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Bats (Mammalia: Chiroptera) in Besaparski Ridove Special Protection Area (Natura 2000), Southern Bulgaria: Species List, Distribution and Conservation

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Abstract: There were no published data on the bat fauna of Besaparski Ridove Special protection Area (southern Bulgaria); a few records from adjacent territories were published prior to this study. In 2011-2012, we performed a study by visiting roosts, setting up mist nets and using bat detector recording. As a result of 6 mist-netting nights, ultrasound records for 3 h 20 min at 4 places and more than 60 checked abandoned buildings, we found 11 species: *Rhinolophus ferrumequinum, Myotis blythii, M.* cf. *mystacinus, Plecotus austriacus, Barbastella barbastellus, Nyctalus noctula, N. leisleri, Hypsugo savii, Pipistrellus pipistrellus, P. pygmaeus* and *Miniopterus schreibersii*. Four species (*Rhinolophus hipposideros, N. noctula, P. pipistrellus* and *Pipistrellus nathusii*) were previously reported from the adjacent towns of Krichim and Pazardzhik. We did not record two of the aforementioned species (*R. hipposideros* and *P. nathusii*) but due to their ability to cover long distances and the suitable habitats, we consider them likely to be also present in the protection area. Due to long-term human interventions, the site is severely deforested, which resulted into almost complete loss of natural roosts for forest-dwelling bats. In the area, there are no natural roosts for cave-dwelling species, too. The bats in the site roost mainly in buildings and other man-made constructions.

Keywords: Natura 2000, loss of natural roosts, open areas, feeding habitats

Introduction

Besaparski Ridove (= "Besaparski Hills") are declared as a Special Protection Area (SPA) in the frames of Natura 2000 network according to the EU Directive 79/409 (Birds). It is situated in the south-western part of the Upper-Thracian Valley, in the vicinity of the town of Pazardzhik and in the foothills of the Rhodope Mountains. The region includes low treeless hills (called "Besaparski Vazvisheniya") and adjacent open areas. It completely overlaps the Site of Community Importance (SCI) of Directive 92/43 (Habitats), i.e. Besaparski Vazvisheniya SCI (BG0000254) and parts of Reka Maritsa SCI (BG0000578) and Reka Luda Yana (BG0000426). The total area of Besaparski Ridove SPA is 14,765 ha. The highest elevation point of the region is 536 meters. The slopes are severely eroded, bald and waterless. They are composed basically of Proterozoic marbles. About 90% of the territory is covered by thermophilic and calcareous grasslands and arable lands. A small percentage of the SPA region is covered by shrubs and low trees. The forests are low-tree and occupy around 3% of the territory. The main parts are deciduous and coniferous plantations (Dimitrov, Petrova 2014, Tzonev *et al.*

2014). In SPA, there are also populated areas, roads, landfills, open mines and industrial buildings, which cover about 10% of the area. Water areas are also few, covering about 5% of its territory. The standing waters include few micro-dams, fishponds and also flood lands of Maritsa River. (Natura 2000 standard data form, Ministry of Environment and Waters of the Republic of Bulgaria, available from http://natura2000.moew.government.bg).

Before this study, there was no published data on bats from Besaparski Ridove SPA, The only exceptions are the records of four bat species from the adjacent towns Pazardzhik and Krichim (Benda *et al*. 2003). Therefore, this study provides baseline information to serve in both future studies and conservation of this SPA.

Material and Methods

The study was carried out on 27–30 September 2011 and 7 August 2012 at several places within SPA (Table 1), for a total of five days and six mist-net nights. The species diversity was examined by the following methods: catching bats with mist nets near water bodies, recordings with ultrasonic bat detector, searching abandoned buildings and bridges for the presence of bats and analyzing pellets of nocturnal birds of prey (Fig. 1).

We used polyester mist nets, mesh size 16 mm, length 3, 6, 7, 9, 10 or 12 m in six places, set up during the whole night, from sunset to sunrise (21 nets with total length 188 m for 6 mist-net nights). One of the places with mist nets was outside the boundary of the SPA (400 m away), but we chose to include the data from it, because the distance is within the typical flight distance of all species of bats. Identification of species caught in the nets was according to Dietz, von Helversen (2004).

