Illinois Academy of Science Transactions, Vol. 46, 1953

TRAPPING AND MARKING SQUIRRELS ON A REFUGE IN SOUTHERN ILLINOIS

RICHARD J. MORAN
Southern Illinois University, Carbondale

A population of fox squirrels (*Sciurus niger rufiventer* [Geoffroy]) and gray squirrels (*Sciurus carolinensis carolinensis* Gmelin) in an area of Crab Orchard National Wildlife Refuge was studied beginning in September, 1951. Southern Illinois University and the Refuge Division of the United States Fish and Wildlife Service cooperated in the two-year project.[1] The research, which included analysis of data from controlled hunting together with year-around life studies of the squirrels, was aimed toward better management of these species. The squirrels on selected sites were trapped alive, marked and released; this formed a great part of the field work throughout the year. Trapping studies began on January 8, 1952 and ended March 31, 1953. Over this 15-month period, 200 animals, composed of 99 fox squirrels and 101 gray squirrels were handled.

Techniques

The trap used in these studies was of the type used by Baumgartner (1940) to study fox squirrels in Ohio. The device was similar to the ordinary box trap, but it was modified for use with squirrels in that the working parts were completely enclosed within the trap. Shelled corn was used as bait. To make it easy to handle and mark the squirrels they were confined in a small wire cone. Both ears were tagged with a No. 3 fingerling tag, and the outer toe of the left hind foot was marked by ringing the digit with a No. 8 monel band (manufactured by National Band and Tag Company of Newport, Kentucky). Of fifty-three recovered animals, 11 had lost one ear tag each, five had lost both ear tags. The squirrels amputated nearly all marked toes despite efforts to make the band as loose as possible.

Sixty-five traps were permanently established in six study woodlots which were designated as A, B, C, D, E, and F. The areas were selected on the basis of diversification in habitat, workable size, and accessibility. Traps were checked once daily or every other day when success was poor.

Forty-nine of 200 live-trapped squirrels were recaught from one to five times each. Of these, 34 were handled twice each, 12 three times, two four times, and one six times.

Species Ratio

Live-trapping revealed the species ratio of 200 animals to be 50.5 percent gray squirrels and 49.5 percent fox squirrels. The species ratio of 888 squirrels taken during controlled hunting in 1951 and 1952 was nearly 60 percent gray squirrels and 40 percent fox squirrels. The balanced population of fox and gray squirrels as shown by live-trapping probably

[1] Cooperative Wildlife Studies Grant, Southern Illinois University, Carbondale, Illinois.

was a true picture for the relatively small woodlots studied. Hunters worked over large continuous timber tracts where they killed proportionately fewer fox squirrels.

Age and Sex Ratios

Age ratios of squirrels in the fall population of 1952, as determined by trapping, showed high success in reproduction and rearing young during the season. The trapping period of October 4 through December 10 yielded 57 gray squirrels 61.4 percent of which were young, and 76 fox squirrels of which 55.2 percent were young. As squirrel activity and trapping success decreased through late November and early December, adults were captured more often than young. Not until the middle of the following April did young animals again appear in numbers. The appearance of these first-season young coincided with an increased catch of lactating females and an over-all upward trend in squirrel activity.

Although large numbers of squirrels from controlled hunting indicated that females were more abundant than males in the fall population of 1952, the numbers trapped showed that males were taken more often. Adult females were rarely caught during the breeding season and early rearing period, but trapping returns showed a gradual increase in adult females from January through May. Goodrum (1940), in studies of gray squirrels in Texas, found that breeding females have such seclusive habits that it is difficult to arrive at precise breeding seasons for this species.

Seasonal Activity and Travel Range

Activity highs and lows were measured by the total monthly numbers of original captures and recaptures of squirrels. The fall or mast season activity peak was most pronounced with a second peak occurring during March and April (fig. 1). Low activity periods were indicated for mid-summer and mid-winter. This extreme seasonal variation in activity made it difficult to get year-around data on breeding habits and information as to sex and age ratio. Activity peaks seemed to be connected with the post-breeding periods, optimum temperatures conducive to movement, and to the periods of greatest food abundance. Baker (1944) made intensive time-area counts of the gray species in Texas and found similar activity peaks which he believed to be associated with abundance of food.

The travel range of marked squirrels was studied by recording trap numbers of initial and subsequent captures. The movements of 49 animals, 25 gray squirrels and 24 fox squirrels, were followed in this manner. Periods between captures varied from two days to 11 months. Travel ranged from none at all to one-half mile. Fox squirrels ranged farther than gray squirrels. Adult fox squirrels had an average travel range of 143.9 yards, but adult gray squirrels averaged only 84.0 yards. In the same way, young fox squirrels averaged 103.3 yards, and young of the gray species only 92.0 yards.

