SQUIRREL DE-BARKING OF LOBLOLLY PINE

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INTRODUCTION

The management of land in this country for both agriculture and forestry has become more intensified in recent years. At the same time, many species of game have received better managment and protection or regulation of hunting. In many cases this has resulted in maintaining or even increasing game populations. These have caused an increasing amount of damage, caused by game or other wild animals, to agriculture or forest products and an increased concern over any damage.

Damage by rodents to forests has been reported for many years. The bulk of the literature on this subject concerns the effect on forest regeneration of the eating of seeds and seedlings and of cutting of buds, twigs, and cones or other fruit (2, 5, 6, 7, and 11). The damage done by the beaver and porcupine is well known (7). Very few references could be found dealing with girdling or barking of trees by tree squirrels and none were found describing this damage on any species of southern pines. The red, gray, and fox squirrels have barked sugar maple in northern states (1, 3, and 7). The gray squirrel also has barked red and hard maples in Wisconsin (13) and the red squirrel has girdled birches in Alaska (4). Squirrels, especially red squirrels, have girdled ponderosa, jack, lodgepole, and white pine; western larches; and Douglas and grand fir in northern and western states (7, 8, 9, 10, and 12).

HISTORY OF THE AREA

Some de-barking by squirrels on pole and sawlog size loblolly pine *(Pinus taeda)* has occurred in local areas of the Ashley County Refuge in southeastern Arkansas. Foresters for the local timber company have noticed similar damage since 1955 or 1956 but thought it to be caused by insects. Most of the land in this Refuge has been managed for production of pine timber. The area in which the damage occurs was originally logged in 1927. A fire that year or the following year damaged or destroyed some of the remaining timber and left a good seedbed on a year when seed production was good. The result has been a stand largely of even-age loblolly and short-leaf pine *(Pinus echinata)*. A pulpwood and light sawlog cut was made in 1951. The stand was thinned in 1956. Another pulpwood cut and a controlled burn was made in March of 1961.

DESCRIPTION OF DAMAGE

Squirrels damaged the trees by cutting and stripping off the outer bark and scraping the cambium from the inside of the pieces of bark. Most pieces of bark which include the cambium layer bear tooth marks diagonally across the inner side. The squirrels may also have licked the sap from the exposed wood; however tooth marks were not visible and it usually was covered with resin. Licking of sap by red squirrels after removing the bark has been described on some northern conifers (12). Occasional tooth marks in the outer bark at the edge of the damaged area helped to identify the cause of the damage.

Two trees bearing relatively heavy damage were cut. Data on the height and diameter of the trees and where the damage occurred are given in Table I. The average height of the current year's damage was from 49.9 to 64.3 feet. The average diameter of the trunk at the current year's damage was from 5.9 inches at the lowest to 2.3 inches at the highest damage. The current year's damage was scattered over an average of 14.4 feet of the length of the trunk. The damage usually was on the main stem immediately above limbs and in the lower ½ of the crown. Damage was found on limbs on only one tree.

(Show slides and samples of damage.)

Two attempts were made, unsuccessfully, to observe squirrels barking trees and to obtain specimen for checking stomach contents. Therefore, identification is entirely by tooth marks and species present in the area. The damage probably is being done by the gray squirrel *(Sciurus carolinensis)* but possibly by the fox squirrel *(S. niger)*.

EXTENT OF DAMAGE

A sample of the extent of damage was planned on a 40 acre area. Checking of all pine trees, with the aid of binoculars, in 25 equally spaced, circular plots, 1/25-acre in size, was planned. Ten of these plots were checked without finding a damaged tree. It was apparent that the damage was too localized to be sampled adequately by this or similar techniques. The composition of pine 3 inches diameter breast height and larger on the above 10 plots was 21 shortleaf pine and 32 loblolly pine.

A ¼-acre circular plot was made surrounding a nest tree where the heaviest damage occurred. All pine trees 3 inches diameter breast height and above were checked for damage, with the aid of binoculars. Table II gives the diameter breast height, height, and extent of damage of the trees in this plot. A total of 32 loblolly and 3 shortleaf pine trees were in the plot. Thirteen loblolly pine trees (37%) had damage done during the current year. They averaged 12 inches diameter breast height and 73 feet tall and the damage on 8 was estimated as covering over 72 square inches and on 5 as covering between 6 and 72 square inches. Nine other loblolly pine trees had old scars, presumably mostly from squirrel damage. The ten other loblolly pine and the 3 shortleaf pine trees were undamaged. The size was not taken on undamaged trees or ones with old scars; however, many of them were in the same size range as ones with current damage. Damage varies from the maximum on this ¼-acre plot to isolated trees with small areas damaged. No damage has been found on shortleaf pine trees.

TABLE I.

