

DELMARVA FOX SQUIRREL STUDY
BLACKWATER NATIONAL WILDLIFE REFUGE

REPORT #2
PERMIT 8-412-C

PURPOSE:

This study was carried out to increase the scientific knowledge of the life history and habitat preference of the endangered Delmarva fox squirrel. The first study in this location was conducted in 1970-71. The objectives were: (a) To accurately determine the existing population of the Delmarva fox squirrel on one major type of Blackwater Refuge woodland. The ear tagging which was conducted in 1970-71 gave basic data for comparison. (b) To gather base data for population comparison in the TSI area of the block as to adjacent woodland area. (c) To evaluate censusing method of leaf nest counts.

JUSTIFICATION:

The Delmarva fox squirrel (Sciurus niger cinereus) is a large grayish colored tree squirrel inhabiting four counties of the Eastern Shore of Maryland with introductions at Chincoteague NWR, Virginia. The former range was Delaware, Eastern Shore of Maryland, Chester and Delaware, and Lancaster Counties in Pennsylvania. This particular subspecies of the fox squirrel has been placed on the rare and endangered list by the United States Department of the Interior (1970). The State of Maryland has prohibited hunting of this squirrel since 1971.

To provide criteria for acquiring additional lands for the squirrel, we must determine what squirrel densities occur in different types of woodlands and which is better habitat for survival of the Delmarva fox squirrel. The refuge population in the 52 acre Egypt Road block affords us this opportunity.

It will also provide data for use by the Delmarva squirrel recovery team in evaluating possible restocking programs.

CONTENT OF REPORT:

This report will show the estimated Delmarva fox squirrel population on the 52 acre block. It will point out high and low use of the

Delmarva fox squirrel compared to the Eastern gray squirrel. It also compares the number of leaf nests with the 1970-71 study. Study shows the problem with ear tagging done in 1970-71.

PROCEDURE:

We used the same study area laid out in 1970 by a grid system covering the entire 52 acre block located adjacent to Egypt Road. Seven transect lines ran magnetic east and west. A post is located every three chains along the transect lines. The transect lines were spaced five chains apart. Total grid points in the 52 acre block was 29 (see Exhibit #1).

Trapping with live traps (14" x 14" x 32") placed at each grid point. Each trap was pre-baited beginning November 1. Traps were wired open and left until November 4 at which time we started the trapping operation. Each point was trapped five different days making a total of ten trap days at each point for the entire area. Ear corn was used as bait. Trapping was completed on December 17 and 290 trap days (the same number as the 1970-71 study) yielded 18 Delmarva fox squirrels and 4 Eastern gray squirrels. This compares with 16 Delmarvas and 15 Eastern grays in the 1970-71 trapping study.

There were a total of 9 females (sows) and 9 males (boars) trapped in 1976. Six of the squirrels were believed to be immatures or young of the year. This included four males and two females. We did not weigh any of the squirrels during the study.

The 1970-71 study yielded 8 females (sows) and 8 males (boars). Only 2 of the 16 were identified as young of the year. When one compares the study with that of 1970-71 it appears that production is up to a normal level in 1976 since one-third of the population is young of the year.

The capture of all the squirrels was by using the box live traps. The squirrels were anesthetized briefly using metofane and ear tattooed. The use of metofane was excellent and we had no trapping mortalities. The squirrels recovered from the drug in about five to ten minutes. They were held another ten to fifteen minutes before being released at the site of capture. All the squirrels appeared in excellent condition except for wolves (Cuteredra), a parasite, on three of the Delmarvas. One old female had three wolves on her back and condition of squirrel showed loss of fur. However, the squirrel appeared in good condition otherwise.

Three of the Delmarva fox squirrels trapped showed marks from being ear tagged in 1970-71. However, the tags were missing and from the appearance of the ears had been gone for some time. Reports from the State of Maryland on tagged nutria indicates that extreme cold weather

can cause the tags to freeze and that section of the ear becomes frost bitten and will decay away causing the tags to drop out. Because of this factor we recommend that only ear tattooing be used in squirrel marking. However, from the trapping we found that 3 of the 16 tagged squirrels lived more than 6 years.

