible PEFA juv landing on cliff
5	28-Jul	Tenney	2:00-3:00	1	J?	Y			70	80			80						crossed ridge perpendicularly, observer lost sight of as flying over valley
6	17-Aug	Tenney	2:00-3:00	1	A	Y	60	80											circled in from north, circle soared over MET and moved away to the north; primary molt; just above MET
7	9-Sep	Tenney	10:00-11:00	1	A	Y			25				160		0	200			low over Tenney and dropped into Groton Hollow, suspected to be a migrant

KEY: 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



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Legend

- Peregrine Falcon Observation
- Turbine Location (10-26-2009)
- Peregrine Falcon Flight Path

195600299

Client/Project
Groton Wind LLC
Groton Wind Project
Groton, New Hampshire

Figure No.
2-2

Title
Peregrine Falcon Observations Made from Bald Mtn. and Tenney Mtn.
November 16, 2009

00299-F002_2-Peregrine-Falcon-Map.mxd

As there were few peregrine falcon observations from the Bald Knob and Tenney Mountain observation sites, it is difficult to compare the number of observations to the number of hours surveyed during hourly periods at these sites. Peregrine observations appeared to occur randomly during the survey hours at these sites. At Bear Mountain, peregrine observations peaked between 8 and 9 am then declined steadily throughout survey days. At Rattlesnake Mountain, there was a later activity peak between 2 pm and 4 pm (Figure 2-3).

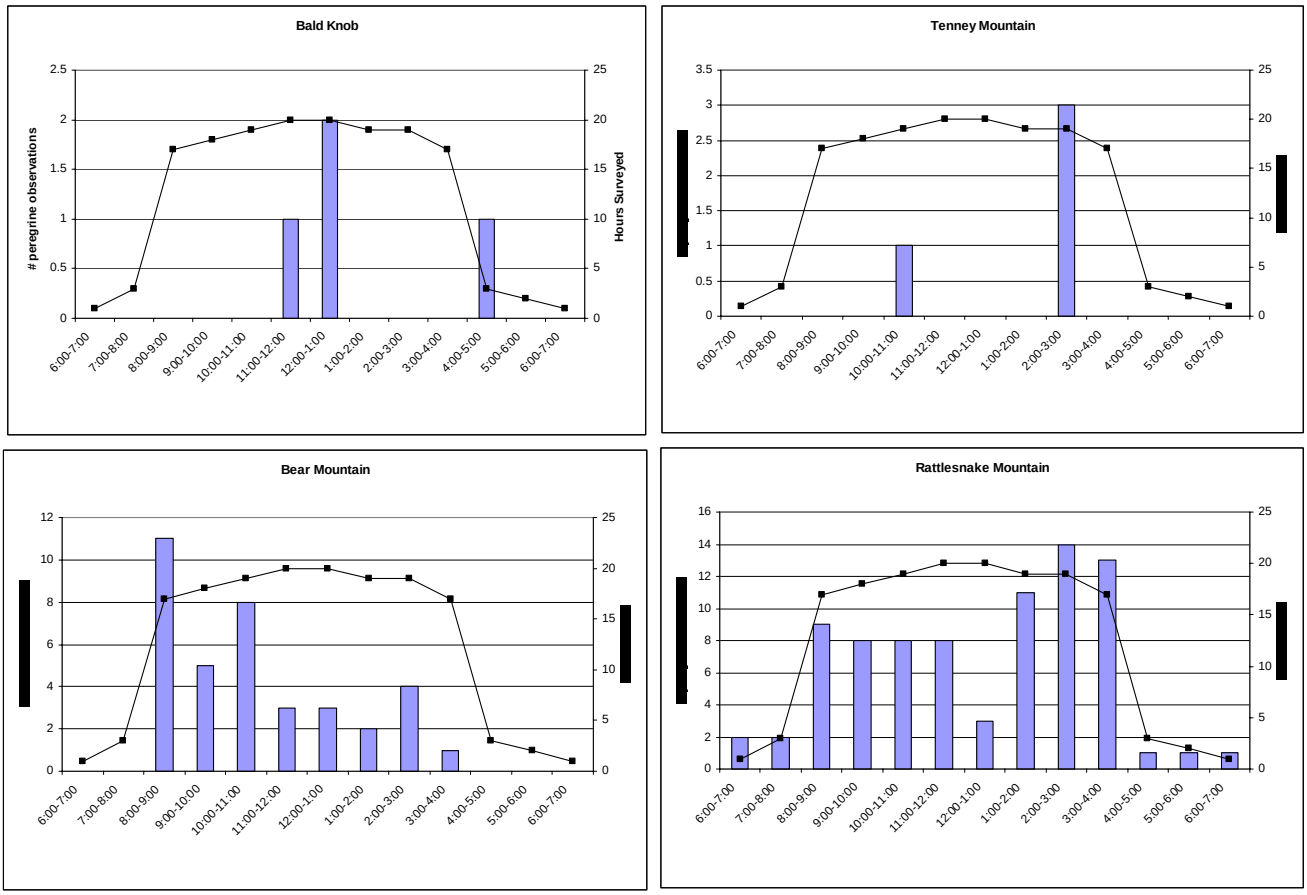


Figure 2-3 a-d (left to right). Number of observations of peregrine falcons compared to number of hours surveyed per hour period during the 2009 surveys from Bald Knob, Tenney Mountain, Bear Mountain, and Rattlesnake Mountain.

Incidental observations

Three peregrine falcons were observed when a Stantec biologist was leaving the Tenney Mountain observation site on August 25 at 7:25 pm. The birds flew over the Tenney Mountain Highway in the vicinity of intersection of I-93, headed in the direction of the Rattlesnake Mountain aerie. The birds were approximately 6 miles northeast of Tenney Mountain and 7 miles southeast of the Rattlesnake aerie.

No peregrine activity was observed during the Rattlesnake Mountain crepuscular survey on July 14. One adult peregrine falcon was observed perched at the Bear Mountain aerie during the Bear Mountain crepuscular survey on July 28.

As part of a broader raptor migration study under a different work plan, there was a separate raptor survey conducted by only the Stantec biologists at Tenney Mountain and Bald Knob on September 1, 2009 from 8:45 am to 4:45 pm. These surveys were not specific to peregrine falcon and therefore were not included in this data set; however, it should be noted that no peregrine falcons were observed at either site on that day (Stantec, un-published data). Additionally, during 11 spring raptor migration surveys conducted from Mount Crosby and Tenney Mountain from March 26 to May 23 in 2009, there were no peregrine falcon observed in the Project area (Stantec, un-publ. data).

2.4 OTHER RAPTOR SPECIES OBSERVED

Although the peregrine falcon surveys focused on documenting peregrine activity, all raptors seen during surveys were documented. This section provides the results of all raptor observations. Peregrine falcon observations are not included in the raptor daily count totals and observation rates reported in this section (however, peregrine falcons are included in the Appendix tables referenced in this section). It should be noted that, particularly during the post-fledging period when local raptors remained in the area, daily count totals represent the total number of observations in a day and may include multiple observations of the same birds. The early-fall migration period experienced relatively more migrant activity, particularly for broad-winged hawks. Observers at the Project area observation sites systematically documented if birds were suspected to be actively migrating or not (while the observers at the aerie sites did not). A summary of the proportion of migrants versus non-migrants for the Project observation sites is provided below.

During the post-fledging period, a total of 203 raptor observations were made from Bald Knob for an observation rate of 1.90 raptors per hour (raptors/hr). During the early-fall migration period, there were 327 observations of raptors made with an observation rate of 6.81 raptors/hr. For the duration of the study period, daily observation totals ranged from 0 to 152 total raptors (Figure 2-4a; Appendix B, Table 3a). Thirty-six percent (n = 192) of raptor observations made from Bald Knob were of birds suspected to be actively migrating, 5 percent (n = 29) of observations were not suspected to be migrating, and migrant status was undetermined for 58 percent (n = 309) of observations. The majority of raptors suspected to be migrants were broad-winged hawks (n = 147; 77 %) detected during the early-fall migration period. A total of 14 species were observed from Bald Knob (not including unidentified accipiter, unidentified buteo, unidentified falcon, and unidentified raptor) (Figure 2-5a).

During the post-fledging period, a total of 160 raptor observations were made from Tenney Mountain for an observation total of 1.48 raptors/hr. During the early-fall migration period, there were 260 raptor observations made for an observation rate of 5.42 raptors/hr. For the duration of the study period, daily observation totals ranged from 0 to 101 raptors (Figure 2-4b; Appendix B, Table3b). Thirty percent (n = 128) or raptor observations made from Tenney Mountain were of birds suspected to be actively migrating, 7 percent (n = 28) were of birds not believed to be actively migrating, and the migrant status of 63 percent (n = 264) of observations was undetermined. Seventy-nine percent (n = 101) of observations of raptors suspected to be migrants were of broad-winged hawks seen during the early-fall migration period. A total of 11 species were observed (not including unidentified accipiter, unidentified buteo, and unidentified raptor) (Figure 2-5b).

During the post-fledging period, a total of 154 raptor observations were made from Bear Mountain with an observation rate of 1.40 raptors/hr. During the early-fall migration period, a total of 114 raptor observations were made with an observation rate of 2.38 raptors/hr. Daily observation totals ranged 0 to 34 raptors (Figure 2-4c; Appendix B, Table 3c). A total of 12

different species were observed (not including unidentified accipiter, unidentified buteo, and unidentified raptor) (Figure 2-5c).

During the post-fledging period, a total of 126 observations of raptors were made with an observation rate of 1.16 raptors/hr. During the early-fall migration period, there were 140 raptor observations made with an observation rate of 2.92 raptors/hr. Daily observation totals ranged from 2 to 40 raptors (Figure 2-4d; Appendix B, Table 3d). A total of 9 species were observed (not including unidentified accipiter, unidentified buteo, unidentified falcon, and unidentified raptor) (Figure 2-5c).

