

Short Note

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Occurrence and population status of the pond bat (*Myotis dasycneme*) in Northwest Russia

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Abstract: Pond bat *Myotis dasycneme* is distributed from Belgium to Eastern Siberia, between 44°–50° N and 60° N. The total population of *M. dasycneme* is probably declining, but supporting data are incomplete. The conservation status of the species is not yet completely assessed. Surveys of hibernacula and foraging sites have been carried out recently in Northwest Russia. Evidence of a recent increase in numbers of wintering bats have been recorded, a northwards expansion is supposed. However, the local pond bat is still under threat as its most significant population is concentrated in only one hibernaculum, which is not well protected.

Keywords: Chiroptera; conservation; range expansion; Vespertilionidae; winter roosts.

Pond bat *Myotis dasycneme* is one species in a group known as ‘trawling bats’, i.e. bats which feed just above the surface of water bodies. Its distribution is fragmented from Belgium to the Eastern Siberia, between 44° and 50° N latitude in the South to 60° N in the North (Horáček et al. 2000). The total population of *M. dasycneme* is probably declining (Piraccini 2016). At the time of the *Action plan for the conservation of the pond bat in Europe* (Limpens et al. 2000) it was one of the rarest and least studied species of bats in Europe. Since then the information increased significantly. In some countries, it has turned out to be more numerous than was previously supposed (e.g. Göröfö et al. 2018). However, after a decline, which may now have slowed down, assessment of pond bat’ conservation status remains a challenge. Its IUCN status is Near-threatened, but a downlisting to Least Concern might result from a better knowledge on population trends, particularly in eastern

parts of its range (Piraccini 2016). For this reason, we have paid special attention to this species in our studies of the natural environment of Northwest Russia, both through winter counts and summer surveys of foraging sites, in order to assess the population status in the area.

Our studies took place over two parts of the Russian Federation: Saint-Petersburg city and Leningradskaya oblast, the former is surrounded by the latter. They are located at the latitude of 60° N, i.e. at the northern border of the pond bat’s range. There are numerous water bodies, which are potential foraging sites, in the area. Winter roosts are also relatively numerous. Unlike neighbouring Russian territories, there are many man-made underground shelters resembling natural caves. Almost all of these are abandoned mines created originally for the sand extraction for glass production. There are also some abandoned limestone quarries and forts built of concrete and granite (Kovalyov 2017; Strelkov 1958). Access to these shelters is usually unrestricted; therefore, they are often visited by tourists. Some amateur speleologists try to find old mines with blocked entrances, which they dig out. However, at the same time, some entrances become blocked as a result of landslides. These two tendencies probably balance each other out, and the total number of ‘caves’ available to bats has changed little when compared to the 1950s (Kovalyov and Popov 2011). However, in 2016 some abandoned mines were destroyed during the construction of a new road; several dozen bats hibernated therein the past (Kirillova 2017).

The ‘caves’ of the Leningradskaya oblast were actively explored for bats in the 1950–70s (Strelkov 1958, 1971). In the 1980s such activities were almost stopped. In the late 1990s, new bat workers censused hibernating bats (Chistyakov 1999; Chistyakov and Nickulin 2010; Ilyinsky et al. 1998). In 2008, a large-scale program to study bats in Saint-Petersburg and the Leningradskaya oblast was launched due to the initiative of D. N. Kovalyov (1963–2017). After collecting information about underground shelters used by bats, these were counted annually. This census was usually performed once during wintering, and up to 10 times in some ‘caves’, in the latter case the largest number was used as an annual index. Since 2010, summer surveys have been

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carried out from May to early August using ultrasonic detectors (Pettersson D 200) and bats identified according to Barataud (2015). During this period (especially in June) bats are well visible due to night light, therefore, their presence was determined also visually.

A large number of hibernating pond bats has been found at ‘Tanechkina Cave’, an abandoned sand mine located at the coast of the Volkhov River (60°0′46″ N, 32°18′53″ E). The floor of this system of galleries 2–3 is covered by water in its inner part. Most of pond bats concentrate in the centre of the ‘cave’ at the edge of the underground lake from October to April (Figure 1). Recent numbers of hibernating bats are larger than in the past, with a maximum of 1922 individuals in the winter 2012/2013 (22.11.2012) versus 91 in 1955 and 318 in 2000 (Figure 2). Other bat species hibernating in this shelter are less numerous including usually about 200 Daubenton’s bats (*Myotis daubentonii*), 10 Brandt’s bats (*Myotis brandtii*), 30 brown long-eared bats (*Plecotus auritus*) and occasionally one northern bat (*Eptesicus nilssonii*). Pond bats have been found irregularly in small numbers (less than 10 individuals) in some of the other 35 ‘caves’ of Leningradskaya oblast.

