

NEW DATA ON DISTRIBUTION, HABITATS AND ABUNDANCE OF DORMICE (GLIRIDAE) IN LITHUANIA

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Four species of dormice occur in Lithuania. *M. avellanarius* is widely distributed across almost all of Lithuania and lives in mixed and deciduous forests. The number of known *M. avellanarius* localities is continually increasing. However the population density of *M. avellanarius* is comparatively low in Lithuania, averaging only 1 ind./ha in spring and 3 ind./ha in autumn. At present, *G. glis* is known to occur at nine localities in Lithuania, mostly situated along the valleys of the two biggest Lithuanian rivers, Nemunas and Neris, and their tributaries. Extinction of *G. glis* from some localities has occurred due to the felling of oak-woods and mature forests containing old oak-trees. Lithuania is situated at the north-western edge of the distribution range of *D. nitedula*, and only two known populations occur in Lithuania. The current status of *E. quercinus* in Lithuania is unclear. In 1957–1959, this species was known to occur in southern Lithuania. However despite special searches, *E. quercinus* were not found in this locality recently. *G. glis*, *D. nitedula* and *E. quercinus* are included in the Red Data Book of Lithuania.

Key words: dormice, distribution, habitats, abundance, Lithuania

INTRODUCTION

The only article in English on the distribution, abundance and conservation status of dormice in Lithuania was published almost 10 years ago (JUŠKAITIS 1994). After this publication, many new localities of dormice were discovered in Lithuania, and new data on habitats and abundance of dormice were collected. Consequently, the status of two dormouse species in the Red Data Book of Lithuania was changed in 2000. Newer data on distribution of dormice in Lithuania were presented in the “Atlas of European Mammals” (MITCHELL-JONES *et al.* 1999), but only on a 50 × 50 km grid. A 10 × 10 km grid was used in two editions of the “Atlas of Lithuanian Mammals, Amphibians and Reptiles” (BALČIAUSKAS *et al.* 1997, 1999) and in a paper by JUŠKAITIS (2001). However the last three publications are in Lithuanian, with only summaries in English. Local publications usually remain relatively unknown abroad, so the aim of this paper is to present the newest data on distribution of four dormouse species occurring in Lithuania, their habitats and abundance.

METHODS

The following principal data sources on new localities of dormice in Lithuania were used:

- oral questioning of both professional and amateur naturalists. This provided the largest number of new localities for the common dormouse (*Muscardinus avellanarius*);
- the author's expeditions through Lithuania (biodiversity studies in separate administrative districts of Lithuania, collecting data for the Lithuanian mammal atlas etc.). Searching was mainly for nests and hazelnuts gnawed by *M. avellanarius*;
- special searches for rare dormouse species using nest boxes;
- scientific and popular publications;
- analysis of owl pellets.

In the present paper, localities of *M. avellanarius* are mapped on 10×10 km squares of the national grid "Lithuania-94". When two or more localities are in the same square, they are designated by a single sign.

The main data on habitats and population density of *M. avellanarius* were collected at two study sites in Šakiai and Molėtai districts (JUŠKAITIS 1994, 2000, 2003). All known localities of rare dormouse species were visited, and 100 nest boxes were put up in two localities of the fat dormouse (*Glis glis*). Abundance dynamics of *G. glis* derived from nest box occupation was observed in Rumšiškės forest during 1991–2002. For studies of the forest dormouse (*Dryomys nitedula*) population, 200 nest boxes were put up in Šilagiris forestry district (area 2664 ha) in 2001.

RESULTS AND DISCUSSION

Common dormouse (Muscardinus avellanarius)

M. avellanarius is the most thoroughly investigated dormouse species in Lithuania. The number of *M. avellanarius* localities is continually increasing. While only 34 localities of *M. avellanarius* were presented in the book "Fauna of Lithuania"

