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Is the parti-coloured bat *Vespertilio murinus* Linnaeus, 1758 a common bat species in Slovenia?

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Abstract. In the last overview of bats in Slovenia, the parti-coloured bat *Vespertilio murinus* was one of the rarest species listed. However, in the past few years (June 2005 - April 2013) we have found 98 new locations. In this article, we present new data on mating sites, summer roosts and hibernacula, as well as other chance encounters. Although *V. murinus* is a permanent part of the bat fauna in Slovenia, it is much more evident during the colder part of the year, when migrating individuals possibly reach their wintering area. We argue that this bat species is much more common in Slovenia and its neighbouring regions than previously assumed.

Key words: *Vespertilio murinus*, mating sites, summer roosts, hibernacula, chance encounters, Slovenia

Izvleček. Ali je dvobarvni netopir *Vespertilio murinus* Linnaeus, 1758 pogost v Sloveniji? – V zadnjem pregledu netopirjev v Sloveniji je bil dvobarvni netopir (*Vespertilio murinus*) zabeležen kot ena najredkeje opaženih vrst netopirjev. V zadnjih letih (junij 2005 – april 2013) pa smo s terenskimi raziskavami odkrili 98 novih najdišč. V prispevku podajamo nova opažanja parišč, poletnih zatočišč in prezimovališč ter drugih naključnih najdb. Dvobarvni netopir se v združbi netopirjev v Sloveniji pojavlja stalno, vendar je laže opazovan v mrzlem delu leta, ko živali verjetno priletijo k nam na prezimovanje. Zato menimo, da je ta vrsta netopirja tako v Sloveniji kot v sosednih pokrajinah precej bolj pogosta, kot smo sprva predvidevali.

Ključne besede: *Vespertilio murinus*, parišča, poletna zatočišča, prezimovališča, naključne najdbe, Slovenija

Introduction

The established range of *Vespertilio murinus* in Europe stretches from the Pyrenees Mountains, over central Europe to the south of Scandinavia, and towards Russia. Records south of the Alps are rare; the species, however, has been found in the northern part of Italy, Slovenia and throughout the Balkan Peninsula as far as northern Greece (Baagøe 1999, Dietz et al. 2009, Alberdi et al. 2012). In the latest overview of bats in Slovenia (records dating until mid 2005), Zagmajster (2009) reported only on 12 *V. murinus* sites (13 encounters). On almost one half of these sites (five), male display calls were heard, exact locations established for two males and two females, and three chance encounters made, where sex of the animals was not recorded. Without any exact roost being known, this bat was ranked among the four rarest out of the 28 bat species living in Slovenia (Presetnik et al. 2009a).

In recent years, we regularly heard display calls of *V. murinus* during ultrasound transect monitoring (Presetnik et al. 2007, 2009b, 2011, 2012), which encouraged additional research to locate their mating sites. Ultrasound field observations, along with a few discoveries of summer roosts (e.g. Žibrat 2005, Petrinjak 2010) and hibernacula, as well as additional records of chance encounters of mainly injured or exhausted bats, gave a significantly different picture of the species' distribution and frequency of occurrence in Slovenia, which we present in this paper.

Material and methods

Ultrasound inventarisation

During the establishment of the national bat monitoring scheme, several foot transect counts using ultrasound detectors were selected (Presetnik et al. 2007, Presetnik & Podgorelec 2008). Among them, a transect near the hamlet of Leskova dolina in the southern part of Slovenia close to Mount Snežnik (at approximately 850 m a. s. l.) was selected, with the main purpose being monitoring of *V. murinus*, since we had previously heard the bat's characteristic echolocation calls (Schaub & Schnitzler 2007) and social calls (Ahlén & Baagøe 1999) there. On this particular transect, we repeated field observations of *V. murinus* in almost each consecutive autumn, which prompted additional ultrasound inventarisation, a pilot study in 2009, and more intensive research in 2011 and 2012. The method used was slow driving by car (approximately 20 km/h) while listening with unaided ears for the bat's social calls, and with an ultrasound detector (Pettersson D240x) for its echolocation calls. We recorded all bat calls with a digital recorder (Marantz PMD 670) and later analysed the data with the BatSound 4.0 program (Pettersson Elektronik). Firstly, we selected transects in the vicinity of *V. murinus* known locations (Presetnik et al. 2009a), then in similar environments in some other parts of Slovenia, including the capital city of Ljubljana. Most transects were carried out in October and one in November, and they usually started approximately 1–1.5 hours after sunset and lasted, with one exception, for less than 3 hours. Additionally, we also recorded some advertisement or echolocation calls of *V. murinus* on a few other occasions.

