

# First confirmations of the greater noctule bat *Nyctalus lasiopterus* (Schreber, 1780) presence in Slovenia after more than 85 years

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**Abstract.** During a transect count using ultrasound detectors within the framework of the national bat monitoring scheme, three foraging *Nyctalus lasiopterus* were observed on 27. 6. 2014, and eventually confirmed by an analysis of their echolocation calls recorded in the forest clearing Šetinov laz near the hamlet of Leskova dolina close to Mt. Snežnik in southern Slovenia. The re-examination of recordings made at the same site during 15 other transect counts in the 2007–2014 period revealed that *N. lasiopterus* was also present there on 14. 10. 2013. These observations are the first confirmations of this rare species' occurrence in over 85 years, and opens up questions about the regular presence of *N. lasiopterus* in Slovenia.

Key words: *Nyctalus lasiopterus*, foraging area, echolocation, Slovenia

**Izvleček. Prve potrditve prisotnosti velikega mračnika *Nyctalus lasiopterus* (Schreber, 1780) v Sloveniji po več kot 85 letih** – 27. 6. 2014 sva v okviru državnega monitoringa netopirjev med transektnim popisom netopirjev z ultrazvočnim detektorjem na gozdni jasi Šetinov laz pri zaselku Leskova dolina blizu gore Snežnik v južni Sloveniji opazila tri prehranjujoče se velike mračnike *Nyctalus lasiopterus* in določitev vrste kasneje potrdila z analizo posnetkov njihovih eholoških klicev. Ko sva pregledala posnetke, narejene med 15 ostalimi popisi na isti lokaciji v letih 2007–2014, sva ugotovila, da je bil veliki mračnik tam zagotovo prisoten tudi med popisom 14. 10. 2013. To so prva opazovanja te redke vrste po več kot 85 letih, ki odpirajo vprašanje, ali so veliki mračniki redno prisotni v Sloveniji.

Ključne besede: *Nyctalus lasiopterus*, prehranjevališče, ehološkacija, Slovenija

## Introduction

The greater noctule bat, *Nyctalus lasiopterus* (Schreber, 1780), is a rarely observed species in Europe (Dietz & Kiefer 2014). There was only one previous report of its occurrence in Slovenia, i.e. by Dal Piaz (1927), and all other general sources (e.g. Kryštufek 1991, Ibáñez et al. 2001, Presetnik et al. 2009) are based on this report. Even though over 80 years had passed from the only recorded observation, Petrinjak (2009) presumed that it continued to occur in Slovenia, even if only sporadically, and we are presenting results confirming this hypothesis.

## Material and methods

One of the transects, which is part of the foot transect counts carried out using ultrasound detectors within the framework of the national bat monitoring scheme (Presetnik et al. 2007, Presetnik & Podgorelec 2008), is called »Leskova dolina«. It starts at the forest clearing called »Šetinov laz« (lat. 45.6230°N, long. 14.4366°E), 1.9 km E of the hamlet of Leskova dolina in the southern part of Slovenia close to Mt. Snežnik. Šetinov laz is an approximately 200×100 m wide meadow in a shallow depression at 820 m a. s. l, surrounded by extensive mixed Dinaric forests.