The Timber Stand Improvement (TSI) done on the block in 1975-76 by removing the understory shows this helped to decrease the Eastern gray squirrel population and expand the Delmarva range when compared to the 1970-71 study (see Exhibit #2 and #3). Only 4 Eastern gray squirrels were trapped compared to 15 in the 1970-71 study.

Based on the trapping and recapture data and using the same type of index used in the 1970-71 study the following are the results:

M - Number of Delmarva squirrels marked

m - Number of Delmarva squirrels recaptured (November)

n - Number of Delmarva squirrels recaptured (December)

N - $\frac{Mn}{8}$ or $\frac{18 \times 10}{8} = 22.5$ (Delmarva fox squirrel population)

Therefore, for all practical purposes of this study the estimated population should be 23 DFS in the 52 acre block. This represents a squirrel for each 2.26 acres.

Blackwater's total estimated population is 250 Delmarva fox squirrels on 600 acres of the better habitat and/or second growth and edge habitat. On the average it takes 4.8 acres of the refuge to support one DFS.

Therefore, if we assume that the increase in the 52 acres is due to the TSI work we could improve about 550 acres (habitat like that in the 52 acre block) and increase the refuge population another 52 squirrels. However, the cost would be high and the purchase of mature woodlands (such as the Jarrett Tract) may be more feasible. Again, since we are managing an endangered specie we must improve all the present habitat to the optimum carrying capacity and hope to secure funding. For this reason, we should not rule out TSI work on that habitat which can be improved within the next few years.

As mentioned before, no Eastern gray squirrels were marked and only four were trapped. Based on the number trapped in 1970-71 (15) it appears the population has dropped from the estimated 25 to 10. All the Eastern gray squirrels were trapped in an area which is of younger trees and more understory and TSI was not completed until later this summer after much of the breeding season was over. When comparing the 1970-71 Eastern gray squirrel range with the 1976 range, the portion which had TSI performed in 1975 definitely showed the DFS expanded into the area and the Eastern gray squirrel's population decreased. (Exhibit #4 and #5)

It is the writer's opinion that the primary difference between high and low Delmarva fox squirrel use is not the size or age of the woodlands but the condition of the understory. One can readily see that mature woodlands have a dense topstory, whereas, the younger woodlands have a dense understory. Woodlots with little undergrowth and much edge bordering agricultural fields is the best Delmarva habitat. The hardwoods as well as the pine are important since the DFS have been observed feeding on the red maple buds early in the spring when food is scarce.

Based on the information gained through the reported transplants of DFS on Eastern Neck NWR around 1920 and those in the early part of 1970 at Chincoteague NWR we have found that the squirrel can survive outside its preferred habitat when given complete protection. We know from observations afield and reports from private landowners that unprotected marginal habitats (cut-over timber and second growth trees) adjacent to Blackwater show low numbers of the Delmarva fox squirrel. The present timber practices, hunting of Eastern gray squirrels, waterfowl hunting, deer hunting (squirrels taken illegal), and large number of predators (raccoons and fox) on these lands keep the squirrel at a low population level. Therefore, we cannot overlook protection as an important part of the management of this animal. Raccoons which are now at record numbers in the Delmarva fox squirrel range may take a substantial number of the young. The State of Maryland may be able to determine what effects natural predation has on this endangered specie when their study is complete. Another area for study is the effect of cropping adjacent to woodlands. It is felt that the Delmarva fox squirrel does favor agricultural fields both at Blackwater and probably more so at Eastern Neck NWR since the farming in the period after transplant (1920 to present) may have influenced the large numbers found on the island.

The following leaf nest data was collected in 1975 before the placement of wood nesting boxes by the State of Maryland. A total of 73 nests were counted in 1975 compared to 91 in 1970. Fewer nests were observed in the TSI area which may account for departure of some of the Eastern gray squirrels which declined about 15 since the 1970-71 study.