The records with ultrasonic bat detector were taken near four of the mist-nets places. We made point and transect type of recordings (five points and three transects), both with total duration of 3 h 20 min, the earliest starting at 20:47 h, the latest ending at 23:41 h. We used Tranquillity Transect ultrasonic detector (Courtpan, Cheltenham, UK) set to TE factor 10, 320 ms interval and at maximum sensibility. For one of the points for recording, we used Pettersson D240x (Pettersson Electronics and Acoustics AB, Uppsala, Sweden) in manual mode. We recorded the sounds with Sony Walkman MZ-NH600 digital recorder, then converted them in WAV format and analyzed them using BatSound 4.1.4 software (Pettersson Electronics and Acoustics AB, Uppsala, Sweden). We used a sampling frequency of 44.1 kHz, with 16 bits/sample, and the frequency resolution was 1206 Hz in real time. For both spectrogram and power spectrum, we set a 512 pt FFT with a Hanning window for analysis. To determine the species, we measured the following parameters: start frequency, end frequency, frequency of maximum energy, duration of the calls and inter-pulse interval. Ultrasonic records were identified according to Russo, Jones (1999, 2002), Parsons & Jones (2000), Barataud (2002), Pfalzer, Kusch (2003), Obrist, Boesch (2004) and Papadatou *et al*. (2008).

We looked for the presence of bats in more than 60 abandoned buildings (single or in complexes) and three bridges over Maritsa River. We did not look for bats in the buildings of the nearest settlements, where some species commonly roost (Popov 2003, Peshev *et al.* 2004, Simon *et al.* 2004, Petrov 2008).

For the localization of the data, we used GPS Garmin GPSMAP 62 series (Garmin, Olathe, Kansas, USA).

Results and Discussion

There are no natural roosts such as old-forest trees or caves for bats in Besaparski Ridove SPA. There are some data about the presence of very small karstic caves at the foot of the hills in the northern part of the region (Popov 1982), which are known only to the local people; however, we did not manage to find these caves during the study. There are some artificial cliff faces in the open mines that could possibly contain bat roosts (rock crevices). The only roosts for cave-dwelling bats are in the few abandoned or uninhabited buildings outside the villages and towns. Some species use roosts also in inhabited buildings in populated areas (Popov, Sedefchev 2003, Peshev *et al*. 2004, Stoycheva *et al*. 2009) but we did not manage to investigate them. The roosts for forest-dwelling species are also very limited. There are few single old trees with hollows and crevices below loose bark along Stara Reka and Maritsa Rivers at the foot of the hills and along small parching streams flowing through the hills.

During our brief study, we located 11 species (Table 2) at various places in the area and some species groups determined by the ultrasonic bat detector. We confirmed the presence of two species (*Nyctalus noctula* and *Pipistrellus pipistrellus*) previously reported from adjacent towns (Benda *et al*. 2003). We did not located the other two species (*Rhinolophus hipposideros* and *Pipistrellus nathusii*) reported by the same authors for the vicinities of SPA. Further studies are needed to confirm their current presence in the region. With these two species, the total

