

# 2010 Remote Camera Survey

## Wild Meadows Wind Project Grafton and Merrimack Counties, New Hampshire

Prepared for

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July 2011

(Revised October 2013)

## EXECUTIVE SUMMARY

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Atlantic Wind LLC (Atlantic Wind; a subsidiary of Iberdrola Renewables LLC), is evaluating the proposed Wild Meadows Wind Project (Project) in Grafton and Merrimack Counties, New Hampshire. The Project will include the installation of 23 wind turbines, a permanent meteorological (met) tower on Forbes Mountain and associated infrastructure (e.g., access roads, transmission, electrical substation, and an operations and maintenance building). The turbines will be 3.3 megawatt (MW) machines mounted on tubular steel towers with an approximate hub height of 94 meters (m; 308 feet [']) and a rotor diameter of 112 m (367'). The proposed turbines will have a maximum tip height of approximately 150 m (492'). Atlantic Wind contracted Stantec Consulting Services Inc. (Stantec) to conduct remote camera surveys to document the potential presence of American marten (*Martes americana*; marten) in the Project area. Marten are listed as a threatened species in the State of New Hampshire and as such, the likelihood of their presence in the development area was assessed as part of the Project's site evaluation (New Hampshire Fish and Game Department [NHFGD] 2008). The scope of work and methodology described in this report were discussed with the NHFGD during a work plan meeting in Concord, New Hampshire on April 1, 2010. Recommendations made by NHFGD at this meeting were incorporated into the work plan, as was information received from the New Hampshire Natural Heritage Bureau in response to initial data requests.

### *2010 Camera Survey*

Stantec conducted remote camera surveys to document the potential presence or absence of marten in the Project area. Six remote game cameras were deployed on August 5 and 6, 2010, and remained in the field until January 5 and 6, 2011. It is important to note that as of 2013 the locations of 3 of the 6 remote game cameras are now considered to be outside, though in the vicinity of, the currently proposed Project area (Figure 1). The 6 cameras recorded images of 107 animals during 917 camera days (one camera day equals a 24-hour period). For the entire survey period, an overall detection rate of 0.12 individuals per camera day was recorded. This rate is calculated by dividing the number of camera survey days by the number of animals captured with the cameras. In most cases, observations captured by the camera were identified to species; however, individual animals within a species could not be determined. During the course of the camera surveys, species detected by the cameras included coyote (*Canis latrans*), fisher (*Martes pennanti*), snowshoe hare (*Lepus americanus*), weasel (*Mustela cf. erminea*), black bear (*Ursus americanus*), white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*), raccoon (*Procyon lotor*), flying squirrel (*Glaucomys* sp.), and red squirrel (*Tamiasciurus hudsonicus*). No marten were detected during camera surveys. Black bear was the most commonly observed species (n=31), followed by coyote (n=24), moose (n=16), white-tailed deer (n=8), and fisher (n= 6).

## Table of Contents

EXECUTIVE SUMMARY .....	E.1
<hr/>	
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 PROJECT BACKGROUND .....	1
1.2 PROJECT AREA DESCRIPTION.....	1
1.3 SPECIES BACKGROUND .....	4
<hr/>	
<b>2.0 METHODS .....</b>	<b>4</b>
2.1 CAMERA LOCATION DESCRIPTIONS .....	6
2.1.1 Brown Brook Camera .....	6
2.1.2 Melvin North Camera.....	6
2.1.3 Melvin South Camera .....	7
2.1.4 Tinkham North Camera .....	8
2.1.5 Tinkham South Camera.....	8
2.1.6 Braley Camera.....	9
<hr/>	
<b>3.0 RESULTS .....</b>	<b>9</b>
3.1 BROWN BROOK CAMERA .....	10
3.2 MELVIN NORTH CAMERA.....	11
3.3 MELVIN SOUTH CAMERA .....	12
3.4 TINKHAM NORTH CAMERA .....	13
3.5 TINKHAM SOUTH CAMERA.....	14
3.6 BRALEY CAMERA.....	15
<hr/>	
<b>4.0 DISCUSSION.....</b>	<b>16</b>
<hr/>	
<b>5.0 LITERATURE CITED .....</b>	<b>18</b>

### Figures

Figure 1. Project Location Map with Camera Locations

### Photos

- Photo 1. Brown Brook Camera survey site (August 6, 2010)
- Photo 2. Melvin North Camera survey site (August 14, 2010)
- Photo 3. Melvin South Camera survey site (August 6, 2010)
- Photo 4. Tinkham North Camera survey site (August 6, 2010)
- Photo 5. Tinkham South Camera survey site (August 6, 2010)
- Photo 6. Braley Camera survey site (August 6, 2010)

### Tables

- Table 1. Wild Meadows Camera Survey Effort, August 5, 2010 to January 6, 2011
- Table 2. Wild Meadows Camera Survey Summary by Species
- Table 3. Summary of Brown Brook Camera Detections
- Table 4. Summary of Melvin North Camera Detections
- Table 5. Summary of Melvin South Camera Detections
- Table 6. Summary of Tinkham North Camera Detections

Table 7. Summary of Tinkham South Camera Detections  
Table 8. Summary of Braley Camera Detections

**Appendices**

Appendix A. Unknown and Comparison Photographs  
Appendix B. Example Species Photographs

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

## 1.0 INTRODUCTION

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### 1.1 PROJECT BACKGROUND

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

Atlantic Wind contracted Stantec Consulting Services Inc. (Stantec) to conduct remote camera surveys to document the potential presence of American marten (*Martes americana*; marten) in the Project area. Marten are listed as a threatened species in the State of New Hampshire and as such, the likelihood of their presence in the development area was assessed as part of the Project's site evaluation (New Hampshire Fish and Game Department [NHFGD] 2008).