Roosts and chance encounters

During the period between mid 2005 and mid April 2013, many members of the public informed the SDPVN – Slovenian Association for Bat Research and Conservation on finds of injured, exhausted or strayed bats (e.g. Podgorelec 2011), which we will address as »chance encounters«, or on sightings of groups of bat in various environments, and when we checked these finds, some turned out to be *V. murinus*. If possible, we measured the bat's mass (0.5 g accuracy), the length of its forearm (0.1 mm accuracy), and determined its sex and reproduction status.

Results

Autumn ultrasound inventarisation and other ultrasound observations

During the national monitoring ultrasound surveys on the »Leskova Dolina« transect, we heard advertisement calls of *V. murinus* in five out of six autumn counts, and echolocation calls during one out of six summer counts (App. 1). During nine car transect surveys, we covered slightly over 500 km (Tab. 1, Fig. 1); we recorded *V. murinus* on 59 occasions (57 new locations and two repeated locations) and heard social calls on 43 of them (App. 1). The number of locations per car transect ranged from zero (three transects) to 21 (Tab. 1). On six transects with *V. murinus* recorded, the average number of recordings per kilometre was 0.21 (range: 0.09–0.39). On car transects, 76% of bat observations concerned *V. murinus.* During other ultrasound transect surveys conducted on foot and during other field inventarisations, we recorded *V. murinus* on 21 occasions in 14 locations, and heard social calls 15 times (Fig. 1, App. 1).

Altogether, we heard *V. murinus* on 86 occasions in 72 new locations and once in a previously known location (Fig. 1, App. 1). The locations ranged from between 150 to 1,100 m a. s. l. The bats were predominantly observed in small and large settlements with at least one street light (39.7% of locations), though most observations occurred on the edge of a settlement, where lights were not present or illumination was dim, and a forest edge was close by. Smaller settlements – hamlets without street illumination, usually located in forest clearings or close to forest edges – accounted for 19.2% of locations. Locations on forest edges (e.g. roads in forests) accounted for 17.8% of locations, forest clearings that contained a building (e.g. forester's hut, hunting hut or some other sort of building) accounted for 16.4% locations; a further 5.5% of locations were in forest clearings without any building, while one location (1.4%) was on the bank of a large river.

Table 1. Car transects and number of *Vespertilio murinus* locations found. For exact locations, see App. 1, Fig. 1.
Tabela 1. Avtomobilski transekti in število najdišč dvobarvnega netopirja (*Vespertilio murinus*). Natančna mesta najdb so navedena v Dod. 1 in prikazana na Sl. 1.

Transect (length) **Transekt (dolžina)**	**Date** **Datum**	**No. locations (range of height a. s. l.)** **Št. najdišč (razpon nadmorskih višin)**	**No. loc./km** **Št. najdišč/km**
Car transect A – »Javorniki 1« (10.8 km)	6.10.2009	2 (587–826 m)	0.18
Car transect B – »Javorniki 2« (55.1 km)	1.10.2011	15 (587–1096 m)	0.27
Car transect C – »Krim - Rakitna« (64.4 km)	3.10.2011	0	0.00
Car transect D – »Goteniška gora« (77.3 km)	4.10.2011	7 (746–1043 m)	0.09
Car transect E – »Banja Loka – Kočevski Rog« (85.7 km)	5.10.2011	0	0.00
Car transect F – »Ljubljana« (34.9 km)	6.11.2011	6 (288–314 m)	0.17
Car transect G – »Črni vrh – Vrhnika« (54.0 km)	16.10.2012	21 (585–734 m)	0.39
Car transect H – »Bloška planota – Rakitna« (65.5 km)	17.10.2012	8 (678–845 m)	0.12
Car transect I – »Dvor – Kočevska mala gora« (55.7 km)	23.10.2012	0	0.00

