

SOME POPULATION ASPECTS OF CRICETID RODENTS IN A CENTRAL OKLAHOMA TALL GRASS PRAIRIE

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Population parameters of cricetid rodents were investigated with a livetrapping study in a tall grass prairie in central Oklahoma between June 1973, and March 1975. The hispid cotton rat (*Sigmodon hispidus*) represented 60.5% of the captures and 69.7% of all recaptures. The deer mouse (*Peromyscus maniculatus*) and the white-footed mouse (*Peromyscus leucopus*) represented 22.2% and 8.0% of the captures respectively. The *P. maniculatus* population was most abundant in February and had been 95% replaced within 11 months. Survival rates of *P. leucopus* were similar to those of *P. maniculatus*. *Sigmodon* adults were most abundant in the winter; juveniles and old adults were most numerous in the spring and fall. The survivorship curves were greater than those reported in other investigations of *Sigmodon* and may have been influenced by the unusually heavy precipitation in 1973.

INTRODUCTION

Few population studies have been reported on rodents in the Oklahoma grasslands. Only Goertz (1) has reported on an extensive study of a *Sigmodon* population, and there have been no long-term population investigations conducted to elucidate the parameters of cricetid rodent populations in the tall grass prairie of Oklahoma.

This study was initiated to determine the species of mammals present in tall grass prairie of central Oklahoma and to investigate the rodent populations for an analysis of: a) population fluctuations, b) population structure, c) habitat preference, d) survival rates, and e) individual movements. Discussed here are population fluctuations and structure and survival rates.

MATERIALS AND METHODS

A study site at 358 m elevation was selected 8.3 km north of Edmond, Oklahoma, on the northern boundary of Oklahoma County. The site was botanically homogeneous with floristic components represented primarily by perennials such as little bluestem (*Andropogon scoparius*), big bluestem (*A. saccharoides*), and switch grass (*Panicum scribnerianum*). Forbs were scattered throughout the area. Sumac (*Rhus* spp.) and blackjack oak (*Quercus marilandica*) were present on the western boundary. A 125-m line transect contained a predominance (84.9% cover) of little bluestem.

A trapping quadrat of 100 trap stations, 15 m apart in ten north-south and ten east-west rows, covered 11.36 ha. Each station contained a permanent marker and a 22.9 cm Sherman live trap. The traps were baited each afternoon with oats and checked the following morning. Trapping during the summer months was usually daily and averaged tri-weekly during the rest of the year. Trapping began in June 1973, and terminated in March 1975. Each captive was weighed, sexed, and permanently marked by toe-clipping.

RESULTS AND DISCUSSION

Fourteen mammalian species were evident in the study area during the 22 month investigation. These were: Virginia opossum (*Didelphis virginiana*), short-tailed shrew (*Blarina carolinensis*), least shrew (*Cryptotis parva*), eastern cottontail (*Sylvilagus floridanus*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), plains pocket gopher (*Geomys bursarius*), hispid pocket mouse (*Perognathus hispidus*), plains harvest mouse (*Reithrodontomys montanus*), deer mouse (*Peromyscus maniculatus*), white-footed mouse (*P. leucopus*), hispid cotton rat (*Sigmodon hispidus*), prairie vole (*Microtus ochrogaster*), woodland vole (*M. pinetorum*), and house mouse (*Mus musculus*). The *Blarina carolinensis* taxonomy is based on Genoways and Choate (2). Owing to the presence of peripheral habitats of ponds, pastures and rocky outcroppings, the opossum, ground squirrel, and pocket mouse were considered transients in the area.

The five species in Table 1 accounted for 98% of the captures and 99% of the re-

TABLE 1. The five rodent species that composed 98% of the captures and 99% of the recaptures.

	Males	Females	% of rodents marked	Recaptures	% of all recaptured
<i>Sigmodon hispidus</i>	176	88	60.5	1,136	69.7
<i>Peromyscus maniculatus</i>	63	34	22.2	305	18.7
<i>Peromyscus leucopus</i>	23	12	8.0	134	8.0
<i>Reithrodontomys montanus</i>	13	9	5.0	37	2.0
<i>Microtus ochrogaster</i>	7	3	2.0	17	1.0