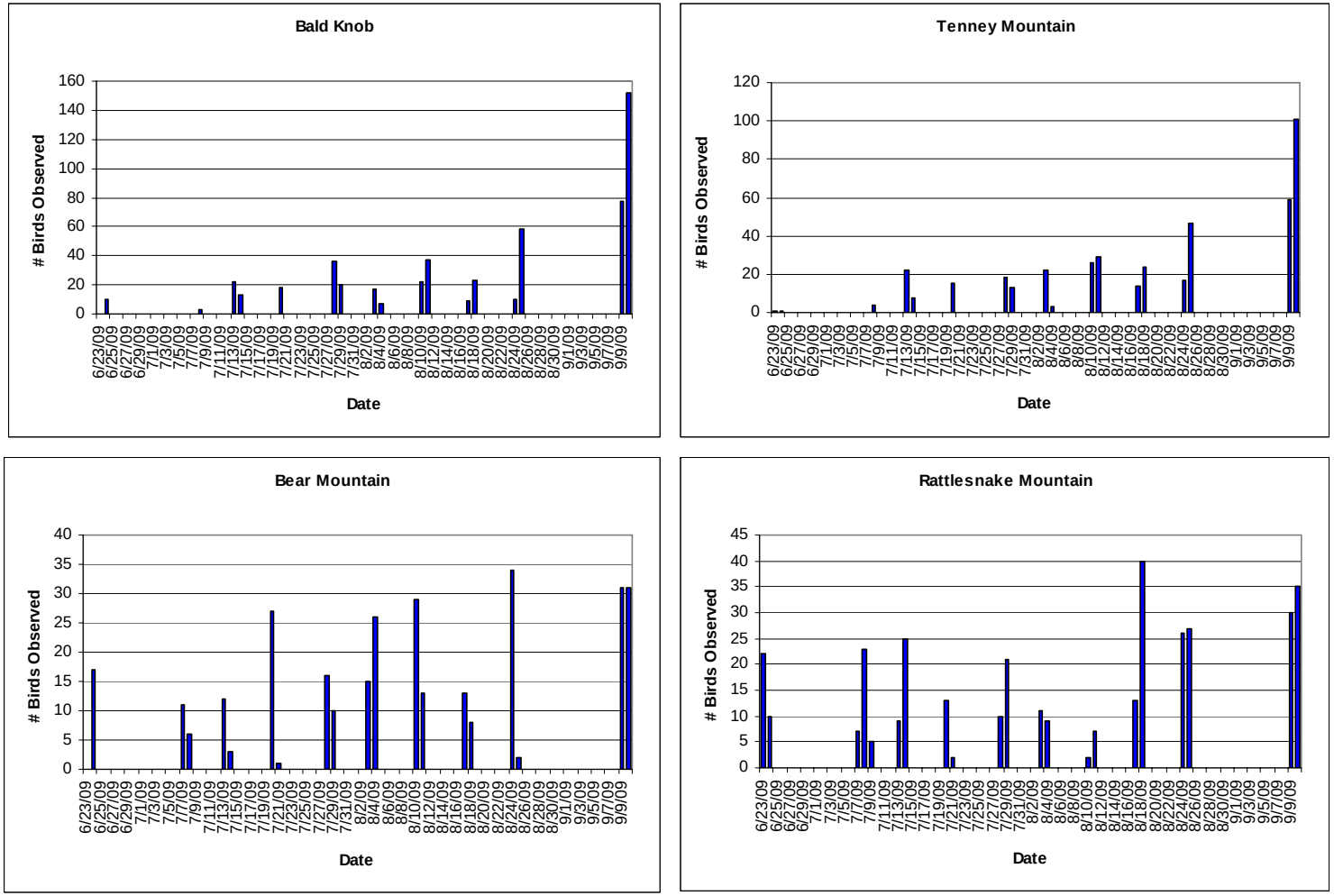


Figure 2-4 a-d (left to right). Daily observation totals (daily count totals represent the total number of observations in a day and may include multiple observations of individual birds) of raptor species during the 2009 surveys from Bald Knob, Tenney Mountain, Bear Mountain, and Rattlesnake Mountain.

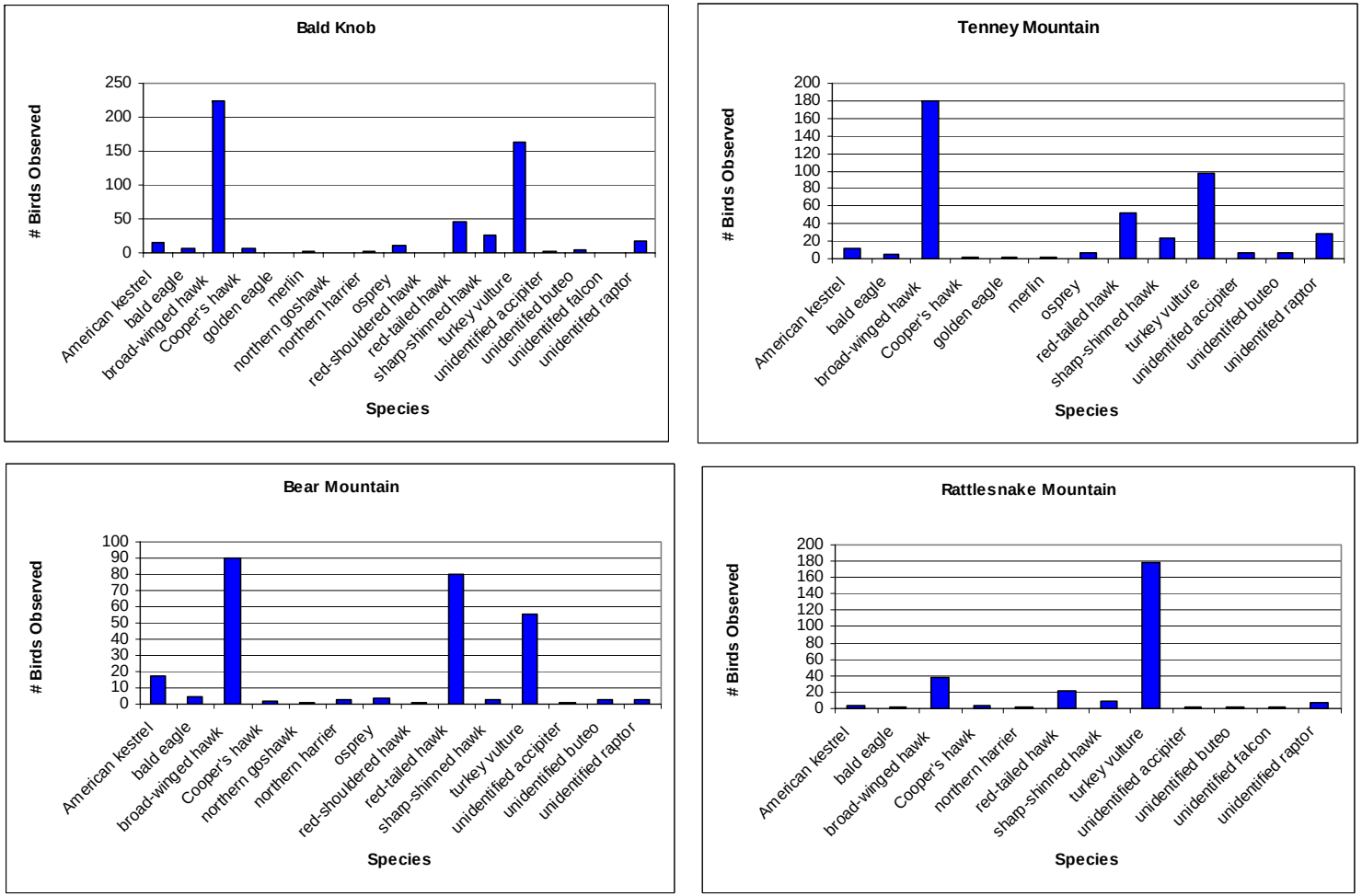


Figure 2-5 a-d (left to right). Number of observations of raptors (count totals represent the total number of observations and may include multiple observations of individual birds) during the 2009 surveys from Bald Knob, Tenney Mountain, Bear Mountain, and Rattlesnake Mountain.

On a daily basis, the majority of observations of raptors peaked between 10 and 11 am at Bald Knob, Tenney Mountain, and Bear Mountain; however, observations peaked between 3 and 4 pm at Rattlesnake Mountain (Figure 2-6 a-d; Appendix B, Table 4a-d). It should be noted that the majority of observation hours took place between 9 am and 4 pm for the duration of the study, and there appears to be a positive relationship between the number of hours surveyed and the number of observations of raptors during the hour periods (Figure 2-6 a-d).

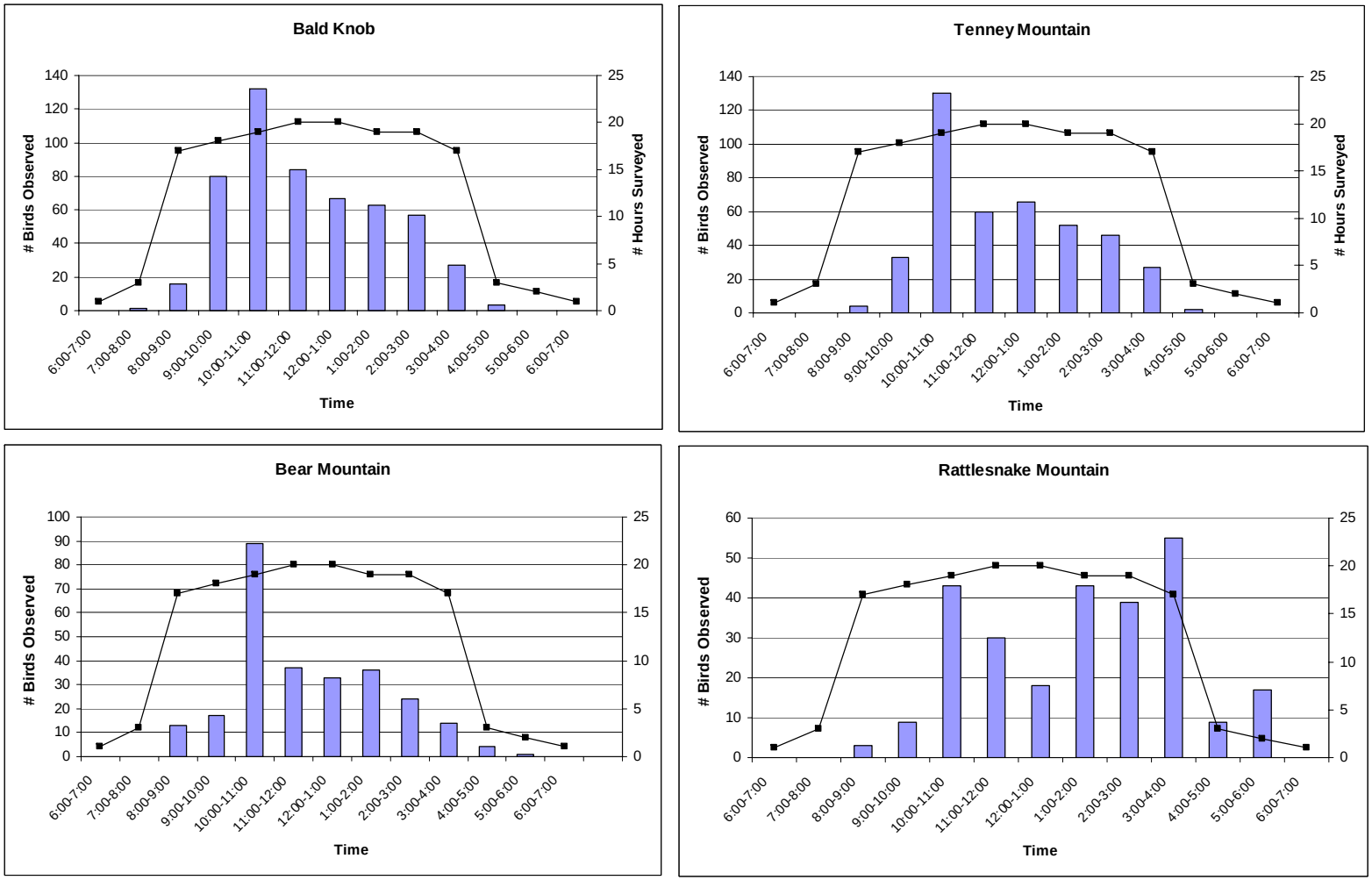


Figure 2-6 a-d (left to right). Number of observations of raptors compared to number of hours surveyed per hour period during the 2009 surveys from Bald Knob, Tenney Mountain, Bear Mountain, and Rattlesnake Mountain.

2.5 FLIGHT POSITIONS AND FLIGHT HEIGHTS OF RAPTORS IN THE PROJECT AREA

Raptor flight positions in relation to the topography of the Study area and the Project area, and the average minimum flight heights for birds within these position categories, are depicted in Table 2-2 a-b below. Note that some birds occurred in multiple flight position categories as they traveled through the Study area and the Project area and flight positions were not recorded for all birds observed; therefore, the number of flight position observations is not equal to the number of raptor observations.

