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STATUS OF WINTER POPULATIONS OF PINE VOLES (*Microtus pinetorum*

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Knowledge of the spatial and temporal organization of free ranging animal populations is important to an understanding not only of the social behavior between members of those populations, but also of several demographic parameters of the population, including reproduction, dispersal and mortality. Such information is particularly important when viewed in the context of pest species management. The efficacy of control practices such as rodenticide application and habitat manipulation might be greatly enhanced if performed with an understanding of the organization and status of pest populations in mind.

Early considerations of pine vole (*Microtus pinetorum*) spatial and temporal organization were based on the observations that several animals could be captured at 1 tree in an orchard (Hamilton 1938, Benton 1955). Paul (1970) reported a "loose colonial" organization of pine voles in his study of North Carolina populations. More recently, FitzGerald and Madison (1981) have reported preliminary observations of discrete pine vole "family-units" based on radiotelemetric data gathered in the late summer and fall seasons. The status of winter populations has not previously been investigated.

This paper presents preliminary data on the spatio-temporal patterns of a winter pine vole population. Of particular interest in this study are three questions 1) What is the composition of winter pine vole aggregations? 2) What is the range of movement of these groups? and 3) How stationary are pine voles during the winter?

Methods

A 0.4 ha plot was established in an orchard in New Paltz, Ulster County, New York. The plot consisted of 65 medium aged apple trees arranged in 5 rows. At each tree, two permanent trap sites were randomly positioned at locations with good pine vole sign. Traps were placed in tunnel systems and covered with 30 cm^2 pieces of roofing tarp. Apple slices served as bait.

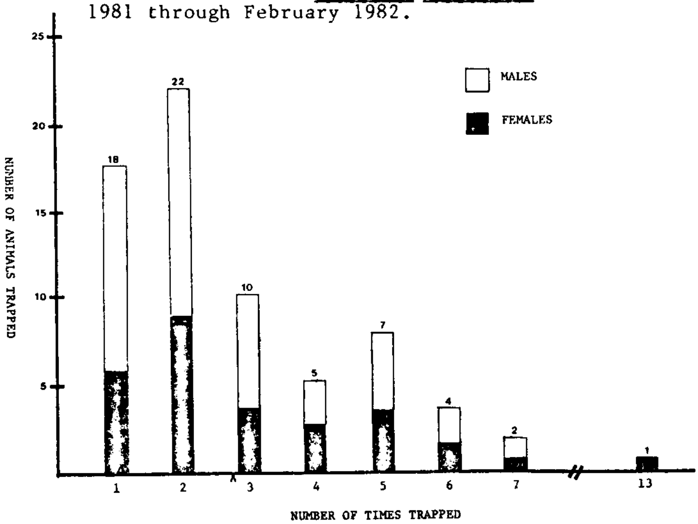
The sex, age (pelage characteristics) and reproductive conditions (males: nonscrotal or scrotal; females: nonbreeding or breeding - perforate, parous, pregnant and/or lactating) of captured animals were determined. All animals were toe clipped and returned to the tunnel at the capture site.

The population was monitored over a 4 day period each month from October 1981 to February 1982. Due to snow cover and cold temperatures in February, data were collected for a 2 day period then.

Results and Discussion

Two hundred captures of 71 animals were amassed from October 1981 through February 1982. On average, each animal was captured 2.82 times. Figure 1 presents a frequency distribution of the number of times captured as a function of the number of animals captured. The use of the negative Binominal Population Estimate (one of the class of Zero Truncated Frequency models) provided an estimate of 84.7 trappable individuals in the population. In this case, 83.8% of all trappable individuals were captured.

Figure 1. Frequency distribution of the live captures of male and female pine voles (Microtus pinetorum) trapped from October 1981 through February 1982.



Of 71 animals captured, 40 were males (30 adults: 10 subadults) and 31 were females (25 adults and 6 subadults). No juvenile pine voles were trapped during the study which is of interest because of the 31 females captured, 15 were in breeding condition throughout part or all of the study. Two criteria, vaginal perforation and/or pregnancy, were used as indicators of breeding condition.

Figure 2 shows the average range size measured in number of trees for males and females. Animals trapped only 1 time were given a range size of 1 tree. Overall, males and females did not differ in the number of trees over which they ranged. Removing those animals trapped only once from further range size determination did not alter this pattern. That is, there was no difference between male vs. female and adult males vs. adult female range size for those animals trapped greater than one time. The range size of females in reproductive condition was significantly smaller than the range size of females not in reproductive conditions (t-test, 29 d.f. $p<.05$) (Snedecor and Cochran 1978). (See Figure 3).

Figure 2. Home range sizes (number of trees) of male and female pine voles (Microtus pinetorum) as a function of age and number of times captures.

