In four of five years data, the results indicated that suppression of grackle populations increased white-winged dove nesting success. The percentage of eggs fledging young ranged from 13 to 31 per cent higher on the Longoria Unit, where grackle control was practiced. Management implications derived from this study indicate that it is possible to increase nesting success of whitewings by using DRC-1339 as a poison to suppress the grackle population.

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A 2-ACRE ENCLOSURE FOR TREE SQUIRREL RESEARCH

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Our study was designed to determine if a large outdoor enclosure is suitable for evaluating the shelter requirements of gray squirrels. We designed and tested an escape-proof enclosure to determine how many squirrels could be maintained without overpopulation, and to determine if reproduction would occur.

A 2-acre area in a stand of mixed hardwood about 40 years old with low mast production and few den sites was selected in the West Virginia University Forest, 11 miles east of Morgantown. The tree canopy was removed from a 30-foot wide strip centered on the fence line, leaving approximately 1.5 acres of canopy inside the enclosure.

The squirrel-proof fence was 7.5 feet high with a 3-foot strip of 28-gage sheet metal attached above the 5-foot high base course of 1-inch mesh wire. A 3-foot wide 1-inch mesh wire was laid on the ground and attached to the bottom of the fence to prevent animals from going underneath. Materials cost approximately $2,000, and 125 man-days were used to build the fence.

We plugged the natural dens and installed 10 den boxes (Barkalow and Soots 1965) 20 to 25 feet up in trees. We did not interfere with leaf nest construction and maintenance. An observation platform was constructed near the enclosure center.

Natural foods were supplemented with corn and laboratory rat chow *ad lib.* Drinking water was supplied. Squirrels were ear-tagged and fur-marked with Nyanzol D dye. (Use of a trade name is for information only, and is not an endorsement by the U. S. Department of Agriculture.) External parasites were controlled by rotenone, and sodium sulfamethazine was added to the drinking

water to control coccidiosis. No losses to predation were observed or suspected. Age estimates were made, using the techniques described by Uhlig (1955) and Barrier and Barkalow (1967).

November 1969 to August 1970—Low population

Three adults, two males and one female, were introduced in November, and a subadult pair and an adult pair were introduced in February and March respectively. Some fence-running occurred immediately after each introduction, but it was not excessive.

By May two squirrels were missing. Later in the summer, another squirrel escaped. We assumed that the squirrels escaped over the fence at the stretch panels (fig. 1). Therefore we moved the wooden cross braces to the tops of the posts. But the problem was not completely solved until a sheet metal shield was installed under the braces in July 1972.

Premating behavior began in April, and mating chases were observed in May and June. The first known litter was born in July and was successfully reared, probably by the only breeding-age female in the pen. The birth and survival of a litter was a key event.

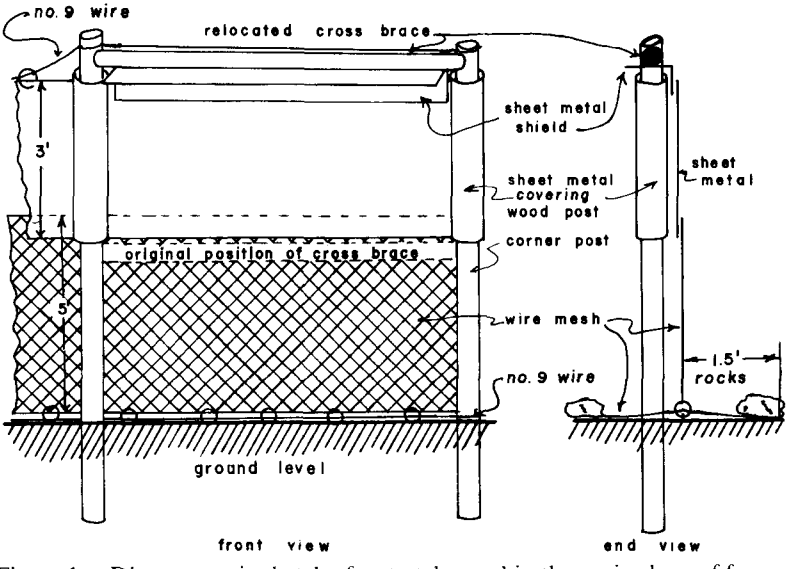

Figure 1. Diagrammatic sketch of a stretch panel in the squirrel-proof fence.

September 1970 to August 1971—High population

To determine how many squirrels could be maintained in the enclosure, the residual group of 7 (3 males and 4 females) was increased to 19 by introducing 3 groups of 4 squirrels (2 males, 2 females) in December, March, and July respectively. With escapes, 17 was probably the maximum density attained.

No more squirrels were added until those previously introduced had integrated with the earlier residents. We judged the effect of each new introduction on the residents by looking for behavioral changes.

Mating chases began in mid-May, and the first litter was born in early July. When the young were less than 4 weeks old, they were ear-punched. Three more litters were born in late July, and the young were toe-clipped at less than 10 days

of age, because their ears were too small to punch. The late July litters were subsequently destroyed, probably by the mothers.

After the second group of squirrels was introduced in March, we saw some behavioral signs of overpopulation. Squirrels started to escape through holes in the rusted 20-gage wire net in May; and despite repairs, 12 were lost by September 1. We hypothesized that the July introduction of 4 squirrels, raising the total number to 17, may have contributed to the litter destruction.

We concluded that 10 to 12 squirrels would be a reasonable density in our 2-acre enclosure.

September 1971 to July 1972—Medium population

The rusted wire net was replaced with a heavier material (14-gage 1-inch mesh wire) and the enclosure was readied for restocking. There were 7 squirrels remaining in the enclosure, and we brought the population up to 12 (5 males, 7 females) by March 1.

Two litters were born in early May—earlier than previous litters born in the enclosure. By mid-July a third litter was born and a fourth female was pregnant (determined by palpation).

The three litters were checked when less than 10 days old; one squirrel from each litter was removed for age determination and then returned. The two early May litters were not disturbed again until age 6 to 7 weeks, when they were examined, weighed, and ear-tagged on June 7. Litter survival was 100 percent, and in mid-May they were removed from the enclosure to reduce the population.

CONCLUSIONS

Gray squirrel reproduction was not inhibited by the 2-acre enclosure, but litter survival was reduced at the highest population levels. Toe-clipping and/or population density may have been factors in litter survival.

A population of 10 to 12 squirrels seems to be optimum density for the 2-acre enclosure.

We believe escape problems have been reduced to the minimum possible with our enclosure design, and that it is suitable for many kinds of squirrel research.

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