Adult male squirrels ranged farther than adult female animals. Although adult male fox squirrels moved an average of 188.1 yards, the

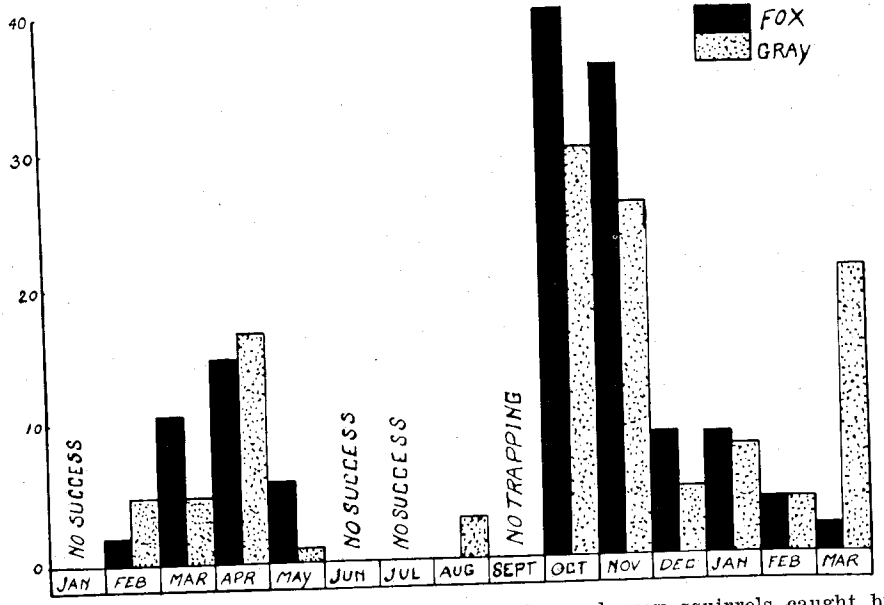

FIG. 1.—Monthly variations in number of fox and gray squirrels caught by live-trapping, Crab Orchard National Wildlife Refuge, January 1952—March 1953.

adult females traveled but 105.1 yards. Average travel range for adult male gray squirrels was 95.1 yards, but only 51.3 yards for the adult females. Baumgartner (1943) reported the travel range of the fox squirrel in Ohio to be 136.7 yards. His studies also indicated that females averaged 24.6 yards less than that of male squirrels. Goodrum (1940) believed the home range of the gray squirrel in Texas to be 200 yards or less.

Only three records of unusually long-range inter-woodlot movements were collected in the present study. All were made by young squirrels. A complete round-trip, with a minimum travel of one-third mile each way, was made by a young gray squirrel. A second young gray squirrel traveled one-quarter mile from the original point of capture in a period of five days. A young fox squirrel showed the longest range—a one-half mile trek from Woodlot F to a small isolated cedar grove.

In addition to these trapping records, five marked squirrels bagged by hunters during controlled hunting in 1952 were killed within the same woodlots where they were last handled. Among these returns were two young gray squirrels which had been toe-clipped in the nest at an age of two and one-half weeks. The ranges of squirrels trapped over a short period of time in any one woodlot were entirely concurrent and gave no indication of territoriality.

FALL WOODLOT POPULATION LEVELS

Squirrels bagged during controlled hunting in 1952 were carefully examined in order to record

the tag number of all marked individuals and the woodlot where each squirrel was killed. Previous to the September hunt, 58 squirrels (33 gray and 25 fox) had been marked and released over the six study woodlots which totaled 113 acres. The majority of these squirrels were marked between March 1 and June 15. All woodlots were hunted, but marked specimens were returned from only the two larger of the six areas (table 1). The pre-hunting populations were computed for these two woodlots by use of Lincoln index calculations. In Woodlot E, hunters bagged 104 squirrels, but the catch included only four of the 28 animals which had been marked and released there. Applying the index to these figures, the calculated pre-hunting population was determined from the proportion T : 28 :: 104 : 4. The pre-hunting population or T was then 728 squirrels or 4.6 squirrels per acre (table 1). This kill represented 14 percent of the estimated total population. Post-hunting trapping from October 4 to December 10 revealed that eight or one-third of the remaining originally marked squirrels were still in the woodlot. During this period 37 new individuals were marked.

Woodlot F yielded a total kill of 18 squirrels of which only two were marked. Twenty individuals had been marked in this woodlot (table 1). Using these figures in the index, the calculated pre-hunting population was 180 animals or 7.2 squirrels per acre (table 1). The kill constituted 10 percent of the calculated population. This woodlot, though relatively small, had been selected for study because it appeared to be the highest type of range on the area. Post-hunting trapping here indicated that at least four of the 18 marked squirrels in question were still present. Twenty-four new squirrels were handled in the woodlot from October 4 to December 10. This method for estimating fall squirrel populations was employed by Friley (1952) in studying fox squirrels in Michigan. He found a close correlation between yearly calculated populations and corresponding yearly hunter kills.

TABLE 1.—CALCULATED SQUIRREL POPULATIONS OF TWO WOODLOTS AS DETERMINED BY LINCOLN INDEX, CRAB ORCHARD NATIONAL WILDLIFE REFUGE, SEPTEMBER, 1952

Woodlot	Acres	No. marked Jan.-Aug.	September kill		Total kill	Calculated population	Calculated population per acre
			Unmarked	Marked			
E	160	28	100	4	104	728	4.6
F	25	20	16	2	18	180	7.2

LITERATURE CITED

BAKER, R. H., An ecological study of tree squirrels in eastern Texas: Jour. Mann., vol. 25 (1): 8-24, 1944.

BAUMGARTNER, L. L., Trapping, handling, and marking fox squirrels: Jour. Wildlife Management, vol. 4 (4), 444-450, 1940.

———, Fox squirrels in Ohio: Jour. Wildlife Management, vol. 7 (2), 193-202, 1943.

FRILEY, C. B., JR., Criteria for estimating fall fox squirrel populations: Paper presented at Midwest Wildlife Conference, Des Moines, Iowa, December 17-19, 1952.

GOODRUM, P. D., A population study of the gray squirrel in eastern Texas: Texas Agr. Expt. Sta. Bull. 591, 1940.