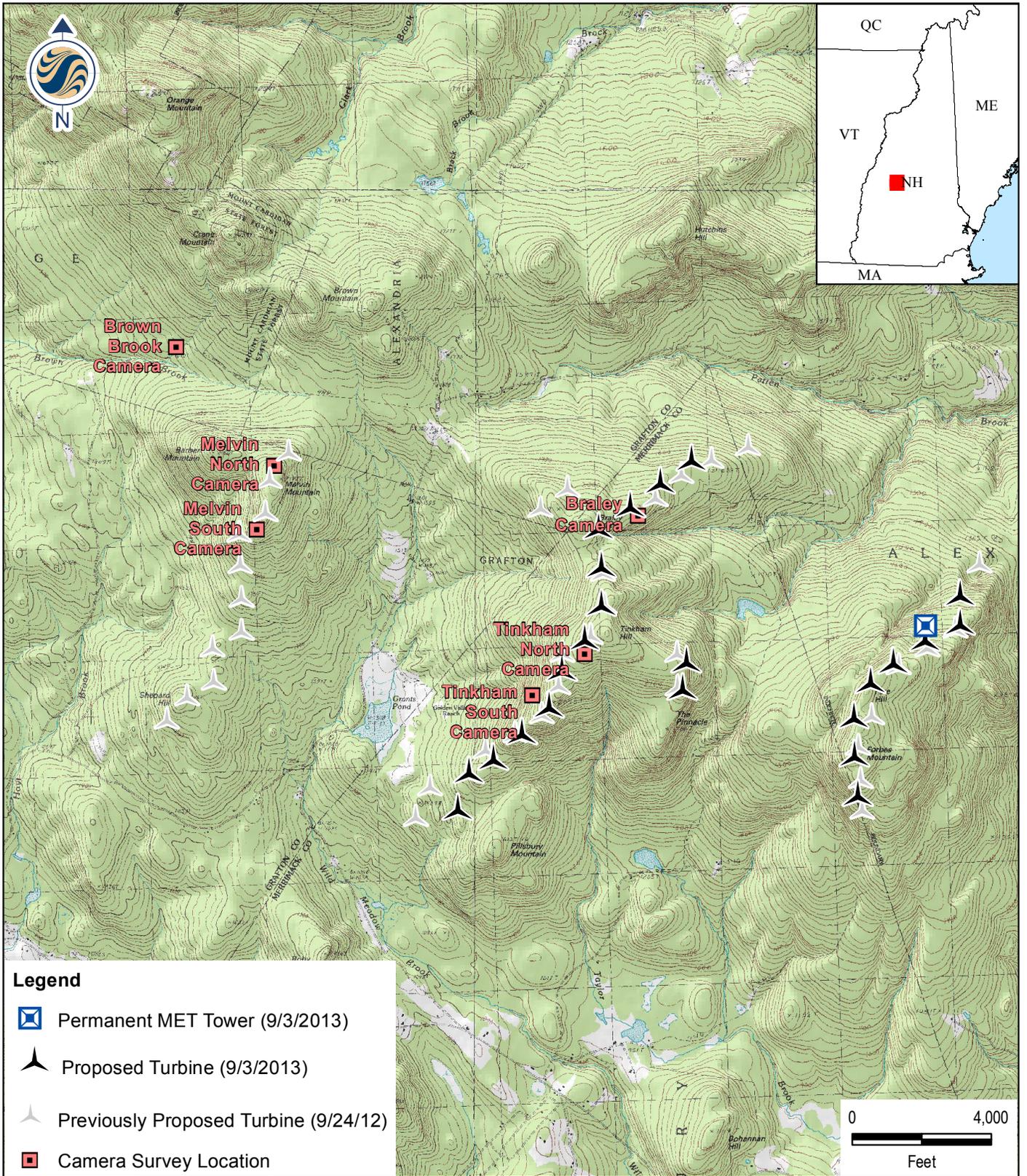
Based upon available occurrence records extending up to 2004, marten have been principally documented in northern New Hampshire and are not known to occur in the Project area (Kelly 2005). A review of occurrence records for the state of New Hampshire identified one marten capture by a fur trapper approximately 30 miles north of the Project area and snow track observation and direct observation of marten also approximately 30 miles north of the Project area (Kelly 2005). To assess the potential presence or absence of marten in the Project area, remote camera surveys were conducted. Camera surveys were employed because they allowed 24 hour data collection intervals (night and day), sampling over multiple seasons (summer, fall, and winter), and sampling of a large land area in a variety of habitats. The scope of work and methodology described in this report were discussed with the NHFGD during a work plan meeting in Concord, New Hampshire on April 1, 2010. Recommendations made by NHFGD at this meeting were incorporated into the work plan as was information received from the New Hampshire Natural Heritage Bureau in response to initial data requests.