In summer pond bats have been registered at 42 locations in Saint-Petersburg and Laningradskaya oblast (Figure 3). They were mainly found foraging over water bodies edged with broad-leaved trees at the southern border of Leningradskaya oblast. Higher numbers of pond bats were also observed in the ‘skerries’ of the Gulf of Finland (i.e. the sections with indented coastline and with small islands nearby).

Our annual censuses show that the number of hibernating pond bats increased over last decades in the main hibernaculum. Since most pond bats are concentrated in a small section of the ‘cave’, significant errors in census are not likely. Only the number of 91 in 1955 (Strelkov 1958) is approximate. The author claimed that the real number of bats was higher, but he either sampled or ringed several ten

ones, while most of ringed bats disappeared soon after. The sampling and ringing in Tanechkina Cave continued up until 1962, the exact numbers of pond bats were not reported, but 81 females were dissected (Strelkov 1971). Subsequent studies in the 1990s focused on bat counts, with neither sampling nor ringing being reported. In 1998–2000 there were likely about 300 pond bats, far from recent the recent numbers.

With up to 1922 hibernating pond bats Tanechkina Cave is one of the largest winter roost ever recorded. Significantly higher numbers have been recorded in only two hibernacula, both in Denmark, sheltering 3400 and 4600 (Baagøe and Degn 2009). Interestingly, a recent increase in numbers (between 2003 and 2009) was recorded at these sites as well. In Russia, two other large winter colonies are known. In 1998/1999 1730 pond bats were recorded in Smolinskaya Cave in the Urals (Bolshakov et al. 2005). At the Volga River, about 1000 pond bats were registered in three shelters close to each other (Smirnov et al. 2007). In Estonia a hibernaculum ranks next to these ones with up to 420 pond bats (Masing 2015). And up to 204 pond bats have been registered in Arakaevskaya Cave in the Urals (Bolshakov et al. 2005). In other places, hibernating pond bats are significantly less numerous, with only a few or several tens of them being recorded (Limpens et al. 2000). The large winter colonies of pond bats reflect partly the size of local populations, as some of bats, especially males, hibernate individually close to summer foraging habitats (Haarsma et al. 2019). This means that pond bats are probably even more numerous in the studied area than we censused in hibernacula.

The maximal known distance of migration from summer habitat to the winter hibernacula of a pond bat is 344 km in the western extreme of the range (Fairon 1967), although typically the distance travelled is smaller (Haarsma et al. 2019). If bats of the studied area behave the same, bats

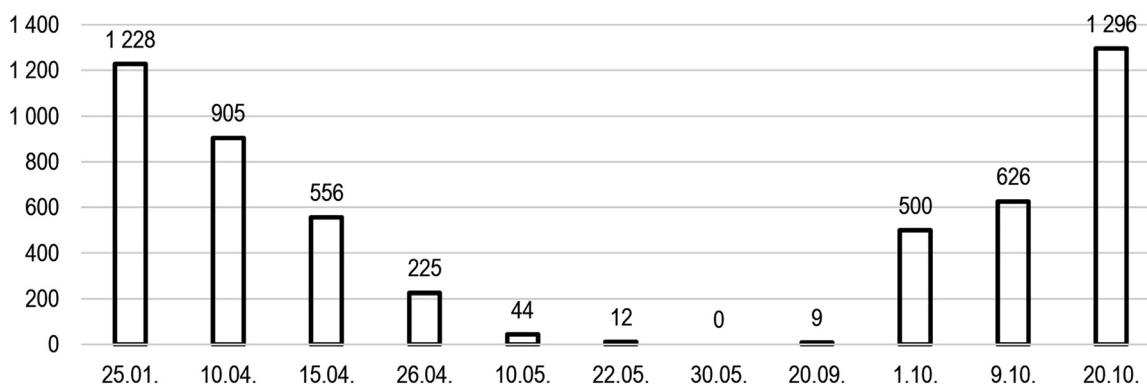


Figure 1: Seasonal evolution of the number of pond bats in Tanechkina Cave (Leningradskaya oblast, Northwestern Russia) in 2009.

