

2012 Camera Trap Survey on the Guthrie-Bancroft Parcel, Colby Hill, Lincoln, Vermont

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Summary

In 2012 three camera traps were installed on the Guthrie-Bancroft on Colby Hill, Lincoln, Vermont, from 8 June to 6 October 2011 for a total of 520 camera trap nights, recording 35 usable photographs and 9 videos and documenting five mammal and one bird species, including Black Bear and White-tailed Deer recorded this year in all four ecosystems. 2012 results are discussed in the context of camera trap results from previous years.

Introduction

In 2012 we monitored medium and large mammal species on the Guthrie Bancroft Parcel on Colby Hill, Lincoln, Vermont, using one analog (Camtrakker) and two digital (Cuddeback) game cameras traps at selected sites in the four ecosystems that are part of the long-term mammal monitoring effort on Colby Hill. The newly acquired digital camera model (Cuddeback Attack) failed part-way through the survey period and had to be sent in for repair

Materials and Methods

Methodology was similar to that used in previous years (Decher 2004 - 2012). Camera-trapping this year was again restricted to Ecosystem 1, ES 6, ES 14 and ES 20, the same ecosystems as selected for the long-term small mammal monitoring. The three cameras were placed in each of the four ecosystems for at least two weeks earlier in the summer and two weeks later in the summer/ fall (Table 1).

Ecosystem	Summer (days)	Fall (days)
ES 1	26 Jul – 9 Aug (15)	23 Sept - 6 Oct (14)
ES 6	12 Jul - 26 Jul (15)	6 Sept - 23 Sept (18)
ES 14	8 Jun – 28 Jun (21)	9 Aug - 23 Aug (15)
ES 20	28 Jun - 12 Jul (15)	23 Aug – 6 Sept (15)

Table 1: 2012 Summer and Fall Sampling Periods in each Ecosystem.

GPS waypoints recorded at each camera location were downloaded from a Garmin 60csx GPS receiver and plotted online on Google maps using the program GPS Visualizer (<http://www.gpsvisualizer.com/>).

Results and Discussion

In 2012 the film-based camera (Camtrakker) recorded 9 useful photographs, whereas the digital (Cuddeback) cameras recorded 35 still photographs and 9 videos showing five mammal and one bird species. The most commonly recorded species in 2012 were Black Bear (12 still images, 5 videos) and White-tailed Deer (11 still images) and, both recorded in all 4 ecosystems. Moose was represented this year with 3 images in 2 ecosystems.

