

## PRESENT STATUS OF A RARE BAT SPECIES, *NYCTALUS LASIOPTERUS* (SCHREBER, 1780), IN HUNGARY

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**ABSTRACT** - By reviewing all published and unpublished data, the present status of *Nyctalus lasiopterus* in Hungary was assessed. The species is known from 12 localities in the country, mostly situated in the North Hungarian Mountains. Only one stable population is known, which is located in the Mátra Mountains and has been present each summer since its discovery in 1995. Except for this population, the species is rarely found in other locations. Radio-tracking resulted in the finding of 13 roosting trees, which were exclusively beeches (*Fagus sylvatica*) in a montane beech forest. The largest roosting group consisted of more than 50 individuals. Sex ratio was highly female biased; adult males have rarely been found in the country. Lactating females and juveniles were captured regularly, which indicates the presence of a stable nursing population in the country. In Hungary, the main threat to *N. lasiopterus* is likely to be the logging of old beech forests. Further research is needed to draw a better picture of the Hungarian population of the species and strengthen the conservation of this magnificent bat.

**Key words:** greater noctule, distribution, sex ratio, reproduction, Hungary

**RIASSUNTO** - *Status di una specie rara, Nyctalus lasiopterus (Schreber, 1780), in Ungheria.* Lo status attuale di *Nyctalus lasiopterus* in Ungheria è stato valutato analizzando tutti i dati, pubblicati e non, disponibili. La specie è segnalata in 12 località, perlopiù nelle montagne settentrionali. E' nota una sola popolazione riproduttiva, nei Monti Mátra, che è stata segnalata ogni estate a partire dal 1995. Nelle altre località, la specie è stata rinvenuta solo sporadicamente. La radiotelemetria ha permesso di individuare 13 roost, tutti all'interno di faggi (*Fagus sylvatica*). Il gruppo di dimensioni maggiori consisteva di più di 50 esemplari. La sex ratio è decisamente in favore delle femmine, mentre esemplari maschi sono stati catturati solo raramente. Femmine allattanti e giovani dell'anno sono stati catturati con regolarità, suggerendo che la riproduzione della specie in Ungheria avviene regolarmente. La minaccia principale alla sopravvivenza della specie è il taglio delle foreste di faggio mature. Ulteriori ricerche sono necessarie per ottenere un quadro più preciso della distribuzione della specie nel Paese e sostenerne la conservazione.

**Parole chiave:** nottola gigante, rapporto sessi, riproduzione, Ungheria

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### INTRODUCTION

*Nyctalus lasiopterus* (Schreber, 1780) is a rare bat species of the Palaeartic

region. Its distribution area extends from the Iberian Peninsula eastwards to the Urals, Iran and Kazakhstan, southwards to Morocco, Libya and possibly

Algeria (Ibáñez et al. 2004; Simmons 2005). The species is considered to be rare all over its range, in many European countries only a few data on the species being available (Ibáñez et al. 2004). *N. lasiopterus* is a typical tree-dwelling bat, roosting in trees all year round. It has been found in the cavities of very different trees, including both deciduous and coniferous species, under the dried leaves of palm trees (*Washingtonia filifera*) (Ibáñez et al. 2004) and also in bat boxes (Dondini and Vergari 2000). Only two subterranean occurrences of the species are known: Beck and Gebhard (2000) reported a female specimen which was found in a cellar of a castle in Switzerland (possibly an accidental occurrence) and Tvrtković and Baltić (1996), found the remains of 16 *N. lasiopterus* in a cave in Croatia. In some parts of the Mediterranean area, it may prey upon small migrating birds in autumn and spring (Dondini and Vergari 2000; Ibáñez et al. 2001; Popa-Lisseanu et al. 2007).

The species has been studied actively in Hungary since the early 1990s. Besides basic faunistics, radio-tracking surveys were also conducted to get information on its habitat requirements and the sex ratio of the species was also evaluated (Estók 2007a, b; Estók and Gombkötő 2007; Estók et al. 2007; Estók and Görföl 2009). The aim of this paper is to draw a picture of the present status of the species in Hungary, based on the results of research carried out in the last two decades.