The following is a breakdown of the leaf nest count data for the years of 1970 and 1975.

	<u>Year</u>		<u>Year</u>
	1970		1975
Limb nests	In pines	32	23
	Hardwoods	<u>5</u>	<u>8</u>
		37	31

	<u>Year</u>		<u>Year</u>
	1970		1975
Trunk nests	In pines	27	22
	Hardwoods	26	20
	Cedar	<u>1</u>	<u>0</u>
		54	42

Leaf nest counts will no longer be made because of the introduction of nest boxes.

SUMMARY:

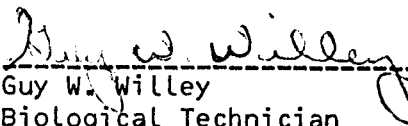
Population estimate for the Delmarva fox squirrel (Sciurus niger cinereus) on the 52 acre study plot by the index method of recapture to the ratio of marked individuals is 23. This is an increase of 5 over the 1970-71 count. It is felt that the TSI work in the block may have forced some of the Eastern gray squirrels to the Luthy Tract and Malkus private owned lands which has a dense understory. These lands are located directly across the county road (Egypt). We also found that ear tagging of squirrels is not feasible if we are to gain information on a long term basis. Marks on the ears from the old tags gave us some information (three survived more than six years after the study). However, the location of tagging was lost and we are unable to determine movement patterns if any. In closing we feel the ear tattooing and use of the drug metofane is the best method for marking the squirrels in the future.

ACKNOWLEDGMENTS:

I wish to thank the following people for their help and assistance in conducting the study of the Delmarva fox squirrel:

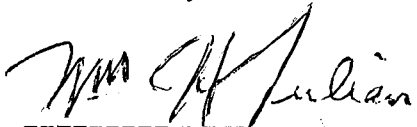
William H. Julian - Refuge Manager
Franklin A. Hughes - Refuge Mechanic
William Giese - Recreation Aid
Dr. Vagn Flyger - University of Maryland
Gary J. Taylor - Biologist - State of Maryland