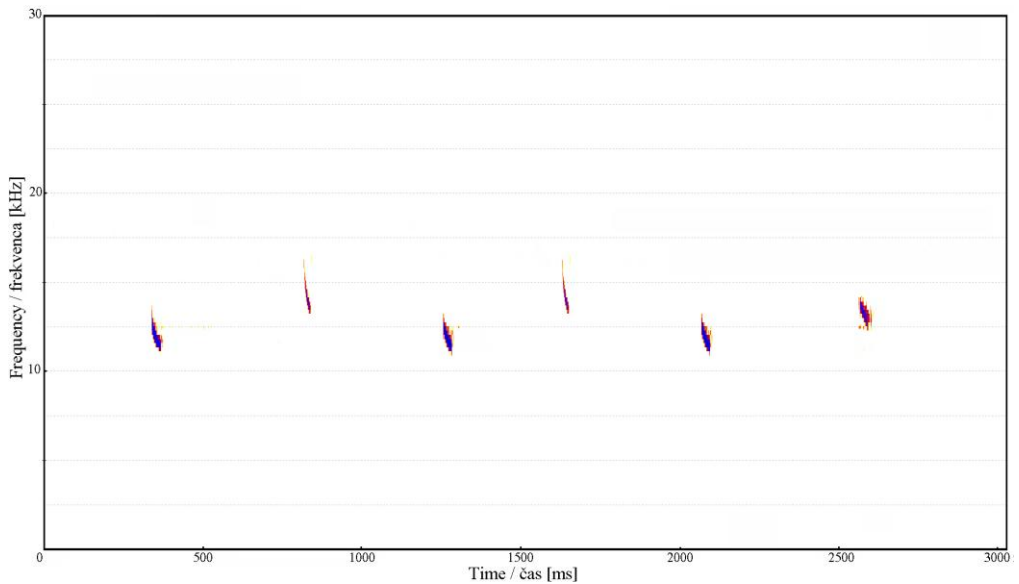
The protocol for the national bat monitoring foot transect reads as follows: i) be at the starting point (point A) at sunset, ii) wait for half an hour, iii) start transecting by listening for 3 minutes at point A, iv) move to point B and listen for 3 minutes, iv) walk to the next point, etc. until the 10<sup>th</sup> point (point J) is reached. Points are approximately 220 m from each other, and the total time to walk from point A to point J lasts approximately one hour. From sunset to the end of the walk along the transect, surveyors constantly listen with bat detectors (Pettersson D240x) and record all bat calls in 10× time expansion mode on a digital recorder, which was in our case Marantz PMD 670. Recordings are later analysed with the BatSound 4.0 program (Pettersson Elektronik).

Transect counts were done each year from 2007 until the autumn of 2014, 16 times in total. Surveys were usually performed once during summer months (end of June–start of August) and once in October. However, some summer counts are missing due to financial constraints.

## Results and discussion

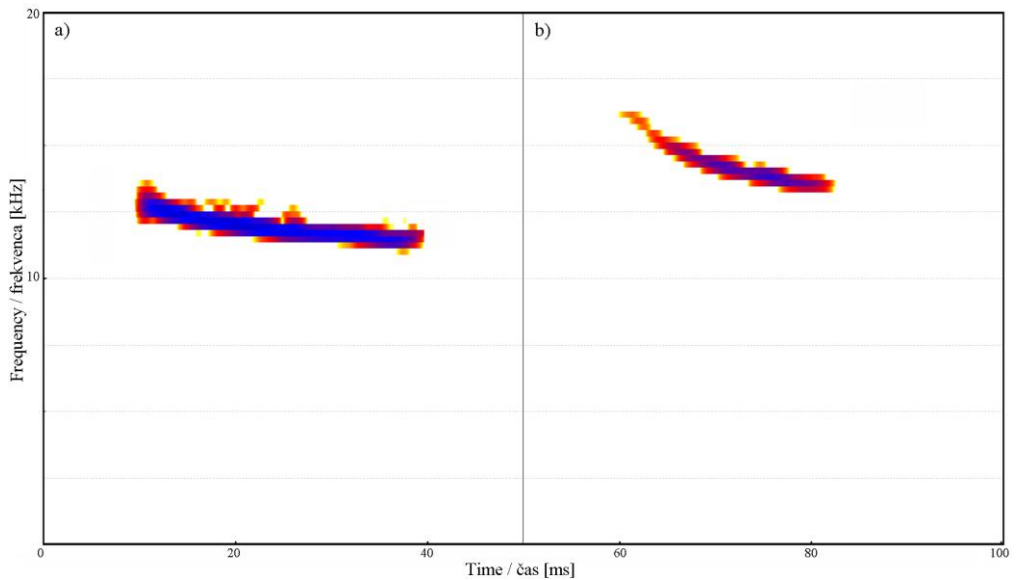
On 27. 6. 2014, approximately 20 min after sunset, we heard loud bat echolocation calls with unaided ears. A few moments later, we observed initially one bat, which was some minutes later joined by at least two more animals. The bats were foraging at times below treetops, and at times at approximately their height. On the heterodyne bat detector, we could clearly hear alternating echolocation calls (»plip-plop«), with the best listening frequency between 11–16 kHz (Fig. 1), and the animals were notably bigger in comparison to *Nyctalus noctula*.