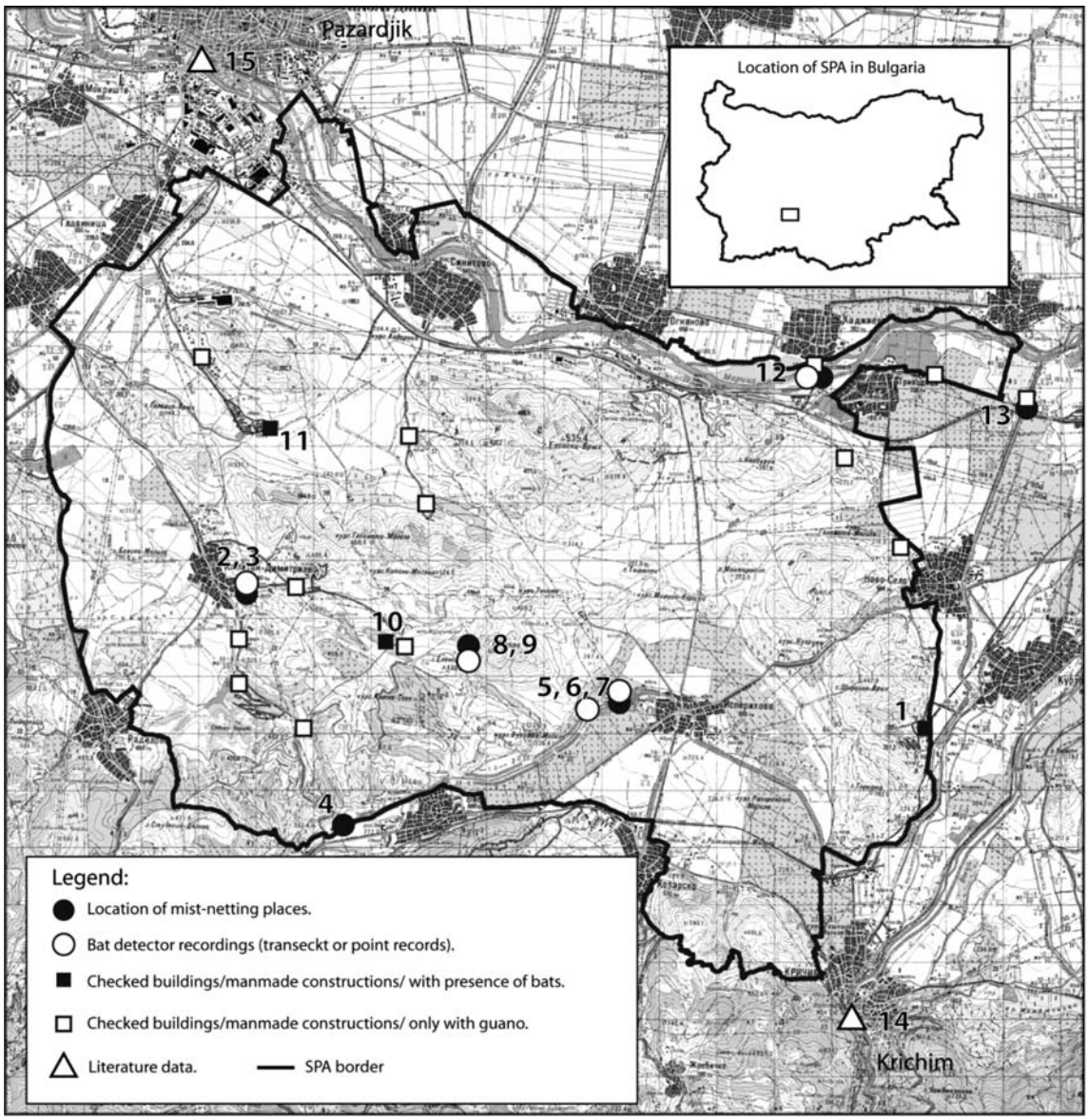

Fig. 1. Map of Besaparski Ridove Special Protection Area with the points visited and methods used. The numbered points present localities of bats detected by using mist-netting, detector recordings or direct observations of roosts. We found only guano in many checked buildings (signed with open squares without numbers). The coordinates and the description of the localities are presented in Table 1

number becomes 13 (39.4% of all 33 species recorded in Bulgaria, see Petrov 2008). The collected data about the presence of the bat species are based mainly on recordings with bat detectors. Four of the 11 species were identified by ultrasonic detector only (*B. barbastellus, H. savii, P. pygmaeus, M. schreibersii*), two were found in roosts (*R. ferrumequinum, M. blythii*) and one species was found only by catch with mist nets (*M. mystacinus*).

All of the bat species detected in Besaparski Ridove SPA are included in the annexes of the Bulgarian Biodiversity Act (SG 77/2002), Directive 92/43/EEC on the Conservation of Natural Habitats and the Wild Flora and Fauna (Habitat Directive), and in the IUCN Red List of Threatened Species. The Red Data Book of Bulgaria includes all of them except one *P. pygmaeus* (Table 2). All species are included also in Annex II of Bern Convention on the Conservation of European Wildlife and Natural Habitats (SG 23/1995), Annex II of the Bonn Convention on Migratory Species of Wild Animals (SG 16/2000) and also in EUROBATS (Agreement on the Conservation of Populations of European Bats, SG 16/2000).