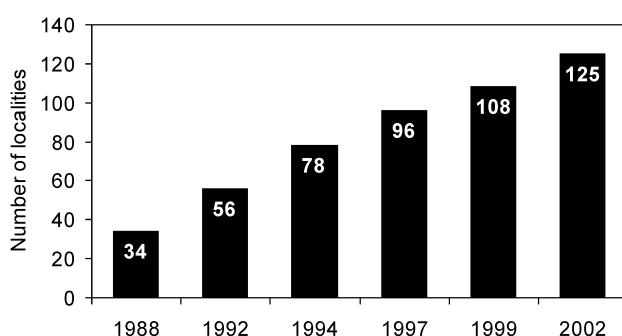


Fig. 1. Changing numbers of the common dormouse (*Muscardinus avellanarius*) localities in Lithuania in 1988–2002 (according to PRUSAITĖ *et. al.* 1988, JUŠKAITIS 1992, 1994, BALČIAUSKAS *et al.* 1997, 1999, and unpubl. data)

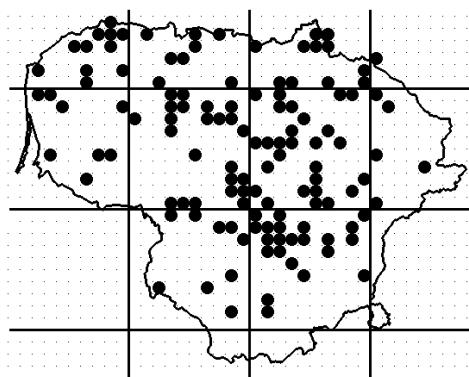


Fig. 2. Localities of the common dormouse (*Muscardinus avellanarius*) in Lithuania, mapped on 10 × 10 km squares of the national grid "Lithuania-94"

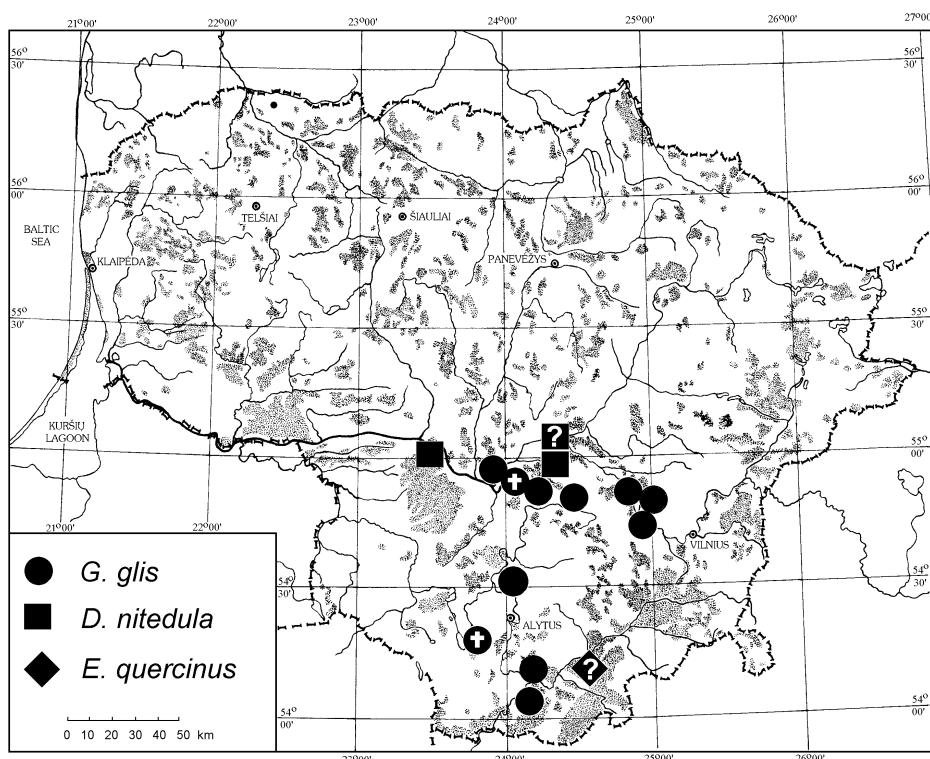


Fig. 3. Localities of fat dormouse (*Glis glis*), forest dormouse (*Dryomys nitedula*) and garden dormouse (*Eliomys quercinus*) in Lithuania. † = destroyed locality, ? = present state of the locality is unknown

nia. Mammals" (PRUSAITĖ *et. al.* 1988), these dormice were known from 125 10 × 10 km squares in 2002 (Fig. 1). The number of separate localities is even larger, exceeding 150. *M. avellanarius* are widely distributed across almost all of Lithuania (Fig. 2). They live in mixed and deciduous forests, but not in pure pine or pure spruce forests. For this reason, localities for this species are lacking in south and south-east Lithuania, where Scots pine (*Pinus sylvestris*) forests prevail. In west Lithuania, where Norway spruce (*Picea abies*) forests dominate, the number of localities is also less. The largest number of localities occurs in central Lithuania, where mixed forests grow, and dormice should be found here in every forest. Some blank areas occurring in Figure 2 are only the consequence of lack of data.

