

THE GRAY SQUIRREL—PAST, PRESENT AND FUTURE

ROLLIN H. BAKER

Michigan State University, East Lansing

Accounts of the dramatic decline of the American bison and the extinction of the passenger pigeon are well known to conservationists and laymen alike. Using these species as examples, the defenders of nature have described eloquently what happens when man encroaches excessively—sometimes necessarily, sometimes needlessly—on the wildlife resources of the country. Frequently we term species as "compatible" or even "plastic" when they are able to adjust themselves to changes that man has made in the landscape and, at the same time, can withstand a reasonable amount of annual harvest. The bobwhite quail, the fox squirrel, the eastern cottontail and even the white-tailed deer have been so classified and may be expected to remain important game species for some time to come. We term other species as "incompatible" or even "non-plastic" when they do not adjust well to the changing patterns of land-use. Some of these, like the gray wolf and the grizzly bear, are titled "wilderness species" and special effort is made to set aside refuges to maintain suitable habitat for them. The following passages will present data to show that the gray squirrel (*Sciurus carolinensis*) also has been notably unsuccessful in adjusting to changes to its forested habitat brought about by man.

In the days of early settlement, the gray squirrel occupied the vast, mature forests of nut-bearing hardwoods (chiefly oaks and hickories) in what is now eastern United States and extreme southern Canada. The species ranged as far west as the vicinity of the one hundredth meridian, where the Great Plains barred further spread, except for short distances in narrow stands of timber along streams (for Kanass, see Packard, 1956:6; for Nebraska, see Swank, 1907:80; for North Dakota, see Bailey, 1926:45; for Manitoba, see Soper, 1946:142). The gray squirrel also was barred where coniferous forests were dominant to the northward, on the higher eastern mountains, and on parts of the Gulf Coastal Plain.

Early writers have described the great abundance of gray squirrels from the Atlantic Seaboard to eastern Iowa. Occasionally, large numbers would band together and move from one place to another. Seton (1953:14-19) summarizes many early observations on movements; in another account, he (1920:57) calculated that one great emigration in Wisconsin, reported by Hoy in 1842 as lasting four weeks, must have included almost a half-billion gray squirrels (also see Cahalane, 1947:400). While on such journeys, squirrels were known to invade habitats normally inhospitable to them and even to swim large bodies of water, including the Mississippi River, as at Prairie du Chien, Wisconsin (Fryxell, 1926:60). The causes of mass movements are unclear; Schorger (1947:402) and others point to shortages of food. At any rate, whether moving cross-country or not the gray squirrel, like the now extinct Carolina parakeet, was credited with doing severe damage to corn and other crops of the pioneers. Damage in Massachusetts was sufficiently serious in 1740 to warrant the payment of a bounty of four pence per gray squirrel (Crane, 1931:270). Cahalane (1947:400) relates that in 1749, the treasurer of Massachusetts paid out 8,000 pounds sterling for the destruction of 640,000 squirrels. Hunters had phenomenal luck; Seton (1953:21) records that in Kentucky 12 hunters accounted for almost 10,000 squirrels in a week's time. In other states kills of similar magnitudes resulted, often through community efforts to rid farming areas of troublesome gray squirrels.

The hunters took their share but in the early days their harvest probably made little impression on the over-all squirrel population. Rather, it was the use of the axe, saw and torch by land-clearing pioneers and later by lumber crews that shattered the realm of the gray squirrel. The clearing and lumbering began in the east and spread slowly westward toward the prairies. In Ohio clearing started as early as 1788 (Chapman, 1939:2), although in the northern part of that state the gray squirrel dominated in dense forests until at least shortly before 1850 (Hicks, 1939:418). At the time of the Civil War a marked

decrease in the number of gray squirrels was observed generally (Cahalane, 1947:400). This decline continued and in the early years of the twentieth century some conservationists even feared that the species might become extinct. Uhlig (1956:2-4) vividly described the destruction of gray squirrel habitat in West Virginia. He estimates that before the arrival of Europeans there were 15 1/2 million acres of forested lands in the state. This area was still 90 percent intact in 1880, but by 1910, only 1 1/2 million acres of virgin timber remained. The chestnut blight also added to the decline, in this state and elsewhere, of high quality gray squirrel habitat; the blight was found in West Virginia in 1911, and by 1930 had removed this important squirrel-tree. In 1956, Uhlig (*op cit.*:66) found 64 percent of the state was forested but that less than 45 percent of this area consisted of hardwood types of sufficient stand-size to be good range for gray squirrels.

The hardwood forests of river plains and swamps of the southern states were less severely treated by clearers and lumbermen, possibly because southern pines were sought more eagerly, and bottom lands were isolated and uninhabited. Even so, the southern habitat also declined; by 1915, gray squirrel populations in eastern Texas began to show signs of marked reduction (Anon., 1945:127). Hunting also became an increasingly greater decimating factor in these often-narrow, stream-side habitats.

As the virgin hardwoods declined and gave way to a mixture of farmland, brushland and second-growth forests, gray squirrels and other forest game were replaced by farm game, including fox squirrel, bobwhite quail and eastern cottontail (Chapman, 1939:2). The primitive habitat of the fox squirrel in Michigan, according to Allen (1943:33), was the prairie margin. In less than 30 years, he reports, the fox squirrel replaced the gray squirrel in cut-over oaks, hickories and other hardwoods over the entire lower half of the southern peninsula of Michigan. In most places where the gray squirrel formerly was dominant the fox squirrel is now the familiar tree squirrel.