Table 2-2a. Number of observations and average flight heights for each position category for raptors observed from **BALD KNOB** 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 (870 total position observations)	196 (22.5%)	52 (5.9%)	44 (5.1%)	204 (23.4%)	154 (17.7%)	220 (25.3%)
Average minimum flight height (m)	81.5	116.2	108.4	115.1	215.0	359.2

Table 2-2b. Number of observations and average flight heights for each position category for raptors observed from **TENNEY MOUNTAIN** 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 (627 total position observations)	178 (28.4%)	37 (5.9%)	18 (2.9%)	166 (26.5%)	86 (13.7%)	142 (22.6%)
Average minimum flight height (m)	122.2	114.3	129.4	121.4	232.8	437.5

At Bald Knob, out of the 870 raptor flight positions observed, the majority (25 %) occurred over position D) over valley, followed by position A1) along or parallel to Bald Knob or ridges in the vicinity (23 %), then position B) the upper slopes of Bald Knob or ridges in the vicinity (23%). At Tenney Mountain, there were a total of 627 flight positions observed. The majority of flight position observations occurred in A1 (28 %), followed by B (26 %), then position D (23 %).

Of the 530 observations of raptors in the Study area from Bald Knob, 254 occurred within the Project area (48 %). Of the observations of raptors that occurred in flight positions where the proposed turbines would be located (positions A, B, and C), 69 percent (n=175) occurred below the maximum turbine height of 121 m (Figure 2-7a; Appendix B, Table 5a).

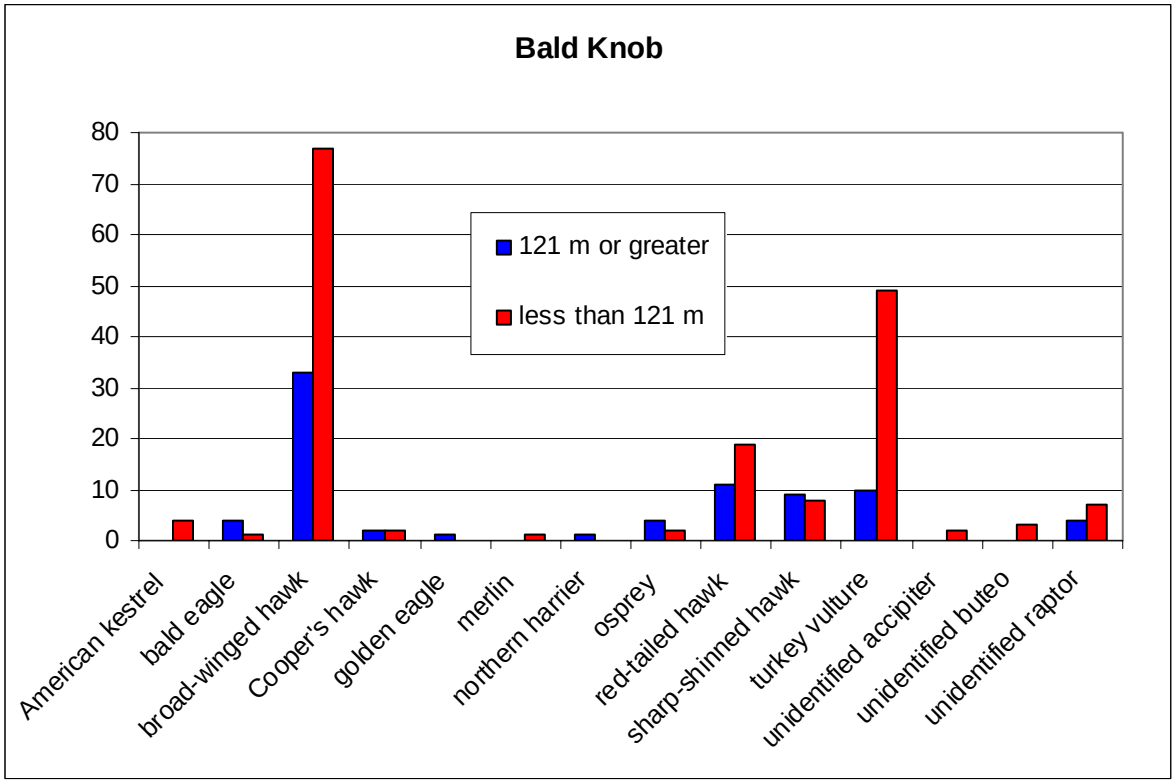


Figure 2-7a. Flight height categories of raptor observations within the Project area, as seen from Bald Knob during the 2009 surveys.

Of the 420 observations of raptors made from Tenney Mountain, 367 (87 %) occurred at some location within the Project area (the proposed turbine areas). Of these 367 observations, 200 (54 %) were observed below the maximum height of the proposed wind turbines (Figure 2-7b; Appendix B, Table 5b).

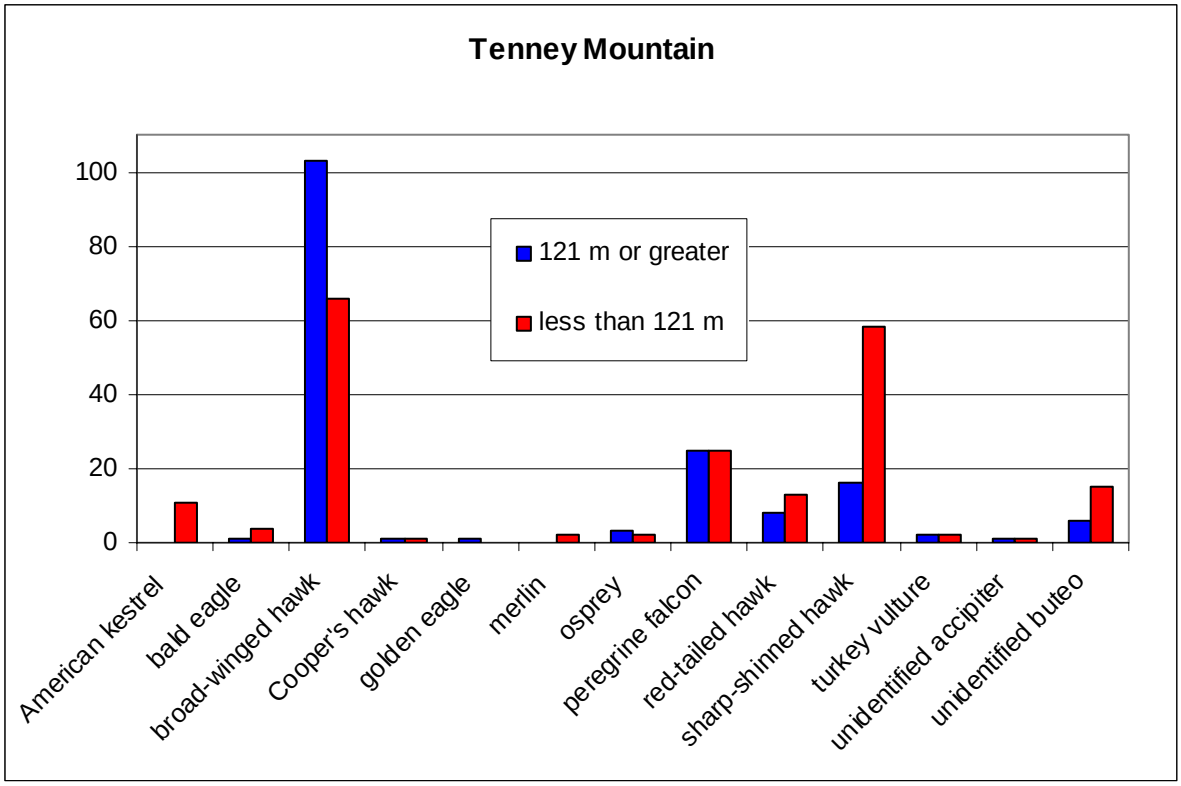


Figure 2-7b. Flight height categories of raptor observations within the Project area, as seen from Tenney Mountain during the 2009 surveys.

2.6 FLIGHT BEHAVIORS

The raptor flight behaviors observed from all four observation sites are summarized in Figure 2-8 a-d below. Note that some birds exhibited multiple flight behaviors as they traveled in the vicinity of the Project and in some cases observers did not document flight behaviors; therefore the number of flight behavior observations is not the same as the number of total birds observed. The majority of flight behavior observations at all sites were of birds circle soaring.

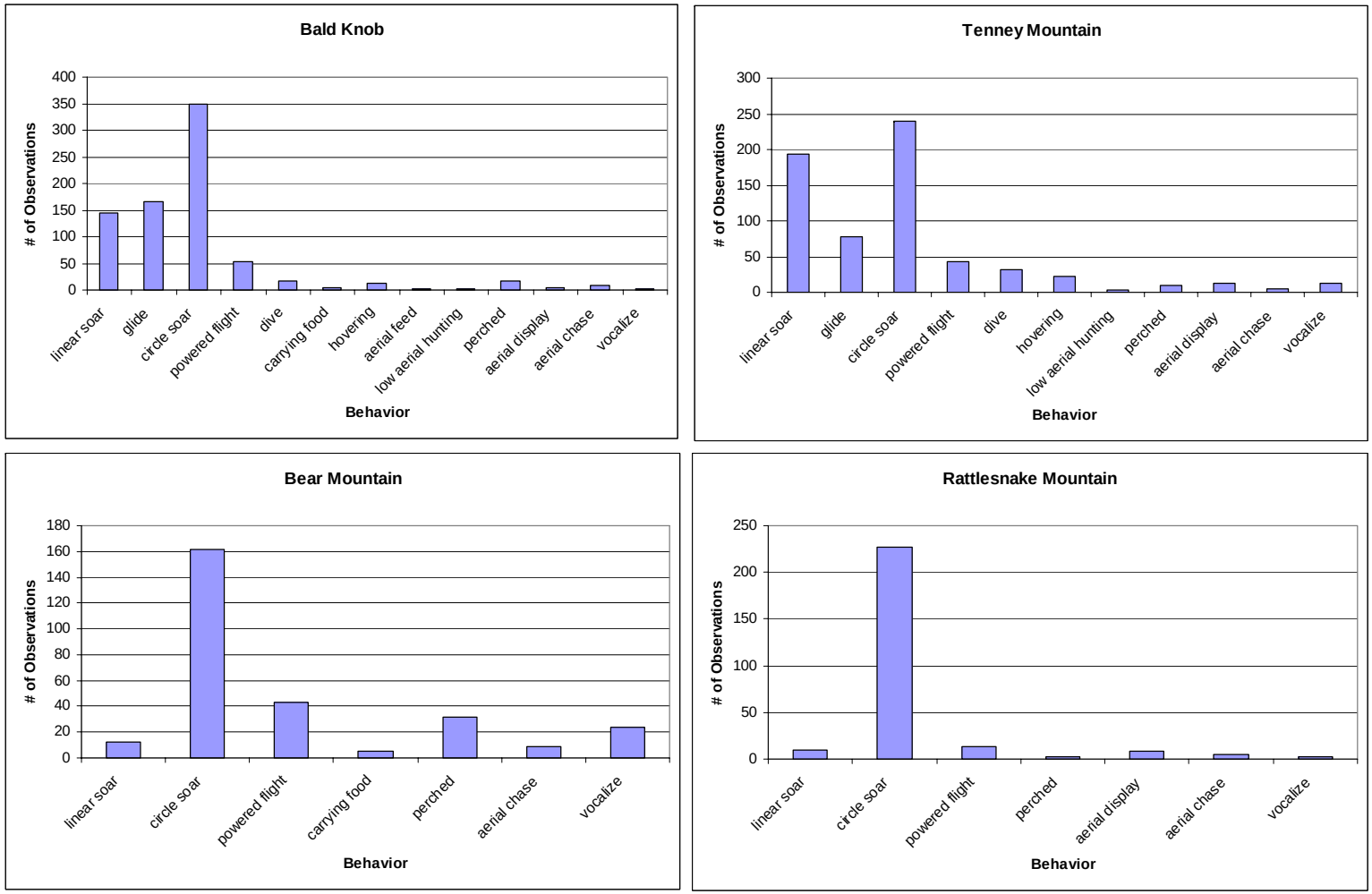


Figure 2-8 a-d (left to right). Number of observations of raptor flight behaviors observed during the 2009 surveys from Bald Knob, Tenney Mountain, Bear Mountain, and Rattlesnake Mountain.

