



Bats (Chiroptera) of the Silesian Beskid Mountains

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Abstract: During a study conducted in 2000–2007 the following 15 species of bats were recorded in the Silesian Beskid Mts. (Western Carpathians, S Poland): *Rhinolophus hipposideros*, *Myotis myotis*, *M. bechsteinii*, *M. nattereri*, *M. emarginatus*, *M. mystacinus*, *M. brandtii*, *M. daubentonii*, *Vespertilio murinus*, *Eptesicus nilssonii*, *E. serotinus*, *Nyctalus leisleri*, *N. noctula*, *Plecotus auritus*, and *Barbastella barbastellus*. The survey of the bat population was carried out by catching bats in nets, with the dominant species captured being *M. daubentonii* (37.0%), *P. auritus* (16.0%), *M. mystacinus* (11.4%), and *M. nattereri* (10.4%). Bats from the genera *Eptesicus* and *Nyctalus* were only caught on very rare occasions. The bat community found in caves consisted of seven species, mainly *R. hipposideros* (59.7%) and *M. myotis* (26.7%).

Key words: bat fauna, Carpathians, mountains, mist-netting, cave inspections

INTRODUCTION

Bats (Chiroptera) are the least studied group of mammals of the Silesian Beskid Mts. (Witkowski 1997). The first information about these animals was provided by Kowalski (1953), who recorded them in a cave in Trzy Kopce and the Malinowska Cave. The presence of bats in the same caves was subsequently confirmed by other authors (Pucek & Raczyński 1983, Kokurewicz 1990, Wołoszyn et al. 1994). Further locations were discovered by members of a Speleo Club from Bielsko-Biała (Klassek 1990, Ganszer 1995, Pulina 1997). However, only information regarding the presence of bats, without identifying the species, was provided. The only exceptions were *Rhinolophus hipposideros* and *Myotis myotis*, which can be easily identified by non-professionals (see: Ganszer 1995, Mysłajek 2000). More detailed studies on the bat fauna in caves of the Silesian Beskid Mts. have been carried out by the Association for Nature “Wolf” since 1996 (Mysłajek 1998a, 1998b, 2002b). Nevertheless, apart from some anecdotal information (Mysłajek 2003), there is still no data published about any bat fauna outside the caves.

The aim of our study was to get a complete list of bat species living in the Silesian Beskid Mts. and to assess the proportion of these species within the bat assemblages.

STUDY AREA

Research was conducted in the Polish part of the Silesian Beskid Mountains (SBM). The area is located in the western-most part of the Polish Carpathians (N 18°59'–19°07'; E 49°33'–49°47'), and is divided into two parts – Polish (ca 560 km²) and Czech (ca 40 km²). Most of the area is protected as a landscape park (386 km²) established in 1998. There are also a few nature reserves, but they only cover 1% of the total area. A part of the Silesian Beskid Mts. was designated a Nature 2000 protected site.

The altitude within the study area ranges from 300 to 1257 m a.s.l. There are 236 caves (unpublished data of the Speleo Club in Bielsko-Biała, 26.11.2006., www.speleo.bielsko.pl), with the Miecharska Cave and the Cave in Trzy Kopce being the biggest caves in the Polish Carpathians outside of the Tatry Mts. (Klassek & Mleczek 2006).

The climate of the Silesian Beskid Mts. is mainly determined by altitude (Table 1) and is divided into three climatic zones: semi-warm (below 670 m a.s.l.), semi-cold (670–980 m a.s.l.) and cold (above 980 m a.s.l.) (Hess 1965). Climatic zones correlate to plant zones. The lowest of these was formerly covered by rich forests dominated by oak (*Quercus* sp.) and lime (*Tilia* sp.). Forest cover has changed extensively and is presently dominated by farmland, villages, and towns. The middle zone was originally covered by beech (*Fagus sylvatica*) and fir (*Abies alba*) with a mixture of spruce (*Picea alba*), while the highest zone was dominated by natural spruce forests. Currently both zones are covered mostly by planted spruce monocultures (Wilczek 1995). Large meadows are located within the forests. Some of those are still used as pasture for livestock grazing, but the rest have not been grazed for a long time, and have subsequently been naturally re-colonized by young spruce, beech, and birch (*Betula pendula*) trees.

Table 1. Characteristics of the climatic zones in the Silesian Beskid Mountains (according to Hess 1965).

