

FOX SQUIRREL POPULATIONS  
at the  
ROSE LAKE WILDLIFE EXPERIMENT STATION  
December 1, 1939 - November 1, 1940

by  
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This report covers the population data obtained in a study of the fox squirrel (*Sciurus niger rufiventer*) at the Rose Lake Wildlife Experiment Station from December 1, 1939 - November 1, 1940.

My own work at the Experiment Station was primarily concerned with a preliminary inventory of populations with emphasis on seasonal numbers, populations in pastured versus unpastured woodlots, and relationships to the other rodents, notably the smaller squirrel species. Logically, the other factors in its biology were studied also, and certain management experiments were started, but only the above will be discussed here.

During the first week in February, 1940, permanent traplines were laid out on a checkerboard pattern of one trap per acre in seven woodlots, which varied in size from 10 to 23 acres. In all, 102 traps on a like acreage were put into operation. Traps were attended twice daily, during the forenoon and again in the afternoon or early evening.

The seven study woodlots were primarily oak-hickory grading into mixed lowland. All degrees of succession from the one to the other occurred. Both grazed and ungrazed were represented, and in several the composition had been altered by various amounts of cutting. So far as we were able to determine none had ever been burned. Fortunately, we were able to obtain a good picture of the past history of these areas from old residents of the community, even as to the actual number and kind of livestock pastured, and the duration of pasturing in each.

Those which had been heavily grazed in the past were almost totally lacking in undergrowth, except scattered clumps of ground juniper (*Junipers communis depressa*) which was generally common in the overgrazed parts of this area. Undergrowth in the ungrazed woodlots was usually dense and reproduction fair to good.

Present composition was recently determined by a cover analysis based on the sampling method.

Population figures were based largely on tagging returns. Fall numbers, however, were derived from a banding-kill ratio obtained during the hunting season. Population estimates for the winter were considered to be most accurate, as the woodlots appeared to have been nearly trapped out and movements between them were probably at a minimum at that time. In discussing populations reference is made here only to resident animals. Any given squirrel was arbitrarily considered a resident in the woodlot in which it was taken the most often, and was not counted in the population of the other woodlots in which it was captured.

In 1940 trapping results in late winter and early spring showed a population of approximately 59 squirrels per 102 acres of woodlot, or roughly one squirrel per two acres. By midsummer this number was more than doubled. A total of 124 were accounted for at that time, or a population of better than one squirrel per acre. About one-half of the latter represented the year's young, so that the adult population was probably comparable to that of late winter and early spring.

In the fall of 1940 thirty-nine squirrels were tagged during the month preceding the hunting season. During the 22 days of hunting 43 squirrels were shot, of which 16 were tagged. From these figures a pre-hunting season population of 105 squirrels was calculated, or approximately one per acre. Subtracting 43, the number of animals shot, from 105 we have 62, the post-season breeding residue. These figures are, obviously, too small to give a highly accurate census. However, we do consider this to be a fair approximation of the fall population.

Certain interesting relationships between age groups were indicated from fall population figures. During the summer the adult:young ratio in the woodlots was nearly perfect, actually being 62:62. Of the 39 animals trapped in the same areas in the fall the ratio was 32:7, a ratio heavy in adults. On the other hand, fall returns from our rabbit traplines along swale borders, fencerows, and other

outlying situations, showed a nearly equal adult:young ratio of 1<sup>1</sup>:11, a figure approaching the summer woodlot ratio. These three facts invite speculation, and may be attributed to a combination of the following factors: (1) A population pressure in woodlots tending to drive the young animals out, (2) the possible unweariness of young animals who voluntarily make excursions from the woodlots, and (3) decreased mast production in the woodlots forcing the animals to make feeding forays to the more productive outlying trees and cornfields.

Further information concerning age ratios was furnished by the hunting season kill. The kill in the woodlots at Rose Lake showed a ratio similar to that obtained by live-trapping, i. e., a preponderance of adults. In order to compare the kill on this limited area with that of other parts of the squirrels' range in southern Michigan, members of the Experiment Station staff worked with personnel from the Field Administration Division of the Department on a series of road blockades. A large amount of game, including squirrels, was taken in sections of the state where sex and age ratios are not known, and was available here for examination. Data from this source probably represents near average conditions for most of the state.

