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BATS OF NON-LOTIC BULGARIAN WETLANDS

Ivan Pandourski & Rumyana Whitcher

Bats of the wetlands in Bulgaria have been the subject of only a few investigations and these results have not yet been published. There are only two publications where isolated findings of bats in wetlands have been reported. HEINRICH (1936) reported seven bat species from the wet inundate longoz forest of Reka Kamchia, and HRISTOV (1961) published a finding of *Pipistrellus pipistrellus* in the region of Sreburna Lake. Up until 1999, all new information was collected by catching bats above water surfaces using mistnets. In 2000, the Swedish zoologist, Professor INGEMAR AHLEN, in collaboration with the Institute of Zoology (BAS), initiated a systematic study of bat communities in the wetlands of the Prebalkan area and the mountains of South Bulgaria using methods of bat sound recording and analysis. Electronic equipment made by the Swedish firm Petterson Elektronik AB, and the software product BatSound 3.10 for Windows, were used. In the autumn of 2003, and in July 2003, Dr. IVAN PANDOURSKI investigated in more detail the species composition and foraging activity of bats in the region of the Bourgas wetlands, especially around the lakes Vaya, Pomoriysko Ezero and Atanasovsko Ezero. More than 1000 ultrasound bat recordings were made and analyzed which allowed the dominating species and their spatial activities to be determined. The important role of the wetlands for the food supply of large bat populations was at last understood. In 2003, within the framework of an international project (NATURA-2000), a monitoring program for the investigation of the species composition and conservation needs of bats in some wetlands along the northern coast of Cherno More in Bulgaria (Shablenska Touzla, Balchishka Touzla and a wet inundate of the longoz forest of Reka Kamchiya) was initiated. The analysis of the results from this study is still ongoing.

All bat species in Bulgaria are protected by the Biological Diversity Act (Order 77 from 2002). Two species *(Myotis capaccinii and Myotis emarginatus*) are included in the National Red Data Book (1985) and a few are included in the 2002 IUCN Red List of Threatened Species (*Barbastella barbastellus* – VU A2c, *Miniopterus schreibersii* – LR/nt, *Myotis bechsteini* – VU A2c, *Myotis capaccinii* – VU A2c, *Myotis emarginatus* – VU A2c, *Myotis myotis* – LR/nt, *Nyctalus leisleri* – LR/nt, *Nyctalus lasiopterus* – LR/nt *and Rhinolophus ferrumequinum* – LR/nt). All *Pipistrellus* species and *Miniopterus schreibersii* are protected by Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Bats are also protected by several international conventions for nature conservation, including the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979); the Convention of Biological Diversity (1993); the Bonn Convention on the Conservation of Migratory Species of Wild Animals CMS (1999); and the Agreement on the Conservation of Bats in Europe – EUROBATS (1999).

Twenty bat species have been established in several types of natural or artificial wetland (marshes, lakes, microreservoirs and fish reservoirs). In some cases the method of ultrasound detection did not allow us to distinguish between the two pairs of sibling species *M. myotis/blythi* and *P. auritus/austriacus*. Catching bats using mistnets confirmed taxonomical determination of the small *Myotis* species. Below we will briefly describe the distribution and biology of the species found in the main categories of wetlands in Bulgaria. The results from the fieldwork in the region of the Bourgas wetlands will be summarized in more detail.

• *Rhinolophus ferrumequinum* (Schreber, 1774)
The Greater Horseshoe bat is a very common cave-dwelling bat species in Bulgaria. It is widely distributed in all karstic terrains and its winter and nursery colonies inhabit natural caves, artificial mines, rock crevices and abandoned attics. The typical foraging habitats for this species are located in deciduous forests not far from the main roosts. Often riparian vegetation is an important foraging site for this species. Isolated specimens have been captured by mist nets above open wetlands or detected above water surfaces (Yazovir Alexandur Stamboliyski).

• *Myotis daubentonii* (Kuhl, 1819). This dendrophilous species inhabits the lowlands of southeastern Bulgaria. High foraging activity has been

observed during the reproductive period over some large wetlands along the south Bulgarian coast of Cherno More, where populations of the species are large. Known localities include the wet inundate longoz forests of Reka Kamchia (HEINRICH, 1936), estuaries of the rivulets Boutamyata (= Potamyata), Silistar and Veleka, the river floods in Strandzha Mt, and around lakes Vaya, Pomoriysko Ezero and Atanasovsko Ezero.

• *Myotis capaccinii* (Bonaparte, 1837). The Long-fingered bat forms large hibernating and nursery colonies and is a typical cave-dwelling species. It is widely distributed in all karstic terrains of the country. Its nursery colonies are established mainly in the lowlands and Prebalkan areas. Its foraging activity takes place over water reservoirs where it shows gleaning foraging behaviour (catching insects close to the water surface). During the present study, high foraging activity was observed above dams, fish reservoirs and inland reservoirs in lowlands (a microreservoir near Ploski village, the reservoir Yazovir Alexandur Stamboliyski, a river flood of the rivulet Rositsa near village of Resen and fish reservoirs near Besarbovo village in the Rouse district).