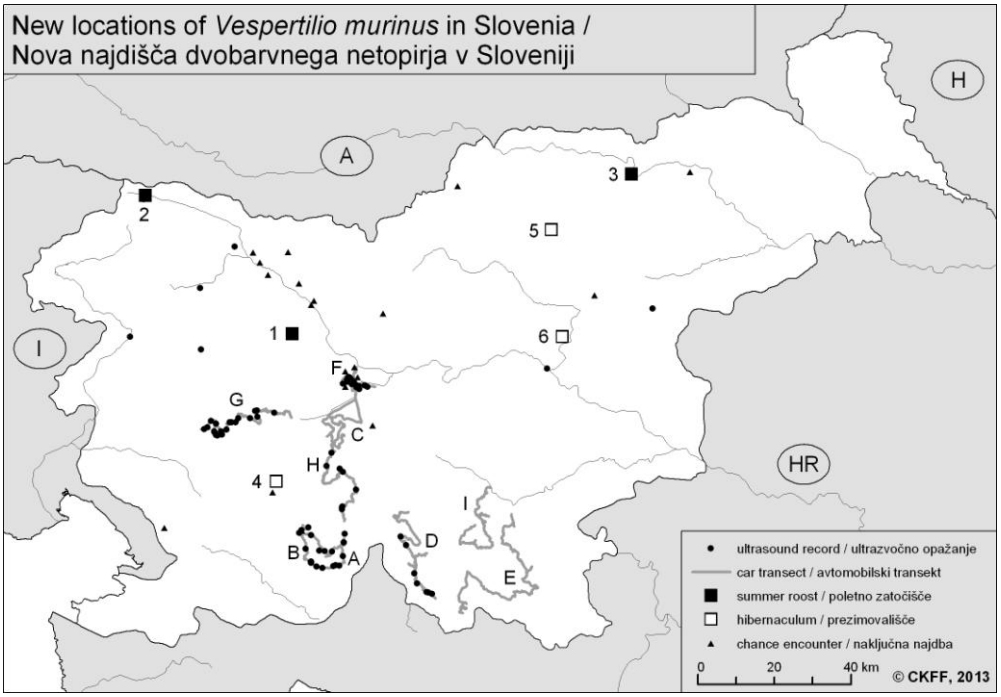

Figure 1. New locations – roosts, detector surveys and chance encounters of *Vespertilio murinus* in Slovenia (June 2005 – April 2013). Roosts 1–6 are described in subchapter b of Results; for details on car transects A–I, see App. 1.
Slika 1. Nova najdišča – zatočišča, ultrazvočna in naključna opažanja dvobarvnega netopirja (*Vespertilio murinus*) v Sloveniji (junij 2005 – april 2013). Zatočišča 1–6 so opisana v podpoglavju b poglavja rezultati; za podrobnosti o avtomobilskih transektih A–I glej Dod. 1.

Records of summer roosts and hibernacula

On 6. 6. 2009, the owners of the Mini Hotel in the village of Vincarje near Škofja Loka (Fig. 1, location 1) noticed many bats emerging in the evening from behind the outer wooden panelling of a two-storey building. On 10. 6., 47 bats emerged, while on 14. 6., at least 50 were recorded, and since all three caught bats were adult *V. murinus* males (App. 2), we apparently observed an exclusively male group. The summer roost of the second male group was located behind a closet standing on the balcony of the fourth floor of a block of flats (Bezje 4) in the village of Kranjska Gora (Fig. 1, location 2) and was observed on 19. 7. 2010 (Petrinjak 2010). The colony consisted of 11 animals and from the 10 measured all were males (App. 2). Another summer observation (1. 8. 2005) was reported by Presetnik (2007) from the attic of the Fala Mansion (Fig. 1, location 3), where an unsexed individual was hanging close to the apex of the roof.

On 15. 2. 2011, a hibernaculum of *V. murinus* was discovered in the entrance section of the cave known as Planinska jama (Fig. 1, location 4), as four bats (two adult males, App. 2) were found to be hiding separately in shallow crevices among more than a hundred *Pipistrellus pipistrellus*, at temperatures between 4.4–4.9 °C. We found another adult male in a crevice approximately 3 m above the ground and 30 m from the entrance of the cave Huda luknja near Gornji Dolič on 9. 2. 2013 at 2.0 °C (Fig. 1, location 5, App. 2). Another bat of unknown sex was hibernating in a warehouse in the village of Spodnja Rečica near Laško (Fig. 1, location 6) on 22. 1. 2013, where discovered upon the shifting of a piece of warehouse equipment.

Chance encounters

From mid 2005 until mid April 2013, 20 other observations of *V. murinus* were made (Fig. 1). In App. 2 we list details on them, together with details about three animals, the locations of which and dates of their discovery have already been given by Presetnik et al. (2009a). Altogether, out of 18 animals examined by experienced chiropterologists, 13 were males and five females (one nulliparous, three adult and one female whose reproductive status was not assessed). One third of animals were found in December and January, while the second numerical spike was registered in April, when almost one quarter of animals were found. We recorded no injured, exhausted or strayed *V. murinus* in the June–September period (Fig. 2, App. 2).