An examination of squirrels at these locations revealed exactly the opposite from what we had found at Rose Lake, i. e, a ratio heavy in juveniles, the actual figure being 27:43. This considerable difference, even though based on inadequate figures, is of interest, and may indicate (1) a partial failure of last year's breeding stock at Rose Lake to reproduce, or (2) a heavy mortality in this year's young. The first theory was partly substantiated by the small number of litters found in nest examinations during spring and summer.

The various woodlots appeared to have their characteristic population levels. However, since there was much intergradation of forest types, and not a great deal of difference between some of the samples, it was difficult to decide, in most cases, what actually determined squirrel numbers in each of the woodlots. To answer this question satisfactorily it will be necessary to work out further correlations between composition and squirrel populations.

Of the seven study areas five had been pastured and two were considered to be unpastured. One of these had been lightly browsed by a few head of cattle but the effect was negligible. Another included both pastured and unpastured portions, but resident squirrels in the two were difficult, if not impossible, to separate. Accordingly, these two woodlots are not used in our discussion. Comparisons will be made between 3 pastured woodlots comprising 41 acres and two unpastured totaling 26 acres.

During late winter the pastured woodlots showed a combined population of 24 squirrels or one animal per 1.7 acres, as against 14 squirrels or one animal per 1.3 acres in the unpastured woodlots. A similar proportion was derived from summer population figures. Apparently then, pasturing has had little immediate effect on squirrel populations in this area.

In addition to fox squirrels the Rose Lake Area supported a considerable population of three of the smaller squirrels native to this part of Michigan. These were the red, flying, and chipmunk species. Their apparent abundance in the same habitats with fox squirrels suggested certain interesting relationships. For instance, to what extent do they compete with the latter for food, or for nesting sites? Although we have done some work on food and nesting habits, we do not have enough data at hand to answer this satisfactorily. It is quite evident, however, that all four species can, and do, live together in some degree of harmony. Furthermore, our work tends to disprove the often quoted story that the red squirrel drives out, and at times may even ensculate the fox squirrel. Out of several hundred specimens examined we have never yet found the slightest evidence of the latter.

While all four species do occupy the same general habitat, it was noted that each was characteristic of a certain part of that habitat. In other words, there appeared to be a differentiation or division of habitat all within the main general habitat. For instance, the fox squirrel usually nested in the larger trees and at a relatively great height, although much of its time was spent on the ground. At the other extreme, the chipmunk definitely lived in the lower strata composed of logs and underbrush.

Red and flying squirrel habitats were less easy to define, but both appeared partial to the smaller trees and to lower levels than the fox squirrel. The chipmunk, and to a lesser extent, the red squirrel, commonly occurred in the undercover, whereas the flying squirrel, being considerably more arboreal in its habits, was seldom found in such locations. This fact may partially explain the latter's greater abundance in the pastured and more open woodlots where ground cover was generally at a minimum.