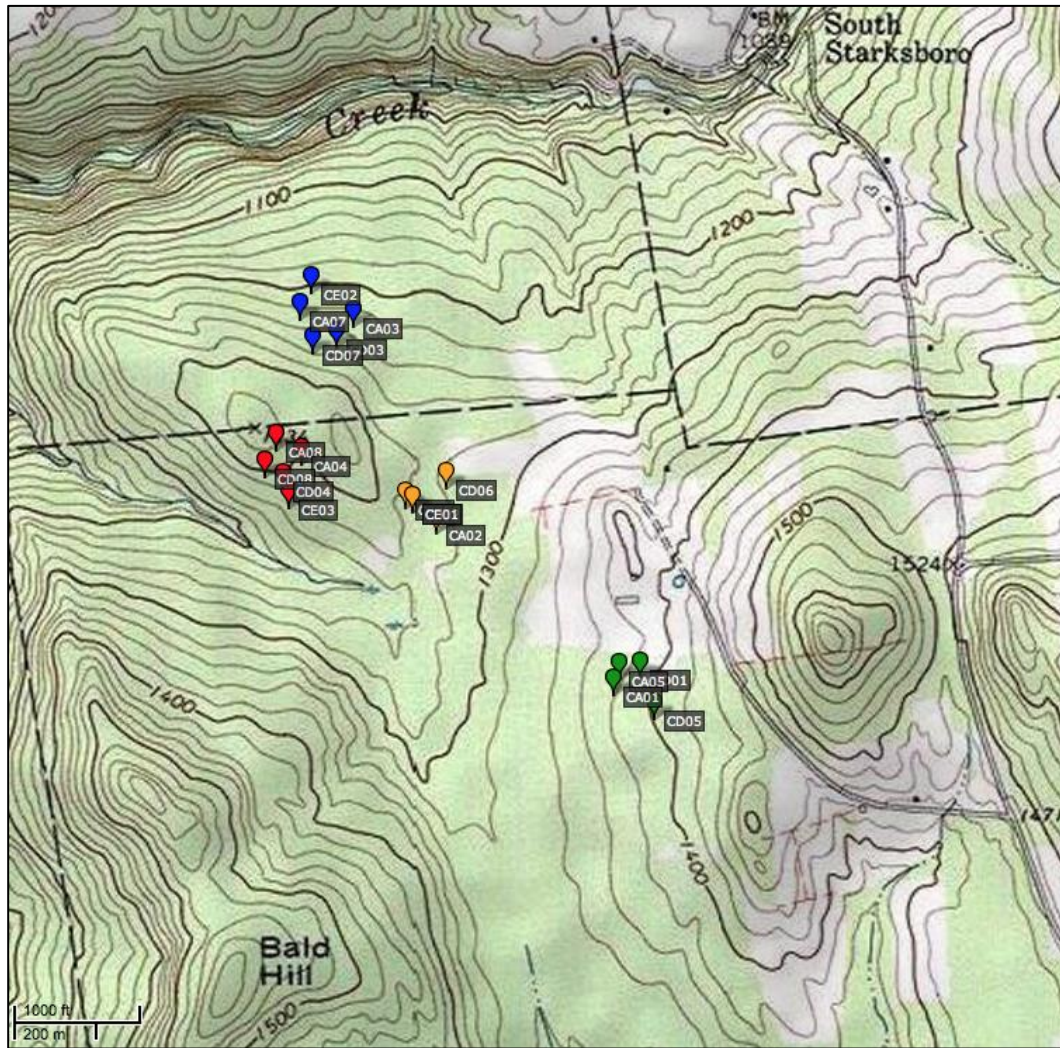


Fig. 1. 2012 Garmin 60CSx readings for camera trap locations plotted with GPS Visualizer (<http://www.gpsvisualizer.com/>) on USGS topographic map of Colby Hill area, Lincoln, Vermont. Legend: Red = ES 1, Yellow = ES 20, Green = ES 14, Blue = ES 6. CD = Digital Camera (Cuddeback), CE, Digital Camera (Cuddeback Attack), CA = Analog Film Camera (Camtrakker).

Average trap success for all ecosystem was 10.1% with the highest trap success (16.7%) in ES 20 (Table 2). The most commonly photographed species this year were White-tailed Deer (*Odocoileus*

virginianus), with 11 images from all four ecosystems and Black Bear (*Ursus americanus*), with 12 images also in all four ES (Table 1). Two images of coyotes (*Canis latrans*; ES 14 + 20) and three images of fisher (*Martes pennant*; ES 14 + 20) were obtained this year. The remaining 4 images were of turkeys (*Meleagris gallopavo*), which had last been recorded by the camera traps in 2006.

Common Name	Scientific Name	ES 1	ES 6	ES 14	ES 20	All	Video
White-tailed Deer	<i>Odocoileus virginianus</i>	7	1	2	1	11	
Black Bear	<i>Ursus americanus</i>	1	2	4	5	12	5
Moose	<i>Alces alces</i>				3	3	
Coyote	<i>Canis latrans</i>			1	1	2	
Fisher	<i>Martes pennanti</i>			2	1	3	2
Turkey	<i>Meleagris gallopavo</i>				4	4	2
Usable Images:		8	3	9	15	35	9
No of Species:		2	2	4	6	7	3
Days Sampled:		29	33	36	30	128	
Number of Cameras		3	3	2	3		
Camera Trap Nights:		87	99	72	90	348	
Trap Success:		9.2	3.0	12.5	16.7	10.1	

Table 2: Images and video recorded and number of sites and ecosystems covered with two automatic camera traps on the Guthrie-Bancroft parcel between 8 June and 4 Oct 2012. Video can only be recorded by the digital (Cuddeback) cameras.

Video sequences this year nicely showed interaction of bear and fisher with the scented bait sticks placed in front of each camera. Video from ES 20 shows fisher (*Martes pennanti*) scent marking after sniffing the scented bait stick. Territorial scent marking is well-known in fishers from other parts of North America (Powell 1993).

Camera Station Code	Dates	ES	Latitude	Longitude	Elevation (m)	W.-t. Deer	Black Bear	Moose	Coyote	Fisher	Turkey
CA01	8 - 28 June	14	44° 08'55.4"	73°01'06.8"	437					1	
CA02	28 Jun - 12 Jul	20	44°09'08.1"	73°01'26.3"	406						2
CA03	212-26 Jul	6	44°09'24.4"	73°01'35.5"	410						
CA04	26 Jul-9 Aug	1	44°09'13.5"	73°01'41.2"	417	6					
CA05	9 - 23 Aug	14	44°08'56.6"	73°01'06.2"	441						
CA06	23 Aug - 6 Sept	20	44°09'10.1"	73°01'29.7"	399						
CA07	6 - 23 Sept	6	44°09'24.9"	73°01'41.3"	387						
CA08	23 Sep - 6 Oct	1	44°09'14.6"	73°01'43.9"	423						

