

SPATIAL DISTRIBUTION OF THE FOREST DORMOUSE (*D. nitedula* PALLAS, 1778) POPULATION IN THE BIAŁOWIEŻA FOREST

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ABSTRACT. The study was conducted in years 1993-1996 in the Białowieża Forest (northeastern Poland) between May and July. 165 nestboxes fixed along a transect (in c. 65 m distance from each other), which were used by Forest Dormice as daily hides, were controlled. Captured animals (n=76) were individually marked. 92% of nestboxes were used during a year by one individual. In 63% of recaptures Forest Dormice were found in the same nestbox as previously. This suggest that the diameter of the home range is c. 65-100 m. The marginal number of cases when one nestbox was occupied by several Forest Dormice indicates that these animals are territorial in the studied part of the year. 10% of animals moved at remarkable distances – 2 km on average. They should be regarded as migrants. Territories are relatively stable from year to year. After the hibernation 47% of animals were encountered in the same nestbox as in the previous year and the most frequently (71%) movements for distances up to 200 m were noted. In a randomly selected season of studies, Forest Dormice occupied c. 35% of nestboxes among all ever inhabited (n=105). 44% of nestboxes were used in only one season. Thus, the population of the Forest Dormouse does not saturate all suitable habitats in the Białowieża Forest. This can be associated with location of the study area at the northwestern border of the species range.

Key words: Forest Dormouse, *Dryomys nitedula*, spatial distribution, migrations, Białowieża Forest

BIAŁOWIEŻA ORMANI'NDA AĞAÇ FARESİ (*D. nitedula* PALLAS, 1778) POPULASYONUNUN SPATIAL DAĞILIM

ÖZET. Araştırma 1993-1996 yıllarında Białowieża Ormanı'nda (kuzeydoğu Polonya) Mayıs ve Temmuz ayları arasında yürütülmüştür. Ağaç farelerinin gündüzleri saklanmak için kullandıkları ve düz bir hat boyunca yaklaşık 65m arayla ağaçlara tespit edilen 165 kutu yuva kontrol edilmiştir. Yakalanan hayvanlar (n=76) ayrı olarak işaretlenmiştir. Kutu yuvaların % 96'sı bir yıl boyunca bir hayvan tarafından kullanılmıştır. Tekrar yakalanan hayvanların % 63'ü daha önce yakalandıkları aynı kutu yuvalarda bulunmuştur. Bu, mesken genişliğinin yaklaşık 65-100 m çapında olduğunu gösterir. Aynı kutu yuvanın birkaç orman ağaç faresi tarafından kullanılma durumunun düşük sayıda olması bu hayvanların çalışmanın yapıldığı Mayıs ve Temmuz aylarında yaşama alanlarını savunduklarını gösterir. Hayvanların % 10'u ortalama 2 km gibi oldukça uzun mesafelere gitmişlerdir. Bunlar göçmen olarak kabul edilebilir. Savunaklar yıldan yıla oldukça sabittir. Kış uykusundan sonra kutu yuvalarda rastlanan hayvanların % 47' si bir yıl önceki kullandığı yuvalarda bulunmuş ve en çok rastlanan (%71) gezinti uzaklığının da 200 m kadar olduğu bulunmuştur. Tüm araştırma süresince (6 çalışma mevsiminde) işgal edilen kutu yuvaların (n=105) rasgele seçilmiş bir çalışma mevsiminde ortalama işgal edilme oranı yaklaşık %35 ' dir. Sadece tek bir mevsimde kutuların %44 'ü kullanılmıştır. Bu bulgular, Białowieża Ormanı'ndaki tüm uygun habitatların ağaç faresi popülasyonu tarafından işgal edilmediğini gösterir. Bu durum çalışma bölgesinin türün yayılış alanının kuzeybatı sınırında bulunması ile ilişkili olabilir.

Anahtar sözcükler. Ağaç faresi, *Dryomys nitedula*, spatial dağılım, göçler, Białowieża Forest

INTRODUCTION

The size of home ranges, the density of their arrangement in the field, the range of their overlap, and finally – the problem of territoriality of animals, are ones of basic populational issues. These measures determine first of all size and density of a population, reflecting its social structure and the quality of occupied habitats.

The Forest Dormouse, as a small rodent (up to c. 11.5 cm of length and 47 g of weight - Ognev 1947, Angermann 1963, Ajrapetyanc 1983, Pucek 1984), falls in the size range of the families *Muridae* and *Microtidae* (Ognev 1947, Nieethammer & Krapp 1978, Corbet & Southern 1977, Pucek 1984) of the same order *Rodentia*. Thus, it might be expected that the size of home ranges used by these animals could be extrapolated to the home ranges occupied by the Forest Dormouse. However, the reservations to legitimacy of such a generalisation are brought by large differences in biology and ecology of this species, as well as of the whole *Gliridae* family, in comparison with other small mammals. The Forest Dormouse is, first of all, a tree-dwelling animal, thus it uses space of a different character than e.g. the Yellow-necked Mouse or the Bank Vole. In Polish conditions, the Forest Dormouse breeds once a year and hibernates from October to April (Ognev 1947, Golodushko 1959, Sidorowicz 1959, Angerman 1963, Pucek 1984). Some authors suggested that the home range of the Forest Dormouse could be similar to the home range of the much larger representative of the same family – the Edible Dormouse *Glis glis* (Gaisler *et al.* 1977, Lozan *et al.* 1990).

