

KROGER HILLS
SMALL MAMMAL SURVEY

Submitted by

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INTRODUCTION

This study is the fourth phase of a mammal survey which was begun in the summer of 1986 in Kroger Hills park.

During the years immediately prior to 1986, the Kroger Hills farm property had been undergoing old field succession for a number of years. The field was cut in the fall of 1986 after the initial summer trapping period. Since that time the park has been trapped every summer and cut every fall.

The original cutting and bushhogging eliminated tree growth, and most of the scrubby and tangled growth. The ensuing cutting and seeding with mixed grasses has converted the area to a managed meadow habitat.

This study is part of a land management study supported by the Hamilton County Park Administration and at one time was also considered for Ohio's barn owl re-establishment program. The fourth or most recent trapping survey was conducted during the summer and fall of 1989.

METHODS

Sherman live traps supplied by the Hamilton County Park Board were utilized. The sample sites were trapped employing 5 X 6 grids with 15 meter spacing. The bait utilized was peanut butter, oats, seed or a combination of these. A thirty trap grid was utilized to reduce loss due to possible theft. This number made baiting and checking traps a bit easier to conform to the worker's summer schedule. Plots 3 and 4 were exceptions. Plot 3 and 4 were trapped to see if any animals were present. Quantification of animals was performed on the plots in the more productive regions.

Population density was determined by direct enumeration of marked individual mice per 100 trap nights, or the Schnabel modification of Peterson's 1896 method (Schnabel, 1938).

The relative grid areas trapped were estimated by calculating:

$$\text{AREA} = (\text{rows} \times 15)(\text{cols} \times 15).$$

Mammal density was normalized to number per hectare ($10,000\text{m}^2$).

Seven plots or grids were utilized for data collection. The sample plots were distributed through several seasons. The sample plots of 1989 repeated the 1988 and 1987 sites.

The Kroger Hill property is composed of a patchy distribution of vegetation types and the sample sites were selected to cover as many types of habitat as possible.

The following is a list and description of the various sample sites:

Plot 1 (0.3 mi. from Terrace Park gate) This plot is also the same as 1988 plot 1. The vegetation was less diverse than in 1988 but thicker density. The species consisted of sweet clover, golden rod, milkweed, wild carrot and thistle. The undergrowth consisted of mixed grass (thicker than 1988) and viney growth.

Grid Size (6 X 5)
Date June 6 - June 15, 1989
Trap nights 270

Plot 2 Summer

This is an area west of the barn approximately in the middle of the Kroger Hill property. The vegetation here is similar to Plot #1 with respect to vegetation species types but the density is much reduced and the undergrowth of grass is extremely reduced. Some bare ground visible

Summer

Grid Size (6 X 5)
Date June 22 - June 30 & July 5 - July 10
Trap nights 360

Fall- a fall sample was taken after the area had been cut.

Plot 2 Fall

Grid Size (6 X 5)
Date Oct. 27 - Nov 3
Trap nights 360

Plot 3 Barn Plot

An area of mixed coarse grass (brome) at the barn

Grid Size (5 X 3)
Date July 17 - July 21
Trap nights 75

Plot 4 (lake)

This area appears to be a dried out pond. Very sparse goldenrod, and longer grass. Undercover of clover. Some bush honeysuckle.

Grid Size (5 X 3)
Date July 17 - July 21
Trap nights 75

Plot 5 Fall (1988 plot 2)

An area composed of vegetation similar to plot # 1.

Grid Size (6 X 5)
Date Sept 8 -Sept 15 & Sept 24 - Oct 4
Trap nights 540

Plot 6 (an area overlapping summer plot #1) and plot #5

This area was sampled after the fall cutting. The ground cover was basically cuttings or litter from the summer and ground cover of living grass and short wild carrot or yarrow type growth. (In progress)

RESULTS

As can be seen in tables 1 and 2 the *Microtus* population in Kroger Hills Park is higher than it was in 1988. We see that there has been a steady increase in voles since the original trapping in 1986. During 1986, 1987 and 1988, *Peromyscus* captures per 100 trap nights remained constant but during the summer and fall of 1989 there appears to be a decline in *Peromyscus* captures/ 100 trap nights. The increase in proportion shown in table 3 in *Microtus* through 1987, 1988, 1989 is highly significant, $Z = 4.0$: $P =$ very low.

It therefore appears that *Peromyscus* is being slowly displaced from the meadow. The reason for *Peromyscus* leaving is not so obviously clear. Either the vegetation has become limiting for *Peromyscus* which would be difficult to prove since habitat differences between 1988 and 1989 Summer Plot #2 do not exist. The region of the field near Plot # 1 does have an increased grass cover at the ground level which may be involved. An alternate hypothesis would be that there is a behavioral displacement. Here we could hypothesize increased inter-species stress as *Microtus* increases in number. *Peromyscus* may therefore be being displaced behaviorally.