2.7 OBSERVATIONS OF STATE-LISTED RAPTOR SPECIES

Observers documented two state endangered species during the surveys: golden eagle and northern harrier. The golden eagle was observed simultaneously from Bald Knob and Tenney Mountain on September 9th (Table 2-3). The bird was seen at 500 m over the Groton Hollow valley, then just north of Mount Crosby, and then continued southwest over the valley west of Mount Crosby and Bald Knob (Figure 2-9). There were five total observations of northern harrier (none of which were simultaneous observations) in the Study area (Table 2-3; Figure 2-9).

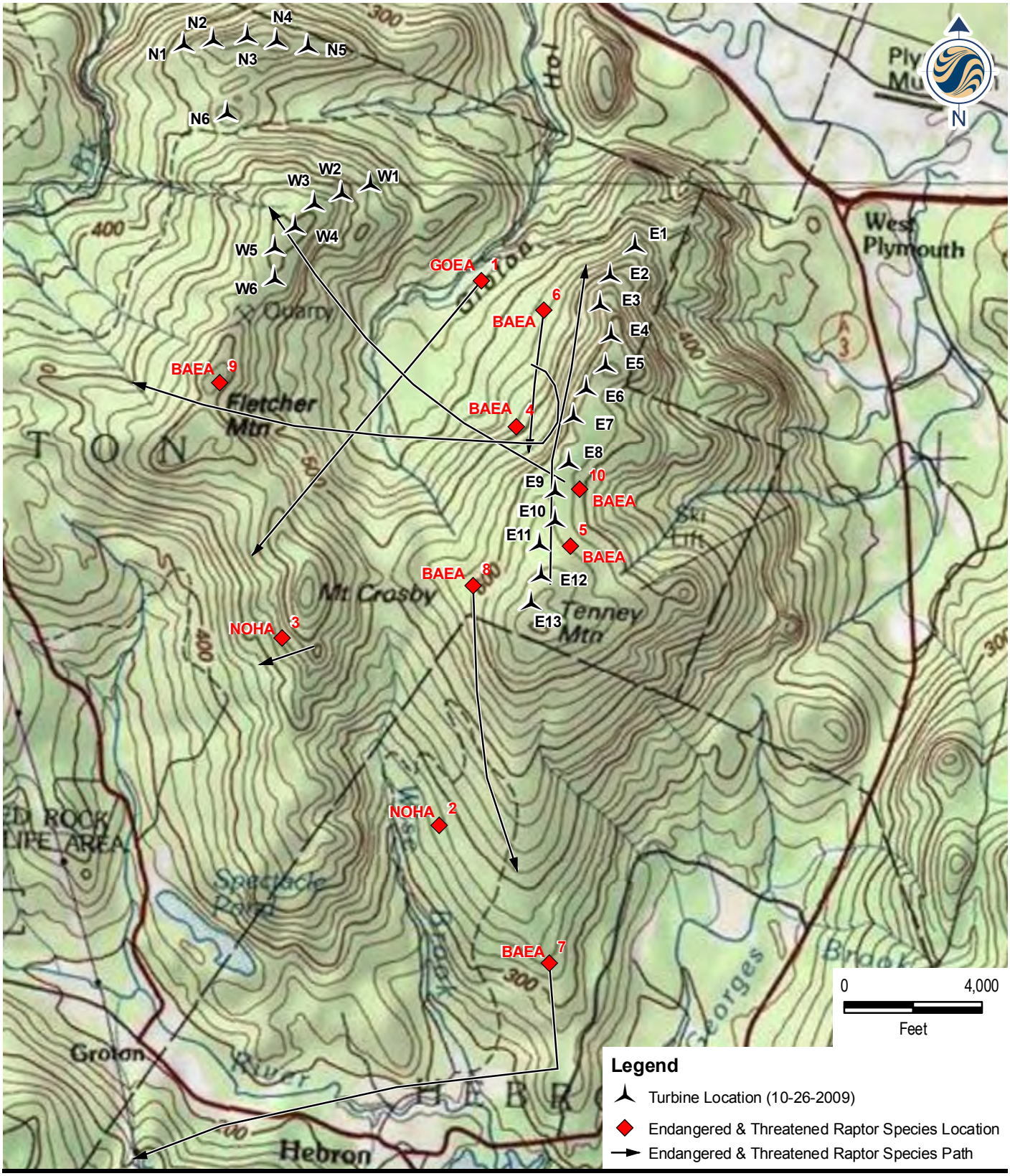
One additional state threatened species, besides peregrine falcon, was observed: bald eagle. There were 13 observations of bald eagle in the Study area, four of which were simultaneous with the observers at Tenney Mountain and Bald Knob, and six of which occurred within the Project area (Table 2-3, Figure 2-9).

Table 2-3. Summary of state endangered or threatened raptor species observations during the 2009 peregrine falcon surveys

							A1		A2		A3		B		C		D			
Map #*	**Date**	**Species**	**Obs. site**	**# birds**	**Age**	**Within Project area?**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	min height (m)	**max height (m)**	**migrant?**	**Observers' Notes:**
1	9-Sep	golden eagle	Bald and Tenney (simultaneous)	1	sub-adult	NO											500	500	Y	500 m over the Groton Hollow valley, then just north of Mount Crosby, and then continued southwest over the valley west of Mount Crosby and Bald Knob.
2	9-Sep	northern harrier	Bald	1	A	NO											500		Y	
3	10-Sep	northern harrier	Bald	1	A	NO			35				175						Y	
	25-Aug	northern harrier	Bear	1	n/a	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	10-Sep	northern harrier	Bear	1	n/a	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	10-Sep	northern harrier	Bear	1	n/a	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	10-Sep	northern harrier	Rattlesnake	1	A	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	13-Jul	bald eagle	Rattlesnake	1	A	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	soaring over cliff
	20-Jul	bald eagle	Bear	1	A	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	flew low over lake
	20-Jul	bald eagle	Bear	1	A	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	high to NW
4	3-Aug	bald eagle	Bald and Tenney (simultaneous)	1	A	YES	50		45				50	100	100	200	200	1,000	UNKN	circle thermal over Groton Hollow, headed west
5	10-Aug	bald eagle	Bald and Tenney (simultaneous)	1	A	YES	100	350	200				130		200		350		UNKN	rising over Tenney and moving west
	10-Aug	bald eagle	Bear	1	J	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
6	11-Aug	bald eagle	Tenney	1	J	YES	50												UNKN	
7	11-Aug	bald eagle	Bald	1	A	NO					150	250							UNKN	moving south along Tenney and west across to Hebron
8	25-Aug	bald eagle	Bald and Tenney (simultaneous)	1	SUB-A	YES	60		150				150		225				UNKN	slow circle south along tenney
9	25-Aug	bald eagle	Bald and Tenney (simultaneous)	1	A	YES							200		200		375		UNKN	
10	9-Sep	bald eagle	Bald	1	A	YES	700												Y	
	9-Sep	bald eagle	Bear	1	n/a	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	10-Sep	bald eagle	Bear	1	A	NO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	

***Only those observations of birds from Bald Knob or Tenney Mountain were included on the map because none of these observations from the aeries occurred in the Project area.**

KEY: 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



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00299-F002-9-Observation-Endangered-Threatened-Raptor-Species.mxd

Client/Project
Groton Wind LLC
Groton Wind Project
Groton, New Hampshire

Figure No.
2-9

Title
Observation locations of endangered and threatened raptor species
November 16, 2009

2.7.1 Incidental Bird Observations

There were 30 avian species detected incidentally from Bald Mountain during peregrine surveys or while traveling to and from observation sites (Table 2-4). Five species were detected from Fletcher Mountain during other on-going wildlife surveys in the Project, and 34 species were detected from Tenney Mountain (not including unidentified raptor, unidentified flock of medium-sized passerines, and unidentified woodpecker) during on-site visits (Table 2-4). There was no state endangered or threatened non-raptor species observed. Observers at the aerie observations sites did not systematically collect incidental bird data; however, a notable incidental observation from Rattlesnake Mountain included 2 sandhill cranes observed on September 10.

Table 2-4. Birds observed incidentally within the Project area during the 2009 peregrine falcon surveys

Species	Site of observation		
	Tenney Mountain	Bald Knob	Fletcher Mountain
American goldfinch	X		
American robin		X	
American robin	X		
black-and-white warbler	X	X	
blackburnian warbler	X	X	
black-capped chickadee	X	X	
black-throated blue warbler	X	X	
black-throated green warbler	X	X	
blue jay	X	X	
blue-headed vireo	X	X	
brown creeper		X	
Canada goose		X	
cedar waxwing	X	X	
chestnut-sided warbler	X		X
chimney swift	X		
common raven	X	X	
common yellowthroat			X
dark-eyed junco	X	X	
downy woodpecker	X		
eastern phoebe	X		
eastern wood-pewee		X	
golden-crowned kinglet	X	X	
great horned owl	X		
hairy woodpecker	X	X	
hermit thrush	X	X	
magnolia warbler	X	X	
mourning dove		X	
mourning warbler	X		
Nashville warbler	X		
northern flicker	X	X	
ovenbird	X	X	
pileated woodpecker	X	X	
purple finch		X	
red-breasted nuthatch	X	X	
red-eyed vireo		X	
red-tailed hawk	X		
rose-breasted grosbeak	X	X	X
ruby-throated hummingbird	X	X	
ruffed grouse			X

Table 2-4. Birds observed incidentally within the Project area during the 2009 peregrine falcon surveys (*cont*.)

Species	Location of observation		
	Tenney Mountain	Bald Knob	Fletcher Mountain
scarlet tanager	X		
veery			X
white-throated sparrow	X		
winter wren	X	X	
wood thrush		X	
yellow-rumped warbler	X	X	
unidentified flock medium sized passerines	X		
unidentified woodpecker	X		
unidentified raptor	X		

2.7.2 Aerie Prey Remains Analysis

There were 32 identified avian species among prey remains collected at Rattlesnake Mountain. Additionally, there were peregrine falcon feathers among the samples, as well as unidentified bat, unidentified bird, unidentified blackbird-sized passerine, unidentified passerine, unidentified shorebird, unidentified thrush, and unidentified warbler-sized passerine (Appendix B, Table 6). The identified prey remains were used to investigate the following questions: 1) does the breeding habitat of prey species occur in the Project area, and 2) were any of the prey species detected in the Project area?