CD01	8 - 28 Jun	14	44° 08'56.7"	73° 01'03.9"	443		1		1		
CD02	28 Jun - 12 Jul	20	44° 09'09.8"	73° 01'29.0"	401	1	1	3			
CD03	12 - 26 Jul	6	44° 09'22.7"	73° 01'37.3"	420	1					
CD04	26 Jul - 9 Aug	1	44° 09'11.5"	73° 01'43.1"	404	1					
CD05	9 - 23 Aug	14	44° 08'53.5"	73° 01'02.3"	442	2	3			1	
CD06	23 Aug - 6 Sept	20	44° 09'11.6"	73° 01'25.3"	392		4		1	1	
CD07	6 - 23 Sept	6	44° 09'22.3"	73° 01'39.9"	400		2				
CD08	23 Sep - 6 Oct	1	44° 09'12.5"	73° 01'45.2"	417						
CE01	28 Jun - 12 Jul	20	44° 09'09.8"	73° 01'29.0"	399						2
CE02	12 - 26 Jul	6	44° 09'27.1"	73° 01'40.1"	421						
CE03	26 Jul - 9 Aug	1	44° 09'10.1"	73° 01'42.6"	399		1				
					Total Images:	11	12	3	2	3	4

Table 3: 2012 camera trap results for the 8 analog (CA) and 11 digital (CD + CE) camera trap stations with their GPS coordinates and (usable) photo/video results (Compare Fig. 1). See Appendix III for data from all years.

Since the beginning of camera trapping at Colby Hill in 2004, 156 useful images of 15 mammal and three bird species were taken from 60 camera positions in the four ecosystems. The five most commonly recorded species over all five years were White-tailed Deer (n = 46), Black Bear (n = 29), Moose (n = 15), Fisher (n = 12), and Coyote (n = 8). See Table 4, Appendix III.

Multi-year Frequency of Encounter for the most Common Species

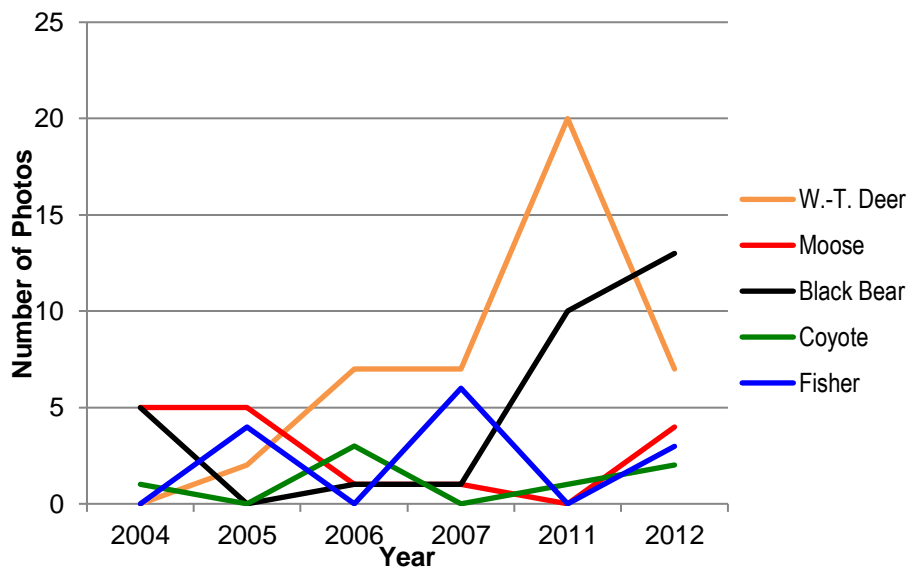


Fig 2. Frequency of camera recordings of dominant species on the Guthrie-Bancroft parcel from six summers of camera trapping between 2004 and 2012.

There is a noticeable increase of bear and White-tailed deer recordings from 2004 to 2012, whereas

moose, coyote and fisher were recorded at more constant levels over the years.

Species Accumulation Curve

A species accumulation (rarefaction) curve was generated from species presence-absence data for the camera results from 2004 to 2012 using the program EstimateS 9.0 (Colwell 2013; Fig. 3).

