

Small Mammals on Mt. Mansfield, Vermont

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Abstract: An inventory of small mammals on the west slope of Mt. Mansfield was begun during the spring of 1994 and concluded in 1995. During these two years, four techniques were used to determine what species were found across the elevational gradient: live trapping, pitfall trapping, walking transects, and road surveys. These techniques were biased towards detection of rodents and insectivores, and to a lesser extent rabbits, marsupials, medium-sized carnivores, and large herbivores. Bats and large carnivores were not sampled at all. Fifteen species of mammals were identified in this area, including 9 species of rodents, 2 insectivores, 2 lagomorphs, 1 carnivore (coyote), and 1 large herbivore (white-tailed deer). Inventory efforts in 1994 were restricted to elevations between 1,200 and 2,200 feet. Pitfall trapping was the most complete of all the techniques used to inventory the small mammal population (8 of 11 species of rodents and insectivores, only failing to note three diurnal or large-bodied rodents). Inventory efforts in 1995 involved live trapping at 3,800 feet and 4,200 feet, as well as pitfall traps between 1,200 and 3,200 feet. Species fell into one of two groups with respect to elevation: those restricted to below treeline and those that are found across the entire elevational range. No rare or unusual species were noted. Field work specifically focused on small mammals will be discontinued at this site, but future work will involve the identification of small mammals captured in pitfall traps at drift fences from 1991 to 1995, and in all subsequent years when the amphibian drift fences are in operation.

Introduction

During the late spring of 1994, I began an inventory of the small mammals on the west slope of Mt. Mansfield, an area within the study region of the Vermont Monitoring Cooperative. The purpose of this work was to identify the species of small mammals that live in this region and to establish a methodology that will allow for standardized replicate sampling in this area at intervals throughout the coming years. In 1994, inventory effort was restricted to the elevations between 1,200 and 2,200 feet in order to assess the effectiveness of a range of inventory techniques. No effort was made to establish a methodology to answer questions associated with the demography of resident populations. In 1995, the inventory effort was concentrated at 3,800 feet and on the summit ridgeline at 4,200 feet.

For the purposes of this study, the small mammal fauna is considered to be composed of the insectivores and rodents. Bats, all carnivores, and all large-bodied mammals were excluded from this inventory effort. However, an attempt was made to collect anecdotal information on rabbits and medium to large-sized herbivores and carnivores at the lowest elevations of the study region, primarily along roads.

Methods

Four techniques were used to inventory the small mammal species on Mt. Mansfield. The first was night-time live-trapping. In 1994, Sherman live traps (7.7 cm x 9.0 cm x 23.0 cm) were set on nine nights in two locations within the VMC monitoring area: 1,200 feet and 2,200 feet elevation. The 1,200 foot location is to the east of and adjacent to the lower 1,200 foot amphibian drift fence, and the 2,200 foot location is to the south of and adjacent to the 2200 foot amphibian drift fence (Figure 1). At each site, forty traps were set in a 4 x 10 trap pattern at 10 m intervals. Traps were set in the early evening hours, baited with rolled oats and peanut butter, and checked again the following morning. All animals captured were identified to species and sex and then released unharmed at the point of capture. Traps were set on 9 evenings at each site, resulting in 720 trap-nights from 2 June to 25 July.

In 1995, Sherman live traps were set on eight night in two locations: 3,800 feet along the Sunset Ridge Trail and at 4,200 feet along the summit ridgeline (Figure 1). At each site, 20 traps were set in an irregular pattern (dictated by the vegetation and terrain) within an area of between 1.0 and 1.5 hectares. Traps were set in the early evening hours, baited with rolled oats and peanut butter, and checked again the following morning. All animals captured were identified to species and sex and then released unharmed at the point of capture. Traps were set on eight evenings at each site, resulting in 320 trap-nights from 1 June to 29 July.

The second technique was pitfall traps at drift fences. These traps are associated with the amphibian drift fences, 2 fences at 1,200 feet and one at 2,200 feet. Pitfall traps were opened on evenings that seemed to be good for amphibian activity (e.g., warm and wet) and checked again the following morning. Animals that were in the pits the following morning, including small mammals, were identified and, if dead, frozen and returned to the laboratory. During 1994, the pitfall traps were open on 12 evenings between 18 May and 1 November, and in 1995 they were open on 18 evenings between 1 May and 1 November.

The third technique was morning transect walks. An observer slowly walked over a known route recording all small mammal activity either on the ground or in nearby trees. Two transects were used, one along the road heading east and south from the 2,200 foot trapping site (0.50 mile) and the other along the trail extending west from the 1,200 foot

trapping site (0.25 mile). During 1994, each transect was walked nine times, once each week between 3 June and 26 July. This technique was not used in 1995.

