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Does the occurrence of the hazel dormouse *Muscardinus avellanarius* in East-Saxony (Germany) dependent on habitat isolation and size?

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Abstract

In the eastern part of Saxony hazel dormice were found in small and isolated woods. Previous studies in selected small woods showed that dormice are able to cross open ground to migrate in or out of these woods. The scope of the present study was to determine the incidence of dormice in relation to isolation and size of the sites on a larger scale. For this 66 sites were checked for the occurrence of dormice in an area of approximately 330 km². Dormice are more likely to be present in woods larger than 20 ha. We assume therefore a minimum habitat size of 20 ha for viable populations. It further seems that where smaller woods are separated by a distance of no more than 20 m to the next dormouse population, there is little effect of habitat isolation. In contrast to this dormice could be observed in single cases in very small and isolated patches, too. One of the most isolated woods with dormice was only 2 ha in extent and a distance of 669 m to the next wood.

Keywords: fragmentation, minimum habitat size

1. Introduction

The hazel dormouse (*Muscardinus avellanarius*) occurs in comparison to other small rodents even in good habitats in low densities (Juškaitis & Büchner 2010). At the same time the species is vulnerable to habitat fragmentation because of its arboreal way of life (Bright & Morris 1996). The habitat size should be therefore a key factor for the survival of a population. Agricultural areas as well as traffic routes result in the fragmentation of the landscape and the remaining forest habitats are often too small to provide a viable population of dormice. Radio tracking hazel dormice by Bright & Morris (1991, 1992) showed that the species even prefers to take longer routes in the canopy instead of using short distances on ground level and even small gaps in hedges were avoided to cross (Bright & Morris 1991, 1992). In contrast a previous survey of Büchner (2008) showed that individually marked hazel dormice crossed open ground with distances up to 500 m between two selected isolated copses and the surrounding woods. The aim of this study is to prove the occurrence of dormice in small copses on a larger spatial scale and to determine the effect of size and isolation of woodlots on the species presence.

2. Study site and methods

The study site with an area of about 330 km² is situated in the eastern part of Saxony (Germany). This landscape has a forest cover of approximately 17%. The larger forests are mainly dominated by coniferous trees, mostly with spruce (*Picea abies*). Several hills on

basaltic rocks show rich deciduous forests. Typical are small copses within arable fields. Those were left on unsuitable places for agriculture. The traditional use of the small copses was coppice-with-standard-system. To proof the occurrence of dormice we used nest tubes and searches for gnawed hazel nuts and summer nests of dormice (see Bright et al. 2006). If one method proofed the evidence of dormice in the selected wood, no other efforts were undertaken there.

In total 1,300 nest tubes were put up in grids of 20 m (25 tubes per hectare). The catching period lasted from July to November 2009 and the nest tubes were checked weekly. To search for gnawed hazel nuts in every wood five squares of 10 m x 10 m were investigated for 20 minutes. From September onwards the understorey and forest edges were checked for summer nests of dormice.

In total 66 sites were surveyed and this included all larger woods (five woods larger than 200 ha). Out of the smaller copses a random sample of 51 copses (size up to 20 ha) was surveyed to get data in relation to their size and isolation.

The boundaries of sites were defined by roads (including larger forest roads) and the forest edge. Furthermore, we considered a site as isolated when there were no links by hedgerows or tree lines to another site.

3. Results

Hazel dormice were present in 27 out of 66 checked sites. The most successful method was the search for summer nests. It revealed the presence of dormice on 10 sites with a low effort.

Sites in which dormice were present have a size of 19.2 ha in median (mean deviation from the median MD = 79.3), sites without dormice 3.5 ha in median (MD = 4.96). The difference is significant (Kolmogorov-Smirnov-Test, $p < 0.05$). Hazel dormice were present in < 70 % of woods larger than 20 ha, while occupancy decreased below 60 % in woods of 10–20 ha and below 40 % in smaller woods (Fig. 1).

