

Differential Vulnerability of Fox and Gray Squirrel Age Classes to Hunting¹

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Abstract: Age ratios were determined for 361 gray squirrels (*Sciurus carolinensis*) and 130 fox squirrels (*S. niger*) taken on 50 ha in Northeast Texas during 5 weekend hunts. Data indicated that adults were more likely than young to be taken on the opening weekend. During weeks 2 and 3, young were more frequently taken while during weeks 4 and 5, adults were again taken more frequently. Results were inconsistent with the beliefs of most biologists and hunters who claim that young animals are more susceptible to the gun than are adults. Because of different vulnerability of adults and young squirrels by week, caution should be observed when interpreting age-ratio data taken from hunter bags.

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Age ratios are an important source of information to wildlife biologists (Downing 1980). Young-to-adult ratios may be used as a measure of the natality and rearing success of a population. However, Caughley (1974) made it clear that age ratios cannot be interpreted, even in a general way, without additional demographic data. Downing (1980) noted that hunters frequently provided large samples for determining age ratio data, but he also cautioned that there were inherent biases in such data. These biases are due to the animal's behavioral characteristics and the behavior and selectivity of the hunter. He also noted that most of these biases have been poorly described. Coe et al. (1980) noted a disagreement among biologists about the vulnerability of different age classes to hunting and why differences existed. They observed that day-to-day differences in age ratios would suggest which age class was more vulnerable to the gun. Gallizioli and Swank (1958) and

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Gallizioli (1965) concluded that young Gambel quail (*Lophortyx gambelii*) were more susceptible to hunting than were adults because the young lacked "experience." Our study offered the opportunity to evaluate this assumption for squirrels.

Study Area

The study area was located approximately 1.5 km east-southeast of Carbondale in Bowie County, Texas, in the Sulphur River bottomlands. Squirrels were hunted within an approximately 300 m × 3 km (50 ha) area extending north along and on each side of Anderson Creek from the point where it flows into Wright Patman Lake.

The study area was dominated by oak-hickory hardwood (90%) and tame pasture (10%). The vegetation within the oak-hickory hardwood type was mixed and varied, consisting chiefly of willow oak (*Quereus phellos*), water oak (*Q. nigra*), overcup oak (*Q. lyrata*), bitter pecan (*Carya aquatica*), and ironwood (*Carpinus caroliniana*). Tame pastures were dominated by common Bermudagrass (*Cynodon dactylon*).

Methods

Squirrels were collected using sporting arms during each weekend from 1 October through 26 October 1980. As each squirrel was collected, it was identified to species and aged as juvenile, subadult, or adult using appearance of hair on the ventral surface of the tail (Sharp 1958), and/or examination of the epiphyseal closure of the radius and ulna (Hale 1949). Date of collection also was noted.

Chi-square goodness-of-fit tests (Steel and Torrie 1960) were used to compare the number of squirrels in each age class by week of harvest. Because of the low number taken, juveniles were combined with the subadult age class to form a "young" class for statistical analyses. Because the different totals of adults and young harvested during the study could have affected our ratio of adults : young/week when only raw numbers were analyzed, we weighted weekly age-class numbers and percentages to account for differences in sample size between adults and young harvested. The age class that had the least number of animals taken during the entire study was weighted to equal that of the age class that had the greatest number of animals taken. The numbers by week of the age class that had the least number of animals taken were then weighted by taking the original weekly percentage of that age class harvested times the "new" weighted total as figured above. Once the weighted numbers were computed for each week, they were then compared on a weighted percentage basis to the data obtained for the age class with the greatest number taken.

Results and Discussion

A total of 361 gray squirrels and 130 fox squirrels was collected (Table 1). Adults comprised 32%, subadults 54%, and juveniles 14% of the gray squirrels collected. Fifty-five percent of the fox squirrels were adults, 42% were subadults, and 3% were juveniles. The low percentages of juveniles taken for each species reflected poor production during the summer breeding cycle probably due to a lack of food caused by drought conditions that existed in the area during the period of study (office of Texas state climatologist).

When the numbers of adult and young gray squirrels taken were compared by week of harvest, there was a significant ($P < 0.005$; $X^2 = 18.39$, 4 df) deviation from the expected age distribution (i.e. if both young and adult squirrels had been equally-likely to have been taken each week given the different total number of each age class taken over the 5 weekends). The same was found for fox squirrels ($P < 0.025$; $X^2 = 11.24$, 4 df). On the opening weekend of the hunt, adults of both species were more likely to be taken than were young (Table 1). However, after the opening weekend, young were taken in greater numbers until the 4th and 5th weekends when adults again comprised a greater percentage of the hunter's bag.