The aim of this paper was to define the size of home range of the Forest Dormice and the extent of their overlap in order to estimate level of coverage of available space by the home ranges.

METHODS

The study was conducted in years 1993-1998 in the managed stands within the Białowieża Forest (north-eastern Poland). Along c. 13 km-long transect, running around a rectangle, 165 bird nestboxes (for small passerines) were hanged. The distance between neighbouring nestboxes was on average 64 m (SD = 17.7). They were used by Forest Dormice as daily hides. The nestboxes were controlled in the period May – July (in total, 55 controls were done). This study period allowed to omit the term in which home ranges of Forest Dormice establish after animals' wake up from hibernation and the period when females share home ranges with their already self-supported youngs (Sidorowicz 1959, Angerman 1963, Pucek 1984, Lozan *et al.* 1990). Caught Forest Dormice were individually marked with tattoos on ears. During the study period we succeeded to mark 76 individuals. Marked Forest Dormice were caught 162 times in total.

RESULTS

Amongst the nestboxes occupied by Forest Dormice, 91.5% were used during one season by one animal (except for statements of pairs during the oestrus period lasting for c. 1 week between 15 and 30 of May, depending on a year) – Fig. 1.

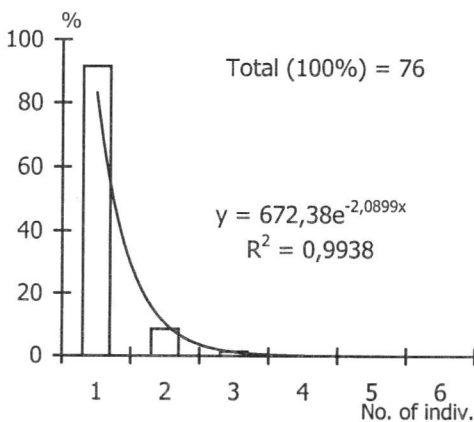


Fig. 1. Percent distribution of use of one nestbox by N Forest Dormice (in one season).

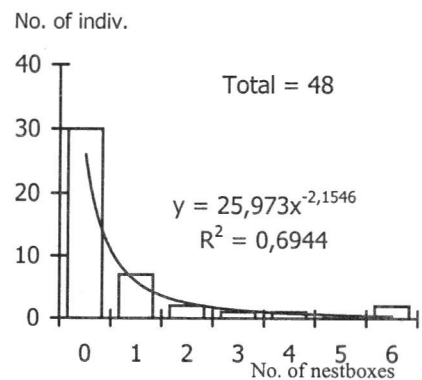


Fig. 2. Distribution of number of individuals which "moved to N nestboxes" during a season.

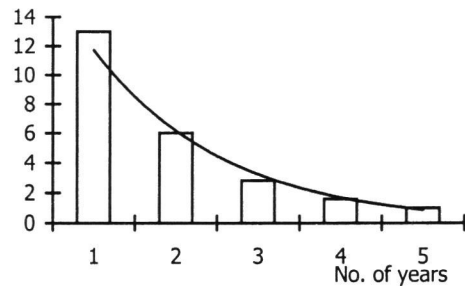
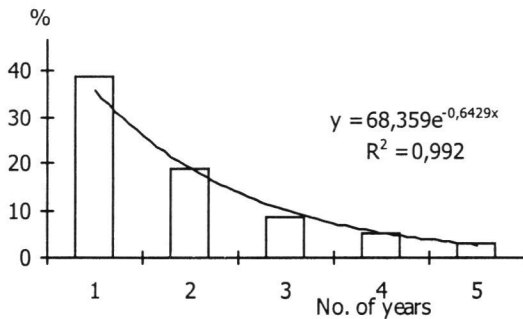
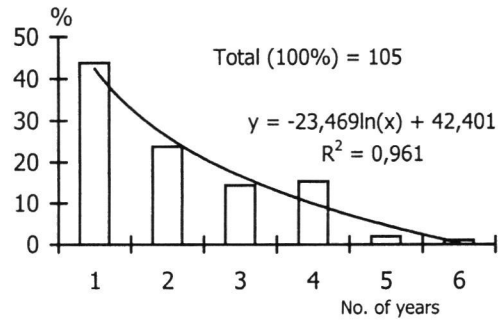
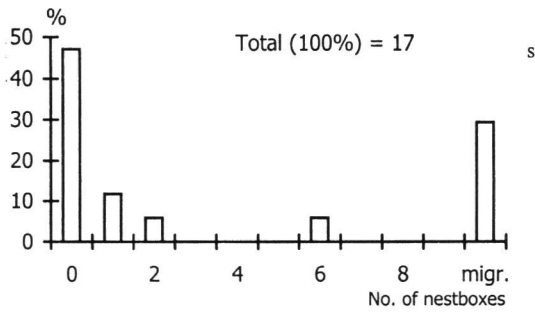


Fig. 5. Distribution of mean percent of nestboxes occupied in a given season, inhabited also in N random other seasons.