A list of the identified bat species in Besaparski Ridove SPA follows. The localities of each of them are listed in Table 1 and their numbers correspond to those indicated in the text:

Table 1. Coordinates and description of the studied sites (buildings are included if bats have been observed bats but not only guano). The numbers correspond to those in Fig. 1 and in the text. Used abbreviations: O – observation, MN – mist nets, D – ultrasound detector, fa – female, m – male, unid. – unidentified sex, ad. – adult, subad. – subadult.

No	Description	Date	Coordi-nates, alt.	Species
1	Abandoned buildings and installations in a marble quarry; guarded; Kurtovo Konare Village	27 September 2011	N42.08293 E24.47990, 217 m	*M. blythii* (1 ad. m, 1 unid., O)
2	3 mist nets, positioned in glades near a small dam; Kapitan Dimitrievo Village	27 September 2011	N42.10104 E24.33717, 273 m	*P. austriacus* (1 ad. fa, MN)
3	2 point recordings with a bat detector (near a small dam and on a meadow); Kapitan Dimit-rievo Village	27 September 2011	N42.10101 E24.33712, 276 m	*B. barbastellus* (D), *M. schreibersii* (D), *P. kuhlii / P. nathusii* (D)
4	2 mist nets over Stara Reka River; Byaga Village	27 September 2011	N42.06600 E24.36042, 272 m	*P. pipistrellus* (1 ad. m, MN)
5	6 mist nets over Stara Reka River and near a fishpond; Isperihovo Village	28 September 2011	N42.08649 E24.41600, 226 m	*N. noctula* (1 subad. m, MN)
6	Transect and point recording with a bat detector near fishpond; Isperihovo Village	28 September 2011	N42.08653 E24.41534, 226 m	*P. austriacus* (D), *P. pygmaeus* (D), *N. noctula* (D), *M. schreibersii* (D), *P. kuhlii / P. nathusii* (D)
7	A transect recording with a bat detector along Stara Reka River; Isperihovo Village	28 September 2011	N42.08500 E24.4106, 226 m	*P. pygmaeus* (D), *P. kuhlii / P. nathusii* (D)
8	4 mist nets near a small dam – Byazhkia Yazovir dam; Kapitan Dimitrievo Village	29 September 2011	N42.09452 E24.38326, 324 m	–
9	A transect and a point recording with a bat detector near Byazhkia Yazovir dam; Kapitan Dimitrievo Village	29 September 2011	N42.09327 E24.38424, 325 m	*H. savii* (D), *P. pipistrellus* (D), *P. pygmaeus* (D), *N. noctula* (D), *M. schreibersii* (D), *M. mystacinus/ brandtii / alcathoe* (D), *P. kuhlii / P. nathusii* (D)
10	An abandoned military bunker in a private prop-erty; Kapitan Dimitrievo Village	30 September 2011	N42.09412 E24.36657, 422 m	*R. ferrumequinum* (5 unid., O)
11	Buildings of a former pig farm, part of them are still in use, the complex is guarded; Glavinitsa Village	30 September 2011	N42.12711 E24.34137, 260 m	1 individual, unid. species (*cf. Myotis* sp.) (O)
12	3 mist nets and a point recording with a bat detector near a bridge over Maritsa River; Trivoditsi Village	07 August 2012	N42.13862 E24.45502, 192 m	*H. savii* (D), *M. schreibersii / P. pipistrellus* (D)
13	3 mist nets over a canal used for irrigation near two bridges, a railroad bridge and an asphalt road bridge); Trivoditsi Village	07 August 2012	N42.13352 E24.49892, 185 m	*M. cf. mystacinus* (1 m, MN)
14	A building in town of Krichim (Benda *et al.* 2003)	10 June 1917, 10 April 1939	N42.03333 E24.46667, 250 m	*R. hipposideros* (2 fa, O)
15	1) Town of Pazardzhik (Benda *et al.* 2003); 2) Ostrova Na Svobodata Islands, Maritsa River	1) 12 April 1955; 2) 3 January 1961	N42.20000 E24.31667, 200 m	1) *P. nathusii* (1 fa, O); 2) *N. noctula* (1 fa, O)

***Rhinolophus ferrumequinum* (Schreber, 1774).** We found five individuals of this species in a bunker at p. 10, which probably were remains from a breeding colony (there was a lot of guano on the floor). Taking into consideration the absence of suitable underground roosts in the region, the bunker where they roost has to be protected. It is in privately-owned land and only few local people know it, therefore the disturbance of bats is low. However, without protection and without informing the people that this is important site for the bats, the future existing of the colony remains uncertain.