The habitat of 20 of the prey remain species is present in the Project area while the habitat of 14 species is absent from the Project area (Table 2-5). It was assumed that the unidentified bat's habitat is present in the Project area while the unidentified shorebird's habitat is absent from the Project area. This assessment was not possible for the other unidentified birds and was not applicable for the peregrine falcon feathers found among the samples. Additionally, there were 10 species among prey remain samples which were confirmed in the Project area either during the 2009 breeding bird surveys or during other on-site visits in 2009 (Table 2-5).

.

Table 2-5. Species identified from Rattlesnake aerie prey remains and presence or absence of prey species habitat in the Project area

Common name	n/a	Absent	Present
American robin*			X
American woodcock			X
Baltimore oriole			X
Bank swallow		X	
Barn swallow			X
Belted kingfisher		X	
Blackpoll warbler			X
Blue jay*			X
Bobolink		X	
Brown thrasher			X
Brown-headed cowbird			X
Cedar waxwing*			X
Chimney swift*			X
Common grackle			X
Eastern meadowlark		X	
European starling		X	
Evening grosbeak			X
Green heron		X	
Killdeer		X	
Mourning dove*			X
Northern flicker*			X
Peregrine falcon	X		
Purple finch*			X
Red-winged blackbird		X	
Ring-billed gull		X	
Rock pigeon		X	
Rose-breasted grosbeak*			X
Ruddy turnstone		X	
Short-billed dowitcher		X	
Veery*			X
White-winged crossbill			X
Yellow warbler		X	
Yellow-bellied sapsucker*			X
Unidentified bat species			X
Unidentified bird	X		
Unidentified blackbird-sized passerine	X		
Unidentified passerine	X		
Unidentified shorebird		X	
Unidentified thrush	X		
Unidentified warbler-sized passerine	X		
TOTAL SPECIES	**6**	**14**	**20**

*Prey species detected in the Project area during 2009 breeding bird surveys or detected incidentally during other 2009 on-site visits.

2.8 DISCUSSION

Peregrine falcons

The purpose or goal of this survey was to investigate whether peregrine falcons use the Project area during the post-fledging and early-fall migration periods, and if they do, how and when. Observations made from the two aerie sites indicated the timeframes during which adults and juveniles were present in the area during the study period. Activity from both adults and juveniles was observed at the Bear Mountain and Rattlesnake Mountain aeries for the duration of the study period. Peregrine falcon activity at aeries during this time is typical as peregrine falcon young will remain in the vicinity of the aerie while they are still being fed by adults, and will begin to disperse and forage independently 4 to 6 weeks after fledgling status (White *et al.* 2002). Due to the juveniles' dependency on the adults at the aerie sites prior to dispersal, the aerie sites (particularly Rattlesnake Mountain) documented the highest observation rates of peregrine falcons.

Out of 20 survey days in 2009, there were no peregrine falcons observed within the Project area from the Bald Knob observation site. As observed from the Tenney Mountain observation site, there were three peregrine falcon observations that occurred along the Tenney Mountain Project ridge below the maximum height of the proposed turbines. As would be expected, the observation rates of peregrine falcons from the Bald Knob and Tenney Mountain observation sites were substantially lower than those documented from the aerie observation sites. The post-fledging and early-fall migration 2009 activity surveys indicate that peregrine falcons do occur in the Project area during these timeframes; however, their occurrence in the Project area was documented to be infrequent.

Considering the number of hours when observers were present on-site and the number of hours when sky conditions were fair and did not restrict visibility, 11 percent of the daylight hours, during which peregrine falcons may been active over the course of the study period, were surveyed. Eighty-eight percent of the airspace above the Project area (22 of the 25 proposed turbine areas) was visible during surveys. Therefore, the results of the 2009 surveys can not describe peregrine activity during all daylight hours during the period of interest, or describe activity across the entire Project area; however, this survey effort was approved during work plan development prior to initiating surveys. The surveys provide a sample of activity during the study timeframe, and over the majority of the area of interest.

The Rattlesnake aerie prey remains analysis provided some information on how likely peregrine falcons are to forage in habitats that occur within the Groton Wind Project area. The majority of species that were identifiable among the samples do occur in habitats that are present in the Project area. However, many of these species, such as American robin, blue jay, and mourning dove, are habitat generalists and are not restricted to ridge top habitats. There were ten species among the prey samples that were confirmed in the Project area during 2009 field surveys. The occurrence of European starling, common grackle, eastern meadowlark, and brown thrasher among the prey remains suggest that the peregrines from Rattlesnake Mountain

will forage in agricultural and urban settings. However, for the migratory species identified among prey remains including shorebirds and warblers, it is difficult to determine where the falcons may have captured these species as peregrines will take migrating birds over open areas while on the wing (NH Audubon pers. comm.). The prey remain samples were collected each year at some point during the peregrine breeding season; therefore, it is assumed that prey were taken during the peregrine breeding season. However, the date of capture for the species identified is not known. Additionally, many species' spring and fall migrations (i.e. shorebirds) overlap with the peregrine breeding season. Therefore, it is unknown if prey were actively migrating or within breeding areas when captured.

All raptor species

For raptors in general, Bald Knob had the highest observation rate out of the four sites, while Bear Mountain had the lowest observation rate. These results may be a function of the differences in topography which may influence raptor use, but may also be influenced by the variability of visibility at observation sites. Also, unlike spring or fall raptor migration surveys, the peregrine surveys conducted from late-June through the beginning of September documented multiple observations of seasonally local birds which were likely observed repeatedly throughout survey days.

Forty-eight percent of raptor observations made from Bald Knob occurred within the Project area. Sixty-nine percent of these observations occurred below the maximum turbine height of 121 m. Eighty-seven percent of raptor observations made from Tenney Mountain occurred at some location over the Project area. Fifty-four percent of these observations occurred below the maximum turbine height of 121 m.

Variations in raptor flight heights among survey days at a single location are due to variable weather conditions and the particular flight behaviors of different raptor species. Typically, *accipiters* and falcons use up-drafts from side slopes to gain lift and, therefore, usually fly low over ridgelines. *Buteos* tend to use lift from thermals that develop over side slopes and valleys and tend to fly high during hours of peak thermal development. Raptors (*accipiters* in particular) typically fly lower than usual during windy or inclement conditions. Local birds may fly at lower altitudes while making small scale movements between foraging locations (Barrios and Rodriguez, 2004).

3.0 Literature Cited

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Appendix A
Project and Aerie Observation Site Datasheets

2009 Peregrine Falcon Use Survey
Groton Wind, LLC
December 2009

Groton Wind Project Peregrine Falcon Surveys

Observation Location:_____ **Observer:**_____

Date:_____ **Start time:**_____ **End Time:**_____

	Temp	Wind speed code	Wind direction	Sky code	Cloud height (low, mid, high)	Cloud type	# of PEFA/hr	# other raptor sp./hr	# total raptors/hr	weather summary
Hour 1										
Hour 2										
Hour 3										
Hour 4										
Hour 5										
Hour 6										
Hour 7										
Hour 8										
Hour 9										
Hour 10										

Horizontal position codes

A1) majority of observed flight occurred parallel to/along ridge

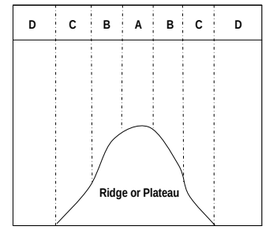
A2) crossed ridge at some point and only portion of flight over ridge

A3) crossed ridge within a depression or saddle of ridge

B) upper slope of ridge

C) lower slope of ridge

D) over valley



Wind Speed Indicator

0=smoke rises vertically (<1mph [2kph])

1=wind direction shown by wind drift (1-3mph [2-5kph])

2=wind felt on face; leaves rustle (4-7mph [6-12kph])

3=leaves, small twigs in constant motion (9-12mph [20-29kph])

4=dust rises; small branches move (13-18mph [20-29kph])

5=small trees in leaf begin to sway (19-24mph [30-38kph])

Flight behavior codes

P=perched

D=diving, partially to mostly closed wings while descending

PF=powered flight/flapping

HO=hovering, stationary altitude with some flapping and fanned tail, hunting looking downward

CS=circle soaring

K=kiting on wind current, partially closed wings and tail

LS=linear soaring, straight-line soaring or slow gliding in 'thermal street' formed between updrafts

AF=aerial feeding, eating prey in flight in soar or slow glide

G=gliding/partially closed wings with bend in wrists

LAH=low aerial hunting over ground

B=banking or breaking, fully extended wings with fanned tail

AD=territorial or courtship aerial display

CF=carrying food

AC=aerial chase

Sky condition indicator

0=clear or a few clouds

1=partly cloudy (scattered) or variable sky

2=cloudy (broken) overcast

4=fog or smoke

5=drizzle

7=snow

8=showers

						Flight height(s) for horizontal position code(s)** (*fill in flight height for each position raptor observed in)*						**Date:**		**Observer:**	
Obs. #	**Time**	**Species**	**# of Indiv.s***	**Age (J, Sub-A, or A)**	**Within project boundary?(yes/no)**	**A1**	**A2**	**A3**	**B**	**C**	**D**	**Flight Behavior Code**	**Flight Azimuth** (general direction traveling in)	**Band ID Present or visible**	**Notes (if a Peregrine observation provide notes on the direction it came from in relation to the two aeries) For example: To Bear Mountain, From Bear Mountain, To Rattlesnake Mountain, From Rattlesnake Mountain, or other.**

***Best estimate of flight height above ground directly below bird. If bird changes flight height within a position code, indicate minimum/maximum flight height in same column.**

****If there is a group of birds seen together (flock of BWHA) in the same position codes, but at different flight heights, create a separate entry for birds at different flight heights.**

2009 Peregrine Aerie Observation Summary Datasheet

Project Site: Groton				Aerie: Hebron Rumney			
Observer:				Date:			
Start time:		End time:		Sheet ___ of ___			
	Sky Code	Wind code	Wind dir	TSvisibility	BK/CS vis	PEFAs	Oth rapt
Hour 1:							
Hour 2:							
Hour 3:							
Hour 4:							
Hour 5:							
Hour 6:							
Hour 7:							
Hour 8:							
Hour 9:							
Hour 10:							

Raptor Species Codes	
TUVU	Turkey Vulture
BAEA	Bald Eagle
GOEA	Golden Eagle
OSPR	Osprey
NOHA	Northern Harrier
RTHA	Red-tailed Hawk
RSHA	Red-shouldered Hawk
BWHA	Broad-winged Hawk
NOGO	Northern Goshawk
COHA	Cooper's Hawk
SSHA	Sharp-shinned Hawk
PEFA	Peregrine Falcon
MERL	Merlin
AMKE	American Kestrel
UNEA	Unknown Eagle
UNBU	Unknown Buteo
UNAC	Unknown Accipiter
UNFA	Unknown Falcon
UNRA	Unknown Raptor

Sky Codes	
0	Clear or a few clouds
1	Partly cloudy (scattered) or variable sky
2	Cloudy (broken) overcast
3	Completely overcast
4	Fog or smoke (suspended)
5	Drizzle
6	Light mist (falling)
7	Snow
8	Showers

Activity Codes	
PE	Perched
SO	Soaring
DF	Direct flight
AE	Aerial interaction
VO	Vocalizing
WP	With Prey
UN	Unknown

Location Codes	
OOS	Out of sight
A	Airspace in front of cliff
B, C, D....	Locations recorded on map by observer

