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COMPARISON OF PINE VOLE POPULATIONS IN A MAINTAINED AND AN ABANDONED ORCHARD

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Before more effective and reliable control methods for pine vole populations can be developed, it is essential to increase our knowledge of the pine vole's basic biology and ecology. Former research conducted by Estep et al (1978) and Noffsinger (1976) has demonstrated distinct differences in food habits, physiological condition and reproductive activity of pine voles in active and abandoned orchards. A summary of their findings is presented in Kirkpatrick and Noffsinger (1977). Results from these studies has promoted an interest to more completely define population characteristics of pine voles in these two orchard types. In this manner, it will be possible to enhance our knowledge of this species' response and adaptability to habitats of different vegetative composition, structure and type. Utilizing capture-recapture techniques, we have undertaken a study to examine population structure, density, and movement of pine voles in a maintained and an abandoned orchard. The two orchards are the same ones where Noffsinger (1976) previously collected voles in September 1974 through July 1975. The maintained orchard has had no form of vole control beyond mowing for five years. The other orchard has been completely abandoned for six years. Both orchards are the same age and have similar topography and soil types.

Trapping was initiated in September 1977 and will continue until July 1978 at seven week intervals. Three trapping sessions have been completed: one in late summer (September), one in mid-autumn (October), and one in early winter (December). An area of approximately 0.3 hectares is being trapped in each orchard, comprising six tree rows with nine to ten trees per row. In both orchards, trees are spaced on the average 8.5 m apart within and

between rows. The trapping grid consists of 164 stations and 221 traps. Two traps are placed at every tree, and one midway between each tree in the row. Ten traps are also placed in each aisle at 8.5 m distances. Traps are prebaited, then set and checked morning and evening for five days. All captured voles are sexed, aged by pelage, weighed, and assessed for reproductive condition. New individuals are toe-clipped with a unique identification number.

Vegetation data were collected in the fall after the leaves had dropped. A 1 X 1 m quadrat frame was placed on the ground under every tree and midway between all trees within rows in the study grid. Plots were also taken in the aisles at randomly selected locations along a metric tape. Within the frame, percent cover to a height of one meter was estimated by species. Percent uncovered ground, including bare ground and litter, was also estimated. Overlap of cover by different species was not subtracted. Values presented in Table 1 are mean total percent cover of major vegetation types for the entire study grid. Woody cover includes cover by stems and by Japanese honeysuckle (Lonicera japonica)which has persistent leaves.

Table 1. Mean total percent cover by vegetation type in the maintained and abandoned orchards.

Vegetation type	Maintained orchard	Abandoned orchard
Grass	52	9
Forb	20	3
Woody	5	25
Uncovered ground	38	63

Because this study is still in progress, the data has not been completely analyzed. Some preliminary results from the trapping follow. Most captures have occurred at trees. Very few (0-4) voles have been captured in the aisles during each trapping session in both orchards. Captures in traps located midway between trees and at trees noticeably increased in December in both orchards indicating greater activity at this time. Total number of captures and recaptures steadily increased from September to December and

were greater in the abandoned orchard in September and October, and greater in the maintained orchard in December (Table 2).

Table 2. Total captures, recaptures, trap mortality, and number of different individuals during each trapping session in the maintained (M.O.) and abandoned (A.O.) orchards.

Month	Total Captures		Total Recaptures		Number Individuals		Trap Mortality	
	M.O.	A.O.	M.O.	A.O.	M.O.	A.O.	M.O.	A.O.
Sept.	39	44	8	15	31	29	1	6
Oct.	64	113	14	45	50	68	26	8
Dec	191	131	98	55	93	76	18	18

In both orchards, most recaptures generally occurred at the same trees. Movement was restricted to two to three adjacent trees within a row, or less often, across to an adjacent tree row. Voles captured in December that had been previously marked in September and October were usually taken at the same tree, or in the same area of two to four adjacent trees in a row. This was true for both orchards and for adults and immatures alike. These results point to a similarity in general behavior between pine voles in the two orchards.

The number of different individuals captured during each trapping session is also presented in Table 2. These values may be used as relative indices of population size for comparing the two orchards. Doubts about the randomness of our samples prevents us from presenting any specific density estimates until the study is completed and the data further analyzed. A live trapping session followed by a total trap-out is planned for this fall. This should provide a general insight into the amount of bias present in estimating population size using models which assume equal probability of capture.

For all three trapping periods combined, a total of 158 and 131 different individuals were handled in the maintained orchard and the abandoned orchard, respectively.

Comparison of these values and the values for each period does not suggest significant differences in population sizes between the

two orchards. However, Noffsinger's (1976) data revealed the existence of a similar pregnancy rate in both orchards in July and September. Thus, it is not unexpected to find a similar number of voles in both orchards at the time of our samples. Noffsinger (1976) also found that the number of pregnant females in the abandoned orchard sharply declined in November. Our data tend to confirm this since in December, 28 percent of the captured voles in the maintained orchard were immatures (juveniles and subadults) as opposed to only 16 percent in the abandoned orchard.

The lack of apparent differences in population sizes may also be attributed to differences in trappability. Some evidence to support this may be found in the recapture rates of previously marked individuals. Of 67 adults in the December sample of the maintained orchard, only 21 percent had been captured during previous trapping sessions. In the abandoned orchard in December, however, 55 percent of 64 adults had been previously marked. Many of the new adults in the maintained orchard in December were probably present on the grid and of trappable age in October, and some even in September. However, the abundant food supply in the maintained orchard in September and October may have reduced their susceptibility to trapping. This speculation will be examined later this fall during the proposed trap-out.

Despite the existence of possible biases in the data, these results indicate that there is large population of pine voles in the abandoned orchard. Clearly, this species can persist in orchards which have lost their dense herbaceous ground cover. However, the pine vole is essentially a woodland species adapted to a deciduous forest habitat. In the abandoned orchard, increased canopy closure and the invasion of the understory by several woody species presents a basic vegetation structure similar to that of deciduous woods. Thus, it may not be unusual to find relatively high numbers of voles in abandoned orchards which have reverted to a dominant understory cover type of woody species. We feel that it is very important to continue studies on the pine vole in orchards with different understory vegetation types. This may

reveal a certain cover type which is nonconducive to pine voles invasion or population maintenance.

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