***Rhinolophus hipposideros* (Bechstein, 1800).** The species is known only from published data from surroundings of SPA (in p. 14, town of Krichim). Benda *et al*. (2003) reported two females in a building, which had been observed by Buresh on 10 June 1917 and 10 April 1939. We suppose that individuals of *R. hipposideros*, which have found roosts in the town, are feeding in its surroundings, including in SPA.

***Myotis blythii* (Tomes, 1857).** We found two adult specimens (one male and one of unidentified sex) in a roost, i.e. a slightly crumbling unused tunnel, p. 1. The bats were in drainage pipes clogged at the top. In the tunnel and also in the other nearby buildings, we observed little piles of fresh guano which is a sign that they are used temporarily by other single bats as a roost.

***Myotis mystacinus* morph-group.** We captured by mist nets one male individual determined as *Myotis* cf. *mystacinus* in p. 13 (we did not collect a DNA sample). Future investigations have to be done to confirm the presence of this or other species of the group. A sound record of *Myotis mystacinus / brandtii / alcathoe*, was detected only once (p. 9). We suppose that some recorded sounds determined as *Myotis* sp. originate from this species group (such sounds were detected in all recordings).

***Plecotus austriacus* (Fischer, 1829).** We located the species using mist-netting in p. 2 (one adult female) and by ultrasonic recordings in p. 6. Probably, the bats use roosts in buildings in the nearby populated areas. There is a possibility that they roost in tree hollows but there are not many old trees in the region.

***Barbastella barbastellus* (Schreber, 1774).** Only ultrasonic records of this species were detected (p. 3). There is a low possibility that the species uses natural roosts, e.g. crevices under bark trees in the forest along small streams nearby but there are not many such trees. More likely, the bats are roosting in buildings in the region.

***Nyctalus noctula* (Schreber, 1774).** This species was detected by mist-netting in p. 5 (one subadult male) and also by ultrasonic recordings near water bodies (p. 6 and 9). Over Byazhkia Yazovir dam, it only passes over (the recorded sounds were faint). There is a high possibility that the sounds of *N. noctula / N. leisleri / Vespertilio murinus* recorded near Maritsa River (p. 12) are of *N. noctula*. We did not detect feeding activity. We consider that bats are roosting in buildings in nearby villages and also in crevices of panel blocks of flats and bridges in the towns of Pazardzhik, Krichim and Peshtera, which are usual roosts for this species (Bihari 2004, Georgiev, Stoycheva 2006, Tilova *et al*. 2008, Stoycheva *et al*. 2009). Benda *et al*. (2003) also reported the presence of *N. noctula* (at p. 15, Ostrova Na Svobodata Islands, Maritsa River, 3 January 1961: 1 female, ringed inVoronezh Reserve, Russia, on 13 August 1957).

***Nyctalus leisleri* (Kuhl, 1817).** We located this species using mist nets near fishpond in p. 5 (an adult female). A part of the recorded ultrasonic type *N. noctula / N. leisleri / Eptesicus serotinus / V. murinus* are probably of this species.

***Hypsugo savii* (Bonaparte, 1837).** The species was recorded by ultrasonic detector in p. 9 and 12. We detected relatively high flight activity in p. 9 suggesting that few individuals were feeding over the dam. Probably their roosts are in abandoned or habitable buildings and bridges in the region.

***Pipistrellus pipistrellus* (Schreber, 1774).** We caught one adult male of this species in p. 4. We also recorded sounds in p. 9 and determined only two of them with certainty. The sounds of the type *M. schreibersii / P. pipistrellus,* which were recorded in p. 12*,* were probably of this species. It was reported by Benda *et al*. (2003) in p. 14, i.e. an individual had been captured on 8 September 1939 (a bat ringed on 26 August 1939 in Ukraine).

***Pipistrellus pygmaeus* (Leach, 1825).** We detected this species only by the ultrasonic detector and in p. 6 and 7 there was relatively high flight activity. The other locality of the species is p. 9.

***Pipistrellus nathusii* (Keyserling et Blasius, 1839).** Benda *et al*. (2003) reported the species from the surroundings of SPA in p. 15 (12 April 1955: 1 female, town of Pazardzhik). We consider that part of the ultrasonic records of the type *Pipistrellus kuhlii / Pipistrellus nathusii* recorded in p. 3, 6, 7 and 9 are of this species.