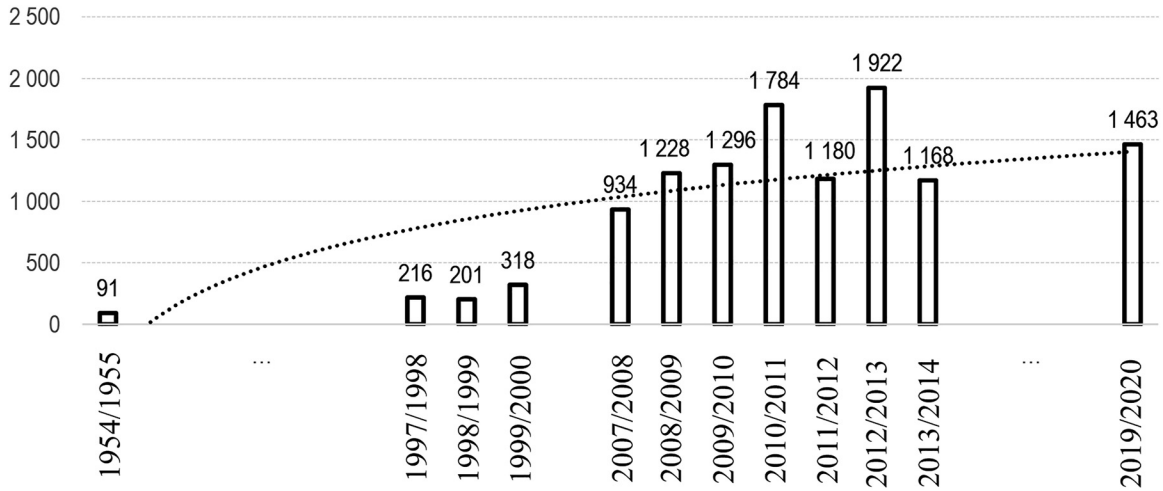


Figure 2: Evolution of hibernating pond bats in Tanechkina Cave from 1954 to 1955 to the present. Since 2008 – our data; the previous numbers are from published sources: Strelkov (1958), Chistyakov (1999) and Chistyakov and Nickulin (2010).