Respectfully submitted,



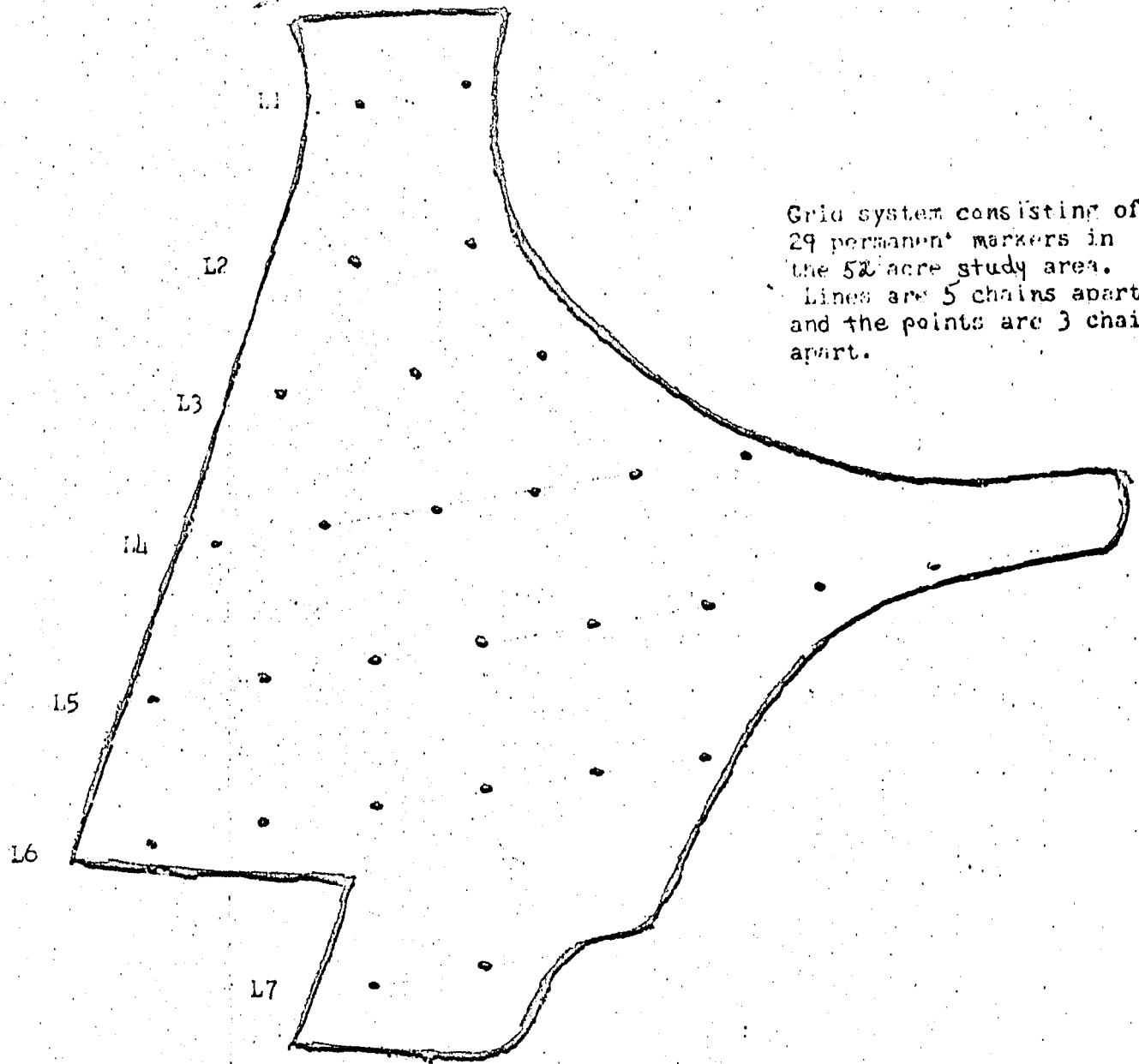
Guy W. Willey
Biological Technician
December 30, 1976

Reviewed by:

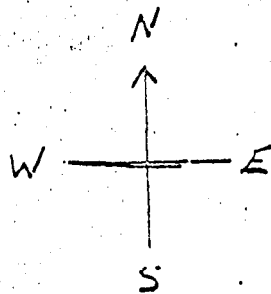


William H. Julian
Refuge Manager
December 30, 1976

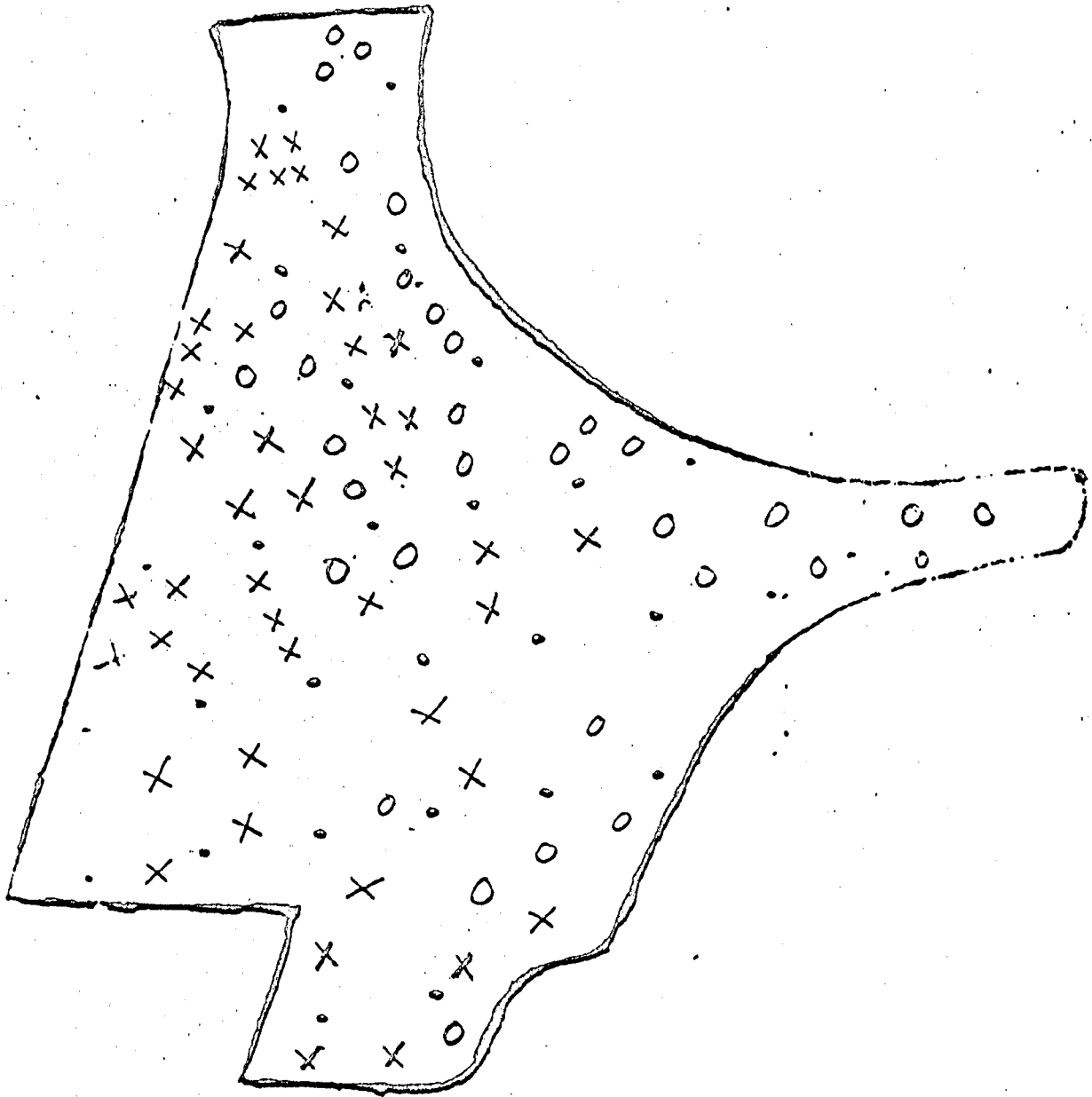
SQUIRREL STUDY PLOT



Grid system consisting of 29 permanent markers in the 52 acre study area. Lines are 5 chains apart and the points are 3 chains apart.

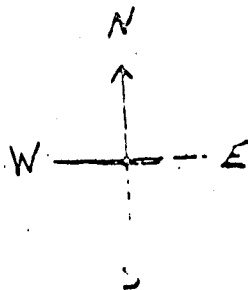


Nest Distribution Data



O Limb Nests - 26 found in pine trees. 7 found in hardwoods. total 33 nest.

Conducted Jan. 7- 10, 1975.