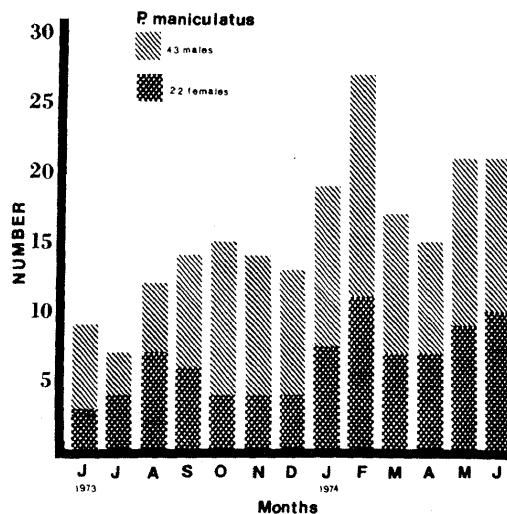
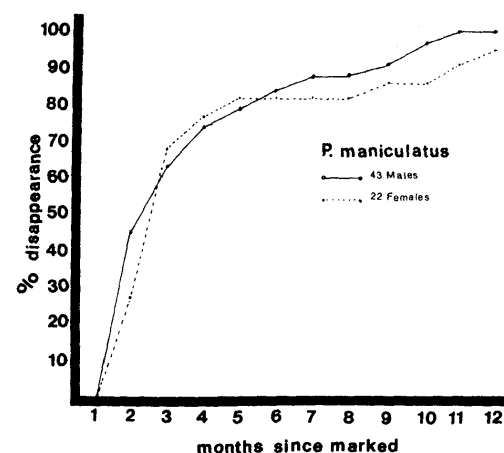
captures, with *S. hispidus* alone representing 60% and 70% respectively. *R. montanus* were captured only in January, February and March. This might be explained by diet preferences, because harvest mice are known to prefer invertebrates, which were probably less available during the winter months. Such a situation might make the bait more attractive. *M. ochrogaster* did not appear until the final month of the study. These ten individuals had probably dispersed from a nearby increasing population in a pattern described by Myers and Krebs (3).

The densest rodent populations were represented by *P. maniculatus*, *P. leucopus*, and *S. hispidus*. Trapping intensity for the first 12 months of the study was sufficient to utilize the "capture-calendar" method (4) to estimate the monthly populations of the latter species. In this method it is assumed that all trappable individuals were captured each month. However, once an individual was marked, it was tallied as having been present in all months prior to being recaptured. For example, an individual marked in January and not recaptured until April was tallied as having been present January through April.

The population fluctuation of *P. maniculatus* is shown in Figure 1. The population was lowest in the summer months and peaked in February. This pattern is similar to that reported for *P. maniculatus* in a mixed prairie in Kansas (5). The average sex ratio for the year was 1:1.45 (female:male). Greater movements by males were implied by a sex ratio of 1:2 during fall (September-November).

The population turnover of *P. maniculatus* was 83% complete in six months and 95% complete in 11 months (Figure 2). The rate of disappearance of males was faster than that of females. These data agree with *P. maniculatus* survival rates reported by Burt (6) and Blair (7, 8).

The *P. leucopus* population attained its greatest density in August 1973, with ten individuals (Figure 3), and declined steadily until none were evident in the study area. The population turnover rate for *P. leucopus* was similar to that of *P. maniculatus*; 95% of the mice disappeared within ten months (Figure 4). Again, males disappeared faster than females. Sex ratios varied

FIGURE 1. Population fluctuation of *Peromyscus maniculatus*.FIGURE 2. Survivorship curves of *Peromyscus maniculatus*.

from 1:0.9 in fall months to 1:2.5 in spring (March-May) and averaged 1:1.5 for the first 12 months of the study.

Age categories for the *Sigmodon* population were based on weight criteria of Fleharty and Choate (9) (Figure 5). Old adults were most numerous in May 1974, and second most numerous in October 1973. October was the only time when old adults represented the largest segment of the population. Adults were the most numerous age category in eight of the 13 months. Their highest numbers were recorded when 31, 41, and 36 adults occurred in January, February, and March respectively. Juveniles represented the most numerous age group in four of the months and reached their highest numbers in May and October. Only in March 1974 were juveniles absent.

Annual fluctuation of these age groups is very similar to the pattern for a population of *S. hispidus* in a Kansas remnant grassland (10). That population, however, had old adults most abundant during the summer months. Such a pattern may have eventually developed in my study because June 1973 was the only month when old adults were not present, whereas 12 were counted in June 1974. *Sigmodon* populations are known to fluctuate and periodically "crash" (1, 10). The low numbers in all age groups during the initial months of this study might indicate recovery from a population low.

The population turnover rate for *Sigmodon* is illustrated in Figure 6. Within three months, 63% of the males and 55% of the females had disappeared from the study area. The population turnover was 99% complete in ten months. Two males survived for a period of ten months and two females remained in the area for nine months. Odum (11) found cotton rats survived only six months in the wild and Goertz (1) reported turnover of a *Sigmodon* population as 98% complete after only six months. Goertz (1) also documented that a male survived 12 months.