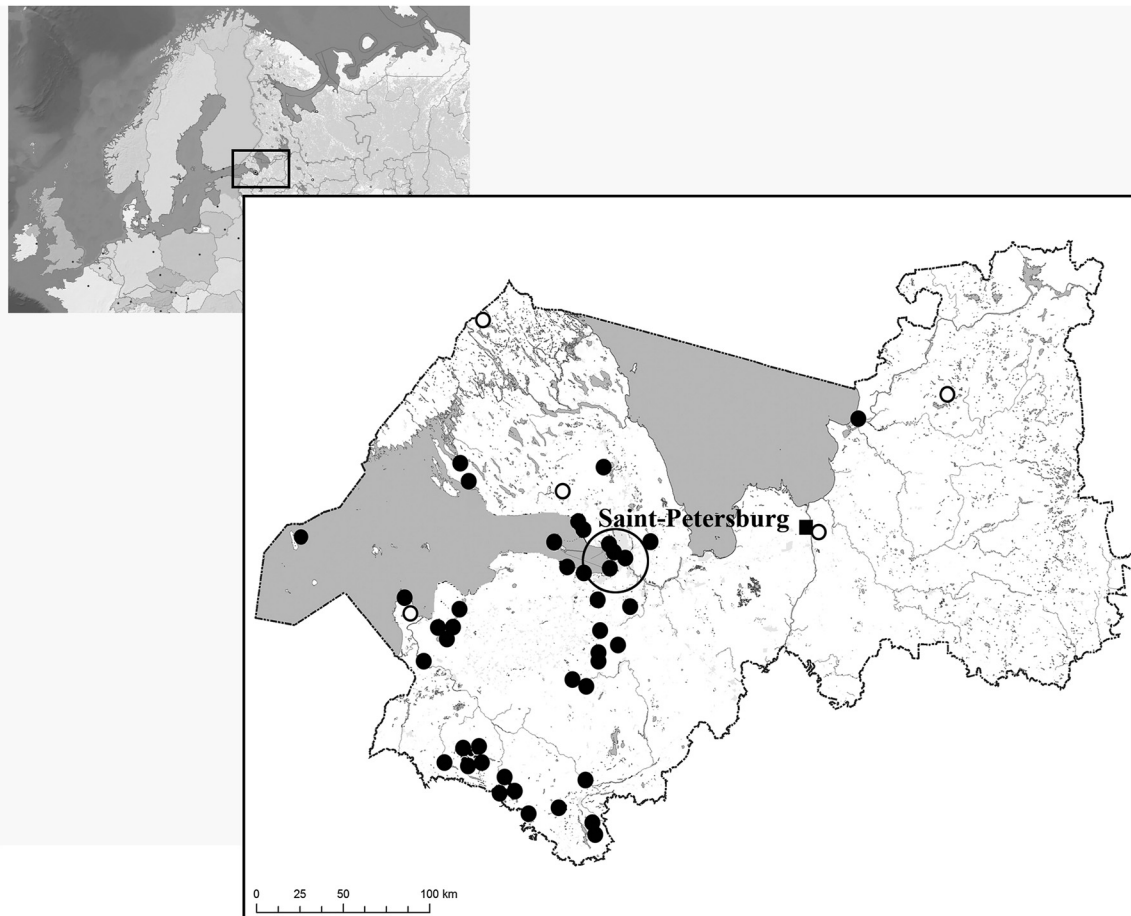


Figure 3: Locations of ■ the main hibernacula of pond bats (Tanechkina Cave) and summer surveys in Leningradskaya oblast: ● records of pond bat foraging sites, ○ water bodies surveyed in summer, where pond bats were not registered.

hibernating in the Tanechkina Cave could spread over the whole of the Leningradskaya oblast in summer. But movements of regional pond bats remain unknown. In the nearby

Estonia bats were actively banded from 1947 to 1993 (Masing 2015), but none Estonian ring has ever been found in Tanechkina Cave. The neighbouring Russian territories are

not well studied in this respect. According to a review made 20 years ago (Bogdarina and Strelkov 2003), the pond bat was not reported there. During the last 15 years pond bats have been ringed in Darwin reserve located at 350 km southeast to Tanechkina Cave (Shapkin 2020; Vasenkov and Sidorchuk 2007) (returns were not reported). Recently, pond bats were recorded using ultrasonic detectors south (Popov 2015), north (Belkin et al. 2019) and northeast (Belkin et al. 2020) of Tanechkina Cave at distances between 200 and 400 km. The latter ones are of special interest because they probably indicate a range expansion of this species as it is suspected in Finland following the record of one hibernating individual (Siivonen and Wermundsen 2003), and foraging individuals in summer (Tidenberg et al. 2019). An additional evidence of a recent northward range expansion of this species is reported from Nizhne-Svirsky Reserve located at the northern border of the studied area (the most eastern location shown in Figure 3). The bird ringing station there has been active since 1968, and bats started to be recorded systematically there in 2012 (Starikov and Popov 2012), until the first pond bat was caught in October 2021 (Popov and Starikov 2022).

Since the number of hibernating pond bats has apparently increased, and the species range has expanded, we suspect that the local population increased, possibly due to climate warming. Several bat species follow such trend in northern Europe (e.g. Roche et al. 2019; Rydell et al. 2018). However, the increase of pond bat population in north-western Russia could result from the particularly favourable winter shelter. The outset date of Tanechkina Cave is not known, but it has been assumed that such mines were abandoned at the beginning of the 20th Century (Strelkov 1958). Not reported in the first publication about bats of the studied area (Bianki 1916) pond bats probably settled in the ‘cave’ about 100 years ago and their number increased since that time. Subsequent growth has been accommodated because this shelter is large, and the potential foraging habitats nearby are numerous.

If a relatively small number of winter hibernacula are used by high numbers of pond bats, this means that the species could be under threat, as the loss of a single hibernaculum could have a disproportionate effect on the local population. The pond bat colony in Tanechkina Cave is likely subjected to frequent disturbance. Another threat is the natural degradation of the ‘cave’. In the 1950s, the height of the galleries exceeded 2 m (Strelkov 1958), but now near the entrance it is only about 1 m, due to stream flows bringing a lot of ground inside. The height gradually increases towards the centre of the cave reaching at least 2 m in the interior part.

It was suggested that the bulk of the pond bat population is located within Russia with the total population being

estimated as 100–150,000 bats (Limpens et al. 2000). However, the available data suggest a different order of magnitude. Apart from the above-mentioned large hibernating colonies, less than several dozen individuals have been observed either in summer or in winter roosts. Extrapolation of data obtained from localised areas of Russia to its entire territory is problematic, and the total abundance of the pond bat across its range remains unknown. The evidence basis for downgrading conservation status of the pond bat to Least concern has not been established yet.

Research ethics: The procedures were in accordance with the national laws.

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