### 1.2 PROJECT AREA DESCRIPTION

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

Peaks located partially or entirely within the Project include Braley Hill (635 m; 2,083'), Tinkham Hill (692 m; 2,270') and the Pinnacle (604 m; 1,981') on the western portion of the Project. Forbes Mountain (658 m; 2,159') and Pine Hill (638 m; 2,091') make up the eastern portion of the Project. Tinkham Hill and Braley Hill are generally oriented northeast to southwest and Forbes Mountain is a narrow north-northeast, south-southwest oriented ridgeline. The peaks range in elevation from 604 m (2,100') to 692 m (2,270) at their highest points. Located west and outside of the Project area, Barber Mountain (651 m; 2,136'), Melvin Mountain (660 m; 2,165'), and Sheppard Hill (550 m; 1,640') were originally part of the Project area but as of the 2013 design, were dropped from the project layout.

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



**Legend**

-  Permanent MET Tower (9/3/2013)
-  Proposed Turbine (9/3/2013)
-  Previously Proposed Turbine (9/24/12)
-  Camera Survey Location



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

Figure No.

**1-1**

Title

**Camera Survey Location Map**

7/20/2012  
 REV: 9/6/13

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### 1.3 SPECIES BACKGROUND

In northern New Hampshire, marten inhabit a variety of forested habitats but have historically been associated with mature conifer and mixed forest types. Studies conducted in Maine and Newfoundland indicate that habitat use by this species is more generalized than previously thought (Chapin *et al.* 1997, Hearn *et al.* 2010).

Researchers in Maine determined that structural diversity of the forest community was more important than the specific age and species composition of the forest and found that structural diversity was provided by a variety of habitats including mature deciduous-dominated forests and regenerating forests. During winter, marten utilize forests with dense clusters of stems and downed coarse woody debris, which provides them access beneath the snow and cover from predators. Marten are among a group of small mammals that rely on winter snow cover for survival. These mammals move under the snow in a “subnivean zone” for protection from heat loss and predators such as fisher (*Martes pennanti*) and large owls (*Tyto alba*); this subnivean zone also provides access points to prey and winter resting places (DeGraaf and Yamasaki 2001).

Historic records indicate marten numbers began to decline in the 1800s as a result of habitat loss and over-trapping. The marked decline of the species in New Hampshire led to a subsequent ban on trapping in 1935. Legal protection for marten and changes in land use practices have resulted in an expansion in marten distribution, although they have yet to reach their historic range. Current research suggests re-colonization in New Hampshire is occurring in regions along the eastern border with Maine, a state where populations are stable and are legally harvested for fur (Kelly 2005). In northern New Hampshire, marten numbers have apparently increased, and direct observations and snow track observations have documented the species as far south as Waterville Valley, approximately 31 miles north of the Project area (Kelly 2005).

Despite recent conservation efforts, marten remain listed as a threatened species in New Hampshire. Suggested limiting factors to the reestablishment of marten in some parts of its former range in New Hampshire include habitat fragmentation, interspecific competition from fisher, and climate change resulting in decreased snow depths (Kelly 2005).

### 2.0 METHODS

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Stantec conducted remote camera surveys to document the potential presence or presumed absence of marten in the Project area. Six Moultrie™ Gamespy 6.0 megapixel trail cameras affixed with cellular modems were deployed from August 5, 2010, through January 6, 2011, at the Project (Figure 1). Cameras were distributed at locations throughout the Project area near roadways or trails, and each location was recorded with a Global Positioning System (GPS) receiver. Selected locations were in forested habitats with appropriate cover and foraging opportunities that might possibly

support marten. As of 2013 the locations of 3 of the 6 remote game cameras are now considered to be outside, though in the vicinity of, the currently proposed Project area. Camera locations are described below in Section 2.1.

Marten have traditionally been attracted to trap sites using a combination of scent and food baits. Each camera station included a tuft of wool soaked in a mustelid-specific trappers lure, a Vaseline-based skunk lure, and food bait consisting of compressed bait cubes or a punctured tin of sardines. The scented wool patch was wired to a tree approximately two feet above the ground, perpendicular to the game camera and at an appropriate height for marten to access from the ground. Cameras were aimed directly at the scent station using the laser pointer feature. The skunk-based lure was smeared eight feet high above the wool patch to act as a more powerful broadcasting lure to draw animals from farther away than the more localized scent provided by the trappers lure-doused wool. When possible, the site surrounding the camera station was raked clean of debris to provide a surface that would better allow observation of tracks from passing animals. Low-lying vegetation was cleared from the camera field view to create an unobstructed view of animals triggering the camera's beam and to minimize photographs triggered by moving vegetation during windy conditions.