Climatic zones	Average temperature [°C]	Annual precipitation [mm]	Snow occurrence [days]	Length of vegetation season [days]
Cold	2	1600	250	140
Semi-cold	4	1400	210	170
Semi-warm	6–8	800–1000	110–165	200–220

There are numerous towns, villages, weekend cabins, and recreation centres along the forest peripheries as well as many ski lifts, ski routes, and tourist paths within the forest. Human penetration into the forest is the most intense during weekends and holidays (Mysłajek 2001a). The average density of human population is the highest in the Polish Carpathians, on average 150 inhabitants/km², and reaches up to 300 inhabitants/km² near Bielsko-Biała town (Walaszek 2002).

METHODS

We conducted research during the period 2000–2007. Our main methods for surveying the bat fauna of the Silesian Beskid Mts. (SBM) have been the capture of bats in mist nets and cave inspections. We obtained some additional data by examining buildings and old military bunkers and by using ultrasound detectors. We also checked 444 bird boxes (155 in 2002, 1 in 2003, 135 in 2004, 24 in 2005, and 129 in 2006).

We captured bats from May to October in mist-nets (3×7 m, Ecotone, Poland) in 23 localities during 65 nights (a total of 300 hours of netting). At every point of capture we used 2–5 nets and we checked them every 10 minutes. We recorded the species of each bat as well as the reproductive status of females. In accordance with the Polish law we obtained the appropriate permission to capture bats from the Ministry of Environment.

During the study period we carried out irregular surveys of caves in the SBM. We generally checked them year-round, but mainly during autumn and winter. In total we carried out 55 visits in 28 caves. During cave checking we identified all species of bats, with the exception of morphologically very similar *Myotis mystacinus* and *Myotis brandtii*, which we counted together. We also obtained unpublished information about bats observed in caves by members of the Speleo Club in Bielsko-Biała. However, the data indicated the presence of the *Rhinolophus hipposideros* (which is easily recognized by non-professionals) as well as some bats not identified by members of the club.

We also checked the Waligóra bunker in Węgierska Górka three times during the autumn of 2006 and once in February 2007. Furthermore, we obtained and checked information regarding the presence of bats in three buildings, in Brenna, Wisła and Bielsko-Biała Olszówka. We carried out an irregular survey of bats with Pettersson ultrasound detectors D-220 and D-240 within the study area.

For each species location (see Appendix 1) we recorded: the place name, the code of the Universal Transverse Mercator (UTM) grid, and the elevation above sea level (in metres). To describe individuals we used the following abbreviations: D – species recorded by ultrasound detector, N – species captured by mist nets, H – individuals observed during hibernation, and O – observations of no hibernating bats.

RESULTS

In the SBM we recorded the following 15 species of bats from two families: Rhinolophidae – *Rhinolophus hipposideros* (Bechstein, 1800), and Vespertilionidae – *Myotis myotis* (Borkhausen, 1797), *Myotis bechsteinii* (Kuhl, 1817), *Myotis nattereri* (Kuhl, 1817), *Myotis emarginatus* (Geoffroy, 1806), *Myotis mystacinus* (Kuhl, 1817), *Myotis brandtii* (Eversmann, 1845), *Myotis daubentonii* (Kuhl, 1817), *Vespertilio murinus* Linnaeus, 1758, *Eptesicus nilssonii* (Keyserling et Blasius, 1839), *Eptesicus serotinus* (Schreber, 1774), *Nyctalus leisleri* (Kuhl, 1817), *Nyctalus noctula* (Schreber, 1774), *Plecotus auritus* (Linnaeus, 1758) and *Barbastella barbastellus* (Schreber, 1774). Bats were recorded at locations given in Appendix 1.

We recorded 13 species of bats (Table 2) during netting efforts. The most common species captured was *M. daubentonii* (37.0%), followed by the also numerous *P. auritus* (16.0%), *M. mystacinus* (11.4%) and *M. nattereri* (10.4%). We very rarely captured bats from the genera *Eptesicus* and *Nyctalus*.

Table 2. Bats captured with mist-nets in the Silesian Beskid Mts. in 2000–2006.