Fig. 6. Distribution of mean repeatability of the use of nestboxes' among N random seasons.

It was never stated that more than 3 individuals would occupy one nestbox within the same season (3 indiv. in 1.4% of nestboxes). In these cases an “exchange” of inhabitants took place, which means that the first inhabitant disappeared and never occurred again after the second one was met. If a Forest Dormouse was caught several times within a season, in 62.5% of cases it was met in the same nestbox as previously (Fig. 2). 10.4% of animals should be considered as migrants - the mean distance of their movements was c. 2 km, the largest - 4.5 km (it is the longest passage possible to note within the used transect). High repeatability from year to year of places of meeting marked Forest Dormice was noted. After wintering (hibernation) 47.1% of animals were found in the same nestbox as in the preceding year (Fig. 3). The most frequent were movements for up to 200 m - they amounted to 70.6% of all passages. In 29.4% of cases displacements were remarkable and were on average c. 1.2 km (the furthest distance - c. 1.5 km). At the same time, the observations showed that during 6 seasons amongst all the nestboxes, only 105 were occupied (they were localised in habitats suitable for the Forest Dormouse - subsequently they were considered as 100%). In the last (the sixth) season no new, not used in the previous seasons, nestbox was inhabited. In one season Forest Dormice inhabited on average 35.2% (SD = 11.9%) of the nestboxes placed in suitable habitats. Amongst all nestboxes “suitable to inhabit” 43.8% was used in only 1 of 6 seasons of studies (Fig. 4). Out of the nestboxes occupied in a given season (considered as 100%), on average 39.1% (SD = 8.0) were used in another season (Fig. 5). Therefore, after comparison of nestboxes' use among several (from 2 to 6) randomly chosen seasons, a distribution of the mean percentage (calculated in relation to all the 105 used nestboxes) was obtained, described by the exponential curve of the equation $y = 22.349 e^{-0.6452x}$ ($r^2 = 0.9884$) (Fig. 6).

DISCUSSION

Animals moving for remarkable distances during one season should be considered as migrants, especially if there is no distinct continuum in the distribution of distances crossed by the animals (Fig. 2). In this case the Forest Dormice which moved for c. 2 km on average, which was distinctly further than displacements of the remaining animals, constituted a fraction of 10%. The longest passage of a non-migrant was only c. 200 m and the substantial majority of animals did not reach even the neighbouring nestbox (Fig. 2). Thus it may be concluded that the diameter of the Forest Dormouse home-range is usually c. 65-100 m, and rarely reaches larger size. This result is much lower than suggested by Gaisler *et al.* (1977). As home ranges of other mammals usually have elongated shapes (e.g. Erlinge 1977, Mazurkiewicz 1983, Andrén & Delin 1994, Wauters *et al.* 1994, Jędrzejewski *et al.* 1995), it can be proposed that the calculated diameters are an approximate length of the short and the long diameter of an ellipsis. These home ranges are relatively stable from year to year. However, often distinct shifts of the home ranges take place, from much larger distances than shifts within a season (Fig. 3). Moreover, the marginal number of observed cases of occupation of one nestbox by several Forest Dormice showed that in the studied period of a year (May – July) they are territorial. Similar conclusions were presented also by other authors (Golodushko 1959, Angerman 1963). These facts may show that the Forest Dormouse population presents within a year a fixed spatial structure, which is subsequently reconstructed after each period of animals' "absence" in their habitat – i.e. after hibernation. A similar situation was suggested also by Lozan *et al.* (1990) with regard to the Edible Dormouse. Such an every-year restoration of the spatial structure and, subsequently, also of the social one is known in birds that abandon their territories for winter (e.g. Hinde 1952, Nowakowski 1994).

The second problem answered by the presented studies can be formulated as a question: How densely are Forest Dormice home-ranges – territories assembled in space? It draws attention that in a randomly chosen season of studies only in c. 35% of nestboxes "suitable to inhabit" were used by the animals. Amongst these nestboxes as much as 44% were used in only 1 out of 6 studied seasons, and only 1% of nestboxes – in all the six seasons (Fig. 4). Additionally, amongst all nestboxes inhabited in a chosen season, in some other randomly chosen season less than 50% of nestboxes were used. This proves that the population of the Forest Dormouse in the Białowieża Forest does not fill completely suitable habitats (Nowakowski & Boratyński 1997), leaving unused but potentially useful space. Such a dilution of a population can be connected with the localisation of the studied area on the northwestern limit of the species geographical range (Storch 1978, Pucek & Raczynski 1983, Jurczyszyn & Wołk 1998, Krištufek 1999).

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