Visibility Codes	
C	Clear
H	Hazy
O	Obscured

Wind Speed Codes	
0	Smoke rises vertically (<1 mph, <2kph)
1	Wind direction shown by smoke drift (1-4 mph, 2-5 kph)
2	Wind felt on face, leaves rustle (5-7 mph, 6-11 kph)
3	Leaves and twigs in constant motion (8-11 mph, 12-19 kph)
4	Dust rises, small branches move (12-18 mph, 20-29 kph)
5	Small trees in leaf begin to sway (19-24 mph, 30-38 kph)

2009 Peregrine Falcon Use Survey
Groton Wind, LLC
December 2009

		AI		A2		J1		J2		J3		J4		Other raptor		
Hour	Min	Act	Loc	Act	Loc	Act	Loc	Act	Loc	Act	Loc	Act	Loc	SPCODE	Act	Loc
	00															
	05															
	10															
	15															
	20															
	25															
	30															
	35															
	40															
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	10															
	15															
	20															
	25															
	30															
	35															
	40															
	45															
	50															
	55															

Appendix B

Raptor Observation Data Tables and Peregrine Falcon Prey Remain Table

Appendix B Table 1a. Observations from Bald Knob that were simultaneous with other observers*

Species	Not Simultaneous	Simultaneous	N/A	TOTAL
American kestrel	15			**15**
bald eagle	1	5		**6**
broad-winged hawk	125	100		**225**
Cooper's hawk	6			**6**
golden eagle		1		**1**
merlin		1	1	**2**
northern goshawk	1			**1**
northern harrier	2			**2**
osprey	5	5		**10**
peregrine falcon	4			**4**
red-shouldered hawk	1			**1**
red-tailed hawk	27	18		**45**
sharp-shinned hawk	22	5		**27**
turkey vulture	88	72	4	**164**
unidentified accipiter		2		**2**
unidentified buteo	3		1	**4**
unidentified falcon	1			**1**
unidentified raptor	16	2		**18**
TOTAL	**317**	**211**	**6**	**534**

*Six turkey vulture and 2 red-tailed hawks were simultaneous observations with observers at Bear Mountain, the rest were simultaneous with observers at Tenney Mountain.

Appendix B Table 1b. Observations from Tenney Mountain that were simultaneous with other observers*

Species	Not Simultaneous	Simultaneous	N/A	TOTAL
American kestrel	11			**11**
bald eagle	1	4		**5**
broad-winged hawk	71	109		**180**
Cooper's hawk	2			**2**
golden eagle		1		**1**
merlin	1	1		**2**
osprey	1	5		**6**
peregrine falcon	3	1		**4**
red-tailed hawk	41	11		**52**
sharp-shinned hawk	18	5		**23**
turkey vulture	35	62		**97**
unidentified accipiter	6	1		**7**
unidentified buteo	6			**6**
unidentified raptor	27	1		**28**
TOTAL	**223**	**201**	**0**	**424**

*One peregrine falcon and 6 turkey vultures were simultaneous observations with observers at Bear Mountain, the rest were simultaneous with observers at Bald Knob.

Appendix B, Table 2. Summary of peregrine falcon observations at the Bear Mountain and Rattlesnake Mountain aeries 2009

Date	Location	Time	# of birds	Age	Observation Notes
24-Jun	Bear	8:00-9:00	1	?	vocalization ID; couldn't tell age due to radio chatter
24-Jun	Bear	10:00-11:00	1	?	soaring over survey site and back toward nest; couldn't age due to low visability
24-Jun	Bear	8:00-9:00	2	J	2 juveniles perched near aerie
24-Jun	Bear	9:00-10:00	2	A	male brings back prey to aerie, female flies in from OOS; ad male travelling in from E from Baker Valley (prey ID?)
24-Jun	Bear	10:00-11:00	1	J	3rd juvenile comes in to feed
24-Jun	Bear	12:00-1:00	2	A	male flies back to aerie and both adults fly OOS after soaring together
7-Jul	Bear	8:00-9:00	4	J	3 juv seen flying near observation site chasing crows
7-Jul	Bear	8:00-9:00	1	A	soaring nearby
7-Jul	Bear	10:00-11:00	1	J	seen later in day
8-Jul	Bear	2:00-3:00	1	A	dove toward crows to north, about 20ft over observer's head; chased crows and drifted back south at eye level
8-Jul	Bear	2:00-3:00	1	A	likely bird #5 seen again 20 mins later
13-Jul	Bear	3:00-4:00	1	?	unknown age bird at aerie
14-Jul	Bear	8:00-9:00	1	J	perched at obs site, flew SE toward aerie
20-Jul	Bear	10:00-11:00	1	J	
20-Jul	Bear	10:00-11:00	1	J	juv begging heard near aerie, flying overhead
20-Jul	Bear	10:00-11:00	1	A	seen soaring high overhead with juv
20-Jul	Bear	11:00-12:00	2	A	2 adults soaring together
20-Jul	Bear	12:00-1:00	1	J	juv begging
20-Jul	Bear	2:00-3:00	1	?	circling way up just to S of obs site; stooped down to S and disappeared below tree level
20-Jul	Bear	2:00-3:00	1	J	juv begging to S near aerie
28-Jul	Bear	11:00-12:00	1	A	at aerie, brief sighting and voc--stooping on ad RTHA
28-Jul	Bear	1:00-2:00	2	J	one juv returns to aerie with prey; other flies out; both perch
29-Jul	Bear	10:00-11:00	1	?	soaring over cliff for 18min
4-Aug	Bear	10:00-11:00	1	A	
10-Sep	Bear	8:00-9:00	2	?	AE with crows and eachother, B
10-Sep	Bear	9:00-10:00	3	?	SO, B
23-Jun	Rattlesn.	8:00-9:00	1	A	adult female remained perched near aerie in sight of observer for the entire survey period

Appendix B, Table 2. Summary of peregrine falcon observations at the Bear Mountain and Rattlesnake Mountain aeries 2009 (*cont*.)

Date	Location	Time	# of birds	Age	Observation Notes
23-Jun	Rattlesn.	2:00-3:00	1	A	male returns with food from the west (RWBL??); juveniles feed
23-Jun	Rattlesn.	throughout	3	J	all 3 juveniles seen throughout day; see aerie worksheet for details
24-Jun	Rattlesn.	8:00-9:00	1	J	
24-Jun	Rattlesn.	8:00-9:00	1	J	
24-Jun	Rattlesn.	10:00-11:00	1	J	
24-Jun	Rattlesn.	10:00-11:00	2	A	
24-Jun	Rattlesn.	12:00-1:00	2	A	
7-Jul	Rattlesn.	8:00-9:00	2	J	chasing each other, flying around cliffs and attacking a raven; around for 1hr
7-Jul	Rattlesn.	9:00-10:00	1	A	flew from cliff into valley
7-Jul	Rattlesn.	9:00-10:00	1	A	flew up to top of cliff, perched for a bit and took off E around toward Main Cliff
7-Jul	Rattlesn.	11:00-12:00	1	A	Perched on Rattlesnake cliffs and flew out of sight to the east
8-Jul	Rattlesn.	11:00-12:00	3	J	2 females and 1 male moving E over Baker Valley
8-Jul	Rattlesn.	1:00-2:00	1	?	soaring out over Baker valley
8-Jul	Rattlesn.	2:00-3:00	1	J	soaring around high over aerie
8-Jul	Rattlesn.	2:00-3:00	2	J	male and fem juv; both perched near aerie, one seen by PB @ Tenney site
8-Jul	Rattlesn.	3:00-4:00	2	?	to SW stoop high
13-Jul	Rattlesn.	8:00-9:00	1	?	flying
13-Jul	Rattlesn.	9:00-10:00	1	?	soaring
20-Jul	Rattlesn.	8:00-9:00	1	A	
20-Jul	Rattlesn.	9:00-10:00	1	A	
20-Jul	Rattlesn.	1:00-2:00	1	A	flying and calling just below aerie; possibly 2 birds
20-Jul	Rattlesn.	1:00-2:00	1	A	vocalization: "kree kree" call possibly an alarm/scold
20-Jul	Rattlesn.	2:00-3:00	2	J	1m, 1f
20-Jul	Rattlesn.	3:00-4:00	1	A	
20-Jul	Rattlesn.	3:00-4:00	2	J	juveniles flying and perching on cliff
21-Jul	Rattlesn.	6:00-7:00	2	J	juvs heard vocalizing and moving east out into the Baker Valley
28-Jul	Rattlesn.	1:00-2:00	1	A	vocalizing above ledge--"kree" call as CORA voc nearby; interatcion?
28-Jul	Rattlesn.	2:00-3:00	1	J	juv
28-Jul	Rattlesn.	2:00-3:00	1	A	
28-Jul	Rattlesn.	3:00-4:00	1	J	juv
28-Jul	Rattlesn.	3:00-4:00	1	J	2nd juv

Appendix B, Table 2. Summary of peregrine falcon observations at the Bear Mountain and Rattlesnake Mountain aeries 2009 (*cont*.)

Date	Location	Time	# of birds	Age	Observation Notes
28-Jul	Rattlesn.	3:00-4:00	1	A	adult; vocalizing and flying around in front of aerie continued until past 4:27; something (climber?) had them stirred up
29-Jul	Rattlesn.	3:00-4:00	1	J	juv chasing TUVU; later hawking insects
3-Aug	Rattlesn.	11:00-12:00	1	A	
3-Aug	Rattlesn.	1:00-2:00	1	?	
4-Aug	Rattlesn.	2:00-3:00	1	?	
11-Aug	Rattlesn.	12:00-1:00	1	?	unkn age, too high; soared up out of valley and to west
17-Aug	Rattlesn.	11:00-12:00	1	?	AE
17-Aug	Rattlesn.	11:00-12:00	1	?	SO
17-Aug	Rattlesn.	11:00-12:00	1	?	VO
17-Aug	Rattlesn.	2:00-3:00	1	?	VO, A
17-Aug	Rattlesn.	5:00-6:00	1	?	DF, PE
17-Aug	Rattlesn.	6:00-7:00	1	?	DF
18-Aug	Rattlesn.	3:00-4:00	1	?	vocalizing only
18-Aug	Rattlesn.	4:00-5:00	1	?	brief view as flew through trees and into cliff area; age unkn
24-Aug	Rattlesn.	1:00-2:00	1	?	DF, A
24-Aug	Rattlesn.	1:00-2:00	2	?	AE, A
24-Aug	Rattlesn.	1:00-2:00	3	?	DF, A
24-Aug	Rattlesn.	2:00-3:00	2	?	AE, A
24-Aug	Rattlesn.	2:00-3:00	2	?	DF, VO, A
10-Sep	Rattlesn.	7:00-8:00	2	?	DF, PE, A
10-Sep	Rattlesn.	8:00-9:00	2	?	VO, OOS
10-Sep	Rattlesn.	9:00-10:00	2	?	DF, PE, A
10-Sep	Rattlesn.	9:00-10:00	1	?	PE, A
10-Sep	Rattlesn.	9:00-10:00	1	?	SO, A
10-Sep	Rattlesn.	10:00-11:00	1	A	SO, A, adult PEFA circled over obs site then back to aerie
10-Sep	Rattlesn.	10:00-11:00	2	A, J	SO, A, soaring infront of aerie, can hear possible juvenile but no other bird seen. Adult flew over cliff then OOS.
10-Sep	Rattlesn.	10:00-11:00	2	?	PE, A