No.	Species	Captured bats	
		n	%
1	<i>Myotis daubentonii</i>	266	37.0
2	<i>Plecotus auritus</i>	115	16.0
3	<i>Myotis mystacinus</i>	82	11.4
4	<i>Myotis nattereri</i>	75	10.4
5	<i>Myotis emarginatus</i>	64	8.9
6	<i>Myotis brandtii</i>	35	4.9
7	<i>Myotis myotis</i>	32	4.5
8	<i>Rhinolophus hipposideros</i>	25	3.5
9	<i>Myotis bechsteinii</i>	12	1.7
10	<i>Eptesicus nilssonii</i>	10	1.4
11	<i>Vespertilio murinus</i>	1	0.1
12	<i>Eptesicus serotinus</i>	1	0.1
13	<i>Nyctalus leisleri</i>	1	0.1
	Total	719	100.0

We recorded seven species inside the caves (Table 3). The bat community in this type of shelter was greatly dominated by *R. hipposideros* (59.5%) and less numerous *M. myotis* (26.7%). There was hardly any record of other species, with the exception of the slightly more abundant *M. mystacinus*/*M. brandtii* group. *R. hipposideros* was also the most abundant (67.6%) amongst bats recorded in caves by members of the Speleo Club from Bielsko-Biała (Table 4).

Table 3. Bats recorded in caves of the Silesian Beskid Mts. by the authors, 2000–2006. Abbreviations: Rhh – *R. hipposideros*, Mym – *M. myotis*, Mys/Myb – *M. mystacinus*/*M. brandtii* - counted together, Par – *P. auritus*, Eni – *E. nilssonii*, Uind – unidentified bat. * – percentage calculated only for identified individuals.

Cave	Date	Rhh	Mym	Mda	Mem	Mys/Myb	Par	Eni	Uind	Total
Cave in Trzy Kopce	2000.12.03.	8	5							13
	2003.03.22.	4	7		3	2				16
	2004.02.12.	1	3			1				5
	2006.03.14.	4	11		2	1				18
Malinowska Cave	2003.03.13.		2			2				4
	2006.01.16.					1				1
	2006.02.11.					1				1
Chłodna Cave	2000.02.12.		1			5			1	7
	2000.08.26.		1							1
	2003.03.11.		2							2
	2005.12.22.		1			1				2
	2006.11.26.		1			1	1			3
Cave in Stołów	2003.03.22.		4							4
Salmopolska Cave	2006.01.17.	1								1
	2006.11.11.	3								3
Cave „pod Balkonem”	2002.09.09.								1	1
Cave Wiślańska I	2006.11.11.	6	1		1					8
Cave Wiślańska II	2006.11.11.	56								56
Medyków Cave	2003.03.23.							1		1
Cave in Jaworzyna	2003.03.23.		1							1
Cave in Kościelec II	2004.09.01.	4								4
Grabowa Cave	2006.11.18.	22								22
Cave „Studnia w Malinowie II”	2006.11.18.	5								5
Miecharska Cave	2006.11.04.	11	16	2	3	1			2	35
Total	n	125	56	2	9	16	1	1	4	214
	%*	59.5	26.7	1.0	4.3	7.6	0.5	0.5	-	100.0

We recorded three species (*R. hipposideros*, *V. murinus* and *B. barbastellus*) in man-made constructions, such as buildings and bunkers. We observed the following numbers of *R. hipposideros* in the Waligóra bunker in Węgierska Górka: on 01.09.2006 – 3 individuals, on 23.09.2006 – 4 indiv., and on 01.10.2006 – 2 indiv. This species was also observed in a wooden house in the Filipionka meadow in Brenna (1 indiv. 29.07.2006., J. Rzymelka pers. comm.). *V. murinus* was discovered twice in a concrete house in Bielsko-Biała Olszówka: on 29.07.2001, 1 young male was observed hanging on an outside wall near the main door, and on 18.05.2002 1 adult male was hidden in an empty plastic flowerpot on a balcony on the second floor. The same species (an adult male) was recorded on 10.03.2003 inside a concrete house in Wisła. The *B. barbastellus* was observed once (23.02.2007) in the Waligóra bunker in Węgierska Górka. No signs of bats were found in bird boxes we checked.

During the study period we recorded three species of bats by ultrasound detectors: *E. serotinus*, *N. noctula*, and *M. daubentonii* (for locations see Appendix 1).

Evidence of reproduction was obtained through observation of lactating females or the presence of juveniles for the following species: *R. hipposideros*, *M. myotis*, *M. bechsteinii*, *M. nattereri*, *M. emarginatus*, *M. mystacinus*, *M. brandtii*, *M. daubentonii*, *V. murinus*, *E. nilssonii*, and *P. auritus*.