## MATERIALS AND METHODS

All available Hungarian data on the species - including unpublished results of the au-

thor - were collected to evaluate the present status of *N. lasiopterus* in Hungary. Most data were obtained between 1993 and 2010, by mist-netting over 400 nights in the North Hungarian Mountains, mostly near drinking sites in deciduous forests (Estók and Gombkötő 2007; Estók 2007b; Estók unpublished). In 2009, the distribution of the species at potential habitats of the North Hungarian Mountains was also investigated by the detection of echolocation calls (Estók and Görföl 2009); identification of the calls was based on the characteristics presented by Estók and Siemers (2009). Radio-tracking was performed at two localities, in the Mátra Mountains and in the Bükk Mountains (Estók et al. 2007; Estók unpublished; Estók and Görföl 2009). Data on sex-identified Hungarian specimens were used to assess the sex ratio of *N. lasiopterus*, by the Chi-squared test for goodness of fit. Expected values were calculated on the base of 1:1 male-female sex ratio.

## RESULTS AND DISCUSSION

### 1. Hungarian distribution

The species is known from 12 localities in Hungary (Fig. 1). Most occurrences are associated with the area of the North Hungarian Mountains. Most mist-netted individuals were captured in the Mátra Mountains, where the only known stable population dwells. Regular samplings at that most significant Hungarian locality in 2007 showed that the species possibly arrives in late spring/early summer and leaves the territory in early autumn at the latest.

### 2. Habitat, roosting sites

All but two specimens were recorded in the North Hungarian Mountains, where wide woodlands are present. The circum-

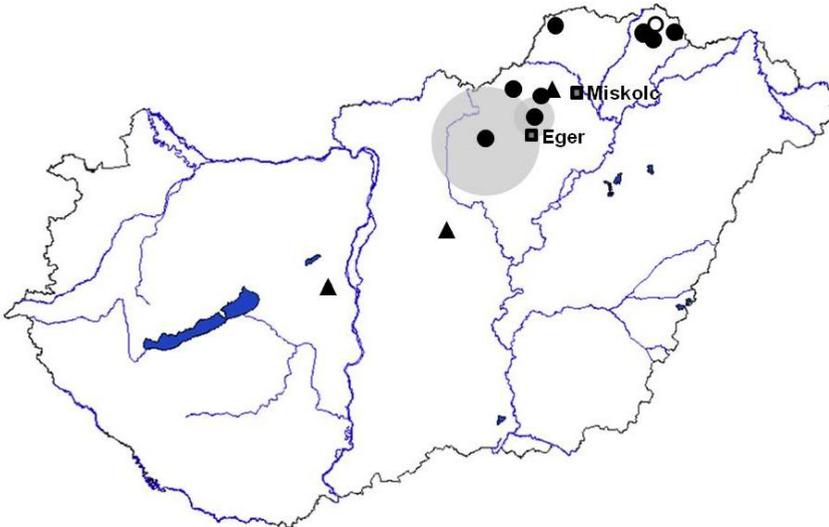


Figure 1 - Hungarian occurrences of *Nyctalus lasiopterus* (triangles: data before 1975; circles: data after 1990; filled symbols: captured specimens or found remains; open symbol: acoustic data; grey circles correspond to the areas of Mátra Mountains (large circle) and Bükk Mountains (small circle), their size being proportional to the number of observed individuals; squares: main cities; data from Estók 2007b and Estók and Görföl 2009).

stances of the two findings of the species in lowlands suggest that they were migrating individuals. Our radio-tracking data showed a frequent roost changing behaviour of *N. lasiopterus* (Estók et al. 2007; Estók and Görföl 2009), a behaviour typical of forest-dwelling bat species (Lewis 1995), which has also been reported for *N. lasiopterus* in maternity colonies in Spain (Popa-Lisseanu et al. 2008). Radio-tracked bats used exclusively beech trees (*Fagus sylvatica*) as roosts (N = 13), in a natural, old mountain beech forest (*Aconito-Fagetum*). The largest roosting group consisted of more than 50 individuals (Estók and Görföl 2009).