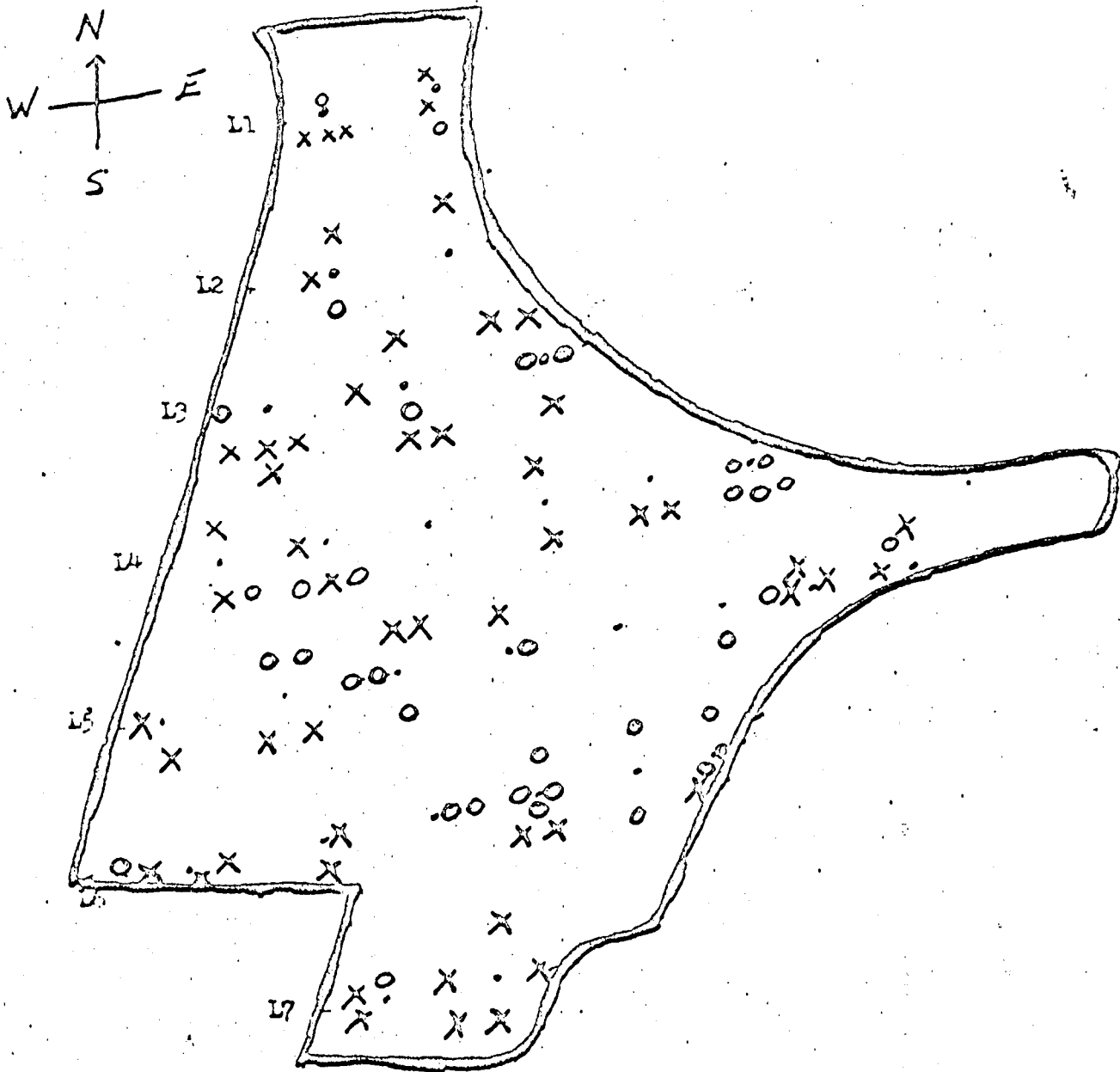


X Trunk Nests- 27 in pine, 21 in hardwoods. Total 48 nest.