Table 4. Bats recorded in caves of the Silesian Beskid Mts. by members of the Speleoclub in Bielsko-Biała, 2000-2006. For abbreviations see Table 3.

Cave	Date	Rhh	Uind	Total	Author	
Cave in Trzy Kopce	08.04.2000.	3	4	7	J. Ganszer, C. Szura	
	08.12.2001.	1	3	4	J. Ganszer, U. Tebin	
	24.02.2002.	3	3	6	A. Smoter, M. Smoter	
	01.12.2002.	5	4	9	J. Ganszer	
	04.01.2003.	1	7	8	A. Żera, A. Żera	
	22.11.2003.	2	3	5	J. Pukowski, G. Molek, J. Ganszer	
	29.11.2003.	10		10	J. Ganszer	
	28.12.2003.	10		10	A. Wiculski, P. Wyrobek	
	13.10.2004.	2	2	4	J. Ganszer, A. Smoter	
	17.02.2006	4	11	15	J. Pukowski	
	01.04.2006.	6	28	34	R. Głowacki	
	Cave „Studnia in Malinów II”	23.10.2005.	6		6	B. Juroszek, G. Szalbot
	Cave in Malinów IV	23.10.2005.	1		1	B. Juroszek, G. Szalbot
	Dująca Cave	12.11.2005.	1		1	M. Pawelczyk
15.11.2005.		20		20	M. Pawelczyk	
02.12.2005.		29	2	31	J. Ganszer	
12.03.2006.		27	2	29	R. Głowacki	
Salmopolska Cave	20.02.2005.	1		1	B. Juroszek	
	20.11.2005.	2		2	R. Głowacki	
Cave in Jaworzyna	03.11.2002.	1		1	J. Ganszer, J. Pukowski	
	20.10.2005.	5		5	G. Michałek, G. Gawłowski	
Cave in Kościelec I	12.11.2005.	1		1	J. Ganszer, M. Ganszer	
Cave „Studnia in Kościelec”	15.06.2003.	1		1	A. Smoter	
Cave „pod Grzebieniem”	13.04.2006.	1	2	3	J. Ganszer	
Grabowa Cave	18.11.2004.	18		18	B. Juroszek, P. Cieślak, J. Cieślak	
	30.01.2005.	4		4	B. Juroszek	
	21.10.2005.	1		1	G. Michałek, G. Gawłowski	
Cave in Skrzyczne I	26.04.2004.	1		1	U. Król, P. Beczała, L. Ostrowski	
Cave in Malinów III	13.10.2003.		1	1	U. Król, P. Beczała	
Cave „Głęboka” in Stołów	06.11.2005.		1	1	K. Krzysteczko, M. Bieniek	
	12.11.2005.		3	3	M. Jaśkiewicz, M. Pieniek, K. Krzysteczko	
	25.02.2006.		2	2	J. Drag, E. Pocha, R. Muzyczka	
	20.10.2003.		1	1	U. Król, P. Beczała	
Cervice in Klimczok	19.08.2000.		1	1	J. Pukowski, J. Ganszer, E. Chylaszczek	
Zwierzaka Cave						
Total	n	167	80	247		
	%	67.6	32.4	100.0		

DISCUSSION

Although there are 24 species of bats in Poland (Sachanowicz et al. 2006), the bat fauna of the Silesian Beskid Mts. includes only 63% of them. On the other hand, we may expect the presence of *Plecotus austriacus*, because it was recorded in areas adjacent to the SBM (Rehák 1998, Danko et al. 2003, Mysłajek et al. 2004).

The composition of the bat community in our study area, which we recorded with the help of mist-nets, is quite similar to those determined by netting in the Beskid Mały Mts. (Mysłajek 2002a), the Pieniny Mts. (Paszkiwicz et al. 1998), and the Beskid Sądecki Mts. and Beskid Niski Mts. (Węgiel et al. 2004). This is due to the strong domination of a couple of species – *M. daubentonii* and the *P. auritus*, which constitute 40–68% of all captured individuals. The most distinct bat community is in the Pieniny Mts. (Paszkiwicz et al. 1998), with a large share of *M. myotis* and the *Pipistrellus pipistrellus*. The latter species has been never caught with nets in any other parts of the Polish Carpathians (Mysłajek 2002a, Węgiel et al. 2004, this study).

