

Small Mammals of the Guthrie-Bancroft Farm - Year 5
Colby Hill Ecological Project, Lincoln and Bristol, Vermont

2006 Final Report

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Summary

In 2006 we continued sampling small mammals on the Guthrie-Bancroft parcel in ecosystems 1, 6, 14, and 20. We captured 206 individuals with an overall capture success of 27.7%, including 12 species of terrestrial small mammals. Similar to 2005 an additional uncommon species, not previously recorded from Colby Hill, the Pine vole (*Microtus pinetorum*), was captured in Ecosystem 1. This raised the number of known and trappable small mammal species, including the weasels, at Guthrie-Bancroft to 14. Four weasels (*Mustela* sp.) were captured in ES 6, 14 and 20.

Introduction

Long-term re-sampling of ES 1, 6, 14 and 20 continued in 2006 (for overview of all five years see Appendix II). For a brief description of the four selected ES, see Appendix I. The 2006 small mammal sampling took place between 25 July and 17 August 2005. Minor changes this year include the use of the name *Myodes gapperi* instead of *Clethrionomys gapperi*. This name change follows the most recent edition of *Mammals Species of the World* (Musser and Carleton 2005).

Material and Methods

As in 2005 ecosystems were sampled with two replicate traplines of 14 stations with two Sherman traps per station, and one line of 6 pitfalls along a plastic driftfence usually placed in an area of dense undergrowth to capture small shrews, for a total of 62 trap units per ecosystem. Traplines were run for three consecutive nights totaling 744 trapnights. At each station one trap was usually placed "low" in the micro-topography (undergrowth, along log or under woody debris) and the other trap "high" on a ridge, at the base of a tree, or on a fallen log or horizontal branch. Traps were baited with rolled oats flavored with peanut butter and checked every

morning between 7:00 and 10:00 hours. As in prior years, habitat data were recorded at each successful trap site using estimates of canopy cover, tree and log density, and ground cover types.

As in 2002 and 2005, we recorded maximum and minimum temperature and rainfall with a digital thermo-hygrometer (Oregon Scientific, Inc.) and a standard All Weather Rain Gauge (Productive Alternatives, Inc., MN) placed in ecosystem 20 (alder swamp, sedge meadow, edge of former beaver pond), which we monitored daily throughout the study period. Some animals that died in Sherman or pitfall traps during heavy rainfall or on cold mornings were kept for further examination and as vouchers specimens and will be preserved in the Zadock Thompson Natural History Collection of the University of Vermont. As in previous years saliva samples were taken from rodents of the genus *Peromyscus* for species identifications. Sampled *Peromyscus* were marked with a rodent ear punch (National Band & Tag Company, Newport, KY) to avoid taking multiple samples from recaptured individuals and identifying recaptured animals. Camera trapping was also continued in 2006. For results see the separate 2006 camera trap report.

Results and Discussion

Terrestrial Small Mammals

Figure 1 presents the map of the study area showing the sites re-sampled in 2006. Bar graphs show 2006 frequencies of small mammal species as a percentage of trapping effort at each site. Figure 2 relates these results to frequencies from the previous three or four years of sampling efforts in the four ecosystems, showing the variation in presence and abundance of individual species. Note the pronounced dominance of three species (*Blarina brevicauda*, *Peromyscus* sp. and *Myodes gapperi*) in ES 1, 6 and 14 in all years and the greater evenness and diversity of species in the more open successional habitat of ES 20, but also, to a lesser degree, in ES 14.

Table 1.1 shows an overview of trapping results for the four sampled ecosystems including those from previous four (or three) years. Table 1.2 gives diversity indices calculated from proportions of the total number of small mammal captures in each ecosystem, based on trapping effort. This year the highest Shannon Wiener diversity was obtained in ES 14 ($H' = 1.28$). As in 2005 the highest Simpson Index was obtained in ES 20 ($1-D = 0.999$). In Table 1.3 estimated biomass of small mammals per 100 trapnights has been re-calculated using 2006 average or actual weights of species caught. ES 1 had the highest and ES 20 the lowest biomass

in 2006 with 696.8 g and 292.2g, respectively. ES 6 had the highest and ES 20 the lowest **average** biomass with 674.2 g (4 years) and 474.2 g (5 years), respectively.

In 2006 the list of small mammals recorded from the Guthrie-Bancroft parcel was again increased by another species. The Pine vole, *Microtus pinetorum*, was caught for the first time in ES 1. Three Meadow jumping mice, *Zapus hudsonius*, were caught in ES 20 (4 in 2005), but only 1 Woodland jumping mouse, *Napaeozapus insignis* (14 in 2005). This year four weasels (*Mustela* sp.) were caught, one in ES 6, one in ES 14, and two in ES 20.

Appendix II provides an overview over all ecosystems sampled and all captures made since summer 2000 totaling 1061 captures made in 4004 trapnights with an average of 26 percent trapping success.