The fourth technique was road surveys. A set route of 9.8 miles in the western part of the VMC monitoring area was driven during mid-day, and all mammals living or dead (roadkills) were recorded. The road survey route was driven nine times, once each week between 3 June and 26 July. This technique was not used in 1995.

Results and Discussion

Species richness. All techniques combined identified 11 species of insectivores and rodents (Table 1) of a possible 29 known from the state (Table 2). The deer mice (*Peromyscus maniculatus*) and white-footed mice (*P. leucopus*) were distinguished by the depth of their cheek pouches, a technique that is not completely reliable on living animals. Therefore, the identity of these two species in particular--as opposed to the genus--at each elevation should be viewed as probably but not certain. Further work using analysis of salivary amylase would be necessary to identify *Peromyscus* species with certainty.

With respect to elevational changes, the small mammal fauna is divided into two groups:

1. Those found primarily or exclusively below treeline. They include the jumping mice, *Microtus* voles, chipmunks, beaver, porcupines, and *Sorex* shrews. The absence of *Sorex* above treeline, however, may be a function of not doing any pitfall trapping, the most effective technique for inventorying that group, in those locations.
2. Those found over the entire elevational range. This group includes the *Peromyscus* mice, red-backed voles, and short-tailed shrews.

Four additional species, eastern cottontail, snowshoe hare, coyote, and white-tailed deer, were also observed (Table 1) from a total possible of 30 known from Vermont (Table 3). No effort was made, however, to systematically survey this group, and the absence of any species does not indicate anything of biological importance.

Analysis of techniques. Analysis of 1994 data indicate that pitfall traps at the drift fences are more effective at sampling small mammals in this area than are live traps. The pitfall traps caught eight identifiable species, whereas the Sherman traps only caught five at any one site, which were a complete subset of those found in the pitfall traps. Further, the Sherman traps caught fewer individuals of many species, especially jumping mice, voles, and masked shrews. Therefore, the results of the trapping conducted at the higher elevations in 1995 must be viewed with caution. Pitfall traps were specifically excluded above 3,200 feet because of the potential for permanent harm to the fragile vegetation there. If a more complete survey of small mammals above treeline is needed in the future, the relative costs and benefits of these traps should be reconsidered.

The transect walks were useful at locating a small number of diurnal and arboreal species, like squirrels, porcupines, and rabbits, that normally are not found in traps, but only accounted for three species not found in the pitfall traps. It is apparent that the road surveys are not a useful technique. Despite the susceptibility of many mammalian species to being killed by cars, it does not appear that traffic in the VMC study area is sufficiently high or fast enough to kill animals that cross the road with any regularity.

Future plans

Active work focusing on the small mammals will not be continued at this site. However, further information on this taxon will be gained by two techniques:

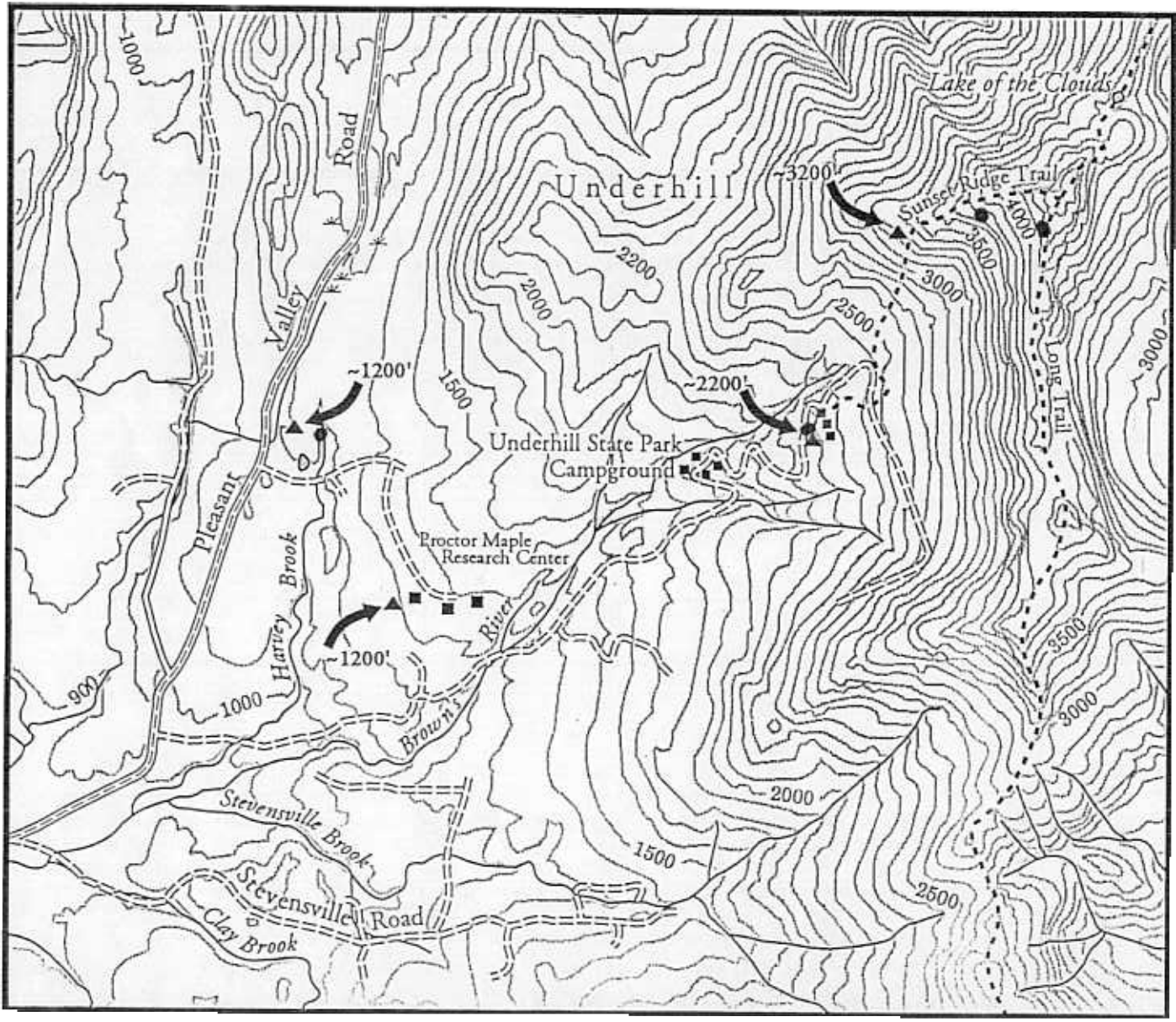
- 1 Identifying the small mammals killed in amphibian pitfall traps from 1991 to 1995. This represents hundreds of specimens that must be individually prepared for cleaning by the dermestid beetle colony at the Zadoch Thompson Memorial Museum at the University of Vermont, and is a slow process.
2. Continuing to trap small mammals as incidental captures at pitfall traps run primarily to monitor amphibian populations.