In spite of the results of the bat capture study in the Pieniny Mts. (Paszkievicz et al. 1998), there is a visible difference between bat communities in the mountains and those in the lowlands of Poland. The most important difference is the very low number or even absence of taxa belonging to the *Pipistrellus* and *Nyctalus* genera in mountainous areas, which are quite important members of the bat population in lowland regions (Rachwald et al. 2001, Ciechanowski 2002, Mysłajek et al. 2005). This phenomenon requires more studies.

The bat community hibernating in the caves of the SBM is very similar to those observed in similar shelters in other parts of the Polish Carpathians outside of the Tatry Mts. (Mleczek et al. 1994, Mleczek 2002), and is dominated by *R. hipposideros* and *M. myotis*. Bat communities in caves in other parts of our country are more diverse (Piksa & Nowak 2000, Węgiel et al. 2001, Kowalski et al. 2002, Gottfried et al. 2003). The same applies to bat communities hibernating in man-made structures, both in mountain (Mleczek et al. 1994, Mleczek 2002) and lowland regions (Lesiński & Kowalski 2002, Lesiński 2006).

Bats frequently inhabit both bird and bat boxes in the lowland regions of Poland (Kowalski & Lesiński 1994, Kasprzyk & Ruczyński 2001, Ciechanowski 2005, Lesiński 2006), but we have not recorded their presence in this type of shelter in the SBM. In our opinion it may be caused by competition with glirids (Gliridae), which are often recorded in bird boxes within the study area (Mysłajek & Nowak 2003).

Among the taxa we recorded in the SBM, *R. hipposideros*, *M. bechsteinii*, *M. emarginatus*, *V. murinus*, *E. nilssonii* and *N. leisleri* are included in the Polish Red Data Book (Włoszyn 2001a, 2001b, 2001c, 2001d, 2001e, 2001f). Some of these are quite numerous (see Tables 1, 2) which shows how important the SBM area is for their conservation. Such an important hibernacula needs to obtain a proper legal status (e.g. caves: Grabowa, Miecharska, Wiślańska I and II), and the proposed borders of the Silesian Beskid Mts. Nature 2000 site should be extended to protect this area. Equally important is the implementation of forest management rules to protect old-growth forests and cave surroundings. During our research we recorded some cases of forest workers carrying out logging next to caves, piling tree branches by cave entrances, and burning them. The interiors of caves should also be protected against uncontrolled penetration and devastation (Mysłajek 2001b).

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STRESZCZENIE

[Nietoperze (*Chiroptera*) Beskidu Śląskiego]

Podczas badań prowadzonych w latach 2000–2007, na obszarze Beskidu Śląskiego (zachodnia część Karpat) stwierdzono 15 gatunków nietoperzy. Były to: podkowiec mały *Rhinolophus hipposideros*, nocek duży *Myotis myotis*, nocek Bechsteina *M. bechsteinii*, nocek Natterera *M. nattereri*, nocek orzęsiony *M. emarginatus*, nocek wąsatek *M. mystacinus*, nocek Brandta *M. brandtii*, nocek rudy *M. daubentonii*, mroczek posrebrzany *Vespertilio murinus*, mroczek poźłocisty *Eptesicus nilssonii*, mroczek późny *E. serotinus*, borowiaczek *Nyctalus leisleri*, borowiec wielki *N. noctula*, gacek brunatny *Plecotus auritus* i mopek *Barbastella barbastellus*. W zespole nietoperzy odławianych za pomocą japońskich sieci dominował nocek rudy (37,0%), gacek brunatny (16,0%), nocek wąsatek (11,4%) oraz nocek Natterera (10,4%). Jedynie sporadycznie odławiano nietoperze z rodzajów *Eptesicus* i *Nyctalus*. W jaskiniach Beskidu Śląskiego hibernowało 7 gatunków nietoperzy, wśród których przeważały podkowiec mały (59,5%) i nocek duży (26,7%).

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APPENDIX I.

Locations of bat species in the Silesian Beskid Mts.