Table 1. The numbers and percentages of fox and gray squirrels taken by age class and week during October 1980. Percentages may not add to 100 due to rounding error.

Species and age	Week					total N %
	1 N %	2 N %	3 N %	4 N %	5 N %	
Fox						
Adult	24(67)	11(38)	23(46)	7(88)	6(86)	71(55)
Subadult	12(33)	16(55)	25(50)	1(12)	1(14)	55(42)
Juvenile	0(0)	2(7)	2(4)	0(0)	0(0)	4(3)
Total	36	29	50	8	7	130
Gray						
Adult	55(44)	13(16)	16(22)	21(44)	10(31)	115(32)
Subadult	55(44)	51(63)	50(68)	21(44)	18(56)	195(54)
Juvenile	16(13)	17(21)	8(11)	6(13)	4(13)	51(14)
Total	126	81	74	48	32	361
Fox and Gray						
Adult	79(49)	24(22)	39(31)	28(50)	16(41)	186(38)
Subadult	67(41)	67(61)	75(60)	22(39)	19(49)	250(51)
Juvenile	16(10)	19(17)	10(8)	6(11)	4(10)	55(11)
Total	162	110	124	56	39	491

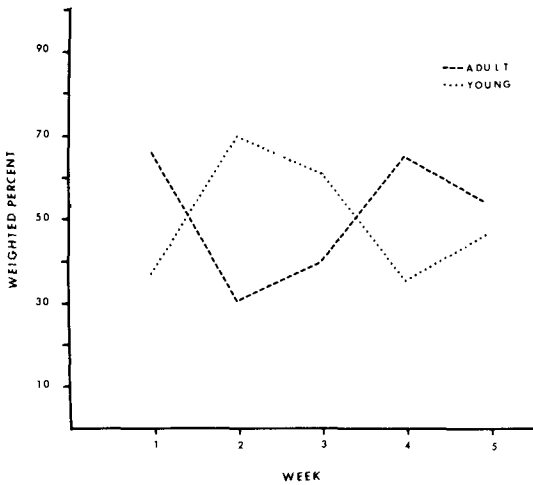


Figure 1. Weighted percent of adult and young (juvenile and subadult combined) fox and gray squirrels harvested during 5 week-ends, October 1980.

Because of similar trends for fox and gray squirrels, data were combined. Trends from the resulting weighted numbers (Fig. 1) were almost identical to data produced by using data by species (Table 2). The combined weighted data also indicated that adult squirrels were more susceptible to the gun on the opening weekend of the hunt than were young. However, if we had only sampled the squirrel population on the 2nd or 3rd weekend, the

Table 2. The weighted numbers and percentages of adult and young (juvenile and subadult combined) fox and gray squirrels taken during October 1980. Percentages may not add to 100 due to rounding error.

Species and age	Week					total
	1	2	3	4	5	
Fox						
Adult	24(82)	11(33)	23(41)	7(87)	6(86)	71(50)
Young	14(18)	22(67)	33(59)	1(13)	1(14)	71(50)
Total	38	33	56	8	7	142
Gray						
Adult	118(62)	28(29)	34(37)	45(62)	21(49)	246(50)
Young	71(38)	68(71)	58(65)	27(38)	22(51)	246(50)
Total	189	96	92	72	43	492
Fox and Gray						
Adult	142(63)	39(30)	57(39)	52(65)	27(64)	317(50)
Young	85(37)	90(70)	91(61)	28(35)	23(46)	317(50)
Total	227	129	148	80	50	634

reverse would have been found. This agreed with results of Gambel quail research (Gallizioli and Swank 1958, Gallizioli 1965), where young birds were considered more susceptible. If we had only sampled during the 4th and 5th weekends, we would again have found more adults in our bag.

It is possible that adult squirrels dominated food resources early in the hunting season which resulted in greater exposure to hunters. It also is possible, due to the drought, there were more adult squirrels in the population and/or young squirrels immigrated into the area following loss of dominant adult squirrels during the opening weekend. In any event, generalities about which age classes are more susceptible to the gun should be made with caution as vulnerability may vary by week. Because of different vulnerability of adults and young squirrels by week, caution should be observed when interpreting age ratio data taken from hunter bags.

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