The cameras were equipped with an infrared beam that illuminated a distance of up to 45 feet during both low light and dark conditions. The cameras were set to trigger when a subject interrupted this infrared beam. When the infrared beam was interrupted, a series of three digital photos were taken and stored on a 4GB SD™ photo card. The camera delay was set to record the series of 3 photos with a 30-second delay between each series of photos. Each digital photo was numerically identified and included the date, time, temperature, and moon phase. Where cellular service was present, photos were uploaded to a remote server and could be viewed on the Moultrie™ website during the course of the survey event. This website allowed Stantec to remotely manage some of the camera settings and monitor battery life on the camera and modem. Stantec visited the cameras every one to two months during the survey to download pictures and refresh lures, baits, and batteries.

Photos gathered during the camera trapping survey were visually inspected to identify animals present. These data were then summarized with the species detected, as well as date and time of detection for each photo. A second observer examined the photos to check for accuracy and confirm identifications. To prevent over reporting the number of individuals detected, a series of photos of the same animal was counted as one "capture." When definitive species identification could not be made due to poor image quality or because only part of the animal was visible in the frame, the photo was labeled as unknown or unknown to species group. Reporting used in this report is similar to methods used on other studies (Nielson and McCollough 2009, Crowley *et al.* 2005). Stantec did provide likely species identification of each of these unknowns based upon the size, shape, and color features that could be seen in the photo. Upon request, a CD can be provided with photos of all wildlife images recorded during the survey period.

## 2.1 CAMERA LOCATION DESCRIPTIONS

### 2.1.1 Brown Brook Camera

The Brown Brook camera (elevation 518 m [1,698']) was deployed in a location considered in 2009 to be the northwestern section of the Project area in a valley between Crane Mountain and Barber Mountain. As of 2013, this location is now considered outside of the project area. The surrounding forest was dominated by mature hardwood species with a smaller component of mature softwood and a relatively open understory (Photo 1). The camera was located next to an unimproved logging road along a tributary of Brown Brook. It was secured approximately three feet above the ground and was focused on the bait station approximately eight feet away in an adjacent tree.



**Photo 1.** Brown Brook camera survey site.  
Stantec Consulting. August 6, 2010.

### 2.1.2 Melvin North Camera

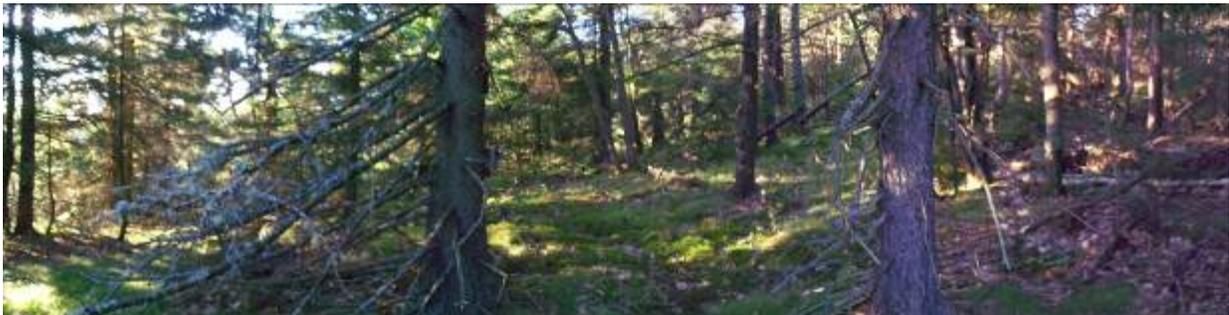
The Melvin North camera (elevation 656 m [2,153']) was located north of the summit of Melvin Mountain, approximately 300 m (1,000') from the Melvin Mountain temporary met tower clearing in a location considered in 2009 to be inside the Project area. As of 2013, this location is now considered outside, but in the vicinity of, the Project area. The camera was deployed in a stand of mature softwoods with a smaller component of mature hardwood species. The understory was relatively open. Signs of recent timber clearing were apparent approximately 121 m (400') to the west (Photo 2).



**Photo 2.** Melvin North Camera survey site, showing scent station.  
Stantec Consulting. August 14, 2010.

### 2.1.3 Melvin South Camera

The Melvin South camera (elevation 644 m [2,114']) was located off a logging trail approximately 460 m (1,509') south of the summit of Melvin Mountain in a location considered in 2009 to be inside the Project area. As of 2013, this location is now considered outside, but in the vicinity of, the Project area. The camera was deployed under a canopy of mature spruce that had mossy ground cover over large areas of exposed bedrock (Photo 3).



**Photo 3.** Melvin South camera survey site.  
Stantec Consulting. August 6, 2010.

#### 2.1.4 Tinkham North Camera

The Tinkham North camera (elevation 693 m [2,272']) was located approximately 267 m (876') southwest of the Tinkham Hill temporary met tower. The site was composed of mature softwood and hardwood species with a relatively open understory and was surrounded by small pockets of forested wetlands (Photo 4). Claw marks on trees in the surrounding forest showed evidence of black bear (*Ursus americanus*) activity.



**Photo 4.** Tinkham North camera survey site.  
Stantec Consulting. August 6, 2010.

#### 2.1.5 Tinkham South Camera

The Tinkham South camera (elevation 596 m [1,956']) was deployed approximately 600 m (1969') south of the Tinkham North Camera along the southwest slope of Tinkham Hill. The site was adjacent to a well-defined game trail, which showed evidence of moose (*Alces alces*) activity. The surrounding forest was composed of mature softwood with a relatively open, moss covered understory. Several small rocky outcroppings ran along the ridgeline adjacent to the camera site (Photo 5).