Rhinolophus hipposideros: (1) Cave in Trzy Kopce (H), in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (2) proposed nature reserve “Kościelec” (N), Cave in Kościelec II (O), Cave “Studnia w Kościelcu” (H) [CA50, 1000 m a.s.l.]; (3) Skrzyczne – Zbójceki Ravine (N) [CA50, 880 m a.s.l.]; (4) Cave in Stołów (H), in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.]; (5) nature reserve “Kuznie” (N) [CA50, 980 m a.s.l.]; (6) Bunker “Waligóra” in Węgierska Górka (O) [CV69, 460 m a.s.l.]; (7) Salmopolska Cave (H) [CA50, 902 m a.s.l.]; (8) Wiślańska Cave I, Wiślańska Cave II (H) [CA50, 870 m a.s.l.]; (9) Grabowa Cave (H) [CA50, 870 m a.s.l.]; (10) Cave “Studnia w Malinowie II” (H) [CA50, 1029 m a.s.l.]; (11) Miecharska Cave (H) [CA50, 964 m a.s.l.]; (12) Cave in Jaworzyna (H) [CA50, 1030 m a.s.l.]; (13) Cave in Malinów IV (H) [CA50, 1030 m a.s.l.]; (14) Cave in Skrzyczne I (H) [CA50, 880 m a.s.l.]; (15) Cave “nad Grzebieniem” [CA50, 1060 m a.s.l.], (16) Brenna – meadow Filipionka (O) [CA50, 750 m a.s.l.].

Myotis myotis: (1) Cave in Stołów (H), in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.]; (2) Cave in Trzy Kopce (H), in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (3) proposed nature reserve “Kościelec” (N) [CA50, 1000 m a.s.l.]; (4) nature reserve “Kuznie” (N), Chłodna Cave (H) [CA50, 980 m a.s.l.]; (5) Ostre – stream in the forest compartment 69 (N) [CA60, 555 m a.s.l.]; (6) Skrzyczne – Zbójecki Ravine (N) [CA50, 880 m a.s.l.]; (7) Malinowska Cave (H) [CA50, 1020 m a.s.l.]; (8) Salmopolska Cave (H) [CA50, 902 m a.s.l.]; (9) Wiślańska Cave I (H) [CA50, 870 m a.s.l.]; (10) Cave in Jaworzyna (H) [CA50, 1030 m a.s.l.]; (11) Miecharska Cave (H) [CA50, 964 m a.s.l.].

Myotis bechsteini: (1) in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (2) proposed nature reserve „Kościelec” (N) [CA50, 1000 m a.s.l.]; (3) nature reserve “Kuznie” (N) [CA50, 980 m a.s.l.]; (4) Ostre – stream in the forest compartment 20 (N) [CA60, 540 m a.s.l.]; (5) Skrzyczne – Zbójecki Ravine (N) [CA50, 880 m a.s.l.].

Myotis nattereri: (1) proposed nature reserve „Kościelec” (N) [CA50, 1000 m a.s.l.]; (2) nature reserve “Kuznie” (N) [CA50, 980 m a.s.l.]; (3) in the front of the Dująca Cave (N) [CA51, 996 m a.s.l.]; (4) in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (5) in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.].

Myotis emarginatus: (1) Cave in Trzy Kopce (H), in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (2) in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.]; (3) in the front of the Dująca Cave (N) [CA51, 996 m a.s.l.]; (4) nature reserve “Kuznie” (N) [CA50, 980 m a.s.l.]; (5) Skrzyczne – Zbójecki Ravine (N) [CA50, 880 m a.s.l.]; (6) Twardorzeczka – road in the forest compartment 83 (N) [CV59, 820 m a.s.l.]; (7) Wiślańska Cave I (H) [CA50, 878 m a.s.l.]; (8) Miecharska Cave (H) [CA50, 964 m a.s.l.].

Myotis mystacinus: (1) Ostre – stream in the forest compartment 20 (N) [CA60, 540 m a.s.l.]; (2) Bielsko-Biała – Wapieniczanka stream (N) [CA51, 440 m a.s.l.]; (3) Twardorzeczka – road in the forest compartment 83 (N) [CV59, 820 m a.s.l.]; (4) in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.]; (5) in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (6) Ostre – stream in the forest compartment 69 (N) [CA60, 555 m a.s.l.]; (7) proposed nature reserve “Kościelec” (N) [CA50, 1000 m a.s.l.]; (8) nature reserve “Kuznie” (N) [CA50, 980 m a.s.l.]; (9) Szczyrk – Godziszczanka stream (N) [CA50, 560 m a.s.l.].