Climate Data

Minimum and maximum temperature and humidity, and amount of rainfall recorded between 25 July and 14 August 2006 in Ecosystem 20 are shown in Figure 3. Temperature ranged between 12.3°C at night (9 Aug.) to 36.9°C during the day (30 July) in 2006 (10.1°C–32.7°C in 2002; 12.8°C -31.5°C in 2005). Rainfall in the 21-day period recorded in 2006 was 105.8 mm (2005: 17 days, 85.3 mm; 2002: 21-day, 41.2 mm). As in 2002 and 2005 there were substantial shifts in minimum (nocturnal) temperature and humidity during the 2006 recording period, which may affect the activity of smaller shrews and jumping mice.

Microhabitat Data

Microhabitat Data collected at each trap stations as summarized by ecosystem in Figure 4. The most open "alder swamp/sedge meadow" (ES 20), had the lowest canopy cover with 70.53%, although clearly increasing with succession over the years (2005=65.4%, 2002=15%; Fig. 4a). ES 20 also had the highest percentages of herbaceous undergrowth with 59.0% (2005=59.8% , 2002=78.5%; Fig. 4f), the highest grass cover with 28.7% (2005=26.2%, 2002=12%; Fig. 4g), and the most exposed rocky surface with 7% (2005=4%, 2002=0%, Fig. 4j). Ecosystem 1 had the highest canopy cover with 96.5% (2005=94.9%, 2002=61.6%; Fig. 4a) and the largest percentage of exposed bare soil with 5.1% (2005=7.1%, 2002=10.2%; Fig. 4h). ES 6 had the densest leaf litter cover with 80.7% (2005=61.2, 2002=68.1%; Fig. 4i), the highest average log diameter with 13.01 cm (2005=13.2 cm; 2002=25.9 cm; Fig. 4e), and the largest average nearest

tree diameter with 25.1 cm (2005=21.7 cm, 2002=21.2; Fig. 4c), all indications of the maturity of this forest type.

Figure 5 summarizes microhabitat data by small mammal species. Data for the species *Microtus pinetorum* (n=1) are included for the first time. *Sorex cinereus* was associated with the least canopy cover of 76.5% (81.9% in 2005, 58.5% in 2002; Fig. 5a). *Blarina brevicauda* was associated with the largest trees at 28.6 cm dbh (21.4 cm in 2005, 16.9 cm in 2002) *Napaeozapus insignis* was found in areas with the most herbaceous cover of 66.7% (65.6% in 2005, 24.3% in 2002; Fig. 5f) followed closely by *Zapus hudsonicus*. At 70% the meadow vole, *Microtus pennsylvanicus*, was the species associated with the most grass cover (41.8% in 2005, 20% in 2002, Fig. 5g). *Peromyscus* sp. were caught in areas with the densest leaf litter cover at 63.7% (64.5% in 2005, 51.9% in 2002; Fig. 5i).

Analysis of Variance

We found statistically significant differences among ecosystems only for *Peromyscus* sp. and *Microtus pennsylvanicus*. *Peromyscus* had the lowest occurrence in ES 20 and the highest occurrence in ES 1. Among the diversity indices only Simpson's Diversity Index (1-D) showed significant differences among ecosystems with ES 1 being least and ES 20 being most diverse (Table 2).

Regression of small mammal and habitat data

Table 3 summarizes results of a simple linear regression matrix of habitat variables and small mammal data. Statistically significant ($P < 0.05$) **positive** correlations were only found between number of *Peromyscus* sp. and leaf litter and between canopy cover and leaf and herb ground cover. Statistically significant **negative** correlations exist between *Peromyscus* and both herb and grass cover and between leaf litter and herb cover. Also positively correlated were grass cover (includes sedges) and rocky areas.

Rare and unique species caught in 2006

Pine vole (*Microtus pinetorum*).

This finding was another surprise, after the Southern bog lemming (*Synaptomys cooperi*) caught in ES 14 in 2005. The pine vole was first reported from Sherburne and Saxtons River, Vermont,

by Osgood (1936). Godin (1977) examined additional specimens mostly from the northeastern part of Vermont but mapped the distribution as including all of the state. Likewise in his monograph on the species Smolen (1981) included all of the state in the distribution of the subspecies *M. p. scalapsoides*. According to his map the species barely reaches into Southern Quebec and Ontario and only the southwestern-most part of Maine.



Plate 1: Pine vole (*Microtus pinetorum*) caught on 9 August 2006 in ES 1 in well-drained upland with dense fern microhabitat.

Weasels (*Mustela* sp.)

Four weasels were captured in 2006, one in ES 6 in a Sherman trap set on a horizontal log, one in the wet fern area of ES 14 (= 2005 *Synaptomys cooperi* location!), and two in Sherman traps set in the dense forbaceous growth of ES 20. All weasels this year survived the life-trapping, and could be released immediately. We chose to release weasels quickly and to not attempt stressful body and tail measurements on live animals to reduce mortality of the often considerably weakened animals in Sherman traps. For this reason we left the identification of all four individuals as *Mustela* sp.. The brief handling of the animals and visual inspection in the bag (see



Plate 2) was insufficient to determine if we had caught all ermines (*Mustela erminea*) or also long-tailed weasels (*Mustela frenata*).

