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Density Estimation for an Urban Population of the Field Mouse [1]

Wskaźniki zagęszczenia miejskiej populacji myszy polnej

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The density of the field mouse *Apodemus agrarius* (Pallas, 1771) was estimated twice during the course of a year, using the Petersen index, in one of the green spaces of Warsaw. The densities obtained, 88 and 39 individuals/ha, are higher than those given for areas outside towns. The biotic and abiotic factors responsible for such high densities are discussed.

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The aim of the study was to estimate the density of the field mouse, *Apodemus agrarius* (Pallas, 1771) in a habitat formed by one of urban green areas. Papers so far published on such habitats have either been faunistic in character (Sumiński, 1922; Chudoba *et al.*, 1961) or supplied information on relative density (Andrzejewski *et al.*, 1978). In order to estimate possible epidemiological or trophic role of this species in a town it is necessary to have an idea about its real densities.

The study area was situated in the Greek Orthodox cemetery in Warsaw, lying within the limits, but outside the centre of the city. The cemetery is adjoined by extremely busy streets, a housing settlement and a park. Density estimates were carried out in the southern part of the cemetery in June and October 1977. The area is covered by trees more than 80 years old, and a dense herb layer which is similar to the *Tilio-Carpinetum* habitat in respect of species composition and structure. The southern part except for its centre is rarely visited by humans and the herb layer only rarely mown in certain parts.

Live traps were placed in a basic grid (40×40 m) over the whole of the southern part of the cemetery, occupying an area of 5.25 ha. A total of 42 trapping sites were set up and two traps placed on each of them. The trapping cycle consisted of 6 (June) and 7 (October) inspections of the traps, during which the mice were marked and released. The traps were inspected twice daily in June and once daily in October. The last two inspections of each trapping cycle were used to estimate the percentage of marked mice. The number of all individuals present in the area was estimated by the Petersen index [2] (Petersen, 1896). In order to reduce the rodents, habituation to traps to a minimum (and to avoid constantly catching the same individuals) the traps were moved round the basic trapping sites during in-

[1] Praca wykonana została w Inst. Kształtowania Środowiska w ramach problemu MR.II.6.

[2] Known also as Lincoln index.

spections. In accordance with the accepted system of drawing lots the traps could either remain on the basic trapping site or be shifted 20 m from it in a N, W, S or E direction. The number of possible shifts of traps situated on the edges of the cemetery were obviously smaller. In order to check whether there was migration between the different parts of the cemetery, traps were also set in the northern part during the course of the trapping cycle, usually placing about 30 live traps and snap-traps near the bank separating the two parts of the cemetery.

During the late-spring trapping period 87 mice were marked during the first 4 inspections of the traps. The percentage of mice marked, estimated on the basis of the subsequent two inspections, was 18.9 (lower and upper limit with 0.95 confidence level was estimated on the basis of the binominal distribution as respectively 9 and 32%). The whole population of the southern part of the cemetery was estimated at 460 individuals (272—967), thus giving a result of 87.6 mice per hectare of this area (52—184).

In autumn 66 individuals were marked during the first five inspections of traps. The percentage of marked mice, estimated on the basis of the two subsequent inspections, was 32.2 (17—50). The whole population was estimated at 204 mice (132—388) and density 38.9 individuals/ha (25—74).

During trapping carried out in the northern part of the cemetery at the same periods, the figures were respectively 76 and 51 mice. None of the animals were marked, which indicates that there was either no or very little migration between the two parts of the cemetery. This in turn leads to the conclusion that the densities obtained are not overestimated as a result of animals entering the area. Entry of mice into the cemetery from the neighbouring park is also ruled out, since control trappings showed that there were no field mice in the park.

According to data encountered in literature on rodent populations in more natural habitats, densities of field mice are far lower than those found during the course of the present studies. The density of *A. agrarius* in shelter belts and biocenoses of cultivated fields, for instance, was assessed as 16.8 individuals/ha (Ryszkowski *et al.*, 1973), whereas average density was maintained on a level of a few individuals only per hectare (cf. also Goszczyński, 1977). Low density values (less than 10 individuals/ha) have also been given for wooded land (Ryszkowski, 1970). Maximum out-urban density of *A. agrarius* (about 46 individuals/ha), described as a mass irruption, was recorded by Andrzejewski & Wrocławek (1961); except for that particular year, density of that population has been maintained on a level of 4—12 individuals/ha for several years.

It was shown in the study by Andrzejewski *et al.* (1978) that with increasing urbanization the field mouse becomes a decided dominant in the rodent group. In the study area *A. agrarius* also formed about 98% of the rodents caught (in addition to this species the house mouse, brown rat, common vole and European pine vole were occasionally caught). The lack of competition from the rodent group is probably one of the factors contributing to attainment of such great densities by the field mouse population. The favourable habitat conditions in the study area may constitute a further factor. In the paper by Babińska-Werka *et al.* (1979) it was found that the amount of avail-

able shelters determines the occurrence or absence of field mice in an urban green space. The number of shelters may also be assumed to determine population numbers. The large number of shelters rich luxuriant vegetation and in the surface layer of the soil, and the very rare visits to the area by dog's and humans, justify the assumption that the cemetery area is among the most abundant in numbers of *A. agrarius* in Warsaw.

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Penetration of Mammals Over Urban Green Spaces in Warsaw

Penetracja terenów zieleni miejskiej Warszawy przez ssaki

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Goszczyński J., 1979: Penetration of mammals over urban green spaces in Warsaw. Acta theriol., 24, 31: 419—423 [With 2 Tables & 1 Fig.].

The method of counting tracks in the snow was used to examine the composition and numerical relations of the group of mammals in three urban zones in Warsaw, and also in control areas. A threefold decrease in number of species was found from the city boundaries towards its centre. The number of green agreas in which mammals occur decreases with increasing urbanization of the area and this also applies to penetration of mammals. Only a small number of species (squirrels, stone martens and partly also rabbits) increase their numbers in a town. Domesticated mammals (cats and dogs) greatly dominate in urban green spaces.

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