Myotis brandtii: (1) Bielsko-Biała – Wapieniczanka stream (N) [CA51, 440 m a.s.l.]; (2) in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.]; (3) in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (4) Ostre – stream in the forest compartment 69 (N) [CA60, 555 m a.s.l.]; (5) proposed nature reserve „Kościelec” (N) [CA50, 1000 m a.s.l.]; (6) Ostre – stream in the forest compartment 20 (N) [CA60, 540 m a.s.l.]; (7) nature reserve “Kuznie” (N) [CA50, 980 m a.s.l.].

Myotis mystacinus/Myotis brandtii complex (counted together during hibernation): (1) Cave in Trzy Kopce (H) [CA51, 970 m a.s.l.]; (2) Malinowska Cave (H) [CA50, 1020 m a.s.l.]; (3) Chłodna Cave (H) [CA50, 980 m a.s.l.]; (4) Miecharska Cave (H) [CA50, 964 m a.s.l.].

Myotis daubentonii: (1) Miecharska Cave (H) [CA50, 964 m a.s.l.]; (2) Bielsko-Biała – Wapieniczanka stream (N) [CA51, 440 m a.s.l.]; (3) in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.]; (4) in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (5) proposed nature reserve “Kościelec” (N) [CA50, 1000 m a.s.l.]; (6) nature reserve “Kuznie” (N) [CA50, 980 m a.s.l.]; (7) Ostre – stream in the forest compartment 20 (N) [CA60, 540 m a.s.l.]; (8) Ostre – stream in the forest compartment 69 (N) [CA60, 555 m a.s.l.]; (9) Bielsko-Biała – Wapienica, artificial lake Wielka Łąka (D) [CA51, 475 m a.s.l.]; (10) Skrzyczne – Zbójecki Ravine (N) [CA50, 880 m a.s.l.].

Vespertilio murinus: (1) Ostre – stream in the forest compartment 20 (N) [CA60, 540 m a.s.l.]; (2) Bielsko-Biała – Olszówka Street No. 141 (O) [CA51, 450 m a.s.l.]; (3) Wisła – Kuriady Street No. 14 (O) [CA40, 460 m a.s.l.].

Eptesicus nilssonii: (1) in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.]; (2) Skrzyczne – Zbójecki Ravine (N) [CA50, 880 m a.s.l.]; (3) proposed nature reserve “Kościelec” (N) [CA50, 1000 m a.s.l.]; (4) Ostre – stream in the forest compartment 20 (N) [CA60, 540 m a.s.l.]; (5) nature reserve “Kuznie” (N) [CA50, 980 m a.s.l.]; (6) Medyków Cave (H) [CV59, 1000 m a.s.l.].

Eptesicus serotinus: (1) Ostre – stream in the forest compartment 20 (N) [CA60, 540 m a.s.l.]; (2) Szczyrk – Godziszczanka stream (D) [CA50, 560 m a.s.l.].

Nyctalus leisleri: (1) Ostre – stream in the forest compartment 20 (N) [CA60, 540 m a.s.l.].

Nyctalus noctula: (1) Bielsko-Biała – Wapienica, artificial lake Wielka Łąka (D) [CA51, 475 m a.s.l.]; (2) Glinne (D) [CV69, 1034 m a.s.l.]; (3) Wysznia (D) [CV59, 930 m a.s.l.].

Plecotus auritus: (1) Twardorzeczka – stream in the forest compartment 96 (N) [CA60, 590 m a.s.l.]; (2) Twardorzeczka – road in the forest compartment 83 (N) [CV59, 820 m a.s.l.]; (3) in the front of the Dująca Cave (N) [CA51, 996 m a.s.l.]; (4) in the front of the Cave in Stołów (N) [CA51, 988 m a.s.l.]; (5) Cave in Trzy Kopce (H), in the front of the Cave in Trzy Kopce (N) [CA51, 970 m a.s.l.]; (6) Skrzyczne – Zbójecki Ravine (N) [CA50, 880 m a.s.l.]; (7) Ostre – stream in the forest compartment 69 (N) [CA60, 555 m a.s.l.]; (8) proposed nature reserve “Kościelec” (N) [CA50, 1000 m a.s.l.]; (9) nature reserve “Kuznie” (N), Cave Chłodna (H) [CA50, 980 m a.s.l.].

Barbastella barbastellus: (1) Bunker “Waligóra” in Węgierska Górka (H) [CV69, 460 m a.s.l.].