Computer analysis of the echolocation calls of the first bat (when flying alone) were: maximum frequency 11.7–13.9 kHz, start frequency 15.7–22.5 kHz, end frequency 11.5–14.5 kHz, call duration 21–30 ms and interpulse interval 364–468 ms (N = 6, Fig. 1). The low maximum and end frequency of the echolocation calls, together with the long call duration (Fig. 2) are, according to Haquart & Disca (2007), Estók & Siemers (2009) and Haquart et al. (2010), characteristics of *N. lasiopterus* echolocation calls. Such characteristics are sufficient to separate *N. lasiopterus* from *N. noctula*, which does not have such a low echolocation call frequency, and from *Tadarida teniotis*, whose echolocation calls on the above given frequencies should be of shorter duration.



**Figure 1.** Spectrogram of the *Nyctalus lasiopterus* echolocation calls sequence made at the forest clearing Šetinov laz near the hamlet of Leskova dolina on the 27. 6. 2014.

**Slika 1.** Spektrogram serije ehoklacijskih klicev velikega mračnika *Nyctalus lasiopterus*, posnetih na jasi v Šetinovem lazju pri Leskovi dolini 27. 6. 2014.



**Figure 2.** Spectrogram of the recorded a) lower and b) higher echolocation call types of *Nyctalus lasiopterus* (interpulse interval is not in scale, see Fig. 1).

**Slika 2.** Spektrogram posnetega a) nižjega in b) višjega tipa ehoklacijskega klica velikega mračnika *Nyctalus lasiopterus* (medklicni presledek ni v merilu, glej. Sl. 1).

Consequently, we checked all previous echolocation recordings made on that transect as we had recorded, on several other occasions, echolocation calls attributed to taxa *Nyctalus noctula* / *lasiopterus* and/or *Nyctalus* / *Eptesicus* / *Vespertilio*. Only in a survey conducted on the 14. 10. 2013, could we unambiguously attribute a very short recording sequence (3 calls in total) belonging to *N. lasiopterus*, as all other echolocation recordings fell in the overlap zone with *N. noctula*.

After Dal Piaz's (1927) definite record of *Nyctalus lasiopterus* in Slovenia (specimen is kept by the Natural History Museum of the University of Pisa, a drawing of the skull and mandible was published by e.g. Lanza (2012)) more than 85 years ago, our observations are the first that confirm this species' current existence in Slovenia. The site, Šetinov laz, lies approximately 65 km E from Piran, where the first specimen was recorded in Slovenia. The location is approximately 30 km inland from the Adriatic Sea coast, from where the closest most current observations of *N. lasiopterus* originate: approximately 200 km NNW from the island of Kornat in Croatia (Kovač et al. 2011), and approximately 190 km ENE from the town of Dolo in Venice, Italy (Vernier & Vedovat 2011). In these countries, *N. lasiopterus* is also very rarely found (Kovač et al. 2011, Vernier & Vedovat 2011, Lapini et al. 2014), similar as generally in the whole distribution area (Dietz & Kiefer 2014).

The environment close to Mt. Snežnik where *N. lasiopterus* was observed is not surprising as this species was, at middle geographic latitudes in Europe, often found in (sub)mountainous forests (Estók 2011, Dubourg Savage et al. 2013). These finds were often associated with standing or flowing waters which, due to limestone bedrock, are almost absent in the wider area of Mt. Snežnik, while the closest substantial watercourse is approximately 7 km NE of the site of our observation.

Obviously, *N. lasiopterus* does not commonly occur along the transect of Leskova dolina, as it was recorded on only 2 out of 16 possible occasions (12.5%). Nevertheless, more detector and mist netting work should be done in the wider area of our site to be certain whether our observation was merely coincidental or whether *N. lasiopterus* bats are in fact common inhabitants of the area.

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