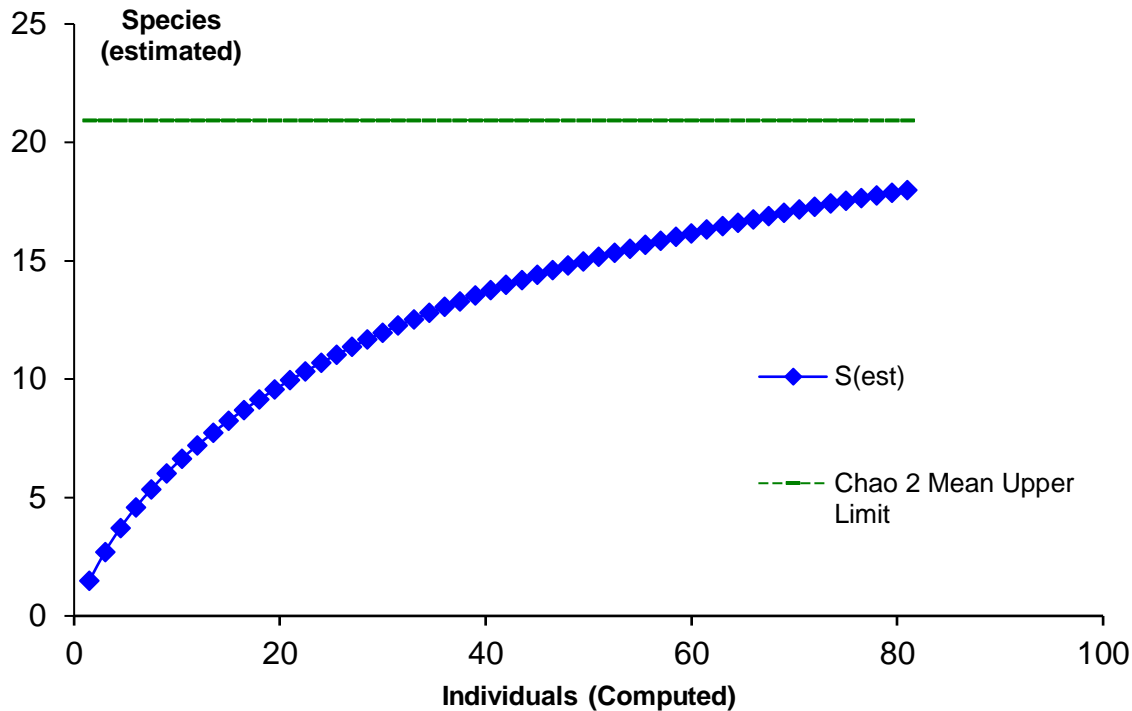


Fig. 3. Individual-based rarefaction curve (blue) and Chao2 richness indicator (green line), generated EstimateS 9.0 (Colwell 2013) using presence-absence data for 18 species (including birds) encountered at Guthrie-Bancroft during six years (2004-2012) of camera trapping.

The species accumulation (rarefaction) curve is gradually approaching a plateau indicating that new species are added at an increasingly slower rate. The Chao2 richness estimator indicates 20.94 species for the total species number that the species accumulation curve is rising towards. This is probably a conservative estimate given the number of Vermont mammals and birds that could potentially be recorded by this type of camera.

Comments on species Detected in 2012

Fisher (*Martes pennanti*)

A video sequence from ES 14 (19 Aug.) with no still-photo equivalent shows a fisher (*Martes pennanti*) rather nervous and wary around the stick. Then the animal running off into the distance, perhaps because of a disturbance, or because it was alarmed by the human scent also present near the

camera. A second video sequence from ES 20 (29 Aug.) shows a fisher sniffing, then chewing on the end of the scented bait stick, and subsequently scent-marking at the base of it. At the end of the 30-second video sequence the individual returns to the stick for a second investigation. Scent marking is well known in fisher (Powell 1993). Rezendes (1999) mentions the 8 to 15 mile diameter home ranges with scent posts frequented by fishers. Local tracking expert Sue Morse previously recorded scent marking of males and females on camera traps in Vermont (Morse 2010). Figure 4 shows the five fisher sighting localities recorded between 2004 and 2012. Powell (1981) mentions home ranges of 15 km² for females, 20 km² for adult males, and 25 km² for subadult males.

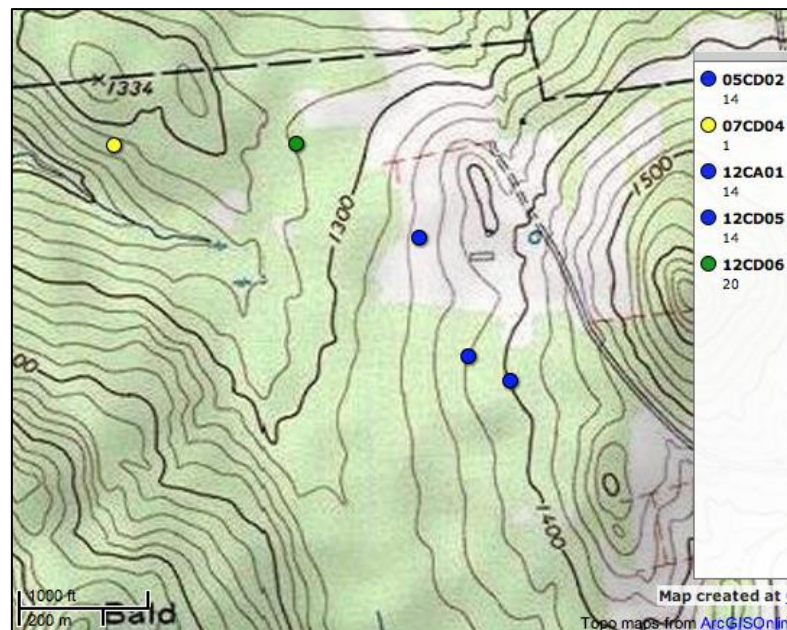


Fig. 4 Map of Fisher (*Martes pennanti*) camera trap sightings between 2004 and 2012 plotted with GPS Visualizer (<http://www.gpsvisualizer.com/>) on USGS topographic map of Colby Hill, Lincoln, Vermont. Legend: yellow = ES20, red = ES6, blue = ES 14, green = ES 14. CA = analog Camtrakker, CD = digital Cuddeback.