Even so, habitat in many areas is improving for gray squirrels. Submarginal farms and areas that have been heavily logged may revert, in time, to forests of types attractive to gray squirrels. Such has happened in Ohio (Hicks, 1938:418) and elsewhere, especially in the eastern states. Yet, second-growth timber, of which elms may be dominant, often supports fox squirrels and few or no gray squirrels. Furthermore, the increasing use of nut-bearing hardwoods for pulp and various chemical products may mean that in many areas, trees will be cut (with little selection) prior to maturity and, consequently, much potential habitat for gray squirrels will not develop. At the northern and northwestern peripheries of its distribution, the gray squirrel may even be extending its range, where oaks now grow along formerly open streams, where the animal has been introduced into planted groves in prairie towns (as in North Dakota, Hibbard, 1956); and where nut-bearing trees have replaced conifers removed in lumbering operations. Although prairie-border states, such as Kansas (Packard, 1956:8), have more acres of timber today than in pioneer days, the trees often are of species unsuitable for gray squirrels.

Fortunately, gray squirrels have become established in groves of nut-bearing shade trees in city parks on schoolgrounds and in back yards in many communities. The literature is filled with references to gray squirrels in urban areas—from Ontario (Judd, 1955:296, and Snyder, 1923:59) and New York (Nichols, 1958) westward to Ohio (Dennis, 1930). Kansas (Cockrum, 1952:113) and North Dakota (Bailey, 1926:45). Currently, these urban groves seem to be principal habitats for gray squirrels in several states, chiefly those in the western part of its range. The value of this specialized habitat was made clear to me during nine year's residence (1946-55) in eastern Kansas. I saw more gray squirrels within the city of Lawrence than on all of my numerous field trips outside of its limits in that state.

The available facts show that, with less publicized fanfare, the gray squirrel has shared somewhat the fate of the American bison and the passenger pigeon. Some comfort may be derived from the following statements: (1) The species still occurs in most parts of its pre-settlement range, although its distribution often is discontinuous and spotty; (2) Favored habitat is becoming re-estab-

lished slowly, especially along streams; (3) The gray squirrel has become resident in groves of nut-bearing shade trees in numerous communities, especially in city parks; (4) If we wish to have more gray squirrels, more long-range programs to manage slow-growing, nut-bearing hardwood forests need to be formulated, keeping in mind that the gray squirrel can be an important wildlife product. In the face of a progressively higher human population in the United States in the years to come, many conservationists may consider that survival, except in token numbers, of the gray squirrel and many other animals and plants may very well depend largely on how compatible these species will be with man's "inevitable" changes in the landscape.

LITERATURE CITED

- Allen, Durward L. 1943. Michigan fox squirrel management. Dept. Conservation, Lansing, Michigan. Game Div. Publ. 100:1-404, 152 figs., frontispiece, unnumbered drawings.
- Anonymous. 1945. Principal game birds and mammals of Texas. Texas Game, Fish and Oyster Comm., Austin, Texas. 149 pp., unnumbered illus. and maps.
- Bailey, Vernon. 1926. A biological survey of North Dakota. N. Amer. Fauna, 49:vi + 226, 21 pls., 8 figs., 1 map.
- Cahalane, Victor H. 1947. Mammals of North America. The Macmillan Co., New York. x + 682 pp., illus.
- Chapman, Floyd B. 1939. The development and utilization of the wildlife resources of unglaciated Ohio. Ohio Wildlife Research Station, Ohio State Univ., Columbus, Release No. 110, 9 pp. (mimeographed).
- Cockrum, E. Lendell. 1952. Mammals of Kansas. Univ. Kans. Publ., Mus. Nat. Hist., 7(1):1-303, 73 figs. in text.
- Crane, Jocelyn. 1931. Mammals of Hampshire County, Massachusetts. Jour. Mammalogy, 12(3):267-273.
- Dennis, Wayne. 1930. Rejection of wormy nuts by squirrels. Jour. Mammalogy, 11(2):195-201.
- Fryxell, F. M. 1926. Squirrels migrate from Wisconsin to Iowa. Jour. Mammalogy, 7(1):60.
- Hibbard, Edmund A. 1956. Range and spread of the gray and the fox squirrels in North Dakota. Jour. Mammalogy, 37(4):525-531, 1 fig.
- Hicks, Lawrence E. 1938. The status of game mammals in Ohio. Trans. Third N. Amer. Wildlife Conf., 415-420.
- Judd, W. W. 1955. Gray squirrels feeding upon samaras of elm. Jour. Mammalogy, 36(2):296.
- Nichols, John T. 1958. Food habits and behavior of the gray squirrel. Jour. Mammalogy, 39(3):376-380.
- Packard, Robert L. 1956. The tree squirrels of Kansas. Univ. Kansas, Mus. Nat. Hist. and State Biol. Survey, Misc. Publ., No. 11:1-67, 2 pls., 10 figs.
- Schorger, A. W. 1947. An emigration of squirrels in Wisconsin. Jour. Mammalogy, 28(4):401-403.
- Seton, Ernest Thompson. 1953. Lives of Game Animals. Charles T. Branford Co., Boston, vol. IV, Pt. 1, pp. xxii + 440, 52 pls., 12 maps, unnumbered figs.
- Snyder, L. L. 1923. A method employed by a black squirrel in carrying its young. Jour. Mammalogy, 4(1):59, 1 fig.
- Soper, J. Dewey. 1946. Mammals of the northern Great Plains along the international boundary in Canada. Jour. Mammalogy, 27(2):127-153, 1 pl., 1 fig.
- Swenk, Myron H. 1907. A preliminary review of the mammals of Nebraska. Nebraska Acad. Sci., VIII (3):61-144.
- Uhlig, Hans G. 1956. The gray squirrel in West Virginia. Conservation Comm. West Virginia, Div. Game Mgt., Bull. No. 3 xii + 83 pp., illus. Prepared September 1959.