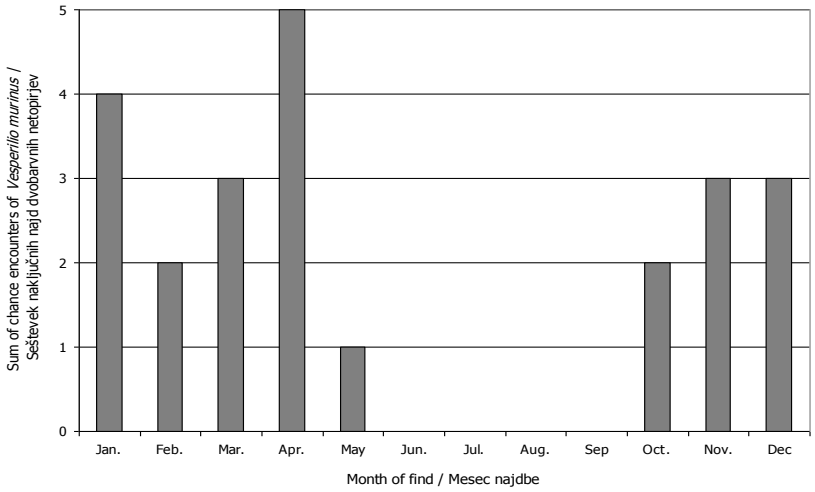

Figure 2. Sum of chance encounters – injured, exhausted or strayed *Vespertilio murinus* with regard to the month of find (October 2002 – April 2013).
Slika 2. Seštevek naključnih najdb – poškodovanih, oslabelih oz. zablodelih dvobarvnih netopirjev (*Vespertilio murinus*) glede na mesec najdbe (oktober 2002 – april 2013).

Discussion

We have documented records of *Vespertilio murinus* at 98 new locations in Slovenia (72 ultrasound observations, 6 roosts, 20 chance encounters; Fig. 1), which is an 8-fold increase in the number of locations for this species in comparison to Zagmajster (2009). However, the change in research methodology had contributed to the sharp increase in the number of locations found. Before our study, autumn ultrasound surveys with adequate equipment were extremely rare, but interestingly, if they were performed, *V. murinus* was quickly found (Zagmajster 2003). Autumn ultrasound surveys also had an advantage over summer counts, since in autumn, male *V. murinus* often performed unmistakable display songs. The rarity of ultrasound finds during the summer period (foot surveys Leskova dolina, Most na Soči, Kranjska Gora; App. 1) could be a consequence of a) possibly smaller summer population of *V. murinus*, and/or b) the difficulties to exactly determine their echolocation calls, which can be easily confused with other species (e.g. *Nyctalus noctula*, *N. leisleri*, *Eptesicus serotinus* (Ahlén 1990)). In any case, our autumn inventarisation revealed that *V. murinus* is, at least in some areas, very common. In fact, during our October and November inventarisations, it was the most frequently recorded species, but as the extent of research was limited, additional research would be necessary to make conclusions as to the abundance of specific bat species.

It is unclear why we frequently heard *V. murinus* along some car transects and did not record it at all along others, but it could possibly be connected with the weather conditions in which our field research was performed. At least on the evening of »car transect I« (Tab. 1, Fig. 1), when we did not hear *V. murinus*, the weather changed from high pressure and clear skies of the previous days to low pressure with low cloud cover and heavy fog.

Obviously the same areas were possibly used by *V. murinus* as mating sites over a span of several years, given that we regularly recorded it in different years at the end of the »Leskova dolina« foot transect in the hamlet of Leskova dolina itself (App. 1), as well as on both occasions when we surveyed the hamlet of Šranga (car transects A and B, App. 1). Another sign of site fidelity are the observations of display songs at the forest clearing along the forester's hut at Medvedjek (car transect D), where display songs had actually been observed 11 years earlier (Zagmajster 2003). The apparent mating site fidelity by *V. murinus* and the easy determination of the species' social calls could be used in the future as a way for its long term monitoring, since Slovenia's current bat monitoring system cannot provide information on population trends for this species (Presetnik et al. 2011, 2012).

Records regarding the two summer colonies, together with the observation of an individual in the Fala Mansion and the summer ultrasound observations (App. 1, 2) are strong evidence that a permanent population of *V. murinus* exists in Slovenia. For now, it seems that the summer population is composed mainly of males, since only one observation of a gravid female has been made in the night between 3. and 4. 6. 1994 (Kryštufek & Červeny 1997). We have to note that in the area of Kočevski Rog, where this gravid female bat was found, almost no additional inventarisation was made in a similar period, but perhaps this female was late on its migratory journey towards its maternity area in the north. This assumption is based on the fact that all the closest confirmed maternity colonies of *V. murinus* are situated in the western part of Switzerland, the southern part of Bavaria and the Czech Republic, and that the centre of its maternity area is even further towards NE Europe and Russia, where maternity colonies are formed from May to August (Baagøe 2001). It seems that the situation in Slovenia is similar to the situation in neighbouring Austria, where only male groups or non-reproductive females have been observed during summer (Spitzenberger & Bauer 2001, Guido Reiter in litt.).

