

Small Mammals of the Guthrie-Bancroft Farm - Year 14  
Colby Hill Ecological Project, Lincoln and Bristol, Vermont  
2018 Report

## Summary

Small mammals were sampled from ecosystems 1, 6, 14 and 20 on the Guthrie-Bancroft Farm in Lincoln, VT between July 17 – July 29, 2018. A total of 264 captures from 854 trap nights were recorded with overall trap success at 30.9%. At least 10 different species of small mammals were captured considering the two *Peromyscus* and two *Sorex* species (*S. cinereus* and *S. hoyi*) could not be morphologically separated. No new species were detected this year, but rare captures included at least four different *Glaucomys volans*, a *Microtus pinetorum*, and a *Synaptomys cooperi*. *Peromyscus spp.* and *Blarina brevicauda* were the most abundant small mammals making up 72% of the all the captures.

## Introduction

2018 represents the 14th year of small mammal sampling in Colby Hill since 2000 with regular annual censusing since 2011. Ecosystems (ES) 14 and 20 have been monitored for 14 years while ES 1 and 6 have been monitored for 13 years. Long-term studies of ecological systems are paramount in providing insights into processes that show annual variability, processes that are slow to manifest, proper natural resource management, and the conservation of biodiversity (Lindmayer et. al, 2012; Franklin, 1989). Cycles within a population of small mammals can only be observed through monitoring a site for multiple years (Krebs and Myers, 1974; Korpimäki and Krebs, 1996; Hörnfeldt, 2004). Vermont Family Forest's minimal-management policy of its Colby Hill lands offers unique insight into small mammal population trends within relatively untouched lands subject to succession without anthropomorphic influence. Over the last 18 years, the small mammal surveys for the Colby Hill Ecological Project have yielded valuable data that will contribute to the state-wide small mammal project (Kilpatrick and Benoit 2011).

## Materials and Methods

From July 17, 2018 to July 29, 2018, the temperature fluctuated between 52°F and 84°F. Rain showers occurred on seven of the twelve nights that traps were set. Seventy-nine traps (70 Sherman and 9 pitfall along a drift fence) were set in ES14 and ES20. Due to damage as well as a low success rate, the drift fence was abandoned for ES6 and ES1. Additionally, two Sherman traps were lost to bear damage between ES1 and ES6, and with only one back-up trap, 69 traps were set in ES1 and ES6. The Sherman live traps were set in two trap lines (A and B) of 34-35 traps each. The traps were set for three consecutive nights in each ecosystem, adding up to a pending total of 887 trap nights. Thirty-three false closes were documented (many due to the fascination of a young black bear) amounting a final total of 854 trap nights. The Sherman traps were baited with “Old Fashioned” oatmeal, and each was flagged to prevent trap loss.

Field work was carried out under the guidelines from the American Society of Mammalogists (Sikes et al. 2011, Wilson et al. 1996). Each captured individual was sexed, weighed, aged (placed in categories: juvenile, subadult, or adult), assessed for reproductive status and inspected for presence of ectoparasites. Several individuals (including individuals that perished in the traps overnight) of *Peromyscus spp.* (n=8), *Myodes gapperi* (n=2), *Microtus pennsylvanicus* (n=1), *Blarina brevicauda* (n=12), *Sorex cinereus* (n=5), *Microtus pinetorum* (n=1), and *Synaptomys cooperi* (n=1) were kept as voucher specimens. These specimens are permanently preserved in the Zadock Thompson Natural History Collection (ZTNHC) of the University of Vermont.

Habitat data was taken at the site of each capture. Distance to the nearest tree (any live woody plant with a height > 2m), and its DBH were recorded. Distance to the nearest log (any woody debris with a greatest diameter of 1cm or more), and its diameter at its widest point were recorded. Canopy cover, herbaceous cover, and leaf cover were estimated in increments of 25% within a 1m radius of each trap.

All *Sorex* specimens donated to the ZTNHC were assumed to be *Sorex cinereus*, but are being processed in order to examine dentition, the only reliable method to rule out *Sorex hoyi*. This report is subject to change pending further investigation of these specimens.