***Miniopterus schreibersii* (Kuhl, 1817).** This species was detected only by ultrasonic recordings in p. 3, 6 and 9. Near Byazhkia Yazovir dam (p. 9), we recorded social calls of *M. schreibersii*. We consider these to be migrating individuals. The nearest

Table 2. Species list and conservation status of bats occurring in Besaparski Ridove Special protection Area

Bat species	BA	92/43 EEC	IUCN 2013	RDB
Greater horseshoe bat *Rhinolophus ferrumequinum*	2, 3	2, 4	least concern	near threatened
Lesser horseshoe bat *Rhinolophus hipposideros*	2, 3	2, 4	least concern	least concern
Lesser mouse-eared bat *Myotis blythii*	2, 3	2, 4	least concern	near threatened
Whiskered bat *Myotis mystacinus*	3	4	least concern	least concern
Western barbastelle *Barbastella barbastellus*	2, 3	2, 4	near threatened	vulnerable
Schreiber's long-fingered bat *Miniopterus schreibersii*	2, 3	2, 4	near threatened	vulnerable
Grey long-eared bat *Plecotus austriacus*	2, 3	4	least concern	least concern
Noctule *Nyctalus noctula*	2, 3	4	least concern	least concern
Lesser noctule *Nyctalus leisleri*	3	4	least concern	vulnerable
Common pipistrelle *Pipistrellus pipistrellus*	2, 3	4	least concern	least concern
Pygmy pipistrelle *Pipistrellus pygmaeus*	3	4	least concern	-
Nathusius' pipistrelle *Pipistrellus nathusii*	2, 3	4	least concern	least concern
Savi's pipistrelle bat *Hypsugo savii*	2, 3	4	least concern	least concern

LEGEND: BA – Biodiversity Act (SG 77/2002) **(2/3, II** – number of the Annex, where the species is listed); **92/43/EEC** – Directive 92/43/EEC on the Conservation of Natural Habitats and the Wild Flora and Fauna (HABITAT DIRECTIVE); **IUCN 2013** – IUCN Red List of Threatened Species. Version 2013.2. (www.iucnredlist.org); **RDB** – Red Data Book of Bulgaria. Vol. 2, Animals (2011).

caves are 10 km of straight distance from the town of Peshtera. Novata Peshtera Cave, one of them, is a known migrating roost for the species (Petrov, Helversen 2011, unpublished data). It is also a winter roost for single bats, similarly to another cave in the region, i.e. Yubileyna. Cave Pavla (near the village of Ravnogor) is also a migrating roost (Petrov, Helversen 2011) and it is at 17 km of linear distance from Besaparski Ridove SPA.

Species groups recorded by ultrasonic detector. There are much ultrasonic detections which cannot be referred only to one species but to species groups because their characteristics overlap. However, these ultrasonic detections give primary overview of the species diversity. The main part (60%) of the ultrasonic detections recorded is of the type *P. kuhlii / P. nathusii* and *Myotis* sp. and such recordings were made in all detecting points. The highest activity of these groups we recorded at Byazhkia Yazovir dam (p. 9). We consider that the sounds of the type *P. kuhlii / P. nathusii* are a sign of the presence of both species, i.e. migrating *P. nathusii* and resident *P. kuhlii*. The latter prefers dry, hot and urbanized regions (Popov, Sedefchev 2003, Peshev *et al*. 2004), which are common in Besaparski Ridove SPA.

We suppose that a substantial part of the calls identified as *Myotis* sp. are in fact foraging *M. daubentonii*. Possibly, part of the recordings (12%) in p. 12 belong to *M. emarginatus* (we have recorded few sounds with very high end and pick frequency).

We made ultrasonic detections of the type *N. noctula / N. leisleri / E. serotinus / V. murinus* from bats which were either high-flying or passing for short time. Part of the recorded sounds were identified as originating from *M. schreibersii / P. pipistrellus* (mainly in p. 9) and we consider that a big part of them (70%) were of *M. schreibersii*.