SQUIRREL STUDY PLOT

Exhibit #3

Nest Distribution data



1971 Count

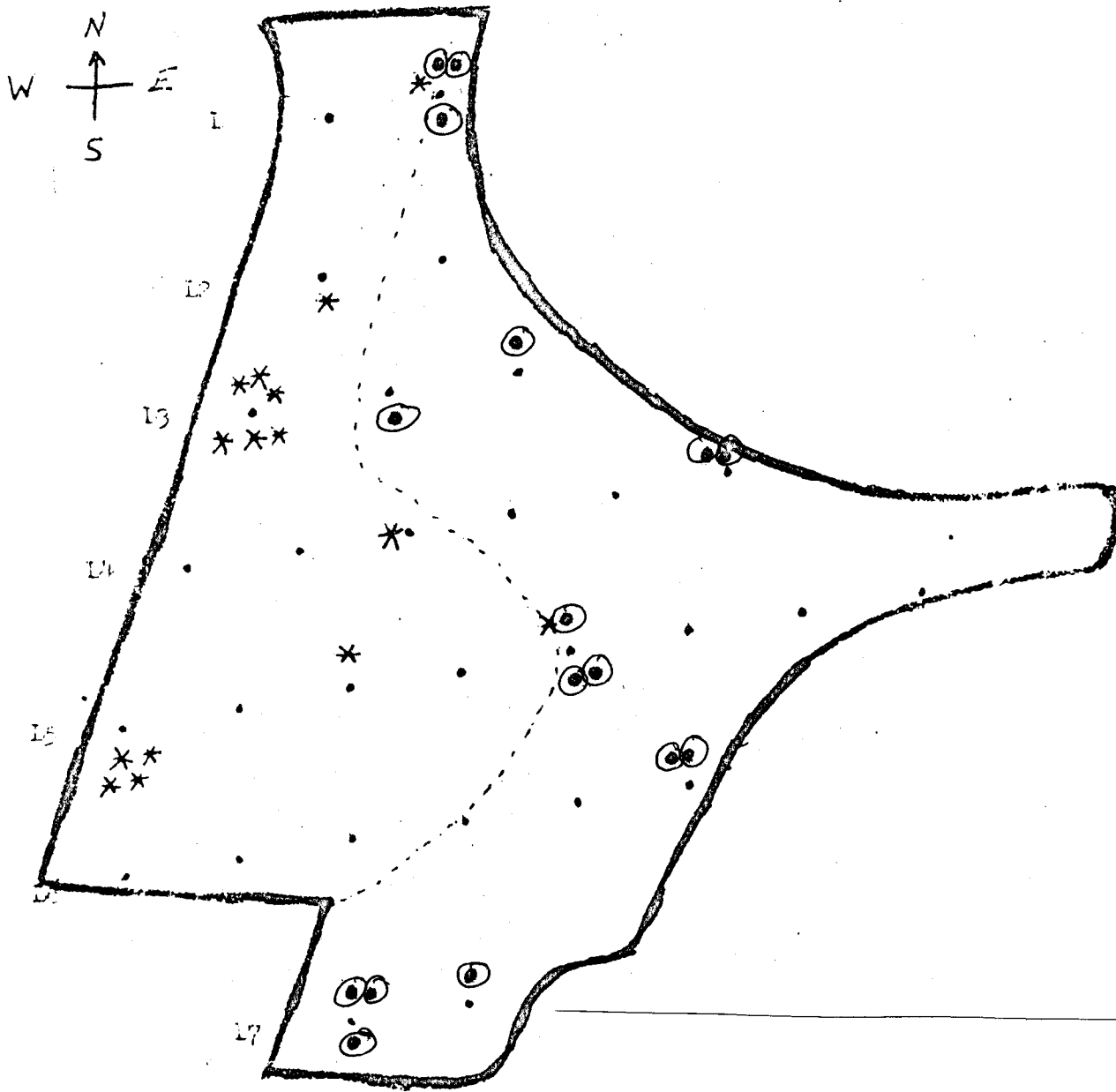
O - Limb Nests. 32 found in pine trees, 5 found in hardwoods. 37 total limb nests.

X - Trunk Nests. 27 found in pine, 26 found in hardwoods, and one found in cedar. 54 total trunk nests.