## Results and Discussion

### Population Trends

Overall trap success in 2018 was 31.1%, which was more than double the trap success of 2017. The highest species diversity was found in ES20 with seven species, while the lowest species diversity was found in ES1 with five species. A relatively large number of captures (n=8) were of rare or difficult to capture species (*Synaptomys cooperi*, *Glaucomys volans*, *Microtus pinetorum*, and *Sorex palustris*). The previous record of combined number of captures of these difficult species in one summer was one. This year represented record captures of *Blarina brevicauda* (37), *Glaucomys volans* (5), *Microtus pinetorum* (2) and *Tamias striatus* (18). *Synaptomys cooperi* has not been captured at Colby Hill since 2012, and *Microtus pinetorum* has not been captured since 2006. *Glaucomys volans* was captured in both ES1 and ES6 this year, and had not been captured at Colby Hill since 2002. All five captures of southern flying squirrel were on rainy nights. The author notes that released individuals with wet fur could not glide properly, and theorizes that *G. volans* is more prone to ground feeding (and thus to ground capture) on rainy nights.

The populations of the five most common species (*Peromyscus spp.*, *M. gapperi*, *N. insignis*, *B. brevicauda*, and *T. striatus*) were all seen in increasing number compared to 2017, except for *M. gapperi*. The 2018 trapping year lacked captures of *Mustela erminea* and *Sorex fumeus*. These species, although uncommon, show up somewhat frequently (58% of years from 2000-2016) (Table 1).

A large number of trees were felled at Colby Hill in March 2018 by a winter storm four months prior to the 2018 survey. The wreckage was extensive, and likely provided surplus structure and forage for small mammals. Additionally, a record hot summer likely increased arthropod biomass, which is believed by the author to have contributed to a record number of *B. brevicauda*.

Weight data from 136 *Peromyscus spp.* was analyzed between the four ecosystems. The analysis of this data showed differences between the average weight between populations. Elevation data taken from each ES correlates positively with this trend in weight. The correlation

seen here provides evidence of an elevational cline in the *Peromyscus spp* at Guthrie-Bancroft Farm, but subsequent data from multiple years is needed to validate this phenomenon.

### Habitat Data

All small mammals surveyed had associations with one or several forms of cover. In general, distance to the nearest log proved more important to the small mammals surveyed than was distance to the nearest tree. *Glaucomys volans* was often trapped within 1m of larger trees (>20cm), likely due to a necessity of a mature deciduous forest for ample tree cavities. *Tamias striatus* was also only trapped in mature deciduous forest, and was found to be heavily associated with large (>10cm) CWD. Among the small mammals surveyed, diameters of the nearest log varied widely, suggesting that all sizes of CWD are important in small mammal habitat.

Some form of canopy cover was observed to be an important habitat trait for all species except *Microtus pennsylvanicus* and *Sorex cinereus*. Anecdotally, a large number of *Blarina brevicauda* were captured in the open “beaver meadow” portion of ES20, suggesting leaf and herbaceous cover may be more important than canopy cover for this species. All small mammal species were found to have a positive association with herbaceous cover except *Tamias striatus*. All species were trapped in areas with >50% leaf cover except *Sorex cinereus*, which was always trapped in muddy seep habitats. Small mammals found to have an especially strong association with heavy leaf cover included *Tamias striatus*, *Glaucomys volans*, *Peromyscus spp.*, *Microtus pennsylvanicus*, and *Blarina brevicauda*.

### **Other Observations**

Large mammals observed by track or trail cam included American Black Bear, White-tailed Deer, Coyote, and Moose. Notably a young American Black Bear was observed checking a trap line for me in ES1, but relinquished his/her duties after realizing I was there. A cumulative 12 traps were subject to bear damage in ES14, ES6, and ES1.

Reptiles and amphibians observed included Green Frog (*Lithobates clamitans*), American Toad (*Anaxyrus americanus*), Spring Peeper (*Pseudacris crucifer*), Eastern Red-backed Salamander (*Plethodon cinereus*), Northern Dusky Salamander (*Desmognathus fuscus*), Eastern Newt (*Notophthalmus viridescens*), Eastern Milksnake (*Lampropeltis triangulum*), and Common Gartersnake (*Thamnophis sirtalis*).

A large diversity of birds was observed on the property, and a species list can be viewed on the eBird “Vermont Family Forest’s Guthrie Bancroft Property (Restricted Access)” hotspot. Notably an American Woodcock was flushed near ES20, a presumed nesting pair of Broad-winged Hawks were viewed in ES14, and a pair of Barred Owls were heard in ES1.