• *Myotis mystacinus* (Kuhl, 1819). The Whiskered bat is considered to be rare in Bulgaria and its biology and behaviour are poorly studied. It is found in forest regions of Rila, Pirin, Vitosha and Stara Planina Mts. Some isolated nursery colonies inhabit attics of abandoned buildings. High foraging activity during the summer was observed above dams, fish reservoirs in mountain areas and inland reservoirs in lowlands. It shows gleaning foraging behaviour (microreservoirs and fish ponds in Rila valley, micro reservoir near Dolni Pasarel, district of Sofia).

• *Myotis nattereri* (Kuhl, 1818). This species is rare in Bulgaria and its ecology and foraging behaviour are poorly understood. It is a forest-dwelling species, but there are some extant recordings from karstic terrains. Only isolated specimens have been observed to forage above the water surfaces of small lakes or microreservoirs in the mountain areas (the reservoir Yazovir Belmeken and fish reservoirs near the stream Reka Eleshnitsa in Rila Mt).

• *Myotis myotis/blythi.* These two sibling species are typical cave-dwellers and form large mixed colonies in long natural caves and other types of underground habitats. The food preferences of these species have not been studied in detail, but some spatial and habitat differentiation in their foraging behaviour is known. *M. blyhti* forages in more open landscapes, near vegetation and rocky terrains. The foraging activity of *M. myotis* does not usually take place above open water surfaces, but night activity was observed along some inland lakes and reservoirs and in the Bourgas wetlands.

• *Myotis bechsteini* (Kuhl, 1818). The Bechstein's bat is rare in Bulgaria. It is found in some mountain and forest regions in western Bulgaria. Some specimens were captured in the region of estuary[188] of Reka Silistar and the longoz forest of Reka Kamchiya (HEINRICH, 1936).

• *Nyctalus noctula* (Schreber, 1774). This species is widely distributed in different karstic and forest regions of the country and it is a common species in the lowlands and Prebalkan areas. It is a migratory species, whose reproductive and wintering colonies inhabit tree holes, rocky crevices and human buildings. It forages high above the ground, but has often been detected above open water surfaces (floods of Reka Rositsa, estuaries of rivulets in Strandzha Mt, fish reservoirs along the rivulet Reka Rousenski Lom, the reservoir Yazovir Alexander Stamboliiski and the Bourgas wetlands).

• *Nyctalus leisleri* (Kuhl, 1818). This species is rare in Bulgaria. Foraging individuals were detected in the wet inundate longoz forests of Reka Kamchiya.

• *Nyctalus lasiopterus* (Schreber, 1780). This species is considered to be rare in Bulgaria as only isolated specimens have been recorded in forest and karstic terrains, located at sea level up to mountain areas. Foraging activity was detected above the estuary of Reka Silistar (Strandzha Mt).

• *Eptesicus serotinus* (Schreber, 1774). The Serotine is a common species in the country and is considered to be petrophilous or synanthropic. It is frequently observed to forage above reservoirs and open water surfaces, especially near karstic terrains.

[188] Real estuaries do not exist in Bulgaria due to the peculiar character of the water basin Cherno More (known as Black Sea). Therefore, it is preferable to use 'outfall', 'river mouth' or 'liman' for this kind of wetlands (eds. note).

It is frequently captured by mistnetting or recognized by its typical ultrasonic emissions using bat detectors above estuaries, reservoirs, lakes located at sea level or lowlands, or above microreservoirs in mountain regions (wet inundate longoz forests of Reka Kamchia, a microreservoir near Stara Kresna village, floods of Reka Rositsa and fish reservoirs along the rivulet Reka Rousenski Lom, Bourgas wetlands).

• *Pipistrellus pipistrellus* (Schreber, 1774). The Common pipistrelle is widely distributed in the country and is a synanthropic or petrophilous species. Foraging activity has been observed above open reservoirs from sea level to about 1300 m a.s.l., microreservoirs, estuaries and fish reservoirs. According to our research, this species is one of the most common bat species foraging in the wetlands along the south Black Sea Coast and in some other inland reservoirs. It was recorded at some fish reservoirs along Reka Rousenski Lom, Rila Valley, lake of Sreburna (HRISTOV, 1961) and is very common in the Bourgas wetlands.

• *Pipistrellus nathusii* (Keyserling & Blasius, 1839). Until recently, this species was considered to be very rare in the country, as only a few isolated recordings have been made in some forest regions. Its biology is poorly understood. Our research confirmed that it is a very common and abundant species in the Bourgas wetlands (lakes Vaya, Atanasovsko Ezero and Pomoriysko Ezero, and the Dolni Pasarel microreservoir).

• *Pipistrellus kuhli* (Kuhl, 1819). This species is found in only a few isolated localities in south Bulgaria. A foraging specimen was caught by mistnets at the estuary of Reka Silistar. It is conjectured that the species is more common in Bulgaria than was previously thought.