**Photo 5.** Tinkham South camera survey site.  
Stantec Consulting. August 6, 2010.

### 2.1.6 Braley Camera

The Braley camera (elevation 625 m [2,051']) was located approximately 400 m (1312') east of the summit of Braley Hill in a mature spruce forest with a relatively open understory. There was some evidence of recent partial harvests (strip cuts) within 300 m (1,000') of the camera site. A significant amount of woody debris remained in logging trails as a result of harvesting (Photo 6).



**Photo 6.** Braley camera survey site.  
Stantec Consulting. August 6, 2010.

## 3.0 RESULTS

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Between August 5, 2010, and January 6, 2011, images of 107 individuals were captured during 917 camera days (one camera day equals a 24-hour period). For the entire survey period, an overall detection rate of 0.12 individuals per camera day was recorded (Table 1).

No martens were recorded by cameras. Black bear was the most commonly observed species (n=31), followed by coyote (*Canis latrans*) (n=24), moose (n=16), white-tailed deer (*Odocoileus virginianus*) (n=8), and fisher (n= 6) (Table 2). Example photos of the species detected are provided in Appendix B.

**Table 1. Wild Meadows Camers Survey Effort, August 5, 2010 to January 6, 2011.**

Camera	# Camera Days	Total Wildlife Images	Total Number of Individuals*	Camera Detection Rate	Species Observed
Brown Brook	154	25	16	0.16	coyote, fisher, snowshoe hare
Melvin North	153	78	30	0.51	black bear, coyote, white-tailed deer, moose, raccoon
Melvin South	153	14	8	0.09	black bear, coyote, white-tailed deer
Tinkham North	152	29	21	0.19	black bear, coyote, white-tailed deer, fisher, moose
Tinkham South	152	51	20	0.34	black bear, coyote, squirrel, flying squirrel, snowshoe hare
Braleley	153	29	12	0.19	black bear, white-tailed deer, fisher, moose, red squirrel
<b>Total</b>	<b>917</b>	<b>226</b>	<b>107</b>	<b>0.25</b>	

\*An individual recorded in multiple frames is given a value of 1.

**Table 2. Wild Meadows Camera Survey Summary by Species. Wild Meadows Wind Project, NH.**

Species	Cameras						Totals
	Brown Brook	Melvin North	Melvin South	Tinkham North	Tinkham South	Braleley	
Black Bear	0	9	1	7	9	5	31
Coyote	8	9	2	1	4	0	24
Moose	0	5	0	8	0	3	16
White-tailed Deer	0	2	3	2	0	1	8
Fisher	3	0	0	2	0	1	6
Snowshoe Hare	1	0	0	0	4	0	5
Raccoon	0	2	0	0	0	0	2
Red Squirrel	0	0	0	0	0	1	1
Flying Squirrel	0	0	0	0	1	0	1
Squirrel	0	0	0	0	1	0	1
Unknown Canine	2	0	0	0	1	0	3
Unknown Mustelid	1	0	0	0	0	0	1
Unknown	1	3	2	1	0	1	8
<b>Totals</b>	<b>16</b>	<b>30</b>	<b>8</b>	<b>21</b>	<b>20</b>	<b>12</b>	<b>107</b>

### 3.1 BROWN BROOK CAMERA

The Brown Brook camera was deployed on August 5, 2010, and the first wildlife photo was recorded six days later on August 11, 2010. Twenty-five photos were triggered by wildlife movement during the 154 day survey period (Table 3). In total, 12 individuals from 3 identified species, and 4 individuals that could not be identified to species, were documented by this camera (Table 2). Identified species were coyote, fisher, and

snowshoe hare (*Lepus americanus*). The four individuals that could not be identified to species include two unidentified canines, one unidentified mustelid (weasel family), and one unidentified species. For unidentified animals, photo quality was poor in some instances because the animal started or moved quickly through the photo frame or was too close to the camera, and in some instances only a portion of the animal appears in the photo. In the instances of the unknown mustelid, the animal appears to have jumped into and then out of the camera range. Based upon apparent size and body shape, the two unknown canines and the unknown species were likely coyotes. Similarly, based upon size, the unknown mustelid was most likely a fisher. Photographs of unidentified individuals are provided in Appendix A. The overall detection rate for this camera over the course of the survey was 0.16 wildlife images per 154 camera days.