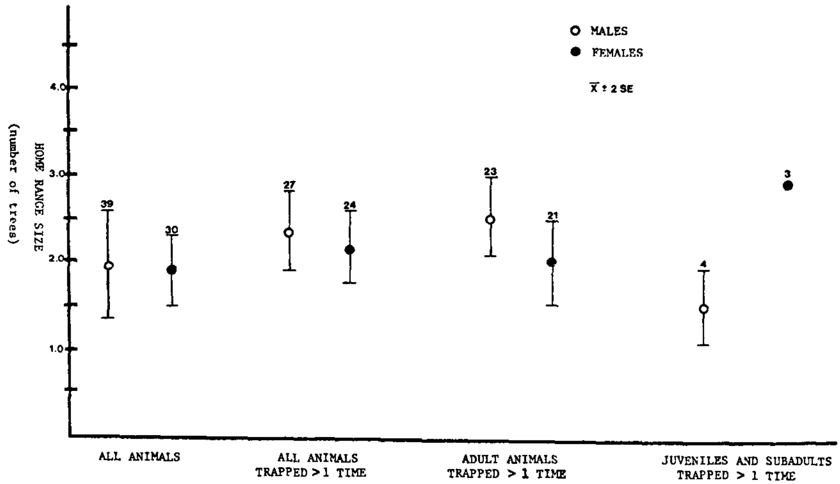
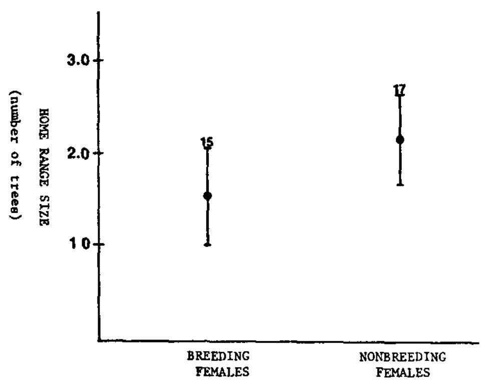
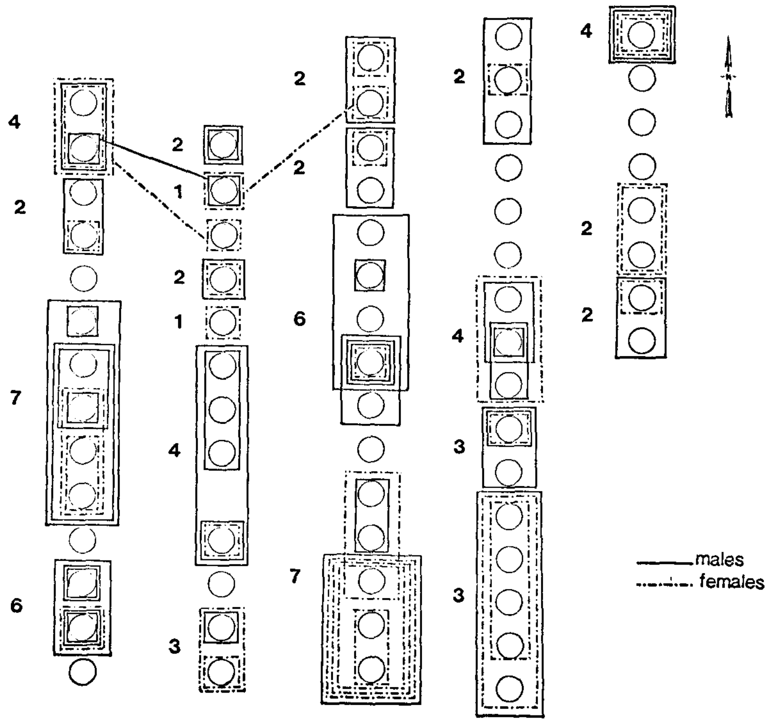


Figure 3. Home range sizes (number of trees) of breeding and nonbreeding female pine voles (Microtus pinetorum).



A total of 19 discrete, non-overlapping aggregations was identified on the study plot. An aggregation was defined as a group consisting of 2 or more animals each trapped at least 2 times at one or more trees. In all cases, aggregations were situated along tree rows as opposed to across rows. The average length of an aggregation encompassed 2.73 trees $\pm$0.34 (range = 1-5). Figure 4 presents a schematic of these aggregations.

Figure 4. A schematic representation of the study plot showing the 19 discrete aggregations of pine voles. (Circles represent apple trees. Rectangles represent male and female home ranges. The number of animals living in each aggregation is shown to the left.)



Of 19 aggregations, 8 contained only 1 pair of animals. Six of these eight pairs consisted of 1 adult male and 1 adult female. In only 2 cases, did an aggregation consist of a same sex pair. On average, pine vole aggregations were comprised of 3.7 individuals: 1.5 adult males, 1.4 adult females and 0.8 subadults.

Pine voles seemed to exhibit a high degree of both inter and intra-sexual social tolerance, as evidenced by male-male, male-female and female-female overlapping home ranges. No physical sign of aggression such as scars or bite wounds was seen on the animals.

Conclusions

1. Pine voles live in spatially discrete aggregations during winter months.

2. These aggregations occur along rows averaging about 3 trees in length.

3. Aggregations are composed of approximately equal numbers of adult males and females (1.5:1.4) plus subadults, suggesting a family structure.

4. Sixty-three percent of all aggregations contained one reproductively active female.

5. Reproductively active females possessed home ranges which were significantly smaller than reproductively inactive females.

Investigations are continuing in an effort to answer the following:

1) How are these patterns similar to patterns of pine vole populations during other seasons?

2) Are these aggregations actually family units, or is their composition random? Based upon age and sex composition of the aggregates, disproving randomness will require behavioral and/or genetic data.

3) How is integrity of the family unit maintained over time?

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Literature Cited

Benton, A.H. 1955. Observations on the life history of the northern pine mouse. J. Mammal. 36(1):52-62.

FitzGerald, R.W. and D.M. Madison. 1981. Spacing, movements and social organization of a free-ranging population of pine voles *Microtus pinetorum*. *In*: Proceedings of the Fifth Eastern Pine and Meadow Vole Symposium. pp. 54-59.

Hamilton, W.J. 1938. Life history notes on the northern pine mouse. J. Mammal. 19(2):163-170.

Paul, J.R. 1970. Observations on the ecology, populations and reproductive biology of the pine vole, *Microtus pinetorum*, in North Carolina. Reports of Investigation #20, Illinois State Museum, Springfield, Illinois. pp. 1-27.

Snedecor, G.W. and W.G. Cochran, *Statistical Methods*. Iowa State University Press. 1978 (Sixth Edition).