The finds of *V. murinus* hibernating in fissures in caves are also interesting, as they point out at possible natural winter roosts in rock walls. In caves, *V. murinus* is not usually seen (Rydell & Baagøe 1994), though Hanák et al. (2010) give accounts of bone deposits in rocky fissures covering the period from the late Pleistocene to recent times. The rarity of observations in caves and cliffs could be related to the difficulty of discovering bats hibernating in narrow crevices. In general, the reported observations in Europe show *V. murinus* hibernating in buildings, where it is usually discovered during their renovation or shifting of a piece of equipment (Rydell & Baagøe 1994), as was also the case in the warehouse in Spodnja Rečica. Additional hibernacula were probably also close to some locations where we noted injured, exhausted or stray bats (App. 2). Dates of these finds are concentrated in the autumn through the winter to mid-spring period and not during the time when pups are born (late June, early July; Baagøe 2001). This suggests that Slovenia is used by male and female *V. murinus* as a wintering area (finds in December–February) and probably also as an area for its seasonal migration (finds in March–May and October–November). Although not a single out of 8 *V. murinus* banded in Slovenia has been recovered, possible vagrant parts of the population probably migrate toward the NE of Europe as suggested by band recoveries in neighbouring Austria (Hutterer et al. 2005).

Our research confirmed that *V. murinus* is a permanent part of the fauna in Slovenia, though it is much more conspicuous during the colder part of the year; possibly also because of seasonal migrations. We expect that some additional autumn research would quickly reveal its presence in most areas of Slovenia and, of course, in its neighbouring regions.

Povzetek

Dvobarvni netopir (*Vespertilio murinus*) je bil z manj kot 15 mesti opažanj v zadnjem pregledu netopirjev (Presetnik et al. 2009a, Zagmajster 2009) med najredkeje najdenimi vrstami v Sloveniji. Vendar so raziskave v okviru monitoringa netopirjev potrdile redno jesensko pojavljanje dvobarvnega netopirja v Leskovi dolini (Snežnik). To je spodbudilo dodatne raziskave, ki so hitro prinesle kopico novih najdb. Osnovna metoda je bil oktobrski in novembrski popis netopirjev z ultrazvočnimi detektorji, ki se je začel približno 1–1,5 ure po sončnem zahodu in je z eno izjemo trajal manj kot 3 ure na noč. Ob vožnji z avtomobilom (približno 20 km/h) smo s prostim ušesom poslušali značilne svatbene napeve dvobarvnih netopirjev in hkrati z ultrazvočnim detektorjem (Pettersson D240x) in digitalnim snemalnikom (Marantz PMD 670) poslušali in snemali vse ultrazvočne klice netopirjev, ki smo jih kasneje analizirali s programom BatSound 4.0 (Pettersson Elektronik). Dodatno smo dvobarvne netopirje slišali ob nekaterih drugih priložnostih. Mnogo oseb je člane Slovenskega društva za proučevanje in varstvo netopirjev obvestilo o naključnih najdbah netopirjev, med njimi je bilo tudi nekaj opažanj dvobarvnega netopirja.

Med avtomobilskimi popisi smo prevozili nekaj več kot 500 km (Tab. 1) in pri tem slišali dvobarvne netopirje 59-krat na 58 mestih (Dod. 1), od tega njihove svatbene klice 43-krat. Dvobarvne netopirje smo slišali na šestih izmed devetih avtomobilskih transektih (Tab. 1, Dod. 1, Sl. 1), kjer je bilo povprečno število najdišč na kilometer 0,21 (razpon 0,09–0,39). Dvobarvni netopir je med avtomobilskimi popisi prevladoval s kar 76-odstotnim deležem opazovanj vseh netopirjev. Skupno smo s transektnimi in točkovnimi ultrazvočnimi popisi dvobarvnega netopirja slišali na 72 novih mestih, ki so ležala na nadmorskih višinah med 150 in 1.100 metri. Večinoma smo ga zabeležili v naseljih z vsaj eno cestno lučjo, vendar so se mnogokrat netopirji držali ob robu naselja, kjer je bila osvetljenost le rahla, gozd pa večinoma blizu. Po padajoči pogostosti smo dvobarvne netopirje slišali še v neosvetljenih naseljih, na gozdih jasah s kočami, ob gozdnih robovih, na jasah brez koč, enkrat pa tudi ob bregu reke. V Vincarjah in Kranjski Gori smo v stavbah našli dve poletni zatočišči skupin samcev (Sl. 1, mesti 1 in 2), od katerih je prva štela vsaj 50 osebkov, druga pa 11. Dodatno smo našli še enega posameznika, ki se je skrival pod slemenom strehe Falske graščine (Sl. 1, mesto 3). V Planinski jami smo našli štiri, v Hudi luknji pri Gornjem Doliču pa eno prezimujočo žival (Dod. 2, Sl. 1, mesti 4, 5), en osebek pa so našli med premikanjem predmetov v skladišču v Spodnji Rečici (Sl. 3, mesto 6). Med drugimi naključnimi najdbami (Dod. 2), ki so razporejene v obdobju oktober–maj (Sl. 2), so bili tako samci in samice. Čas najdb kaže, da se verjetno veliko dvobarvnih netopirjev k nam priseli na jesen in odseli spomladi.