**Table 3. Summary of Brown Brook Camera Detections. Note that detection numbers represent the number of photos and not number of individuals recorded. Wild Meadows Wind Project, NH.**

Photo Date	Coyote	Fisher	Snowshoe Hare	Unknown Canine	Unknown Mustelid	Unknown	Total
8/11/2010				1			1
8/13/2010				1			1
8/28/2010			1				1
9/18/2010	1						1
9/21/2010	6						6
9/24/2010		2					2
10/1/2010	1						1
10/4/2010						1	1
10/7/2010	3						3
10/10/2010	1						1
10/12/2010					1		1
11/16/2010	1						1
12/25/2010		2					2
12/26/2010	2						2
1/1/2011		1					1
<b>Total</b>	<b>15</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>25</b>

### 3.2 MELVIN NORTH CAMERA

The Melvin North camera was deployed on August 6, 2010, and the first wildlife image was recorded eight days later on August 14, 2010. Seventy-eight photos were triggered by wildlife movement during the 153-day survey period (Table 4). In total, 27 individuals from 5 identified species and 3 individuals that could not be identified to species were detected by the camera (Table 2). Identified species were black bear, coyote, white-tailed deer, moose, and raccoon (*Procyon lotor*). For the unidentified individuals, each animal was caught as it passed through the edge of the frame and appears as either a blur or only a portion, in one case the tail, is visible in the photo. Based upon size and coloration, two of the unknown individuals were likely coyote. The image quality for the

third unknown individual was poor, and a likely species determination could not be made (see Appendix A for photos). The overall detection rate for this camera over the course of the survey was 0.51 wildlife images per 153 camera days.

**Table 4. Summary of Melvin North Camera Detections. Note that detection numbers represent the number of photos and not number of individuals recorded. Wild Meadows Wind Project, NH.**

Date	Black Bear	Coyote	White-tailed Deer	Moose	Raccoon	Unknown	Total
8/14/2010	3						3
8/19/2010	1						1
8/21/2010			3				3
9/10/2010	3						3
9/17/2010					3		3
9/18/2010	3						3
9/23/2010	3						3
9/26/2010	1						1
9/28/2010	3						3
10/11/2010		3					3
10/14/2010				4			4
10/17/2010	3						3
10/29/2010		2					2
11/1/2010		3				1	4
11/2/2010		3					3
11/3/2010			3				3
11/10/2010		3					3
11/11/2010		3					3
11/17/2010		3					3
12/6/2010		3					3
12/10/2010						1	1
12/11/2010		5					5
12/16/2010				1			1
12/21/2010				1			1
12/24/2010						1	1
1/1/2011				12			12
<b>Total</b>	<b>18</b>	<b>28</b>	<b>6</b>	<b>17</b>	<b>1</b>	<b>3</b>	<b>78</b>

### 3.3 MELVIN SOUTH CAMERA

The Melvin South camera was deployed on August 5, 2010, and the first wildlife image was recorded 26 days later on August 31, 2010. Fourteen photos were triggered by wildlife movement during the 153-day survey period (Table 5). In total, six individuals

representing three species and two individuals that could not be identified to species were recorded by the camera (Table 2). Identified species were black bear, coyote, and white-tailed deer. The two unidentified individuals each appear briefly in the corner of a single photo. The animals are close to the camera and only their backs appear in the frame. Based upon relative size, both of the unidentified individuals were likely coyotes (see Appendix A for photos). The overall detection rate for this camera over the course of the survey was 0.09 wildlife images per 153 camera days.

**Table 5. Summary of Melvin South Camera Detections. Note that detection numbers represent the number of photos and not number of individuals recorded. Wild Meadows Wind Project, NH.**

Date	Black Bear	Coyote	White-tailed Deer	Unknown	Total
8/31/2010			2		2
9/18/2010	1				1
9/19/2010		1			1
11/4/2010			4		4
11/13/2010				1	1
12/7/2010		1			1
12/11/2010			3	1	4
<b>Total</b>	<b>1</b>	<b>2</b>	<b>9</b>	<b>2</b>	<b>14</b>

### 3.4 TINKHAM NORTH CAMERA

The Tinkham North camera was deployed on August 6, 2010; the first image was recorded seven days later on August 13, 2010. Twenty-nine photos were triggered by wildlife movement during the 152-day survey period (Table 6). In total, 20 individuals from 5 species and 1 individual that could not be identified to species were recorded by the camera (Table 2). Identified species were black bear, coyote, white-tailed deer, fisher, and moose. The unidentified individual was very close to the camera and is represented in the photo frame by what appears to be an ear. Based upon a series of photos taken a short time before this unidentified individual was recorded, this animal was likely a moose (see Appendix A for photos). The overall detection rate for this camera over the course of the survey was 0.19 wildlife images per 152 camera days.

**Table 6. Summary of Tinkham North Camera Detections. Note that detection numbers represent the number of photos and not number of individuals recorded. Wild Meadows Wind Project, NH.**

Date	Black Bear	Coyote	White-tailed Deer	Fisher	Moose	Unknown	Total
8/13/2010	1						1
8/14/2010			1				1
8/17/2010		2					2
8/26/2010	1						1
9/2/2010				2			2
9/8/2010	1						1
9/11/2010				2			2
9/18/2010					3		3
9/25/2010	1				1		2
10/5/2010	1				1		2
10/7/2010					1		1
10/11/2010					3		3
10/24/2010	1						1
11/5/2010			2				2
11/7/2010					1	1	2
11/12/2010					2		2
12/3/2010					1		1
<b>Total</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>11</b>	<b>1</b>	<b>29</b>

### 3.5 TINKHAM SOUTH CAMERA

The Tinkham South camera was deployed on August 6, 2010; the first image was recorded two days later on August 8, 2010. On October 11, 2010, 67 days into the survey period, this camera was dislodged from the tree to which it was attached. The camera continued to record, but the lens was not directed at the scent station. It recorded only a single wildlife image after it was dislodged: a flying squirrel (*Glaucomys* sp.) on the tree above the scent station. When Stantec retrieved the camera on January 5, 2011, bite marks in the camera demonstrated that it was likely a black bear that had ripped the camera from the tree.