SQUIRREL STUDY PLOT

EXHIBIT #5

52 acres



DELMARVA FOX SQUIRREL

○ First-time capture locations
16 squirrels

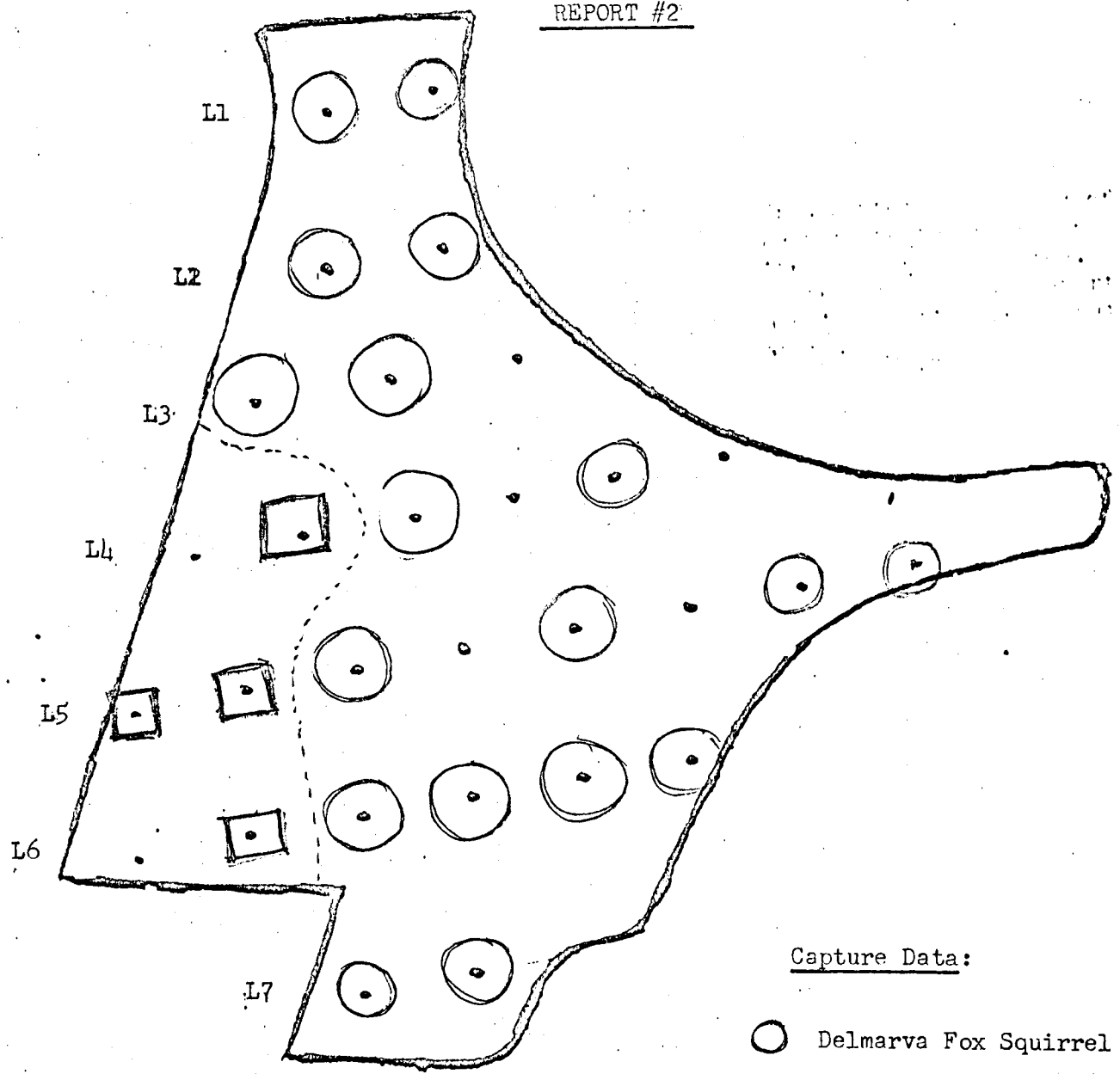
GRAY SQUIRREL

* First-time capture locations
15 squirrels

1970-71 Trapping Program

DELMARVA SQUIRREL STUDY

REPORT #2



Capture Data:

- Delmarva Fox Squirrel
- Eastern Gray Squirrel

1976 Trapping