Although funding for the small mammal portion of this work is not being requested, additional reports will be submitted to the Vermont Monitoring Cooperative as data warrant.

Context

This study is unique. It is the only site in Vermont at which this full range of inventory techniques is being used to look for the presence of small mammals species over a large area. It is also the only site at which a long-term monitoring program for small mammals has been implemented. At one other site in the Champlain Basin and at one site in the Battenkill River watershed (Lye Brook Wilderness Area), small mammals are captured in pitfall traps incidental to amphibian trapping. At two sites in the Champlain Basin (Camel's Hump and the Bread Loaf Wilderness area), small mammals are regularly live trapped to assess their status, particularly with regard to changes in vegetation over time.

Figure 1. The location of drift fences and trapping plots on the west slope of Mt Mansfield



**Location of Drift Fences
on
Mount Mansfield
Underhill, Vermont**

0 5 1
kilometers
contour interval 100 feet

- ▲ Drift fence
- Trapping site

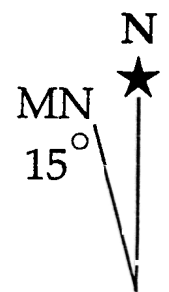


Table 1. Species observed in 1994-1995 by any technique (trapping or observation) at each elevation on the west slope of Mt. Mansfield, Vermont.

	1200 ft.	2200 ft	3200 ft	3800 ft	4200 ft
Rodents					
<u>Peromyscus maniculatus</u>	+	+		+	+
<u>P. leucopus</u>	+	+	+	+	+
<u>Zapus hudsonicus</u>	+				
<u>Napaeozapus insignis</u>	+	+			
<u>Clethrionomys gapperi</u>	+	+		+	
<u>Microtus pennsylvanicus</u>	+	+			
Unidentified vole	+	+			
<u>Tamias striatus</u>	+	+		+	
<u>Castor canadensis</u>	+				
<u>Erithozon dorsatum</u>	+	+			
Insectivores					
<u>Sorex cinereus</u>	+	+	+		
<u>Blarina brevicauda</u>	+	+		+	+
Unidentified mole	+				
Lagomorphs					
<u>Sylvilagus floridanus</u>		+	+	+	+
<u>Lepus americanus</u>					+
Carnivores					
<u>Canis latrans</u>		+			
Ungulates					
<u>Odocoileus virginianus</u>	+	+			+

Table 2. Checklist of insectivores and rodents in Vermont, and their status on the west slope of Mt. Mansfield in the Vermont Monitoring Cooperative study area. Information current to Summer 1995.