Black Bear (*Ursus americanus*)

With 12 images and 5 video sequences black bear was the most commonly recorded animal in 2012. A video sequence from ES 20 (31 Aug) shows a black bear interacting vigorously with the scent stick and even rolling around next to it (compare Plate 14). A young individual in a fern area in ES 1 (30 July) investigates first the camera then the scent stick before trolling off.

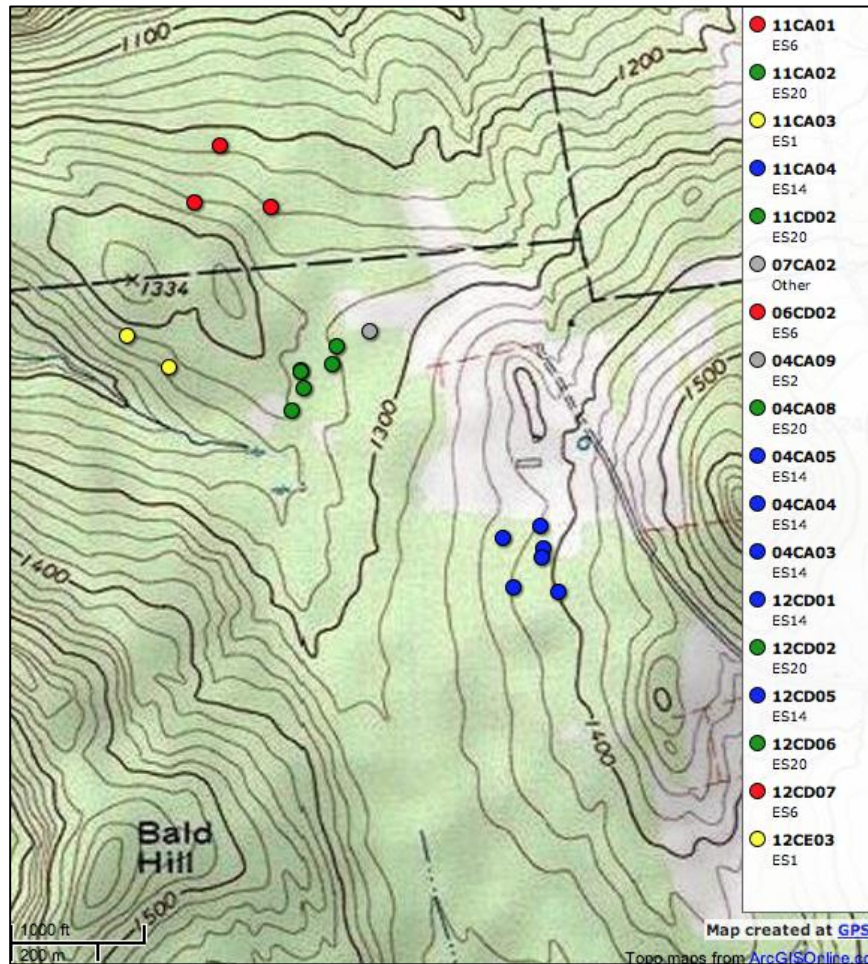


Fig. 5: Map of Black Bear (*Ursus americanus*) camera trap sightings from 2004 – 2012 plotted with GPS Visualizer (<http://www.gpsvisualizer.com/>) on USGS topographic map of Colby Hill, Lincoln, Vermont. Legend: yellow = ES20, red = ES6, blue = ES 14, green = ES 14, gray = ES 2 and undetermined. CA = analog Camtrakker, CD = old digital Cuddeback, CE = new Cuddeback Attack.

Black bears are using all four ecosystems with most sightings occurring in ES 20 and ES 40. Bears were also frequently spotted in the large meadow, especially the northern part with the narrow downsloping “tongue extension” where they feed on apples and in berry patches.

White-tailed Deer (*Odocoileus virginianus*)

Original Vermont White-tailed Deer stock belongs to the subspecies *Odocoileus virginianus borealis* (Smith 1991). One of our pictures (Plate 4) shows a mangy deer in ES 14. Mange may be caused by air follicle mites (Demodicidae), like *Demodex follicorum* or *D. odocoilei* (Yabsley et al. 2013).

