

TWO ADDITIONAL SITES AND FIRST EVIDENCE OF WINTERING OF THE GREATER NOCTULE BAT, *NYCTALUS LASIOPTERUS* (SCHREBER, 1780) IN CROATIA

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This paper presents information about two additional sites of the Greater Noctule Bat, *Nyctalus lasiopterus*, in Croatia. The first site is the first wintering record of this species in Croatia. It is the first record in the continental part of Croatia. The second site refers to an animal that was found dead on a windfarm in the Mediterranean region of Croatia.

Key words: *Nyctalus lasiopterus*, wintering, wind turbine fatality, distribution, Croatia

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Rad donosi informacije o dva dodatna lokaliteta za velikog večernjaka, *Nyctalus lasiopterus*, u Hrvatskoj. Prvi lokalitet je ujedno i prvo zabilježeno zimovanje ove vrste u Hrvatskoj. To je prvi nalaz za kontinentalni dio Hrvatske. Drugi lokalitet odnosi se na pronađenu mrtvu životinju na vjetroelektrani u mediteranskoj regiji Hrvatske.

Ključne riječi: *Nyctalus lasiopterus*, zimovanje, stradavanje od vjetroelektrana, rasprostranjenost, Hrvatska

Nyctalus lasiopterus occurs in the entire Mediterranean region and central Europe up to 50°N and large parts of eastern Europe, but the distribution is very patchy and often limited to isolated records (DIETZ & KIEFER, 2016). It seems that single animals migrate over great distances (HUTTERER *et al.*, 2005). Seasonal migration is indicated with a seasonal absence of females in the summer in Greece (HELVERSEN & WEID, 1990) and in the southern Iberian Peninsula, and absence of animals of both sexes, but mainly females, in the winter in northern areas (DIETZ & KIEFER, 2016).

In Croatia, previous findings of *N. lasiopterus* were from six sites from Mediterranean region, on the Adriatic coast (Fig. 1). Three are historically old (KOLOMBATOVIĆ, 1884; KOLOMBATOVIĆ, 1885; WETTSTEIN, 1928). A finding from Mljet island refers only to osteological remains (TVRTKOVIĆ & BALTIĆ, 1996). A published recent finding refers to ani-

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mals caught by mist netting on the Kornati archipelago, Kornat island in 2009 (Kovač *et al.*, 2011). None of the known findings of this species in Croatia refers to wintering animals. All recently captured animals in Croatia were males. According to the Red Book of Mammals of Croatia, this species is data deficient (Tvrković & Pavlinić, 2006). The aim of this study is to present two findings, one of which is the first wintering record, of this rare bat species for Croatia.

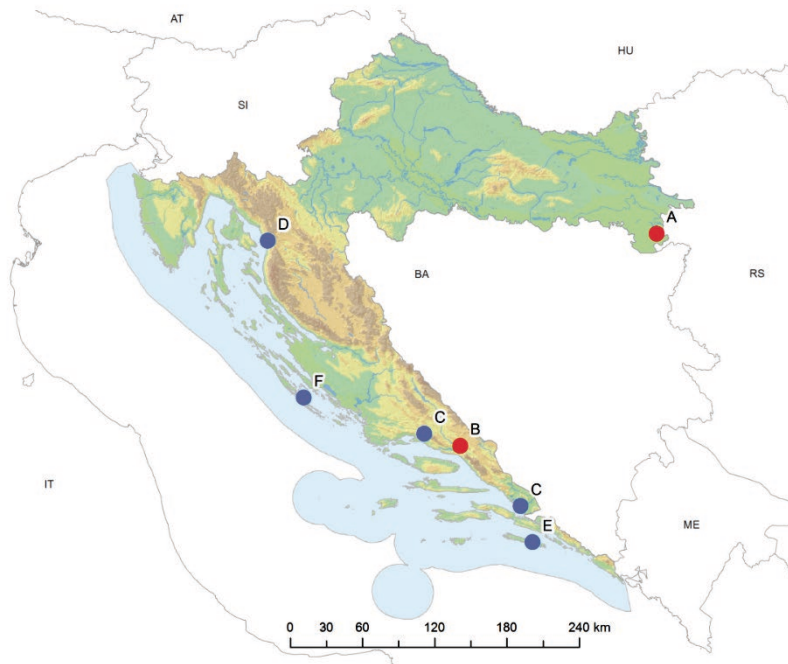


Fig. 1. Sites of *N. lasiopterus* in Croatia. Red dots: new sites reported in this paper A – Vrbanja village (Slavonia region), B – Šestanovac village (Dalmatia region); blue dots: literature sites: C – Kolombatović, 1884; Kolombatović, 1885, D – Wettstein, 1928, E – Tvrković & Baltić, 1996, F – Kovač *et al.*, 2011.