Skupaj smo zbrali podatke o dvobarvnem netopirju z 98 novih mest v Sloveniji. Dvobarvni netopir je gotovo vrsta, ki stalno živi pri nas, vendar je morda tudi zaradi selitev pogosteje opazna v hladnejši polovici leta. Z dodatnimi jesenskimi popisi bi verjetno lahko hitro dokazali pojavljanje dvobarvnega netopirja v večjem delu Slovenije, pa tudi v sosednih pokrajinah.

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Appendix 1. Ultrasound findings and possible mating sites of parti-coloured bat *Vespertilio murinus* in Slovenia in 2007–2012.
Priloga 1. Ultrazvočna opažanja in možna parišča dvobarvnega netopirja *Vespertilio murinus* v Sloveniji, zabeležena v letih 2007–2012.

Structure of records / Organizacija podatkov:
– Location / mesto najdbe, date /datum (surveyor / popisovalec)
(sc) – social calls (display song) / svatbeni klici, »/« – no *V. murinus* detected / dvobarvni netopir ni bil zabeležen

Car transect surveys / Transektni popisi z avtomobilom (see Fig. 1 / glej Sl. 1)
A – »Javorniki 1« 6.10.2009 (P. Presetnik): – Meadow Novi Lazi, along the Kozarišče-Mašun road, SW of the hill Pričev vrh (sc), – Hamlet Šranga (sc).
B – »Javorniki 2«, 1.10.2011 (P. Presetnik): – Hamlet Leskova dolina (sc); – Forest clearing round house 300 m west of the hill Mala kalvarija (sc); – Along the Leskova dolina-Mašun road, at the crossroad 1.9 km SE of Mašun; – Along the Leskova dolina-Mašun road, 700 m NNE from the mountain Puščetek (sc); – Southern part of the hamlet Mašun (sc); – Northern part of the hamlet Mašun (sc); – Forest clearing along the forester's hut (Bač 190) in Blagajeva dolina pri Blatni dolini (sc); – Forest clearing along the forester's hut at Vrh Korena (Palčje 66) (sc); – Forest clearing along the forester's hut Stara hiša (Palčje 68) (sc); – Forest clearing along the hunting hut at Otoška dolina; – Forest clearing along the hunting hut in Jurjeva dolina (sc); – Small forest clearing along the road, 320 m SSE of the hill Vrh vale; – Forest clearing along the forester's hut Laz (sc); – Forest road 1 km NNE of mountain pass Vratca (sc); – Hamlet Šranga.
C – »Krim–Rakitna«, 1.10.2011 (P. Presetnik): – /.
D – »Goteniška gora«, 4.10.2011 (P. Presetnik, M. Podgorelec, L. Likozar, L. Gjerde): – Small forest clearing along the road 3.1 km NW of Borovec pri Kočevski reki (sc); – Forest clearing along the road 2.7 km NW of Borovec pri Kočevski reki; – Hamlet Ravne; – Forest clearing along the cottage 370 m NE of the hill Beliški vrh (sc); – Forest clearing along the forester's hut Medvedjek; – Forest clearing around the hamlet Glažuta (sc); – Forest clearing around the hamlet Jelenov žleb.
E – »Banja Loka–Kočevski Rog«, 5.10.2011 (P. Presetnik): – /.
F – »Ljubljana«, 6.11.2011 (P. Presetnik, T. Knapič): – Parking lot in front of skyscrapers located at Bilčanska ulica 2 and 4 (sc); – Village Zgornja Hrušica (sc); – Street Hradeckega cesta; – Vicinity of the inn Gostilna Čad (sc); – Street Vodnikova cesta at building no. 46 (sc); – Crossroad of the streets Vodnikova cesta and Tržna ulica (sc).
G – »Črni vrh–Vrhnika«, 16.10.2012 (P. Presetnik): – Hamlet Na sredi near Zalog; – Forest edge 610 m SSE of the hill Špiček; – Vicinity of house at Idrijski Log 14 (sc); – Vicinity of the homestead Habeček (Idrijski Log 1) (sc); – NW end of the village Črni Vrh (sc); – Vicinity of the house at Črni Vrh 24 (sc); – Vicinity of the house at Črni Vrh 34 (sc); – Street NW of the church in Črni Vrh (sc); – NE end of the village Črni Vrh; – Hamlet Spodnje Griže (sc); – At the turning off the Črni Vrh-Godovič road, towards the village Predgriže (sc); – Forest clearing around the homestead Klavžar (Predgriže 31); – Eastern part of the Godovič village; – Vicinity of the Godovič primary school(sc); – Hamlet Ivanje doline (sc); – Forest edge 245 m N of the homestead Kobal (sc); – Forest edge 100 m SW of the house at Rovtarske Žibrše 22 (sc); – Vicinity of the house at Rovte 1; – At turning off the main road in the village of Rovte towards the village of Smrečje (sc); – Vicinity of the Rovte church; – Hamlet Jamnik (sc).
H – »Bloška planota–Rakitna«, 17.10.2012 (P. Presetnik): Forest edge 430 m south of the church in Bloška Polica village (sc); – Centre of Bloška Polica (sc); – NW end of Bloška Polica village (sc); – At group of trees in the moor between the villages of Ravnik and Lahovo (sc); – Hamlet Jeršiče (sc); – Village Sveti Vid (sc); – Village Beč (sc); – At the stream pouring out of the lake at Rakitna village (sc).
I – »Dvor–Kočevska Mala gora«, 23.10.2012 (P. Presetnik, A. Hudoklin): – /.