Fifty-one photos were triggered by wildlife movement during the 152 survey period (Table 7). In total, 17 individuals from 3 species and 3 individuals that could not be identified to species were recorded by the camera (Table 2). Identified species were black bear, coyote, and snowshoe hare. A single image of a flying squirrel was recorded by the camera, but it was not possible to determine whether this was a southern (*Glaucomys volans*) or northern (*Glaucomys sabrinus*) flying squirrel. A second squirrel photographed on the ground at night could not be seen in sufficient detail to identify it to species (see Appendix A for photos). The third unidentified image, taken at night, is that

of an animal moving through the vegetation beyond the scent station. Based upon its relative size, this animal is likely a coyote, but it cannot be seen in sufficient detail. The overall detection rate for this camera over the course of the survey was 0.34 wildlife images per 152 camera days.

**Table 7. Summary of Tinkham South Camera Detections. Note that detection numbers represent the number of photos and not number of individuals recorded. Wild Meadows Wind Project, NH.**

Date	Black Bear	Coyote	Flying Squirrel	Snowshoe Hare	Unknown Squirrel	Unknown Canine	Total
8/8/2010	2						2
8/10/2010	5						5
8/14/2010	3						3
8/20/2010				1			1
8/22/2010				5			5
8/27/2010	2						2
9/2/2010						1	1
9/4/2010	1						1
9/6/2010	1	8					9
9/10/2010					2		2
9/15/2010		1		3			4
9/18/2010		3					3
9/21/2010	3						3
9/24/2010	4						4
10/3/2010		2					2
10/4/2010	3						3
12/14/2010			1				1
<b>Total</b>	<b>24</b>	<b>14</b>	<b>1</b>	<b>9</b>	<b>2</b>	<b>1</b>	<b>51</b>

### 3.6 BRALEY CAMERA

The Braley camera was deployed on August 6, 2010; the first image was recorded two days later on August 8, 2010. Twenty-nine photos were triggered by wildlife movement during the 153-day survey period (Table 8). In total, 11 individuals from 5 species and 1 individual that could not be identified to species were recorded by the camera (Table 2). Identified species were black bear, white-tailed deer, fisher, moose, and red squirrel (*Sciurus vulgaris*). The unidentified individual was photographed at night and appears on the ground beyond the scent station. It cannot be seen in clear detail, but based upon its size and its tail, this appears to be a squirrel (see Appendix A for photos). The overall detection rate for this camera over the course of the survey was 0.19 wildlife images per 153 camera days.

**Table 8. Summary of Braley Camera Detections. Note that detection numbers represent the number of photos and not number of individuals recorded. Wild Meadows Wind Project, NH.**

Date	Black Bear	White-tailed Deer	Fisher	Moose	Red Squirrel	Unknown	Total
8/8/2010				3			3
8/14/2010						1	1
8/17/2010	3						3
8/21/2010		2					2
8/28/2010	3						3
9/8/2010	1						1
9/18/2010			6				6
9/23/2010	3						3
9/25/2010	1						1
11/28/2010				2			2
12/17/2010				3			3
12/26/2010					1		1
<b>Total</b>	<b>11</b>	<b>2</b>	<b>6</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>29</b>

#### 4.0 DISCUSSION

Records of marten in northern New Hampshire show that this species has recolonized a portion of its historical range. Reliable records of marten occurrences collected between 1980 and 2004 documented marten from Pittsburg at the northern extent of Coos County south to Waterville Valley in eastern Grafton County. Despite this recolonization and continued protection, marten are still considered relatively rare in New Hampshire, and it remains on the state's list of threatened species. Suggested limiting factors to the reestablishment of marten in some parts of its former range include habitat fragmentation, land use, interspecific competition from fisher, and climate change resulting in decreased snow depths (Kelly 2005). Based upon contemporary marten observation data for New Hampshire, the nearest confirmed occurrences to the Project area were approximately 30 miles to the north (Kelly 2005). Each of the confirmed marten occurrences are located east of Interstate-93, which bisects New Hampshire from southeast to northwest, suggesting that this portion of the state better meets the habitat requirements of this species. It is also possible that Interstate-93 may form a dispersal barrier for marten that are present in northeastern New Hampshire.

During the 917 combined days of camera of surveys, no marten were documented in the Project area, suggesting that this species is unlikely to be present. In addition, no marten or identifiable marten signs were observed incidentally during the other wildlife surveys (e.g., breeding bird, radar, bat acoustic, mist-netting, and raptor surveys) conducted in 2009, 2010, and 2011 at the Project. The six cameras deployed in the vicinity of the Project area recorded a total of nine species, including one member of the

weasel family: fisher. Fisher were recorded at three of the camera sites. Fisher may be better suited to the environmental conditions in this part of the state and may competitively exclude or limit the presence of marten, although the two species can occur together (Kelly 2005). A study of marten and fisher interactions in Maine recorded low numbers of fisher and high numbers of marten in areas with deeper average snowpacks and an opposite relationship in regions receiving less snow (Krohn 1995). Fisher are larger bodied with a heavier foot load causing them to be less successful in deeper snow conditions, whereas marten have a lighter foot load and spend the winter months hunting and traveling in the subnival zone allowing them to thrive in the deeper snow conditions. Based upon the current distribution of marten in New Hampshire and the absence of detections of this species within the Project area, it seems unlikely that marten are present in the Project area.