Latin name	Common name	S^a	C^b
<u>Sorex cinereus</u>	Masked shrew	K	A
<u>Sorex palustris</u>	Water shrew	S	
<u>Sorex fumeus</u>	Smokey shrew	S	
<u>Sorex dispar</u>	Long-tailed shrew	S	
<u>Microsorex thompsoni</u>	Thompson's pygmy shrew	S	
<u>Blarina brevicauda</u>	Short-tailed shrew	K	A
<u>Parascalops breweri</u>	Hairy-tailed mole	S	
<u>Condylura cristata</u>	Star-nosed mole	S	
<u>Tamias striatus</u>	Eastern chipmunk	K	A
<u>Marmota monax</u>	Woodchuck	S	
<u>Sciurus carolinensis</u>	Gray squirrel	S	
<u>Tamiasciurus hudsonicus</u>	Red squirrel	S	
<u>Glaucomys volans</u>	Southern flying squirrel	S	
<u>Glaucomys sabrinus</u>	Northern flying squirrel	S	
<u>Castor canadensis</u>	Beaver	K	O
<u>Peromyscus maniculatus</u>	Deer mouse	K	A
<u>Peromyscus leucopus</u>	White-footed mouse	K	A
<u>Clethrionomys gapperi</u>	Gapper's red-backed mouse	K	A
<u>Microtus pennsylvanicus</u>	Meadow vole	K	A
<u>Microtus chrotorrhinus</u>	Rock vole	S	
<u>Microtus pinetorum</u>	Pine vole	S	
<u>Synaptomys cooperi</u>	Southern bog lemming	S	
<u>Ondatra zibethicus</u>	Muskrat	U	
<u>Mus musculus</u> (I)	House mouse	S	
<u>Rattus rattus</u> (I)	Black rat	S	
<u>Rattus norvegicus</u> (I)	Norway rat	S	
<u>Zapus hudsonicus</u>	Meadow jumping mouse	K	A
<u>Napaeozapus insignis</u>	Woodland jumping mouse	K	A
<u>Erithizon dorsatum</u>	Porcupine	K	O

a: status, based on field work in the VMC study area, on the known geographic distribution of mammals in Vermont, and the natural history of the species:

= unlikely

K = known
S = suspected, based on published range maps

b: observed commonality at the VMC study area

A = abundant, present in most appropriate habitats and observed on most visits
LC = locally common, found regularly but in only a few areas
O = occasional, found uncommonly
R = rare, observed only once or twice

Total in Vermont =		29
At VMC site:	abundant	9
	locally common	0
	occasional	2
	rare	0

Table 3. Checklist of marsupials, chiropterans (bats), lagomorphs (rabbits and hares), carnivores, and artiodactyles (even-toed ungulates) in Vermont, and their status on the west slope of Mt. Mansfield in the Vermont Monitoring Cooperative study area. Information current to Summer 1995.

Latin name	Common name	S^a
<u>Didelphis virginiana</u>	Virginia opossum	S
<u>Myotis lucifugus</u>	Little brown bat	S
<u>Myotis septentrionalis</u>	Northern long-eared bat	S
<u>Myotis sodalis</u>	Indiana bat	S
<u>Myotis leibii</u>	Eastern small-footed bat	S
<u>Lasionycteris noctivagans</u>	Silver-haired bat	S
<u>Pipistrellus subflavus</u>	Eastern pipistrelle	S
<u>Eptesicus fuscus</u>	Big brown bat	S
<u>Lasiurus borealis</u>	Eastern red bat	S
<u>Lasiurus cinereus</u>	Hoary bat	S
<u>Sylvilagus floridanus</u> (I)	Eastern cottontail	K
<u>Sylvilagus transitionalis</u>	New England cottontail	S
<u>Lepus americanus</u>	Snowshoe hare	K
<u>Canis latrans</u>	Coyote	K
<u>Vulpes vulpes</u>	Red fox	S
<u>Urocyon cinereoargenteus</u>	Gray fox	S
<u>Ursus americanus</u>	Black bear	S
<u>Procyon lotor</u>	Raccoon	S
<u>Mustela erminea</u>	Ermine	S
<u>Mustela frenata</u>	Long-tailed weasel	S
<u>Mustela vison</u>	Mink	S
<u>Martes pennanti</u>	Fisher	S
<u>Martes americana</u>	Marten	S
<u>Mephitis mephitis</u>	Stripped skunk	S
<u>Lutra canadensis</u>	River otter	U
<u>Lynx rufus</u>	Bobcat	S
<u>Lynx canadensis</u>	Lynx	U
<u>Felis concolor</u> (E?)	Mountain lion	U
<u>Odocoileus virginianus</u>	White-tailed deer	K
<u>Alces alces</u>	Moose	S

a: status, based on field work, known geographic distribution of mammals in Vermont, and the natural history of the species:

- U = unlikely
- K = known
- S = suspected, based on published range maps
- R = rare, observed only once or twice

Total in Vermont = 30
Known at VMC site = 4