The first *N. lasiopterus* was found after we were privately informed about a fallen tree with bats inside. The second *N. lasiopterus* was found during a systematic search for wind turbine victims.

The first new site concerns a site close to a village in Slavonia (lat: 45°00'43"N, long: 19°02'11"E, 70 m a.s.l., Fig. 1). On October 29, 2014, during the felling of an old oak forest (*Quercus robur*) a bat colony inside a fallen tree was discovered. The colony consisted of 14 females and 10 males (all adult) of *N. noctula* among which we discovered and identified one male *N. lasiopterus* (forearm length: 63.8 mm, weight: 33 g). The colony was found in a 140-year-old oak within a large crack which started at a height of about 15 m and was approximately 1 m long (Fig. 2). The bat colony found during the felling was one of several similar findings that year and several previous years (personal observations).



Fig. 2. Wintering colony near Vrbanja which consisted of 24 *N. noctula* and 1 *N. lasiopterus*. Photo by I. Pavlinić.



Fig. 3. *N. lasiopterus* carcass at wind farm near Šestanovac. Photo by M. Đaković.

The second find refers to a male bat that was found dead, on October 5, 2019, at a wind farm close to Šestanovac village in the Split-Dalmatia County (lat: 43°28'26"N, long: 16°54'17"E, 420 m a.s.l., Fig. 1) in the Mediterranean region of Croatia (Fig. 3). Forearm length was 65.0 mm. All the samples and specimens are part of authors' collection.

N. lasiopterus nursery roosts may be shared with *N. noctula*, *N. leisleri*, *P. nathusii* or *P. pipistrellus* (DIETZ & KIEFER, 2016), therefore our finding is not too surprising, but it proves that *N. lasiopterus* may also share its hibernacula with other tree roosting bat species. The first confirmed wintering site of *N. lasiopterus* in Croatia is approximately 240 km further north from the known range along the Mediterranean coast (Fig. 1). Nearest known sites of *N. lasiopterus* in Hungary are situated in the North Hungarian Mountains with the only known stable population in Hungary in the Mátra Mountains (ESTÓK, 2011) approximately 400 km north of the Vrbanja wintering site. There are no data available on the migration routes of this species that would indicate a potential connection of this wintering site with either the Mediterranean or the Hungarian population. Neither can knowledge of the status of *N. lasiopterus* in other neighbouring countries give us any further hints. In the closest-located Serbia, *N. lasiopterus* was not recorded at all (PAUNOVIĆ *et al.*, 2020), data about *N. lasiopterus* in Bosnia and Herzegovina are only historical with uncertain location (ĐULIĆ & MIRIĆ, 1967), and all records from Slovenia refer to the SW of the country, no more than 50 km from the Adriatic sea (GOJZNIKAR, 2021).

According to recorded bat fatalities on wind farms in Europe from 2003 to 2014, total of 36 *N. lasiopterus* were found killed (RODRIGUES *et al.*, 2015) which makes this globally vulnerable species (ALCALDÉ *et al.*, 2016) potentially highly endangered from wind farms especially along Mediterranean coast. In Croatia, most wind farms are situated along the expected range along the Mediterranean region and wind turbine curtailment during lower wind speed values would greatly mitigate collisions of this species. Another great threat to wintering colonies might be the exploitation of old mountain forests, particularly in southeast Europe, the clearing of old towering mountain forests (DIETZ *et al.*, 2009), and also the drainage of swamps and floodplain areas (DIETZ & KIEFER, 2016). Our observation from Slavonia indicates that such threats

for this bat species also exist in Croatia. In particular, the current management practice of lowland forests in Croatia dictates that large areas with stands of equal age (120 to 140 years old) ends with clear cut during the winter period. Without prior knowledge of potential winter roosts within tree hollows and crevices, this practice results in numerous losses of roosts and bats, not just for *N. lasiopterus* and *N. noctula* but also of colonies consisting of numerous *Pipistrellus pipistrellus*, *P. pygmaeus* and *P. nathusii* which were hibernating in tree roosts in previous years (personal observations).

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