## 5.0 LITERATURE CITED

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## **Appendix A**

### **Unknown and Comparison Photographs**



**Photo 1.** Brown Brook Camera – unknown canine, suspected to be a coyote.  
Stantec Consulting. August 11, 2010.



**Photo 2.** Brown Brook Camera – unknown canine, suspected to be a coyote.  
Stantec Consulting. August 13, 2010.



**Photo 3.** Brown Brook Camera – unknown species, suspected to be a coyote.  
Stantec Consulting. October 4, 2010.



**Photo 4.** Brown Brook Camera – unknown mustelid, suspected to be a fisher.  
Stantec Consulting. October 12, 2010.



**Photo 5.** Brown Brook Camera – fisher for comparison to unknown mustelid shown in Photo 4. Stantec Consulting. September 24, 2010.



**Photo 6.** Melvin North Camera – unknown species, suspected coyote. Only tail and hind foot of showing in lower left corner of photo. Stantec Consulting. November 1, 2010.



**Photo 7.** Melvin North Camera – unknown species.  
Stantec Consulting. December 10, 2010.



**Photo 8.** Melvin North Camera – unknown species, suspected coyote. Animal is in left background of photo passing behind a tree. Stantec Consulting. December 24, 2010.



**Photo 9.** Melvin South Camera – empty frame for comparison to Photo 10.  
Stantec Consulting. November 13, 2010.



**Photo 10.** Melvin South Camera – unknown species, suspected coyote in lower left corner of photo. Stantec Consulting. November 13, 2010.



**Photo 11.** Melvin South Camera – unknown species, in lower right corner of photo.  
Stantec Consulting. December 11, 2010.



**Photo 12.** Melvin South Camera – empty frame for comparison to Photo 11.  
Stantec Consulting. December 11, 2010.



**Photo 13.** Tinkham North Camera – moose for reference to next four photos. Note time signatures on each photo. Stantec Consulting. November 7, 2010.



**Photo 14.** Tinkham North Camera – blur likely moose seen in Photo 13. Stantec Consulting. November 7, 2010.



**Photo 15.** Tinkham North Camera – empty frame for comparison to Photo 13.  
Stantec Consulting. November 7, 2010.



**Photo 16.** Tinkham North Camera – unknown, suspected moose shown in Photo 13.  
Stantec Consulting. November 7, 2010.



**Photo 17.** Tinkham South Camera – unknown, suspected coyote in left background of photo. Stantec Consulting. September 2, 2010.



**Photo 18.** Tinkham South Camera – empty frame for comparison to Photo 17. Stantec Consulting. September 2, 2010.



**Photo 19.** Tinkham South Camera – squirrel, not identified to species.  
Stantec Consulting. September 10, 2010.



**Photo 20.** Tinkham South Camera – squirrel, not identified to species.  
Stantec Consulting. September 10, 2010.



**Photo 21.** Tinkham South Camera – flying squirrel – only wildlife image captured following damage to camera. Stantec Consulting. December 14, 2010.



**Photo 22.** Braley Camera – unknown, suspected squirrel. Stantec Consulting. August 14, 2010.



**Photo 23.** Braley Camera – empty frame for comparison to Photo 22.  
Stantec Consulting. August 14, 2010.

## **Appendix B**

### **Example Species Photographs**



**Photo 1.** Braley Camera – black bear.  
Stantec Consulting. August 28, 2010.



**Photo 2.** Tinkham South Camera – black bear.  
Stantec Consulting. August 14, 2010.



**Photo 3.** Brown Brook Camera – coyote.  
Stantec Consulting. September 18, 2010.



**Photo 4.** Melvin North Camera – coyote.  
Stantec Consulting. October 11, 2010.



**Photo 5.** Melvin North Camera – coyote.  
Stantec Consulting. November 11, 2010.



**Photo 6.** Melvin North Camera – white-tailed deer.  
Stantec Consulting. August 21, 2010.



**Photo 7.** Braley Camera – moose.  
Stantec Consulting. August 8, 2010.



**Photo 8.** Melvin North Camera – moose.  
Stantec Consulting. October 14, 2010.



**Photo 9.** Tinkham North Camera – moose.  
Stantec Consulting. September 18, 2010.



**Photo 10.** Braley Camera – fisher.  
Stantec Consulting. September 18, 2010.



**Photo 11.** Tinkham South Camera – snowshoe hare.  
Stantec Consulting. August 22, 2010.



**Photo 12.** Melvin North Camera – raccoon.  
Stantec Consulting. September 17, 2010.



**Photo 13.** Braley Camera – red squirrel.  
Stantec Consulting. December 26, 2010.