

A PREDATOR-PREY RELATIONSHIP BETWEEN THE SHORT-EARED OWL AND THE MEADOW MOUSE

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An influx of Short-eared Owls (*Asio flammeus*) to the Toronto region occurred in the late winter and early spring of 1936, coincident with a plague of meadow mice (*Microtus pennsylvanicus*). In reporting on this occurrence, it is pertinent to review the local status of this owl. This is made possible through the information compiled by Mr. Murray Speirs for the fifty-year period, 1887-1937, from the occurrence file in the Royal Ontario Museum of Zoology.

The Short-eared Owl has not been known to summer in the Toronto region. It is to be expected in autumn, principally during October, after which it usually disappears. It is again to be expected during February and March. Its absence during December seems fairly definite since it has been recorded only twice on the annual Christmas census of birds taken for the past thirteen years, once in 1930 and once in 1934. The species is thus a transient, which moves into the Toronto region in the autumn, passes on probably to more southerly stations and returns again for the late winter and early spring period.

There is considerable variation from year to year in the number of Short-eared Owls observed. During some years it has not been discovered. A total of thirty to sixty individuals seen during a season indicates that the species is prevalent. The first influx in such numbers occurred in the early winter of 1889-90; next in the falls of 1895 and 1896. Late winter and early spring records for 1896 and 1897 suggest a return of numbers following the fall influxes. The next period which definitely shows large numbers was not until the fall of 1909, and this was followed by a return of many birds in the early months of 1910. The last period of large numbers was in the late winter and early spring of 1936. Our records for periods between certain of those mentioned above suggest the probability that there were other years when Short-eared Owls were comparatively common, but the information is too indefinite to be useful. The most that can be said is that the species is numerous at certain periods, in the Toronto region, and at other times scarce, or entirely absent.

In February, 1936, reports of the presence of Short-eared Owls were received from several outlying sections adjacent to the city. Casual walks through one suitable habitat during the period from February 23 to March 22 led to the observation of from one to five individuals. Incidentally, it was noted that meadow mice were particularly abundant; scurrying mice and their nests were conspicuous.

Early in April another resort of this owl was discovered. Through the tell-tale signs of owl pellets, it became known that owls were, or had been, roosting in the ornamental evergreen plantings about the York Downs Golf Course in considerable numbers. This situation had not been previously regarded by local observers as a particularly likely place to find Short-eared Owls. However, during the second week of April, from one to eight individuals were noted frequenting the location. By the end of the second week they had disappeared. Roosts in the evergreens were inspected, and approximately one-half bushel of pellets, disgorged by Short-eared Owls, was picked up for examination. More than one thousand individual meals were represented by the recovered pellets. We did not attempt to explore the whole district for other roosts which may have existed. The pellets recovered gave a basis for a rough estimate of the owl population which had resorted to the scattered evergreen plantings covering perhaps eight or nine acres. Assuming that the owls had spent sixty days in this section, and had disgorged one pellet each day, the 1,078 pellets recovered gave evidence that eighteen owls had been located there. Inquiry was made of local residents and an attendant of the golf course informed us that as many as twenty-two owls had been present earlier in the year. Without doubt, there had been here an unusual concentration of Short-eared Owls during the late winter (1935-36).

Further inquiry made in the district elicited complaints from gardeners and property owners to the effect that mice had caused considerable damage to young trees and shrubs. Many young evergreens on the golf course had been girdled and a near-by nursery sustained heavy losses of stock. By motoring along the road fronting the golf course, one could see whole clumps of young trees and shrubs completely peeled of bark below the winter's snow line. Inspection of adjacent fields, uncultivated for many years except for the cutting of hay crops, disclosed that they constituted an extensive habitat for a heavy meadow mouse population. Locally there had been a veritable meadow mouse plague.

A summary of the situation is as follows: Meadow mice in the Toronto region generally, in the winter of 1935-36, were at a peak of numbers. Coincident with the large number of mice, unusual numbers of Short-eared Owls were present. The most notable concentration of owls occurred in the exact situation where meadow mice were sufficiently numerous to constitute a plague population. The relationship of the two species is revealed by the results of the pellet examinations given below.

TABLE 1. Results of Pellet Examination in 1936.

	Number	Percent
Pellets examined	1,078	
Individual animals represented.....	1,647	
Meadow Mice	1,181	71.7%
Deer Mice ¹	450	27.3%
House Mice	1	.1%
Birds (8 Snow Buntings, 2 English Sparrows, 1 Horned Lark, 4 unidentified).....	15	.9%

During the late winter period of the next year (1937) Short-eared Owls were again present in the Toronto region but they were not as numerous as in 1936. Meadow mice were generally regarded as less numerous and damage in the locality of the golf course ceased. Studies of Short-eared Owl pellets collected during this period were undertaken, however, although such material was relatively scarce. A search was made in the same evergreen plot as the year before and a satisfactory number secured. The results for this period are as follows:

TABLE 2. Results of Pellet Examination in 1937.

	Number	Percent
Pellets examined	252	
Individual animals represented.....	415	
Meadow Mice	389	93.7%
Deer Mice ²	22	5.3%
Birds (2 Snow Buntings, 1 Horned Lark, 1 unidentified)	4	1%

It will be noted from a comparison of this table with the first that the percentage of meadow mice was increased, while there was a reduction of other kinds of mice eaten. The ratio of all kinds of mice to birds taken as food remained approximately the same. It may be interpreted that the numerical ratio of Short-eared Owls to meadow mice was altered by the second year; that is, although both species were less common, there were relatively more meadow mice available to each owl present. Or it may be interpreted that a disappearance of deer mice increased the pressure on meadow mice.

The facts here presented indicate the converging of a predator on a definite area to feed on a lesser form, the population of which had attained plague proportions. The quantitative pellet analysis discloses the fact that a large number of prey animals from a restricted area were consumed. Heavy predation in 1936 occurred during late winter, a season when the reproduction of meadow mice was normally low. Thus the predator must have had a considerable effect on the numbers of mice locally.

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¹No distinction has been made as to the forms of deer mice discovered in pellets, at least two species probably being involved.

²Probably of two species.