### 3. Reproduction and sex ratio

Since the early 1990s, when *N. lasiop-*

*terus* was rediscovered in the Bükk Mountains, lactating females were also mist-netted at six locations, bringing evidence of the occurrence of the species' reproduction in the country (Gombkötő et al. 1996). Currently, 137 records of sex-identified specimens are known from Hungary. Two records, those of a migrating female captured in April, 1960 and its pup, which was born in captivity (Topál 1976) were excluded from the analysis. Females (N = 118) sharply dominate in both July (N = 78,  $\chi^2=49.3$ ,  $df=1$ ,  $p < 0.001$ ) and August (N = 43,  $\chi^2=25.33$ ,  $df=1$ ,  $p < 0.001$ ) (Fig. 2). Probably some of the few males (N = 17) captured in these two months were subadult specimens. The stable reproduction of the species in the country is supported by the regular capture of lactating females in the Mátra Mountains in the last two deca-

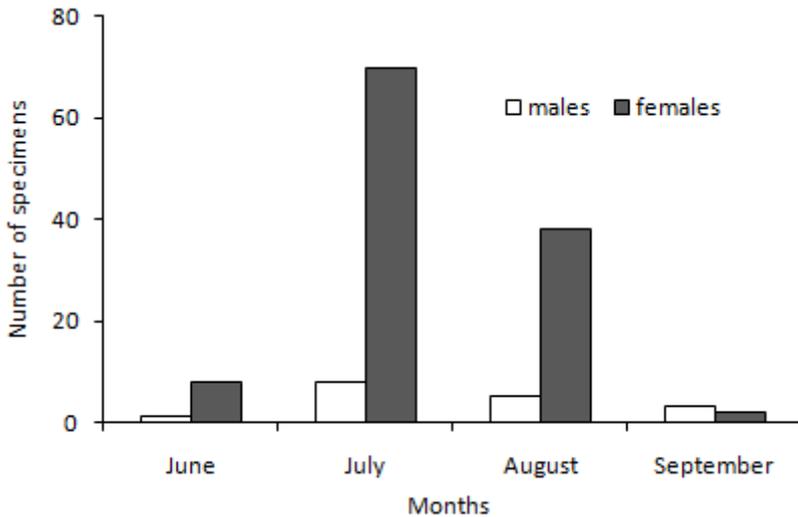


Figure 2 - Sex ratio of *Nyctalus lasiopterus* captured in Hungary between 1933 and 2010 (Data from: Topál 1959; Gombkötő et al. 1996; Czajlik and Harnos 1997; Matis et al. 2003; Estók unpublished data).

des. In other parts of the North Hungarian Mountains, the netting of reproductive females is sporadic, insufficient to prove the species' continuous reproduction at those localities.

## CONCLUSIONS

*Nyctalus lasiopterus* is a rare bat species in Hungary, its known range being limited to the North Hungarian Mountains. As all recent Hungarian locations of the species are either inside or next to beech forests the species probably selects old beech trees as roosts, but further radio-tracking surveys are needed to confirm this hypothesis. Currently, the species' stable reproduction is known for only one locality, however further nursing colonies are probably present in other parts of the North Hungarian Mountains. Besides the well known Spanish population, available records suggest that nursing localities exist also in other parts of Europe. One

of the oldest European records of the species originates from canton Uri, Switzerland, based on the collection of two adult females and one non-volant juvenile (Fatio 1869). Data on reproduction also exist from the eastern part of its range (Abelencev and Popov 1956). Recent records of lactating females from Cyprus indicate that the species is also reproducing in the eastern part of the Mediterranean (Benda et al. 2007). In Slovakia, nursery roosts possibly exist, since post-lactating females and juveniles have been captured several times (Uhrin et al. 2006). On the other hand, strong male dominance and the absence of females in the nursing period have been reported for Greece (Helversen and Weid 1990), and northern Italy (Ravenna, Emilia-Romagna region) (Lanza 1959), which possibly represent mating and overwintering sites of the species.

On the whole, despite the apparent wide range of this species in Europe,

nursing areas seem to be very localised. There is a significant gap in our current knowledge on the distribution and status of the species, especially in the eastern part of the species' range. Nursery colonies are extremely sensitive seasonal aggregations, therefore identifying them is fundamental for the effective conservation of *N. lasiopterus*. The stable nursing colonies of the species in Hungary have high conservation importance, which has to be recognised by local authorities. The recent disappearance of *N. lasiopterus* from Bükk Mountains, its second most significant Hungarian site, where it was regularly mist-netted till 1997, points out the vulnerability of the species. In Hungary, the main threat to *N. lasiopterus* is likely to be forestry, i.e. the logging of old beech forests. Unfortunately the area of old natural and semi-natural beech forests is very limited in the country. Further research at both known localities and other potential roosting areas is needed to strengthen the conservation of this magnificent bat.

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