2009 Peregrine Falcon Use Survey
Groton Wind, LLC
December 2009

Appendix B, Table 3a. Species composition of raptors observed during summer and fall 2009 at **BALD KNOB**

Species	6/23/2009	6/24/2009	7/7/2009	7/8/2009	7/13/2009	7/14/2009	7/20/2009	7/21/2009	7/28/2009	7/29/2009	8/3/2009	8/4/2009	8/10/2009	8/11/2009	8/17/2009	8/18/2009	8/24/2009	8/25/2009	9/9/2009	9/10/2009	TOTAL
American kestrel		1								2		1						1	4	6	**15**
bald eagle											1		1	1				2	1		**6**
broad-winged hawk							1				3	1	14	23		8	1	25	23	126	**225**
Cooper's hawk																			4	2	**6**
golden eagle																			1		**1**
merlin											1							1			**2**
northern goshawk		1																			**1**
northern harrier																			1	1	**2**
osprey																1	2		2	5	**10**
peregrine falcon							2								1	1					**4**
red-shouldered hawk						1															**1**
red-tailed hawk		2		1	7	7	1		2	1	3	1	1			4	4	3	7	1	**45**
sharp-shinned hawk		1				2			1	1						1	1	5	13	2	**27**
turkey vulture		5		2	14	3	14		32	14	8		5	13	7	7	2	18	14	6	**164**
unidentified accipiter													1					1			**2**
unidentified buteo											1	2								1	**4**
unidentified falcon										1											**1**
unidentified raptor					1				1	1		2			1	1		2	7	2	**18**
Daily Totals	**0**	**10**	**0**	**3**	**22**	**13**	**18**	**0**	**36**	**20**	**17**	**7**	**22**	**37**	**9**	**23**	**10**	**58**	**77**	**152**	**534**

2009 Peregrine Falcon Use Survey
Groton Wind, LLC
December 2009

Appendix B, Table 3b. Species composition of raptors observed during summer and fall 2009 at **TENNEY MOUNTAIN**

Species	6/23/2009	6/24/2009	7/7/2009	7/8/2009	7/13/2009	7/14/2009	7/20/2009	7/21/2009	7/28/2009	7/29/2009	8/3/2009	8/4/2009	8/10/2009	8/11/2009	8/17/2009	8/18/2009	8/24/2009	8/25/2009	9/9/2009	9/10/2009	TOTAL
American kestrel																			3	8	**11**
bald eagle											1		1	1				2			**5**
broad-winged hawk				1			5			3	6	1	11	11	3	10	6	19	26	78	**180**
Cooper's hawk																			1	1	**2**
golden eagle																			1		**1**
merlin																		2			**2**
osprey																1	2	1		2	**6**
peregrine falcon				1					1						1				1		**4**
red-tailed hawk					16	6	3		6		6					5	3	2	4	1	**52**
sharp-shinned hawk				2		1							1	1			3	6	4	5	**23**
turkey vulture	1	1			6		6		11	10	8	1	4	9	9	6	2	9	12	2	**97**
unidentifeed accipiter											1		2					1	3		**7**
unidentifeed buteo													5	1							**6**
unidentifeed raptor						1	1					1	2	6	1	2	1	5	4	4	**28**
Daily Totals	**1**	**1**	**0**	**4**	**22**	**8**	**15**	**0**	**18**	**13**	**22**	**3**	**26**	**29**	**14**	**24**	**17**	**47**	**59**	**101**	**424**

2009 Peregrine Falcon Use Survey
Groton Wind, LLC
December 2009

Appendix B, Table 3c. Species composition of raptors observed during summer and fall 2009 at **BEAR MOUNTAIN**

Species	6/23/2009	6/24/2009	7/7/2009	7/8/2009	7/13/2009	7/14/2009	7/20/2009	7/21/2009	7/28/2009	7/29/2009	8/3/2009	8/4/2009	8/10/2009	8/11/2009	8/17/2009	8/18/2009	8/24/2009	8/25/2009	9/9/2009	9/10/2009	TOTAL
American kestrel		1	4	1	2				1			1	2	3					2		**17**
bald eagle							2						1						1	1	**5**
broad-winged hawk			1	2	2	1	5			1	1	2	17	5	5		5		25	18	**90**
Cooper's hawk															1					1	**2**
northern goshawk											1										**1**
northern harrier																		1		2	**3**
osprey											1		1				2				**4**
peregrine falcon		9	6	2	1	1	8		3	1		1								5	**37**
red-shouldered hawk												1									**1**
red-tailed hawk		1			2		3	1	11	7	5	17	7	4	7	4	7		3	1	**80**
sharp-shinned hawk													1							2	**3**
turkey vulture		5		1	4	1	8		1	1	7	4				1	20	1		1	**55**
unidentified accipiter					1																**1**
unidentified buteo																3					**3**
unidentified raptor		1					1							1							**3**
Daily Totals	**0**	**17**	**11**	**6**	**12**	**3**	**27**	**1**	**16**	**10**	**15**	**26**	**29**	**13**	**13**	**8**	**34**	**2**	**31**	**31**	**305**

2009 Peregrine Falcon Use Survey
Groton Wind, LLC
December 2009

Appendix B, Table 3d. Species composition of raptors observed during summer and fall 2009 at **RATTLESNAKE MOUNTAIN**

Species	6/23/2009	6/24/2009	7/7/2009	7/8/2009	7/9/2009	7/13/2009	7/14/2009	7/20/2009	7/21/2009	7/28/2009	7/29/2009	8/3/2009	8/4/2009	8/10/2009	8/11/2009	8/17/2009	8/18/2009	8/24/2009	8/25/2009	9/9/2009	9/10/2009	Grand Total
American kestrel	1																	1	1			**3**
bald eagle						1																**1**
broad-winged hawk	1		1	2			4								1	1		13	4	2	8	**37**
Cooper's hawk																			1	2	1	**4**
northern harrier																					1	**1**
peregrine falcon	5	7	5	9		2		9	2	6	1	2	1		1	6	2	10			13	**81**
red-tailed hawk	2						1								2		1		8	3	4	**21**
sharp-shinned hawk				1														1	1	2	4	**9**
turkey vulture	13	3	1	10	5	6	20	4		4	20	9	8	2	3	6	37	1	5	21	1	**179**
unidentified accipiter																			2			**2**
unidentified buteo																			1			**1**
unidentified falcon																			1			**1**
unidentified raptor				1															3		3	**7**
Grand Total	**22**	**10**	**7**	**23**	**5**	**9**	**25**	**13**	**2**	**10**	**21**	**11**	**9**	**2**	**7**	**13**	**40**	**26**	**27**	**30**	**35**	**347**

2009 Peregrine Falcon Use Survey
Groton Wind, LLC
December 2009

Appendix B, Table 4a. Hourly summary of raptor observations at **BALD KNOB** during summer and 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**	**TOTAL**
American kestrel		3		5		2	1	3	1		15
Bald eagle					1	1	1	1	1	1	6
broad-winged hawk		1	67	85	29	18	13	10	2		225
Cooper's hawk			3	2	1						6
golden eagle				1							1
merlin					1		1				2
northern goshawk									1		1
northern harrier			1			1					2
osprey			1	5	1		2		1		10
peregrine falcon					1	2				1	4
red-shouldered hawk			1								1
red-tailed hawk		2	4	5	14	6	4	7	2	1	45
sharp-shinned hawk		4	1	7	2	7	4	1	1		27
turkey vulture		3		17	31	28	37	32	15	1	164
unidentified accipiter				1		1					2
unidentified buteo	1				1	1		1			4
unidentified falcon		1									1
unidentified raptor		2	2	4	3	2		2	3		18
TOTAL	1	16	80	132	85	69	63	57	27	4	534

Appendix B, Table 4b. Hourly summary of raptor observations from **TENNEY MOUNTAIN** during summer and fall 2009										
Species	**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**	**TOTAL**
American kestrel	2		4	1	2	1	1			11
bald eagle				1	1		1	1	1	5
broad-winged hawk		22	86	30	18	10	9	5		180
Cooper's hawk		1	1							2
golden eagle			1							1
merlin				1			1			2
osprey			4			1		1		6
peregrine falcon			1				3			4
red-tailed hawk		4	4	10	9	9	9	6	1	52
sharp-shinned hawk		1	6	4	5	3	2	2		23
turkey vulture	1	1	12	10	23	18	21	11		97
unidentified accipiter			4		2	1				7
unidentified buteo			2	1	2	1				6
unidentified raptor	1	4	6	2	4	8	2	1		28
TOTAL	4	33	131	60	66	52	49	27	2	424

Appendix B, Table 4c. Hourly summary of raptor observations from **BEAR MOUNTAIN** during summer and fall 2009											
Species	**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**	**5:00-6:00**	**TOTAL**
American kestrel	4	2	3	2	1	3	1	1			17
bald eagle	1		1		1	1	1				5
broad-winged hawk		4	31	18	17	3	16	1			90
Cooper's hawk						1	1				2
northern goshawk			1								1
northern harrier			1		2						3
osprey			2	1	1						4
peregrine falcon	11	5	8	3	3	2	4	1			37
red-shouldered hawk			1								1
red-tailed hawk	6	6	32	11	6	6	3	5	4	1	80
sharp-shinned hawk	1					1	1				3
turkey vulture		5	15	4	5	19	1	6			55
unidentified accipiter	1										1
unidentified buteo			2			1					3
unidentified raptor				1		1		1			3
TOTAL	24	22	97	40	36	38	28	15	4	1	305

Appendix B, Table 4d. Hourly summary of raptor observations from **RATTLESNAKE MOUNTAIN** during summer and fall 2009														
Species	**6:00-7:00**	**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**	**5:00-6:00**	**6:00-7:00**	**TOTAL**
American kestrel				1	2									3
bald eagle				1										1
broad-winged hawk			1	1	11	9	2	8	5					37
Cooper's hawk					1		1	1	1					4
northern harrier									1					1
peregrine falcon	2	2	9	8	8	8	3	11	14	13	1	1	1	81
red-tailed hawk			2		4	3	3	6	3					21
sharp-shinned hawk					2	2		1	4					9
turkey vulture				6	17	15	12	25	23	55	9	17		179
unidentified accipiter					2									2
unidentified buteo						1								1
unidentified falcon					1									1
unidentified raptor					3			2	2					7
TOTAL	2	2	12	17	51	38	21	54	53	68	10	18	1	347

Appendix B Table 5a. Number of individuals of species observed within Project area from **Bald Knob** in proposed turbine areas (positions A, B, C) above or below 121 m

Species	121 m or greater	less than 121 m	TOTAL
American kestrel		4	**4**
bald eagle	4	1	**5**
broad-winged hawk	33	77	**110**
Cooper's hawk	2	2	**4**
golden eagle	1		**1**
merlin		1	**1**
northern harrier	1		**1**
osprey	4	2	**6**
red-tailed hawk	11	19	**30**
sharp-shinned hawk	9	8	**17**
turkey vulture	10	49	**59**
unidentified accipiter		2	**2**
unidentified buteo		3	**3**
unidentified raptor	4	7	**11**
TOTAL	**79**	**175**	**254**