Our investigations have shown that *M. avellanarius* may live in different stands of mixed forest. Similar percentages of nest boxes were occupied by *M. avellanarius* in birch (*Betula pendula*), Norway spruce, ash (*Fraxinus excelsior*), aspen (*Populus tremula*) and oak (*Quercus robur*) stands (JUŠKAITIS 1997). The highest percentage of nest boxes occupied by *M. avellanarius* was registered in a Norway spruce stand with small admixture of deciduous trees including birch, black alder (*Alnus glutinosa*), ash and oak, where spruce made up 70–90% of all trees. Dense understorey formed basically from hazel (*Corylus avellana*) was also present here. However dormice have not occupied a single nest box for a number of years in pure Norway spruce stand that lack understorey.

The correlation analysis of environmental factors and rate of nest box occupation confirmed the significance of the development of understorey for *M. avellanarius* (JUŠKAITIS 1997). The highest and statistically reliable correlation coefficients were established between the rate of nest box occupation and density of understorey ($r = 0.46$; $p < 0.001$) as well as density of hazel ($r = 0.36$; $p < 0.001$). *M. avellanarius* also prefer forest stands containing buckthorn (*Frangula alnus*) in the understorey. The rate of nest box occupation negatively correlated with tree crown density ($r = -0.23$; $p < 0.01$). In its turn it is conditioned by negative relation between the latter factor and density of understorey ($r = -0.35$; $p < 0.001$).

Felling of forest is the most frequent anthropogenic factor, which influences dormouse populations in Lithuania. Its influence is not one-sided: after clear-cutting of some forest areas or cutting of all understorey, dormice cannot live in such places for some years. However, areas where young planted spruce-trees reach about 1 m height, and around them young deciduous trees, hazels and other shrubs grow, become favored habitat for *M. avellanarius*.

Although *M. avellanarius* are widely distributed in Lithuania, they are not abundant. A long-term study of two populations showed that population density is comparatively low in Lithuania, averaging only 1 ind./ha in spring and 3 ind./ha in autumn (JUŠKAITIS 1994, 2000, 2003). Considerably higher population densities

were estimated in some other countries, e.g., from 2.6 to 15.6 adults/ha at separate sites in southwest England (BRIGHT & MORRIS 1990), 3.4 adults/ha in Denmark (VILHELMSEN 1996), 3.0–6.7 adults/ha in Sweden (BERG & BERG 1999), up to 6 ind./ha in Italy (SORACE *et al.* 1999), up to 8.2 adults/ha in Sicily (SARA *et al.* 2001). However also in Lithuania, the density of *M. avellanarius* can reach 3 adults/ha in the most suitable habitats with well-developed understorey.

The results obtained in Lithuania showed that abundance dynamics of two *M. avellanarius* populations investigated was comparatively “smooth”: there were no sudden changes of abundance. Changes in abundance usually continued for some years, and abundance differed no more than three-fold in two successive years (JUŠKAITIS 2000, 2003). In general, *M. avellanarius* is widely distributed in all of Lithuania, and its abundance is stable. It can be presumed that including this species in the Red Data Books of Latvia (PILATS 1994) and Belarus (KASHTALIAN 1996) was due to insufficient dormouse studies in these adjacent countries.

Fat dormouse (Glis glis)

Until 1990, it was unclear whether this species still occurred in Lithuania. At present, *G. glis* is known to occur at nine localities in Lithuania (Fig. 3). It is noteworthy that six out of these nine localities were discovered by checking nest boxes, put up specially for dormouse research. Most of the *G. glis* localities are situated along the valleys of the two biggest Lithuanian rivers, Nemunas and Neris, and their tributaries. It was surprising to find *G. glis* in south Lithuania (Varėna district), where pure pine forests prevail. Dormice live here in the valleys of two small tributaries of the River Nemunas surrounded by pine forests. Typical habitats for *G. glis* in Lithuania are old oak-woods and mature mixed forests containing old oak-trees and hazel. Our data suggest that presence of old oak-trees and old hazel is very important for habitats of *G. glis* in Lithuania.