Notable insects observed were a Rusty Patched Bumble Bee, two Wasp Mantidflies, and many larval and adult Monarchs.

### **Literature Cited**

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Table 1. Captures and success for 14 years of summer small mammal surveys from 2000-2018 at Guthrie Bancroft Farm, Lincoln, VT. Species with asterisk refer to rare or difficult to trap (i.e. *Glaucomys volans*) small mammals.

Year	2000	2001	2002	2005	2006	2007	2011	2012	2013	2014	2015	2016	2017	2018	Total
No. of nights trapped	9	11	12	12	12	12	12	12	12	12	12	12	12	12	164
Trapnights	372	332	591	744	765	744	855	948	948	948	948	948	948	853	10944
<b>Shrews &amp; Moles</b>															
<i>Blarina brevicauda</i>	8	23	18	22	14	24	28	20	1	13	1	5	5	37	219
<i>Sorex fumeus</i>	2	0	0	1	1	3	0	8	6	2	0	0	1	0	24
<i>Sorex cinereus</i>	1	1	10	9	10	10	4	1	0	1	0	1	2	5	55
<i>Sorex palustris*</i>	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2
<i>Parascalops breweri</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
<b>Rodents</b>															
<i>Peromyscus spp.</i>	45	76	63	70	84	119	69	122	21	174	95	187	78	154	1357
<i>Napaeozapus insignis</i>	1	3	4	19	3	47	6	18	4	12	3	6	0	10	136
<i>Zapus hudsonius</i>	3	0	0	4	3	3	0	0	0	4	0	0	0	0	17
<i>Microtus pennsylvanicus</i>	3	4	3	23	1	3	3	18	1	9	5	6	0	13	92
<i>Microtus pinetorum*</i>	0	0	0	0	1	0	0	0	0	0	0	0	0	2	3
<i>Myodes gapperi</i>	17	20	18	95	81	68	52	39	14	41	19	55	27	20	566
<i>Synaptomys cooperi*</i>	0	0	0	1	0	0	0	1	0	0	0	0	0	1	3
<i>Tamias striatus</i>	0	1	2	1	4	8	8	6	0	11	2	4	1	18	66
<i>Tamiasciurus hudsonicus</i>	0	1	0	0	0	2	1	0	0	0	1	1	0	0	6
<i>Glaucomys volans</i>	0	0	1	0	0	0	0	0	0	0	0	0	0	5	6
<b>Carnivores</b>															
<i>Mustela erminea</i>	0	0	1	1	4	2	2	3	0	0	0	1	0	0	14
Total captures	80	129	120	246	206	290	174	236	47	268	126	266	114	265	2567
Species	8	8	9	11	11	12	10	10	6	10	7	9	6	10	16
Cumulative species	8	10	12	13	14	15	16	16	16	16	16	16	16	16	16
Trap success (%)	21.5	38.9	20.3	33.1	26.9	39.0	20.4	24.9	5.0	28.3	13.3	28.1	12.0	31.1	23.5

Table 2. Captures of small mammals by ecosystem (ES) at Guthrie-Bancroft Farm Lincoln, VT in July 2018.