• *Pipistrellus pygmaeus* (Leach, 1825). This is a comparatively rare species in Bulgaria, whose presence was confirmed very recently mainly as a result of using ultrasound bat detecting equipment. Its foraging activity occurs mainly above open water surfaces and its main food preferences are insects, which produce water larvae. Often (as at lake Vaya near Bourgas) it occurs and forages together with *P. pipistrellus*. These two sibling species can be easily distinguished by their ultrasonic emissions, about 45 KHz for *P. pipistrellus*, and about 55 KHz for *P. pygmaeus*.

• *Hypsugo savii* (Bonaparte, 1837). This is a common and widely distributed bat species in the country, and it prefers karstic terrains. It inhabits rocky crevices, or is synanthropic, and can be encountered across wide altitudinal ranges – from sea level to more than 1400 m a.s.l. During the spring and autumn migratory periods a mass foraging activity was observed above water reservoirs, where bats hunted very close to the water surface. It was observed above inland lakes and microreservoirs and was easily recognised by its typical ultrasonic emissions (Bourgas wetlands, a microreservoir near Ploski village and fish reservoirs along the stream Rilska Reka).

• *Plecotus auritus/austriacus.* These two sibling species are common in Bulgaria and are distributed among forest and karstic terrains across a wide altitudinal range. Their small nursery colonies inhabit tree holes or abandoned buildings. It is practically impossible to determine the two species by their almost identical ultrasonic emissions. Their foraging activity often occurs within riparian forests near marshes, estuaries and reservoirs (Pomoriysko Ezero).

• *Vespertilio murinus* Linnaeus, 1758. This species is considered rare in Bulgaria, being found only in mountain forest regions. Its biology is poorly understood. It has been observed above water surfaces in some inland lakes and river floods at about 1000-1300 m a.s.l.

• *Barbastella barbastellus* (Schreber, 1774). The Barbastelle is a rare bat species in Bulgaria whose biology has not been studied. It is considered to be a forest-dwelling species, occurring mostly in mountain areas. There is one record of captured reproductive females in the region of the wet inundate longoz forest of Reka Kamchiya published by HEINRICH (1936).

• *Miniopterus schreibersii* (Kuhl, 1819). The Schreiber's bat is a typical cave-dwelling species forming the largest known bat colonies in the country (about 15 000 individuals). The largest reproductive colonies of this migratory species occur mainly from the lowlands up to mountain regions. It forages far from the main roost and its foraging activity occurs high above the ground. Foraging individuals were detected or mistnetted near some wetlands – estuary of Reka Silistar, floods of some inland rivulets located in karstic terrains, and above

inland microreservoirs.

The lakes in Bourgas region are very important foraging sites for large populations of several different bat species. The very rich food supply, represented by adult forms of Chironomidae (*Chironomus aprilinus* Meigen, 1830 and *Chironomus salinarius* Kiefer, 1915 in the lakes Atanasovsko Ezero and Pomoriysko Ezero and *Chironomus balatonicus* Devai, Wulke, Sholl (KRASTANOV, in press) in lake Vaya) attracts bat communities. Thus, even in late autumn periods, the bat population is very high.

The two species of the family Vespertilionidae (*Pipistrellus pipistrellus* and *P. nathusii*) dominate. The latter was considered to be rare in Bulgaria due to the small number of known roosts. In our study we confirmed that it is very common in the studied area as we detected very high foraging activity above all studied lakes near Bourgas. We established that *Pipistrellus pygmaeus* is not a common species but also forages above the lake Vaya.

Another two comparatively common bat species here are *N. noctula* and *E. serotinus*. We can refer them to the antropophilous complex, as in the region near the studied lakes the settlements are well presented and supply suitable day roosts for bats. These two species were detected not only in the city of Bourgas, but in the surrounding wetlands as well.

Some bat species, which typically inhabit forests, rocky or karstic terrains, are comparatively rare in the studied region of the lakes of Bourgas. These are the closely related species *M. myotis/blythii* whose species determination was not possible using bat detectors because of their almost identical ultrasonic emissions. *Hypsugo savii* was easily detected as was *Plecotus* sp. Isolated individuals were detected foraging above the water surface of the lakes during the late hours of the night (at and after midnight). This fact can be explained by the comparatively long distance between their day roosts and the foraging site.

Bats are a very important element of the general biological diversity of the Bourgas wetlands which, having a very rich fauna, represent a very valuable site for the conservation of the ecological equilibrium along the Bulgarian south coast of Cherno More.

Studies of bats in wetlands in Bulgaria are still in their initial stages. The recently acquired data are collected sporadically using only classical methods of field observations (capturing bats by mistnets in some potential foraging sites). The application of more advanced methods for recording and analysis of bat sounds in different landscapes allowed us to study the structure of bat communities and their foraging activity in more detail. The preservation of waters in the wetlands in Bulgaria and the maintenance of their sustainable equilibrium, are very important for the conservation of the large bat populations whose main food supply are water insects. The restoration of the wetlands near Reka Dounav and in the inland territories of the country is an opportunity for increasing the number and diversity of bat communities. The protection of riparian forests, focusing on the preservation of old tree holes which are suitable for roosting of many bat species (*P. pipistrellus, P. nathusii, M. mystacinus, M. daubentonii, M. bechsteini, N. noctula*), should be a priority conservation measure.