The other small mammals in the field are also increasing as the meadow becomes more grassy. *Zapus* numbers seem to be increasing as well as *Mus musculus*. It is still interesting to note that no *Blarina* were taken during the summer of 1989.

Even though *Microtus* is increasing in most areas of the property, and *Peromyscus* is holding its own or slightly decreasing in others, there appear to be areas which neither mouse will move into in high numbers (i.e. the barn and lake meadow area.) The main difference in these last two habitats is soil consistency which may be too gravelly and therefore limiting.

The barn meadow area is covered by grass but has never yielded *Microtus*. A possible reason is that it is deeply furrowed by plowing under the grass. Several mice were caught during the summer which could have been *Microtus oregonaster* and several specimens of possible *P. maniculatus* were also caught.

	Plot #1	Plot #2	Plot #3(Barn)	Plot #4(Lake)
Peromyscus marked	13.0	14.0	0	1
Lincoln Index	7.8	14.6	0	
per 100 trap nights	13.33	10.8	0	1.3
Microtus Marked	12.	24	0	1
Lincoln Index	18	38.67	0	
per 100 trap nights	4.44	8.05	0	1.3
Mus Marked	3	10	3	0
Lincoln Index		7		0
per 100 trap nights	1.11	4.16	2.0	0
Zapus marked	3	1	0	0
Microtus density/hectare				
direct count	17.78	35.56	0	1.48
Lincoln Index	26.67	57.29	0	-
Peromyscus density/hectare				
direct count	19.26	20.7	0	1.48
Lincoln Index	11.55	21.6	0	-
Area (Hectare)	0.675	0.675	0.338	0.338
Trap Nights	270	360	75	75

TABLE 1 (Summer Plots)

	Plot #5	Plot #2	Plot #6	
Peromyscus marked	16.0	3.0		
Lincoln Index	10			
100 trap nights	3.73	2.00		
Microtus Marked	29.	3		
Lincoln Index	85			
100 trap nights	12.22	2.00		
Mus Marked	2	0		
Lincoln Index				
100 trap nights		.55		
Zapus marked	1	0		
100 trap night	.185	0		
Microtus density/hectare				
direct count	42.96	4.4		
Lincoln Index	125.93	-		
Peromyscus density/hectare				
direct count	23.7	4.4		
Lincoln Index				
Area (Hectare)	0.675	0.675	0.675	
Trap Nights	540	210	150	150

Table 2 (Fall Plots)

DISCUSSION

There has been a significant change in the vegetation of the Kroger Hill property since the management program began in 1986. The land is basically a meadow but there is heterogeneity in the habitat. Certain areas are more bushy, scrubby, and tangled compared with other areas which are basically composed of mixed grasses golden rod, and sweet clover meadow. At present since the fall mowing there are areas in which the ground is covered with low grass and herbaceous growth. Other areas just show the remains of the dead summer growth and bare ground, therefore, the Kroger Hill property is meadow but meadow made of a patch work of various habitats. There are some areas which really aren't worth much biologically, in particular, the area which I referred to as the dry lake which is dry with coarse grass, sparse clover and dry hard pebbly soil. There is also an area south and west of the barn with extremely pebbly soil which never has yielded any mammal life in trapping.

The summer and fall of 1989 produced a dramatic rise in the *Microtus* population and a significant drop off in the *Peromyscus* population. Increases in *Zapus* and *Mus* show that the property is more conducive to other species.

The fall cutting appears to have caused a problem for the mammal populations considered. Plot #6 and fall Plot #2 address this question. Plot #6 is in progress. Mammal density as revealed by trapping success has either dropped considerably or the mice involved have moved. *Peromyscus* probably is now more concentrated in the forest edge and may have been less effected but some of them are still venturing into the field. The question is where are the *Microtus*. They have either moved to other parts of the field than were productive in the summer, are not moving or as trappable, or may have been partially destroyed by the mowing. Their size distribution is fairly homogenous and their numbers are moderate so we can guess the population was still in the growth phase of its cycle. Voles caught during September and October showed some signs of stress however. Some of the animals when captured and held in the hand convulsed. The mowing could have been destructive.

The spring will see meadow growth conducive to *Microtus* and *Peromyscus* in most areas of the field. It would be interesting to sample the population to see if *Microtus* can displace *Peromyscus* from the present meadow type (i.e. tangled growth and grass cover). If the meadow were entirely grass with some wild flowers and little herbaceous variations *Peromyscus* would move out because of vegetation preference.

It would also be interesting to follow the population changes in Peromyscus and Microtus through the complete cycle. (i.e. Microtus must eventually peak and decline.) The apparent reduction in Microtus population occurring right now is purely an artifact caused by cutting.

The meadow type as it is, could provide an answer to the question "Can Microtus displace Peromyscus purely by a behavioral mechanism or must the habitat vegetation change more drastically or completely before Peromyscus can be displaced?"

The Deer population may be down as compared to 1988.

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