Dormouse sites have a distance to the next wood with dormouse occurrence of 15 m in median (MD = 368.8), sites with no records of dormice are isolated by a distance of 569 m in median (MD = 894.9). This difference is also significant (Kolmogorov-Smirnov-Test, $p < 0.05$). Sites isolated less than 20 m (50 % of all sites with dormice) are more likely to have dormice (Fig. 2).

However, in some cases dormice were also present in small woodlands clearly isolated (Tab. 1). The most isolated copse with dormouse presence had an area of only 2 ha and a distance to the next woodland of 669 m.

4. Discussion

In contrast to the report of Herr (1942), who stated that the hazel dormouse is present in nearly every single wood copse west of the city of Görlitz, the current data show that the presence of dormice depends on the size and the isolation of the habitat. Woods larger than 20 ha and not isolated (< 20 m from the next wood with dormice) are more likely to contain hazel dormice. This estimated minimum habitat size is similar to the observation of Bright & Morris (1996) who found the same habitat size for England. Woods larger than 20 ha might have the area, the amount and the diversity of vegetation that could maintain a viable population of hazel dormice, not at risk from stochastic events.

We could see no effect of isolation in terms of the probability of dormouse occurrence if the distance to the next wood is up to 20 m. This includes the very small copses. But it is unknown how often there are interactions between dormice between such woods or copses. Taking the 20 ha as the minimum habitat size it is unlikely that hazel dormice will survive on the long term in small copses without exchanges of individuals. Migrations over open ground could be regular events. Dispersal is typical for hazel dormice before or short after their first hibernation (Juškaits 2008). Animals of this age class were the ones crossing open fields in a previous study in two selected small copses with individually marked hazel dormice (Büchner 2008).

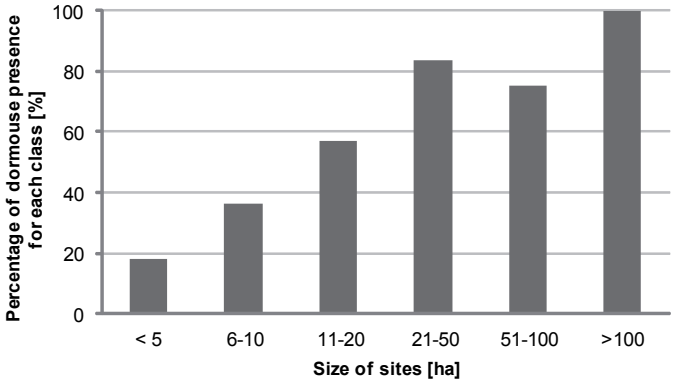

Fig. 1 Percentage of woods with dormice according to the size classes.

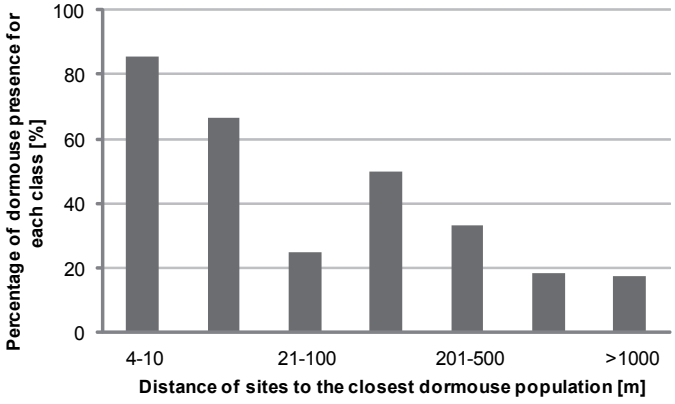

Fig. 2 Percentage of woods with dormice according to the distance of the closest wood with dormice.

Tab. 1 Isolation and size of small wood copses where dormice were present.

Distance to the next wood [m]	45	161	170	184	232	255	669
Size [ha]	3	8	9	14	2	2	2

The record of hazel dormice in a copse of 2 ha isolated more than 600 m from the next wood shows the dispersal potential of the species. However, only the presence of a large source population could ensure a high dispersal rate that may lead to the colonization – and successive periodical local extinctions – of the small and isolated woodlands.

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