Plate 2: *Mustela* sp. In holding bag, caught and released on 17 August 2006 in ES 14.

A recent study from Québec re-emphasized that identifying *Mustela erminea* and *M. frenata* correctly in the field presents some challenges due to a considerable size overlap of the two species. The authors state that “[m]olecular analysis is currently the only definitive tool in discriminating long-tailed weasels from ermines.” (St-Pierre *et al.* 2006).

Conclusions

Trapping success ranged from 8.1 to 37.1 % in the four habitats sampled in 2006. We made 206 individual captures including 12 species (Table 1.1 and Appendix II). Again this year’s verification of the Pine vole on the Guthrie-Bancroft parcel showed that a long-term trapping regime will detect additional species. The slow (but steady) progress in recording additional species of small mammals from the Guthrie-Bancroft parcel is most likely related to our limitation to just two trap types: Sherman and pitfall traps. After using snap traps in the first year (2000) we decided to eliminate them from the long-term study in order to reduce mortality. A recent study from the African tropics confirmed again that different trap types have “complementary effects onto the capture of small mammals”. As in our study, “pitfall traps were more efficient (higher number of species and higher trap success) than Sherman or snap traps for capturing shrews” (Nicolas and Colyn 2006:109+110). In the same study Sherman traps captured more smaller rodent species and snap traps larger ones – a difference not as important in Northern New England, where there is not as great a size range among rodents as in tropical environments. Additional attempts to capture the Water shrew (*Sorex palustris*) along streams and in wet areas, the Long-tailed or Rock shrew (*Sorex dispar*) in mossy rock piles or rock slides (Godin 1977), or the Pigmy shrew (*Sorex hoyi*) found in wet areas and “subclimax beech-maple forest” (Long 1974, Miller 1964) may still warrant the use of small snap traps in particularly promising areas.

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Appendix I

Ecosystem descriptions and summary comments of microhabitat and small mammal findings for sites sampled in 2006

Ecosystem descriptions are based on M. Lapin (2000).

ES 1 = Well-drained, steeply sloping, fine sandy loam spodosol beech-maple-red oak-sweet birch forest (*mesic red oak hardwood forest*). - This habitat had second highest leaf litter ground cover (60.1%) after ES 6 this year (Fig. 5i) the most exposed bare soil ground cover (5.1%) than the other three habitats sampled this year. Capture success was only second highest to ES 14 in 2006 (35.5%). Red-backed voles (*Myodes gapperi*) were again the most frequently captured species as in 2005 (36 captures). *Blarina brevicauda* was less common with just 2 captures this year (13 in 2005) and *Peromyscus* sp, was the second most common captured species with 25 individual captures (29 in 2005).

ES 6 = Seepy terrain rich, moderately well-drained, steeply to very steeply sloping, seepy loam over fine sandy loam spodosol, Northern Hardwood Forest (*Rich Northern Hardwood forest*). ES 6 had the highest diameter of nearest trees (25.1) and nearest logs (13.01), the lowest herbaceous ground cover (12.9%) and the highest leaf litter density (80.7%). Small mammal captures were up from previous years (56 total) with one weasel and one chipmunk caught for the first time but otherwise again similar ratios of the dominant species (*Blarina*, *Peromyscus* and *Myodes*).

ES 14 = Somewhat poorly drained, gently sloping, stony silt loam to fine sandy loam inceptisol, red spruce-balsam fir-hemlock-yellow birch (*spruce-fir northern hardwood forest*). - Second highest herbaceous and grass cover after ES 20. 7 small mammal species were recorded this year but no additional Southern bog lemming (*Synaptomys cooperi*) in the fern area where we set the pitfalls. Instead a first weasel was caught in ES 14 in the same fern area this year. Otherwise ratios of all three shrew species and the dominant rodents (*Peromyscus*, *Napaeozapus* and *Myodes*) were quite similar to 2005.

ES 20 = Very poorly drained, level, muck over stony sandy loam inceptisol, alder-willow shrub swamp/sedge meadow (*Alder swamp/sedge meadow complex*). - This edge of a former "beaver pond" with abundant touch-me-not (*Impatiens*), and goldenrod (*Solidago* sp.) had again the highest herbaceous cover (59.0% Fig. 5f) and lowest canopy cover (70.5%, Fig. 5a) making this the most open habitat with the corresponding greatest nearest tree and log distances and lowest tree and log diameters. Especially along the edges where most of our traplines run canopy cover is clearly increasing with vegetation succession over the years and with canopy measurements taken fairly low in the vegetation. The meadow vole (*Microtus pennsylvanicus*) was down from 23 captures in 2005 to just one this year, perhaps this decline is related to our capture of two individuals of the vole's main predator (*Mustela* sp.) this year. Three more meadow jumping mice (*Zapus hudsonius*) but only one woodland jumping mouse (*Napaeozapus insignis*) were recorded this year and two chipmunks (*Tamias striatus*) for the first time in this habitat.