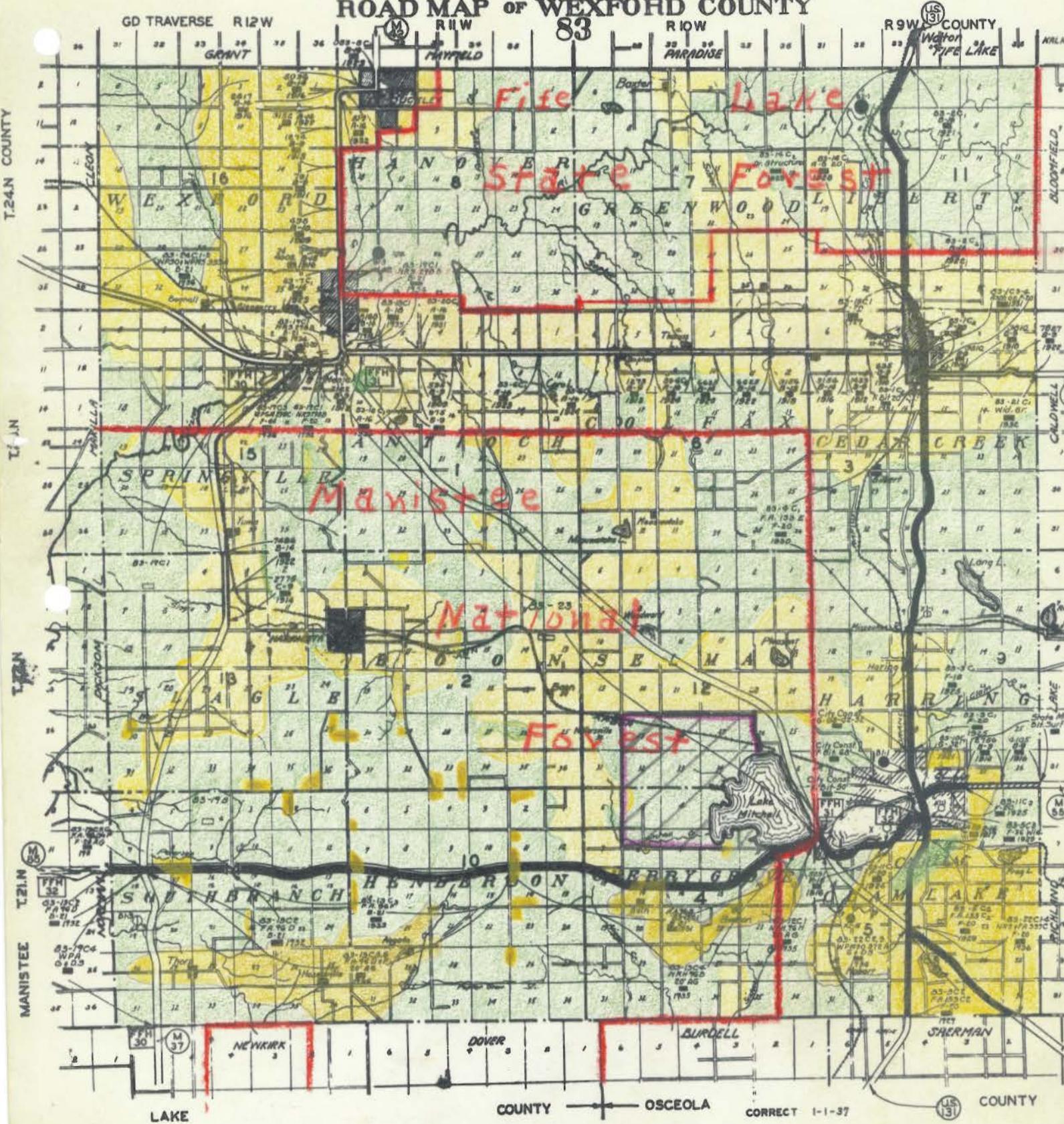
The above is given to present a picture of the complex ecological relationships that may exist between these four squirrel species. As more data are acquired, the picture should gradually become clarified.

In summarizing the foregoing discussion the following can be said in conclusion:

1. Seasonal populations on 102 acres of woodlot ranged from approximately one squirrel per two acres in late winter to approximately one squirrel per acre by early fall.
2. Adult populations remained relatively stable through the seasons but total numbers were practically doubled in midsummer by the year's young.
3. A marked shift of juveniles away from the woodlots, or a high summer juvenile mortality in these areas, was indicated in early fall.
4. A partial failure of last year's breeding stock to reproduce was shown by a comparison between age ratios on the area and those obtained on eastern Michigan road blockades.
5. Hunting season productivity on 102 acres was  $\frac{1}{3}$  squirrels, or less than one squirrel per 2 acres. Post-season breeding residue was 62 animals, or more than one per 2 acres.
6. The short-time effect of overgrazing was apparently not detrimental to fox squirrel populations on this area.
7. Small squirrel populations do not adversely affect fox squirrel numbers, and all can apparently live together in some degree of tolerance. Each species appears to be characteristic of a certain part of the same general habitat.

MICHIGAN  
STATE HIGHWAY DEPARTMENT  
LANSING

ROAD MAP of WEXFORD COUNTY



LAKE

COUNTY

OSCEOLA

CORRECT 1-1-37

US 131

COUNTY