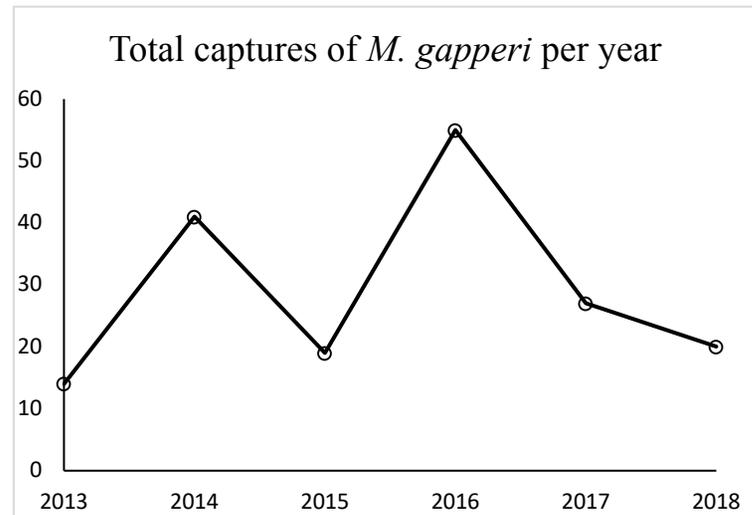
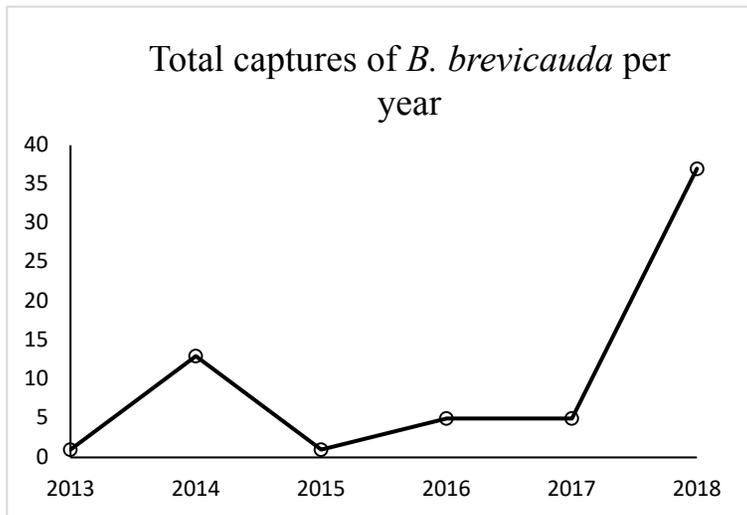
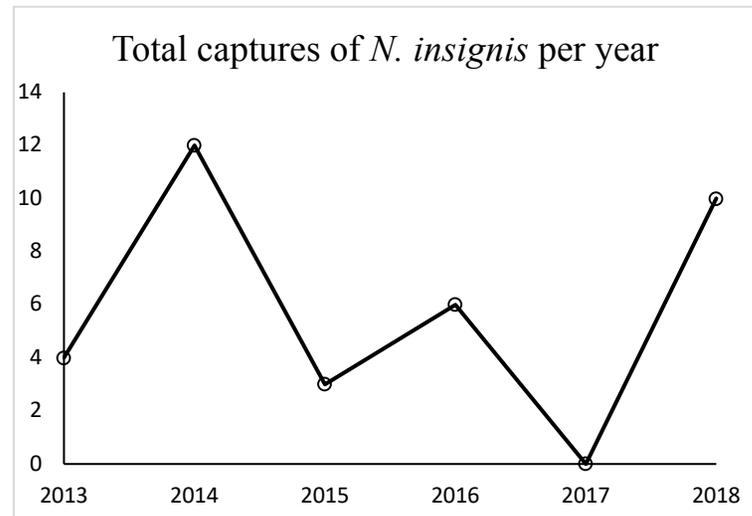
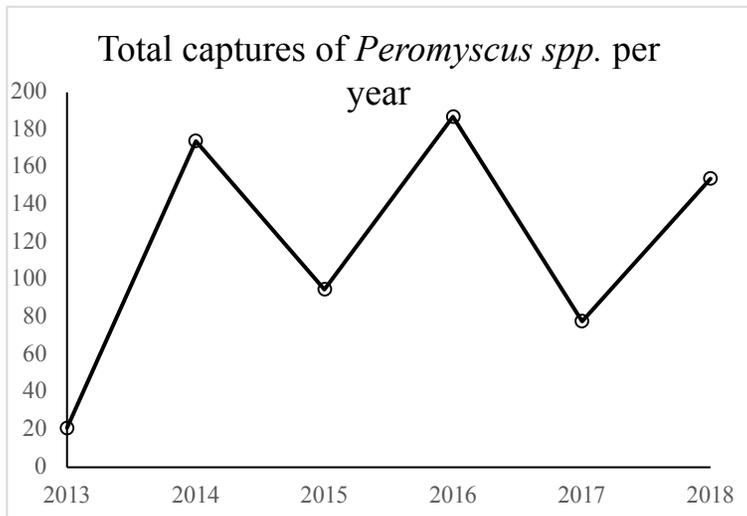
Ecosystem (ES) No.	1	6	14	20	Totals
ES definition	well-drained mesic red oak hardwood forest	seepy terrain rich northern hardwood forest	poorly drained spruce-fir northern hardwood forest	alder swamp/sedge meadow edge of former beaver pond	
Nights trapped	3	3	3	3	12
Total traps	207	207	237	235	886
False closes	16	3	8	6	33
Trapnights	191	204	229	229	853
Shrews & Moles					0
<i>Blarina brevicauda</i>	3	7	7	20	37
<i>Sorex fumeus</i>	0	0	0	0	0
<i>Sorex cinereus</i>	0	0	2	3	5
<i>Sorex palustris</i> *	0	0	0	0	0
<i>Parascalops breweri</i>	0	0	0	0	0
Rodents					
<i>Peromyscus spp.</i>	47	52	29	26	154
<i>Napaeozapus insignis</i>	0	0	3	7	10
<i>Zapus hudsonius</i>	0	0	0	0	0
<i>Microtus pennsylvanicus</i>	0	0	0	13	13
<i>Microtus pinetorum</i> *	0	0	2	0	2
<i>Myodes gapperi</i>	3	4	10	3	20
<i>Synaptomys cooperi</i> *	0	1	0	0	1
<i>Tamias striatus</i>	11	6	0	1	18
<i>Tamiasciurus hudsonicus</i>	0	0	0	0	0
<i>Glaucomys volans</i>	3	2	0	0	5
Carnivores					
<i>Mustela erminea</i>	0	0	0	0	0
Species	5	6	6	7	10
Total captures	67	72	53	73	265
Trap success (%)	35.1	35.3	23.1	31.9	31.1