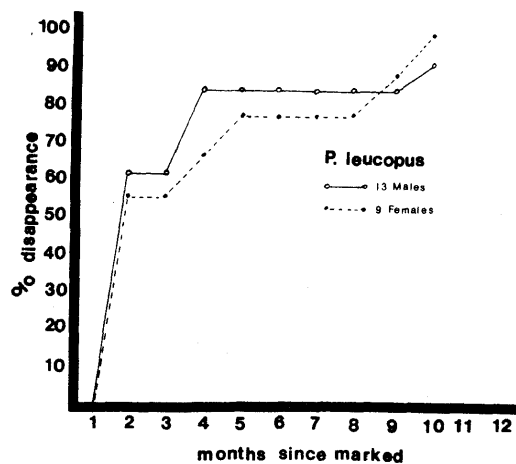


FIGURE 4. Survivorship curves of *Peromyscus leucopus*.

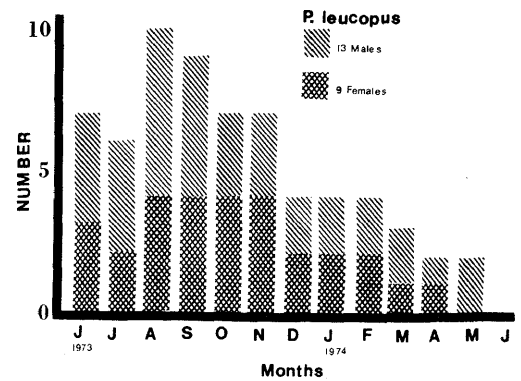


FIGURE 3. Population fluctuation of *Peromyscus leucopus*.

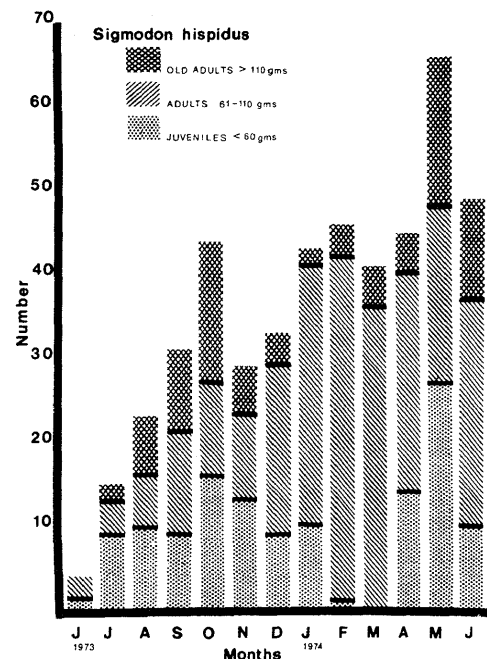


FIGURE 5. Population fluctuation of *Sigmodon hispidus*.

The *Sigmodon* population densities varied from 0.3/ha in June 1973, to 5.6/ha in May 1974. These figures do not approach the population densities reported by Fleharty *et al.* (10) of 0.0/ha to 10.5/ha and Goertz (1) of 0.4/ha to 15.2/ha. However, both of these latter populations (10, 1) later crashed and the authors considered adverse winter weather conditions to be an important factor. The cotton rat population in my study was not subjected to any unusually severe weather but the area did receive an abnormal amount of precipitation. The 1973 rainfall recorded at Edmond, Oklahoma, 8.3 km to the south of the study area, set a new record 63.5 cm above the normal 83.8 cm of rain per year. This added moisture may have enhanced vegetative cover and food resources and thereby increased the longevity of individuals and the general stability of a rodent population.

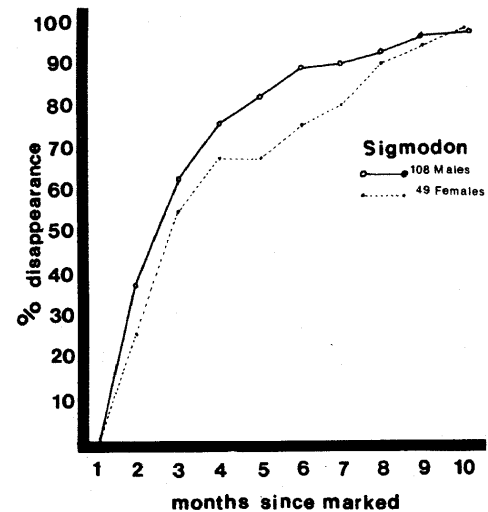


FIGURE 6. Survivorship curves of *Sigmodon hispidus*.

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