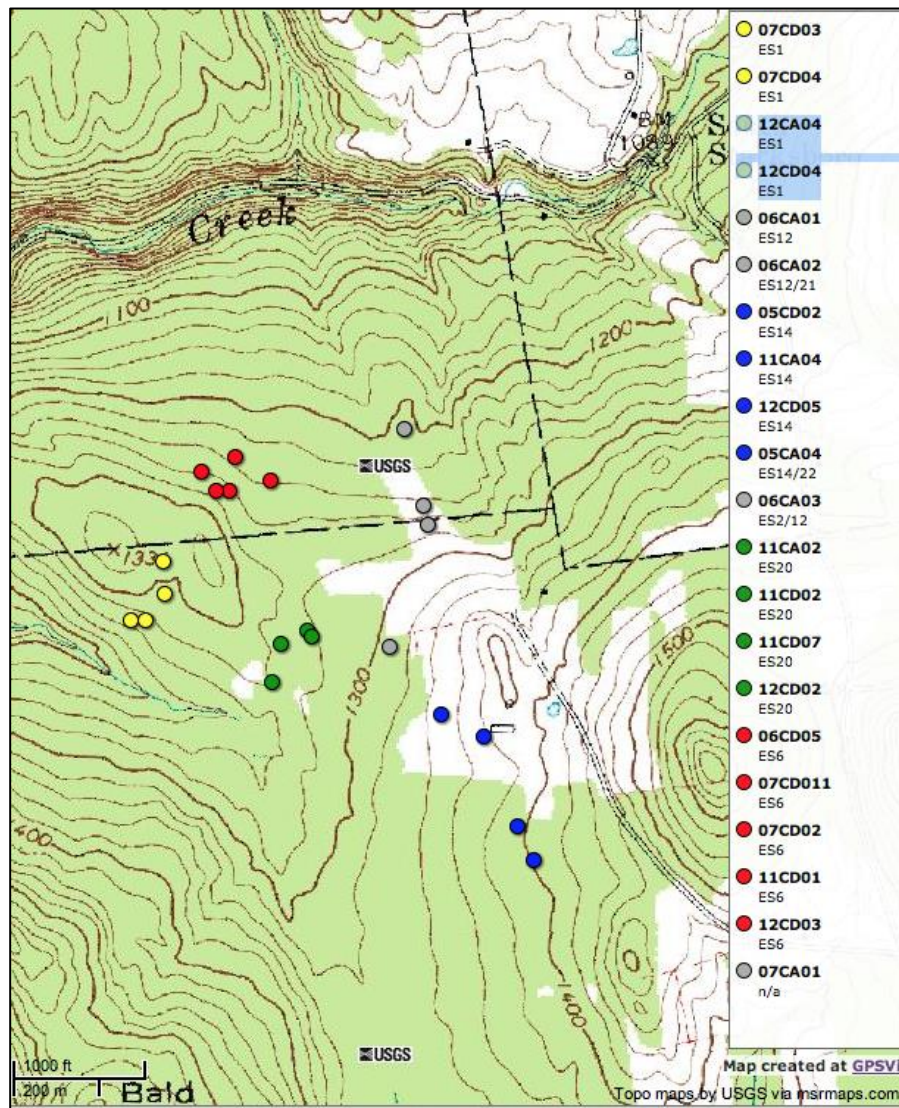


Fig. 6: White-tailed Deer locations recorded between 2004 to 2012 and plotted with GPS Visualizer (<http://www.gpsvisualizer.com/>) on USGS topographic map of Colby Hill, Lincoln, Vermont. Legend: yellow = ES1, red = ES6, blue = ES 14, green = ES 20, gray = other. CD = digital Cuddeback, CA = analog Camtrakker.

Moose (*Alces alces*)

Fifteen images of Moose (*Alces alces*) from five locations are available. Most Moose images (n=13) were taken in ES 20 confirming this large animal's affinity with wetlands created by the Beaver (Alexander 1993), which was reintroduced from Maine in the 1930s (Foote 1946). Based on this information we would expect the adjacent Pierce Farm parcel with its extensive beaver pond system to be even better suited for Moose than the densely forested Guthrie-Bancroft parcel in this long-term survey.