Table 3. Summarized microhabitat data of eight small mammal species captured at Guthrie Bancroft Farm Lincoln, VT in July of 2018.

	Nearest tree (m)	Diameter of tree (cm)	Nearest log (m)	Diameter of log (cm)	Leaf cover (%)	Herbaceous cover (%)	Canopy cover (%)	n
<i>B. brevicauda</i>	1.2 ± 1.0	12 ± 9.7	0.9 ± 0.9	8.9 ± 8.5	90 ± 22	74 ± 36	71 ± 38	37
<i>G. volans</i>	0.4 ± 0.4	24 ± 20	0.4 ± 0.4	6.8 ± 2.3	100 ± 0.0	75 ± 35	100 ± 0	5
<i>M. pennsylvanicus</i>	1.7 ± 1.7	4.6 ± 4.5	1.7 ± 1.7	8.0 ± 5.8	89 ± 19	100 ± 0	17 ± 30	13
<i>M. gapperi</i>	1.4 ± 1.3	18 ± 18	0.4 ± 0.4	13 ± 13	75 ± 75	68 ± 68	75 ± 75	20
<i>N. insignis</i>	1.2 ± 1.0	9.4 ± 8.3	0.2 ± .4	9.4 ± 14	55 ± 39	76 ± 38	40 ± 47	10
<i>Peromyscus spp.</i>	1.0 ± .8	12 ± 11	0.3 ± .4	11 ± 9.5	87 ± 26	60 ± 34	83 ± 26	154
<i>S. cinereus</i>	1.8 ± 1.1	8.2 ± 6.4	0.7 ± .2	4.4 ± 2.6	20 ± 45	70 ± 41	5 ± 11	5
<i>T. striatus</i>	0.7 ± 1.0	16 ± 15	0.2 ± .2	11 ± 7.8	96 ± 9.6	46 ± 32	93 ± 14	18
Average	1.2 ± 1.0	13 ± 12	0.6 ± 0.6	9.1 ± 8.0	76 ± 29	71 ± 36	61 ± 30	262

Table 4. Average weight of *Peromyscus spp.* by ecosystem from the July 2018 Guthrie-Bancroft Farm (Lincoln, VT) small mammal survey.

Ecosystem	Elevation (ft)	Average weight (g)	n
ES1	1386	20.9	44
ES6	1330	20.0	46
ES14	569	17.4	24
ES20	570	17.4	22
<b>Totals</b>	N/A	<b>18.9</b>	<b>136</b>



Figures 1-4. Fluctuations from 2013-2018 of total captures of *Peromyscus spp.*, *Napaeozapus insignis*, *Myodes gapperi*, and *Blarina brevicauda* trapped during summer surveys at Guthrie-Bancroft Farm Lincoln, VT.