LOCATION OF SQUIRREL DE-BARKING ON TRUNKS OF TWO LOBLOLLY PINE TREES

	Tree No. 1	*Tree No. 2*	*Average*
Diameter breast height	13″	15″	14″
Height to current years growth	70.8′	70.8′	70.8′
Height to lowest old scars	46.5′	41.0′	43.8′
Height of lowest 1961 damage	53.3′	46.5′	49.9′
Diameter at lowest 1961 damage	4.8″	7.0″	5.9″
Height of highest 1961 damage	64.3′	64.3′	64.3′
Diameter at highest 1961 damage	2.4″	2.2″	2.3″
Length of trunk encompassing 1961 damage	11.0′	17.8′	14.4′

TABLE II.

EXTENT OF SQUIRREL DE-BARKING ON ONE ¼-ACRE PLOT

	No. Trees	*Per-cent of Trees*	*Size*	*dbh. Inches*	*Height Feet*	*Extent of Damage* (Estimated)*
Loblolly Pine with 1961 Damage	13	37%	greatest	15.3	85	8 Heavy
			Least	7.1	66	5 Moderate
			average	12.0	73	0 slight
Other Loblolly Pine with old Scars	9	26%				
Undamaged Loblolly Pine	10	29%				
Shortleaf Pine (Undamaged)	3	9%				

*Heavy—total area damaged on one tree over 72 sq. in.; moderate—6 to 72 sq. in.; slight—less than 6 sq. in.

All damage known of at present is in two areas approximately two miles apart and each covering less than one square mile. No trees have been found that have been completely girdled. Although the damage allows easy access for insects and fungus, the trees rarely are killed even indirectly. For these reasons the damage has been of little or no eco-

nomic importance. This damage is significant in that it has not been reported on southern pines and probably represents some unusual behavior connected with intensive management for production of pine timber and with maintenance of a game refuge.

DISCUSSION

The damage in 1960 and 1961 was done during two times of year, early to mid spring and mid to late summer. The reason for the damage apparently is for food. Examination of two nests failed to show use of pine bark or fibers in their construction. The time of year that the damage was done indicates that it is not necessarily related to the mast supply. Most of the hardwoods of mast producing size in the flat-woods have been eliminated; however, most of the damage is within ¼ mile of small creek bottoms where quite a bit of oak has been left. From general observations, there appears to be a shortage of plants producing seeds, berries, and fruits which ripen in spring and summer. Similar conditions exist over large areas of the game refuge. Why the damage is limited to two relatively small areas is not apparent. The squirrel population in the area definitely is not high; however, it may be at the carrying capacity for the food supply available in the spring and summer. The game refuge was discontinued this year, largely because a large deer herd has built up and it has been overpopulated for several years. Additional observations will be made to see if the damage continues after the area has been open to squirrel hunting.

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LITERATURE CITED

1. Brenneman, William S. 1945. Tree Damage by Squirrels: Silviculturally Significant? Jour. Forestry 52(8):604.
2. Cook, David B. 1954. Susceptibility of Larch to Red Squirrel Damage. Jour. Forestry 52(7):491-492.
3. Irving, F. D., J. R. Beer, and O. F. Hall. 1956. Sugar Maple Bark Injury by Gray Squirrels in a Minnesota Woodlot. Minn. Forestry Notes, No. 54, 2pp.
4. Lutz, H. J. 1956. Damage to Paper Birch by Red Squirrels in Alaska. Jour. Forestry 54(1):31-33.
5. McCullock, W. F. 1937. Red Squirrels Attack Japanese Larch. Jour. Forestry 35(7):692-693.
6. Mollenhauer, William, Jr., 1939. Table Mountain Pine—Squirrel Food or Timber Tree. Jour. Forestry 37(5):420-421.
7. Pearce, John. 1947. Identifying Injury by Wildlife to Trees and Shrubs in Northeastern Forests. USDI, Fish and Wildlife Ser., Research Report 13, 29pp.
8. Pike, G. W. 1934. Girdling of Ponderosa Pine by Squirrels. Jour. Forestry 32(1):98-99.
9. Schantz-Hansen, T. 1945. Red Squirrel Damage to Mature Red Pine. Jour. Forestry 43(8):604-605.
10. Scheffer, Theo. H. 1952. Spring Incidence of Damage to Forest Trees by Certain Mammals. Murrelet 33(3):38-41.
11. Smith, Clarence F. and Shaler E. Aldous. 1947. The Influence of Mammals and Birds in Retarding Artificial and Natural Reseeding of Coniferous Forests in the U.S. Jour. Forestry 45(5):361-369.
12. Stillinger, C. R. 1944. Damage to Conifers in Northern Idaho by the Richardson Red Squirrel. Jour. Forestry 42(2):143-145.
13. Waggoner, D. W. 1946. The Gray Squirrel in Western Villas County. Wisconsin Consv. Bul. 11(6):3-5.