Despite the short time for our study, we have covered almost all parts of the hills and have chosen the most suitable sites to carry out mist-netting sessions. We searched for bats in almost all abandoned buildings on the hills and also buildings and bridges along Maritsa River. We also looked for bat remains in 95 pellets of night birds of prey (mainly of *Tyto alba* but also of *Athene noctua*) but we did not find any bat remains. In some of the buildings there have been piles of fresh guano, which is a sign that they are inhabited by bats or small colonies during the migration and breeding period (from the end of March till October). It is possible that a part of the abandoned buildings are potential transitional roosts for migrating bats. The big complex of buildings found in p. 1 and 11 as well as two big former army barracks offer plenty of roosting possibilities for bats. They all are guarded, the access is limited and their future depends on the will of their owners.

Data collected during the short period of our study are not sufficient for a detailed evaluation of the bat fauna of Besaparski Ridove SPA and for the hu-

man impact on it. We suppose that the actual species diversity in this area is higher than presently known. Further detailed investigation carried in different seasons for longer periods of time will definitely improve our knowledge for the local species abundance and for the presence of breeding and wintering colonies (the last are commonly in caves, which are absent in SPA). Considering the landscape features and the presence of various man-made constructions suitable for bats, we expect that other species such as *Myotis myotis, Myotis nattereri, Myotis daubentonii, Eptesicus serotinus* and *Vespertilio murinus* also occur in the site (cf. Simon *et al.* 2004, Petrov 2008). The protected area provides mainly feeding habitats for cave-dwelling and forest-dwelling bats and the water bodies are places where more individuals gather during the night. Besaparski Ridove SPA is also a part of their migrating paths.

We did not collect sufficient field data to assess how the species diversity and abundance is affected by human activities carried out in the studied region. Due to long-term human interventions, the site is severely deforested, which resulted into the almost complete loss of natural roosts for the forest-dwelling bats. Therefore, we recommend placing bat houses in the natural forest regions (along the streams of Stara Reka and Maritsa River, the oak forests on the hills and other suitable habitats). Apart from the compensation of natural roosts, the houses will be useful for monitoring forest-dwelling species at the site and are good opportunity to involve the local people (especially young ones) in the conservation of bats (Aleksandrova 2011).

From another point of view, some human activities in the protected area have positive impact on bat fauna because many buildings have been constructed, which are potential roosts for some cave- and forest-dwelling species. When using buildings as roosts, bats become very vulnerable and dependent on owners (Fenn 2002, Simon *et al.* 2004, Petrov 2008). It is necessary that people are informed about the importance of protecting this group of mammals. When a building or bridge used as roost by bats has to be repaired, this has to be done in ways harmless for animals (Tilova *et al.* 2008).

The agriculture activities in SPA are very advanced and widespread. There are data that pesticides are being used to control pests but no specific data on the effect of pesticides on bats exist, neither for Besaparski Ridove nor for Bulgaria in general. According to the study by Wickramasinghe *et al.* (2004) on organic and conventional farms, the excessive use of synthetic chemical fertilizers and pesticides has negative effect on the insect abundance and diversity. This may lead to reduction of the local species diversity of bats.

The building of artificial water bodies may be considered as useful for bats because there is a higher density of insect species around them. Due to the same reason, livestock breeding, which is common in this SPA, can be considered as appropriate for the purpose of preserving bat diversity in the region.

On the other hand, the construction of wind turbine parks may have a negative effect on the bat fauna of Besaparski Ridove (Ivanova 2005, Petrov 2008). The building of solar parks also may have a negative impact it may result into loss of feeding habitats for bats.

We can conclude that almost all bat species in SPA are known and future detailed surveys have to be implemented to complete the information on species diversity, abundance and dynamics of populations. Though many species have been recorded in the course of our study, we suppose that there are further species occurring in the site. We cannot affirm which are the most common species for SPA because of the short time of our survey, but we suppose that these are the synanthropic bats, which use abandoned and inhabited buildings as roosts (*P. austriacus, P. pipistrelus, H. savii, N. noctula* and *M. mystacinus*) (Popov, Sedefchev 2003, Peshev *et al*. 2004, Stoycheva *et al*. 2009). The recordings in most of the studied points confirm this. It is needed to support bat populations in forest habitats by creating artificial roosts. Monitoring known colonies and important roosts also should be conducted. The community has to be informed about the high conservation status and importance of bats for maintenance of ecological balance.

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