Foot transect surveys / Transektni popisi peš
– Foot »monitoring« survey »Leskova dolina«, 3.10.2007 (P. Presetnik), 6.10.2009 (P. Presetnik), 11.10.2010 (P. Presetnik), 12.7.2011 (M. Podgorelec), 1.10.2011 (P. Presetnik), 17.10.2012 (P. Presetnik); – Foot »monitoring« survey »Kranjska Gora«, 18.7.2011 (P. Presetnik), Foot »monitoring« survey »River Soča – Most na Soči«, 1.8.2011. (M. Podgorelec); – Foot survey »River Sava – Zavrate«, 29.9.2010 (D. Stanković).

Other point counts / Priložnosti točkovni popisi
– Street Bevkova ulica (Cerkno) 7.10.2008 (P. Presetnik); – Vicinity of settlement Mašun (sc), 10., 11., 14., 15., 16.10.2008 (C. Schönbächler, M. Pastore); – Village Šmarje pri Jelšah (Šmarje pri Jelšah), 21.9.2010 (D. Stanković); – Forest edge at the turning off the main road towards the village of Nemški rovt (sc), 31.10.2010 (M. Zagmajster); – Vicinity of the house at Grajska cesta 59 (Bled) (sc), 23.10.2011 (P. Presetnik); – Vicinity of the Department of Biology building (Ljubljana) (sc), 3.11.2011 (P. Presetnik); – Vicinity of the rail road bridge, 90 m SE of the bridge Karlovški most (Ljubljana) (sc) 4.11.2011, 4.1.2012 (M. Podgorelec), Square Trg Republike (Ljubljana) (sc), 24.11.2011 (M. Podgorelec); – Forest edge and meadow N and NE of the church at Rakovnik (Ljubljana), 1.3.2012 (M. Podgorelec), Village Pudob (sc), 17.10.2012 (P. Presetnik), Street Tolstojeva ulica (Ljubljana) (sc), 14.10.2012, 17.10.2012, 14.11.2012 (P. Presetnik).

Appendix 2. Roosts and other locations including the measurements and notes regarding parti-coloured bat *Vespertilio murinus* in Slovenia from 2003 onwards.
Priloga 2. Zatočišča, druga najdišča, mere in opombe o dvobarvnih netopirjih *Vespertilio murinus* v Sloveniji od 2003 naprej.

Structure of records:
– Location / mesto najdbe [details of site if not mentioned in the text already/ podrobnejše mesto najde, če to ni omenjeno že v tekstu], date / datum, sex / spol (forarm length / dolžina podlakti [mm] / weight / masa [g]), notes, (informant / najditelj / assessor / določevalec); M – male / samec, F – female / samica, U – sex unknown / spol neznan; »-« – no measurement / meritev ni; survived – cared for until released / žival je bila oskrbovana do izpustitve.
* – site without details published in Presetnik et al. (2009) / najdba brez podrobnosti, objavljena v Presetnik et al. (2009)

Roosts / zatočišča (see Fig. 1 / glej Sl. 1):

1 – Mini Hotel, Vincarje 47 (Škofja Loka), 14.6.2009, M adult (44.2 / 13.0), M adult (41.9 / 11.0), M adult (45.1 / 14.0), immediately released (P. Presetnik);
2 – Block of flats Bezje 4, Kranjska Gora, 19.7.2010, M adult (42.7 / 14.0), M adult (44.8 / 16.0), M adult (44.8 / 13.0), M adult (44.9 / 16.0), M adult (41.2 / 12.5), M adult (45.1 / 14.5), M adult (44.1 / 14.0), M adult (44.6 / 12.0), M adult (44.4 / 13.5), M adult (44.2 / 13.5), immediately released (A. Petrinjak & L. Likozar);
3 – Cave, Planinska jama (Planina), 15.2.2011, M adult (46.2 / -), M adult (44.4 / -), immediately released (P. Presetnik & M. Podgorelec);
4 – Warehouse in the village Spodnja Rečica (Laško), 22.1.2013, U (- / -), immediately released (B. Vrabec / P. Presetnik);
5 – Cave, Huda luknja pri Zgornjem Doliču (Dolič), 9.2.2013, M adult (45.4 / 11.0), immediately released (M. Podgorelec & P. Presetnik).