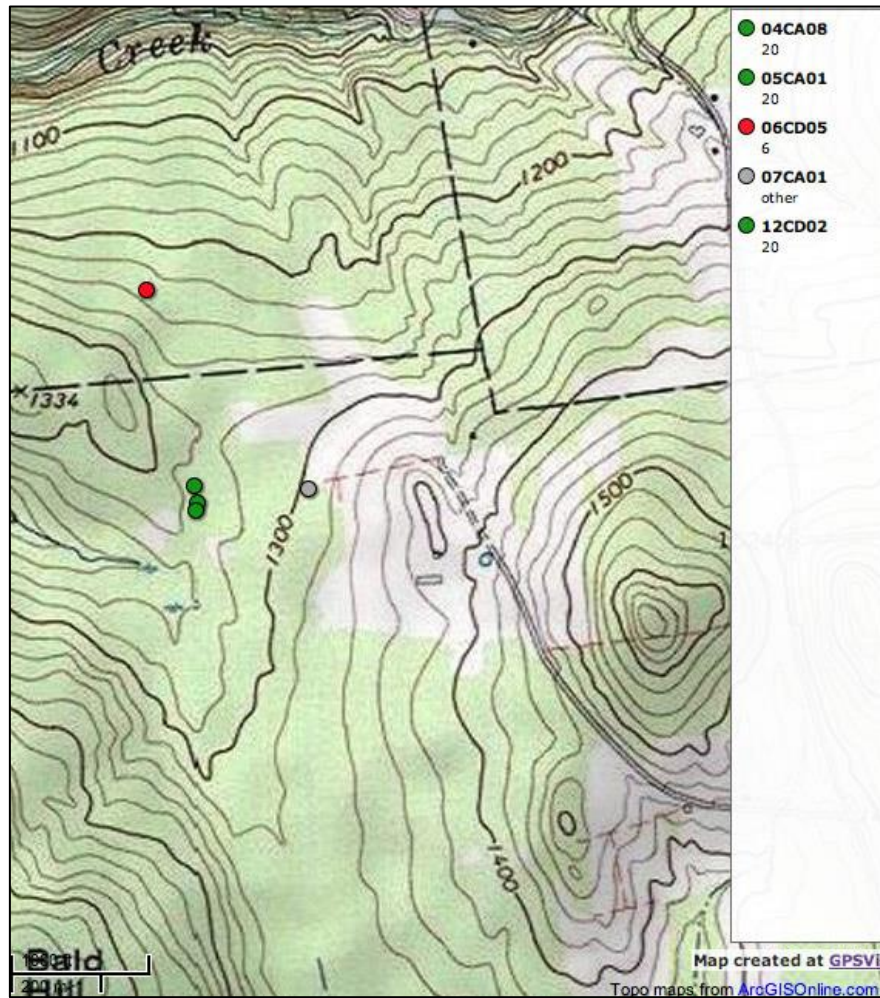


Fig 5. Moose (*Alces alces*) locations recorded between 2004 to 2012 and plotted with GPS Visualizer (<http://www.gpsvisualizer.com/>) on USGS topographic map of Colby Hill, Lincoln, Vermont. Legend: red = ES6, green = ES 20, gray = other. CD = digital Cuddeback, CA = analog Camtrakker.

By 1853 "moose were exterminated from all parts of the state excepting the county of Essex in the northeastern part" (Thompson 1853:50). Alexander (1993) reported an increase of the state moose population from 200 animals in 1980 to 1500 animals in 1993. A recent paper estimated the moose population for a 133 km² area in NE Vermont to 112 animals, or 0.84 moose / km² based on aerial infrared and high resolution color photography (Millette et al. 2011). Western Vermont, or Addison Co. specifically, will probably not support that large a moose population, however, more than once a moose cow with calf was recorded on our camera trap pictures, indicating that Colby Hill is suitable for a breeding population of moose and not just transient individuals. According to Whittaker and Hamilton (1998:545) moose calves "are weaned at six months but remain with the mother for a

year. They are driven off just before the birth of the new young, although the yearlings may rejoin the parents after the young are born."

Coyote (*Canis latrans*)

The 2012 camera trap survey added two images of coyotes from ES 20 and ES 14 (Plates 16 + 17) bringing the total number of coyote images from Guthrie-Bancroft since 2004 to eight. Plate 17 show a coyote interacting with the scent stick. Coyotes first appeared in Vermont in the late 1940, while allowing an all-year hunting seasons on coyotes, the VT F&W Department recognizes their important role in the absence of the original large canid predator in the Northeast, the Wolf (VT F&W Factsheet undated a).