G. glis is a vanishing species in Lithuania. Two localities, where *G. glis* were found in 1936, have now been destroyed (Fig. 3). One locality was flooded when Kaunas hydroelectric power station was built. Extinction of these dormice at another locality occurred due to the felling of mature forests. For the same reason, *G. glis* may also be extinct from some other localities where they were previously recorded, but concrete evidence is lacking. The status of this species in the Red Data Book of Lithuania was changed in 2000: from the 3rd category (rare species) into the 2nd category (vulnerable species).

The *G. glis* population in Rumšiškės forest has been monitored since 1990. The percentage of nest boxes used by *G. glis* suggests that the abundance of this population was fairly stable during the nine years of investigation since the maxi-

mum number of nest boxes used was only twice the minimum (JUŠKAITIS 2000). However the threat of forest felling for *G. glis* populations remains in Lithuania, although most of the known populations are situated in protected areas.

The northern border of *G. glis* distribution area goes through Latvia, where these dormice live in the valleys of the Daugava and Gauja rivers (PILATS, 1994). In Lithuania, some new localities of *G. glis* can be expected in the valleys of the Nemunas and Neris rivers and their tributaries.

Forest dormouse (Dryomys nitedula)

There are two known populations of *D. nitedula* in Lithuania (Fig. 3). One locality is situated in a large forest area, where pure pine stands prevail. However, the dormice live only in mixed forest stands containing Norway spruce with admixture of Scots pine and birch as well as in young Norway spruce stands. In the first habitat, the density of forest dormice was 0.7 adults/ha in 2001–2002. In the second locality, where *D. nitedula* was found in 2001, dormice live in similar habitat. In 1934, one specimen was found near Jonava, but the exact place and present state of this locality are unclear (Fig. 3).

The species is included in the Red Data Book of Lithuania, in the 3rd category as a rare species. Lithuania is situated at the north-western edge of the broad distribution range of *D. nitedula*, so it may be a naturally rare species in this country. The nearest to Lithuania and the most northerly situated locality of *D. nitedula* occurs in Latvia, near the meeting point of the borders of Lithuania, Latvia and Belarus (PILATS 1994). In Lithuania, new localities of this species can be found only accidentally. It is noteworthy, that the distribution area of *D. nitedula* nowhere reaches the coast of the Atlantic Ocean (MITCHELL-JONES *et al.* 1999). For this reason, there is probably no chance of finding this species in the western part of Lithuania, which borders on the Baltic Sea.

Garden dormouse (Eliomys quercinus)

The current status of this species in Lithuania is not clear. *E. quercinus* was recorded only in southern Lithuania, in Varėna district (Fig. 3). In 1957–1959, these dormice (with 4–6 young) were found in nest boxes four times (JEZERSKAS 1961). The dormice were observed in dry Scots pine forest with junipers (*Juniperus communis*) and a ground cover of moss and lichens. In spite of special searches being made, *E. quercinus* was not found in this locality at present, and probably they are extinct. The status of this species in the Red Data Book of Lithuania was

changed in 2000: from the 4th category (indeterminate species) into the 0 category (extinct or probably extinct species).

The full distribution area of *E. quercinus* goes far to the north: even as far as south Finland, the Leningrad region and Karelia (AIRAPETJANC 1983, MITCHELL-JONES *et al.* 1999). However, in recent decades this species has declined in central-eastern Europe and disappeared from areas of former occurrence (MITCHELL-JONES *et al.* 1999). In Latvia and Estonia, only solitary localities are known at present (PILATS 1994). In Poland, *E. quercinus* is one of the rarest mammal species, for which localities are known only in the southern part of the country (JURCZYSZYN & WOLK 1998). In Belarus, this species has been decreasing since the second half of the 20th century (KASHTALIAN 1996).

Data collected during recent years confirmed the distribution and abundance status of each dormouse species in Lithuania. *M. avellanarius* is widespread, and the number of known localities is continually increasing. Meanwhile, *G. glis*, *D. nitedula* and *E. quercinus* – species included in the Red Data Book of Lithuania, are genuinely rare and need protection. Only a few localities are known, and *E. quercinus* may now be extinct in Lithuania.

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