Other findings / druge najdbe

– High block of flats at Bratovševa ploščad 38 (Ljubljana)* [on balcony], 4.10.2003, F nulliparous (42.7 / 14.0), exhausted, survived (U. Žibrat); – House at Brezje pri Tržiču 62 (Brezje pri Tržiču)* [on balcony], 11.4.2004, M adult (- / -) injured, died (M. Zagmajster); – House at Na Gmajni 6 (Pijava Gorica)* [on the outside staircase], 29.4.2005, M adult (41.0 / 8.0), exhausted, died (P. Presetnik); – Block of flats at Zikova ulica 2 (Kamnik), 7.12.2005, M adult (44.6 / 12.5), exhausted, survived (M. Zagmajster); – Primary school Dravlje, Klopčičeva ulica 1 (Ljubljana) [on ground in front of the building], 14.11.2006, M adult (- / -) exhausted, died (N. & L. Malenšek / M. Zagmajster); – Faculty of Social Sciences, Topniška ulica 31 (Ljubljana) [on ground in front of the building], 14.3.2009, F adult (43.2 / 8.5) injured, died (P. Presetnik); – Unfinished building near house at Jezerska cesta 12 (Kranj) [small unsheltered crevice on facade], 8.4.2009, F (43.8 / 10.0), immediately released (A. Petrinjak); – Factory, Iskra Mehanizmi, Lipnica 8 (Kropa) [in pile of waste material], 5.11.2009, F adult (44.1 / 12.0), immediately released (A. Petrinjak); – District Court of Sežana, Kosovelova ulica 1 (Sežana) [in between windows], 1.12.2009, M adult (42.8 / 9.5), injured, died (V. Debevc Gerjevič & S. Šturm / A. Petrinjak); – Primary school Stane Žagar, Cesta 1. maja 10a, (Kranj) [flew into the class room], 8.1.2010, M adult (41.6 / 10.0), immediately released (A. Petrinjak & Lea Likozar); – House at Rožna dolina 2 (Lesce) [crawling in the ventilation shaft of bathroom], 3.10.2010, U (- / -), immediately released (M. Arh / (M. Podgorelec); – Skyscraper at Jakčeva ulica 2 (Ljubljana) [flying on 11th floor], 14.12.2010, M adult 43.4 13.0), survived (P. Presetnik); – Block of flats at Ulica Iga Grudna 19 (Ljubljana), 18.1.2011, M adult (- / -), injured, died (J. Mlakar); – House at Pod hribom 36 (Ljubljana) [collided with window], 23.2.2011, U (- / -), immediately released (U. Vide / M. Podgorelec); – Uninhabited forester's hut, Stara koča (Windischgraetz mansion) [on ground floor], 20.3.2011, M (- / -) fresh carcase (T. Delić); – Primary school at Ljubečna, 18.5.2011, U (- / -), immediately released (M. Mirt Gradišnik / M. Podgorelec); – Skyscraper at Dunajska cesta 5 (Ljubljana) [on the highest floor], 16.1.2012, M adult (44.8 / 9.0), exhausted, survived (S. Zidar); – House at Strahinj 52, 22.1.2012, U (- / -), immediately released (K. Šinkar / A. Petrinjak); – Multi-storey building at Kotnikova 5 (Ljubljana) [inside building], 27.3.2012, M adult (44.8 / 11.5), exhausted (S. Zidar); – Building of Narodni Dom Mežica [on floor in front of the building], 10.11.2012, U (- / -), exhausted, survived (Z. Maher / M. Podgorelec); – Skyscraper at Plečnikova ulica 5 (Maribor) [on balcony of 5th floor], 28.2.2013, M adult (45.1 / -), fresh carcass (M. Kajzer Cafnik / M. Podgorelec); – House Ravbarkomanda 8 (Postojna) [in cellar], 3.4.2013, F adult (46.2 / 12.0), exhausted, survived (M. Černigoj / M.Podgorelec); – House Savska cesta 3 (Radovljica), 12.4.2013, M (45.2 / -), injured, died (Anonymus / A. Petrinjak).