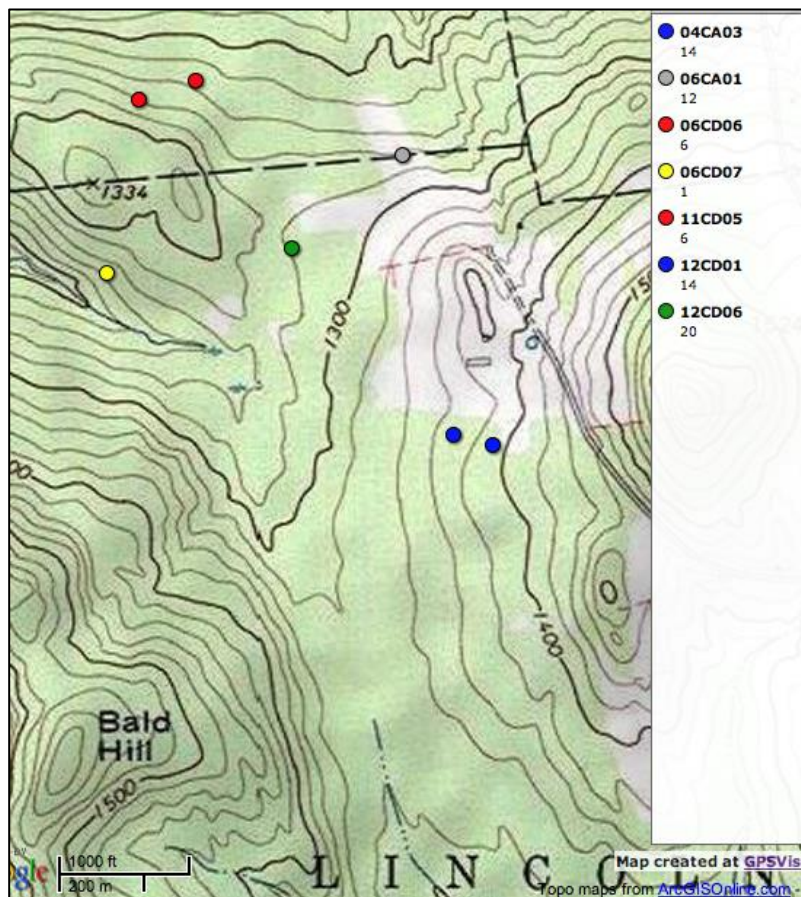


Fig 6. Coyote (*Canis latrans*) locations recorded between 2004 to 2012 and plotted with GPS Visualizer (<http://www.gpsvisualizer.com/>) on USGS topographic map of Colby Hill, Lincoln, Vermont. Legend: yellow = ES 1, red = ES6, green = ES 20, blue = ES 14 gray = other. CD = digital Cuddeback, CA = analog Camtrakker.

Turkeys (*Meleagris gallopavo*)

Images and video of turkeys (*Meleagris gallopavo*) from two separate locations in ES 20 were obtained this year, increasing the total number of turkey images to six. Turkeys seem to prefer more open areas, like ES 20 with its "alder swamp/sedge meadow" and more open forest along the edge of a former beaver pond. However, they were also recorded by our cameras in ES 14 in 2004 and along the northern "tongue extension" of the large meadow (ES 12) in 2006. Turkeys were extinct in Vermont by 1854 due to large-scale deforestation. These distinctive large birds were then reintroduced from New York State starting with 17 turkeys released in Pawlet, Vermont, in 1969, and 14 turkeys released in Hubbardton, Vermont, in 1970, with additional more massive release efforts since 1973. This reestablished a turkey population in Vermont, which is now estimated at 55,000 birds (VT F&W Factsheet undated b)

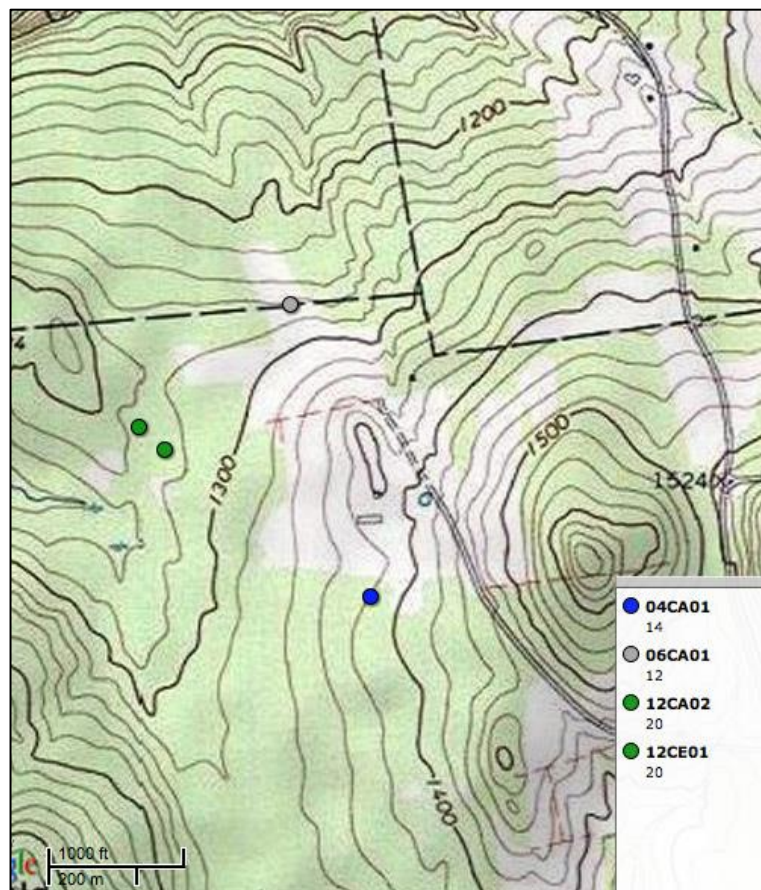


Fig 7. Turkey (*Meleagris gallopavo*) locations recorded between 2004 to 2012 and plotted with GPS Visualizer (<http://www.gpsvisualizer.com/>) on USGS topographic map of Colby Hill, Lincoln, Vermont. Legend: green = ES 20, blue = ES 14 gray = other. CD = digital Cuddeback, CA = analog Camtrakker.

Conclusion

Camera trapping continues to be an easy, non-invasive and relatively inexpensive way to record large mammal activity on the Guthrie-Bancroft land. To improve the monitoring it might be good to use four digital cameras (with a fifth camera as a backup in case of camera failure) to be able to have one camera in each of the four ecosystems all summer and into the fall. A more quantitative approach to camera trapping would either require a larger numbers of camera traps or at least the installation of a grid system, where cameras are moved systematically between pre-determined grid positions (see for example the approach in Nader et al. 2011).

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