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

Species	121 m or greater	less than 121 m	TOTAL
American kestrel		11	**11**
bald eagle	1	4	**5**
broad-winged hawk	103	66	**169**
Cooper's hawk	1	1	**2**
golden eagle	1		**1**
merlin		2	**2**
osprey	3	2	**5**
peregrine falcon		3	**3**
red-tailed hawk	25	25	**50**
sharp-shinned hawk	8	13	**21**
turkey vulture	16	58	**74**
unidentified accipiter	2	2	**4**
unidentified buteo	1	1	**2**
unidentified raptor	6	15	**21**
TOTAL	**167**	**203**	**370**

Appendix B, Table 6. Prey remains (including feathers, bones, pellets and bands) found at the Rattlesnake Mountain Peregrine falcon aerie between 1994 to 2009

Year:	Common name	Species name	Identified by	Does species breeding habitat occur in proposed turbine areas?	Detected on ridge habitat during on-site surveys?
1994	Green heron	Butorides virescens	MassWildlife/NH Audubon	No	No
1994	Rock pigeon	Columba livia	MassWildlife/NH Audubon	No	No
1995	American robin	Turdus migratorius	MassWildlife/NH Audubon	Yes	Incidental
1995	Bank swallow	Riparia riparia	MassWildlife/NH Audubon	No	No
1995	Belted kingfisher	Megaceryle alcyon	MassWildlife/NH Audubon	No	No
1995	Blue jay	Cyanocitta cristata	MassWildlife/NH Audubon	Yes	BBS
1995	Brown-headed cowbird	Molothrus ater	MassWildlife/NH Audubon	Possible	No
1995	Cedar waxwing	Bombycilla cedrorum	MassWildlife/NH Audubon	Yes	Incidental
1995	Common grackle	Quiscalus quiscula	MassWildlife/NH Audubon	Possible	No
1995	European starling	Sturnus vulgaris	MassWildlife/NH Audubon	No	No
1995	Green heron	Butorides virescens	MassWildlife/NH Audubon	No	No
1995	Killdeer	Charadrius vociferus	MassWildlife/NH Audubon	No	No
1995	Mourning dove	Zenaida macroura	MassWildlife/NH Audubon	Yes	Incidental
1995	Northern flicker	Colaptes auratus	MassWildlife/NH Audubon	Yes	BBS
1995	Red-winged blackbird	Agelaius phoeniceus	MassWildlife/NH Audubon	No	No
1995	Rock pigeon	Columba livia	MassWildlife/NH Audubon	No	No
1995	Short-billed dowitcher	Limnodromus griseus	MassWildlife/NH Audubon	No	No
1995	Unidentified blackbird-sized passerine	Unidentified blackbird-sized passerine	MassWildlife/NH Audubon	n/a	n/a
1995	Unidentified shorebird	Unidentified shorebird	MassWildlife/NH Audubon	No	n/a
1995	Unidentified warbler-sized passerine	Unidentified warbler-sized passerine	MassWildlife/NH Audubon	n/a	n/a
1995	Unidentified thrush	Unitentified thrush	MassWildlife/NH Audubon	n/a	n/a
1998	Common grackle	Quiscalus quiscula	Smithsonian	Possible	No
1998	Eastern meadowlark	Sturnella magna	Smithsonian	No	No
1998	Killdeer	Charadrius vociferus	Smithsonian	No	No
1998	Mourning dove	Zenaida macroura	Smithsonian	Yes	Incidental
1998	Northern flicker	Colaptes auratus	Smithsonian	Yes	BBS
1998	Rock pigeon	Columba livia	Smithsonian	No	No
1998	Yellow-bellied sapsucker	Sphyrapicus varius	Smithsonian	Yes	BBS
1999	American robin	Turdus migratorius	Smithsonian	Yes	Incidental
1999	American woodcock	Scolopax minor	Smithsonian	Yes	No
1999	Blue jay	Cyanocitta cristata	Stantec	Yes	BBS
1999	Common grackle	Quiscalus quiscula	Smithsonian	Possible	No
1999	European starling	Sturnus vulgaris	Smithsonian	No	No
1999	Killdeer	Charadrius vociferus	Smithsonian	No	No
1999	Mourning dove	Zenaida macroura	Smithsonian	Yes	Incidental
1999	Northern flicker	Colaptes auratus	Stantec	Yes	BBS
1999	Red-winged blackbird	Agelaius phoeniceus	Stantec	No	No
1999	Rock pigeon	Columba livia	Smithsonian	No	No
1999	Unidentified passerine	Unidentified passerine	Smithsonian	n/a	n/a
2000	American robin	Turdus migratorius	Smithsonian	Yes	Incidental
2000	American woodcock	Scolopax minor	Smithsonian	Yes	No
2000	Blue jay	Cyanocitta cristata	Smithsonian	Yes	BBS
2000	Bobolink	Dolichonyx oryzivorus	Smithsonian	No	No
2000	Chimney swift	Chaetura pelagica	Smithsonian	Possible	Incidental
2000	Common grackle	Quiscalus quiscula	Smithsonian	Possible	No
2000	European starling	Sturnus vulgaris	Smithsonian	No	No
2000	Killdeer	Charadrius vociferus	Smithsonian	No	No
2000	Mourning dove	Zenaida macroura	Smithsonian	Yes	Incidental
2000	Northern flicker	Colaptes auratus	Smithsonian	Yes	BBS
2000	Peregrine falcon	Falco peregrinus	Smithsonian	n/a	n/a
2000	Red-winged blackbird	Agelaius phoeniceus	Smithsonian	No	No
2000	Rock pigeon	Columba livia	Smithsonian	No	No
2000	Rose-breasted grosbeak	Pheucticus ludovicianus	Smithsonian	Yes	BBS
2000	Short-billed dowitcher	Limnodromus griseus	Smithsonian	No	No
2000	Unidentified bird	Unidentified bird	Smithsonian	n/a	n/a
2000	Unidentified passerine	Unidentified passerine	Smithsonian	n/a	n/a
2001	American robin	Turdus migratorius	Smithsonian	Yes	Incidental
2001	American woodcock	Scolopax minor	Smithsonian	Yes	No
2001	Blue jay	Cyanocitta cristata	Stantec	Yes	BBS
2001	Brown thrasher	Toxostoma rufum	Smithsonian	Possible	No
2001	Brown-headed cowbird	Molothrus ater	Smithsonian	Possible	No
2001	Common grackle	Quiscalus quiscula	Smithsonian	Possible	No
2001	Eastern meadowlark	Sturnella magna	Smithsonian	No	No
2001	European starling	Sturnus vulgaris	Smithsonian	No	No
2001	Evening grosbeak	Coccothraustes vespertinus	Smithsonian	Yes	No
2001	Killdeer	Charadrius vociferus	Smithsonian	No	No
2001	Mourning dove	Zenaida macroura	Smithsonian	Yes	Incidental
2001	Northern flicker	Colaptes auratus	Stantec	Yes	BBS
2001	Peregrine falcon	Falco peregrinus	Smithsonian	n/a	n/a
2001	Red-winged blackbird	Agelaius phoeniceus	Smithsonian	No	No
2001	Rock pigeon	Columba livia	Smithsonian	No	No
2001	Unidentified bat species	Unidentified bat species	Stantec	Yes	n/a
2001	Unidentified bird	Unidentified bird	Smithsonian	n/a	n/a
2002	American robin	Turdus migratorius	Smithsonian	Yes	Incidental
2002	Blue jay	Cyanocitta cristata	Stantec	Yes	BBS
2002	Cedar waxwing	Bombycilla cedrorum	Stantec	Yes	Incidental
2002	Common grackle	Quiscalus quiscula	Smithsonian	Possible	No
2002	European starling	Sturnus vulgaris	Smithsonian	No	No
2002	Killdeer	Charadrius vociferus	Smithsonian	No	No
2002	Mourning dove	Zenaida macroura	Smithsonian	Yes	Incidental
2002	Northern flicker	Colaptes auratus	Stantec	Yes	BBS
2002	Peregrine falcon	Falco peregrinus	Smithsonian	n/a	n/a
2002	Unidentified bird	Unidentified bird	Smithsonian	n/a	n/a
2002	Unidentified blackbird-sized passerine	Unidentified Icteridae	Smithsonian	n/a	n/a
2002	Unidentified passerine	Unidentified passerine	Smithsonian	n/a	n/a
2004	American robin	Turdus migratorius	Smithsonian	Yes	Incidental
2004	Barn swallow	*Hirundo rustica*	Smithsonian	Possible	No
2004	Blue jay	Cyanocitta cristata	Stantec	Yes	BBS
2004	Cedar waxwing	Bombycilla cedrorum	Smithsonian	Yes	Incidental
2004	Common grackle	Quiscalus quiscula	Smithsonian	Possible	No
2004	Eastern meadowlark	Sturnella magna	Smithsonian	No	No
2004	European starling	Sturnus vulgaris	Smithsonian	No	No
2004	Killdeer	Charadrius vociferus	Smithsonian	No	No
2004	Mourning dove	Zenaida macroura	Smithsonian	Yes	Incidental
2004	Northern flicker	Colaptes auratus	Stantec	Yes	BBS
2004	Rock pigeon	Columba livia	Smithsonian	No	No
2004	Unidentified passerine	Unidentified passerine	Smithsonian	n/a	n/a
2005	Blue jay	Cyanocitta cristata	Stantec	Yes	BBS
2005	European starling	Sturnus vulgaris	Smithsonian	No	No
2005	Northern flicker	Colaptes auratus	Stantec	Yes	BBS
2005	Rock pigeon	Columba livia	Smithsonian	No	No
2005	Unidentified bird	Unidentified bird	Smithsonian	n/a	n/a
2005	Unidentified passerine	Unidentified passerine	Smithsonian	n/a	n/a
2007	American robin	Turdus migratorius	Smithsonian	Yes	Incidental
2007	Common grackle	Quiscalus quiscula	Smithsonian	Possible	No
2007	Mourning dove	Zenaida macroura	Smithsonian	Yes	Incidental
2007	Unidentified bird	Unidentified bird	Smithsonian	n/a	n/a
2008	Baltimore oriole	Icterus galbula	Smithsonian	Possible	No
2008	Blackpoll warbler	Dendroica striata	Smithsonian	Possible	No
2008	Blue jay	Cyanocitta cristata	MassWildlife/NH Audubon	Yes	BBS
2008	Brown-headed cowbird	Molothrus ater	Smithsonian	Possible	No
2008	Cedar waxwing	Bombycilla cedrorum	Stantec	Yes	Incidental
2008	Common grackle	Quiscalus quiscala	Smithsonian	Possible	No
2008	European starling	Sturnus vulgaris	Smithsonian	No	No
2008	Mourning dove	Zenaida macroura	Smithsonian	Yes	Incidental
2008	Northern flicker	Colaptes auratus	MassWildlife/NH Audubon	Yes	BBS
2008	Peregrine falcon	Falco peregrinus	Smithsonian	n/a	n/a
2008	Purple finch	Carpodacus purpureus	Smithsonian	Yes	BBS
2008	Ring-billed gull	Larus delawarensis	Smithsonian	No	No
2008	Ruddy turnstone	Arenaria interpres	Smithsonian	No	No
2008	Unidentified bird	Unidentified bird	Smithsonian	n/a	n/a
2008	Unidentified passerine	Unidentified passerine	Smithsonian	n/a	n/a
2008	Veery	Catharus fuscensens	Smithsonian	Yes	BBS
2008	White-winged crossbill	Loxia leucoptera	Smithsonian	No	No
2008	Yellow warbler	Dendroica petechia	Smithsonian	No	No
2009	American robin	Turdus migratorius	MassWildlife/NH Audubon	Yes	Incidental