AGREEMENT OF THE CONSERVATION OF POPULATIONS OF EUROPEANS BATS

(EUROBATS)

REPORT ON THE IMPLEMENTATION OF THE AGREEMENT IN BULGARIA

September 2003- December 2009

Contents:

A. General information

Name of the Party: Bulgaria

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Competent Authority: Ministry of Environment and Water (MOEW)

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B. Status of Bats within the Territory of Bulgaria

1. Summary Details of Resident Species

(V. Popov and B. Petrov)

Bulgaria has a uniquely high diversity of bats. Of the 35 species present in continental Europe, **33 species** are known to inhabit Bulgaria at present. Among the reasons for this high diversity are the country's transitional geographic location, its mosaic of habitats which start at sea level and reach an altitude of over 2 900 m, the continued existence of wild nature in many parts of the country, extensive farming activities in the mountains and semi-mountainous regions, the presence of over 5,900 caves and the high diversity and abundance of insects. The greatest bat diversity can be found in the belt between 100 and 400 m altitude, where relatively small areas are inhabited by 17-20 species.

Myotis alcathoe was the last reported bat species for the fauna of Bulgaria (Schunger, 2004). It was found in Vodnite Dupki cave but several other localities were further added- Kresna Gorge, Ropotamo Reserve, Sokolskata Peshtera cave, Bratanovata Peshtera cave (Niermann et al., 2007).

2. Status and Trends

Status (B.Petrov)

Information about the occurrence and habitat preferences of all 33 bat species found in Bulgaria is presented in the table below. **31 species** are considered **Resident**, **1** is **Vagrant** (*Myotis dasycneme*), **1** is **Migratory** (*Pipistrellus nathusii*).

SPECIES	Distribution in Bulgaria	Roosts	Preferred Habitats in Bulgaria	Status
Family Rhinolophidae				
1. *Rhinolophus ferrumequinum* Greater horseshoe bat	A common species found in many places. In recent years some colonies are known to have decreased in number or disappeared	Caves, mine galleries, bunkers, rarely in basements	Prefers karstic regions with a mosaic of scrubs, trees and open spaces, in mountains up to 1600 m	Resident
2. *Rhinolophus hipposideros* Lesser horseshoe bat	Widely distributed but not in high numbers	Caves, mine galleries, bunkers, drain ditches, rarely in houses	Karstic regions with vegetation, caves, in mountains regularly up to 1300 m, maximum altitude around 1600 m	Resident
3. *Rhinolophus blasii* Blasius's horseshoe bat	More common in low altitudes with a pronounced Mediterranean climate; low numbers	Caves, mine galleries, bunkers	Mostly plains and hilly karst regions covered with trees and shrubs	Resident
4. *Rhinolophus mehelyi* Mehely's horseshoe bat	Its discovery in NW Bulgaria delineates the northern border of its distribution on the Balkan peninsula; low numbers everywhere	Only in caves, mine galleries, bunkers	Mostly plains and hilly karstic regions covered with trees and scrubs	Resident
5. *Rhinolophus euryale* Mediterranean horseshoe bat	Almost in the whole country with the exception of open areas; nowhere in high numbers	Caves, mine galleries, bunkers, rarely in abandoned buildings	Mostly karstic regions covered with trees and shrubs near water	Resident
Family Vespertilionidae				
6. *Myotis alcathoe* Alcathoe whiskered bat	So far it has only been found in Strandzha, Vrachanska planina Mt, Central Balkan and Kresna Gorge	Possibly in tree hollows and crevices	Humid broadleaved and mixed forests up to 1500 m in mountains	Resident
7. *Myotis aurascens* Steppe whiskered bat	Isolated findings throughout the country	Possibly in tree hollows and cracks, rarely outside forests	Mixed forests	Resident
8. *Myotis bechsteinii* Bechstein's bat	All over the country where there are old forests; not found in the Thracian lowland; highest numbers in Strandzha Mt.	Maternity colonies in hollows, single individuals live in tree crevices	Spacious broadleaved and mixed forests; from the sea level up to 1650 m in mountains	Resident
9. *Myotis blythii* Lesser mouse-eared bat	In many different sites all over the country; good numbers	Only in caves, mine galleries, rarely in man-made structures	Karstic regions with forests or open habitats	Resident

SPECIES	Distribution in Bulgaria	Roosts	Preferred Habitats in Bulgaria	Status
10. *Myotis brandtii* Brandt's bat	Only in the Western Rhodopes, Central and Western Stara Planina Mt. and Rusenski Lom Nature Park	Tree hollows and crevices	Mixed forests in the mid-mountain belt	Resident
11. *Myotis capaccinii* Long-fingered bat	Almost throughout the country with the exception of open spaces in the Thracian lowland and Dobrogea	Only in caves, rarely in basements of abandoned buildings	Typical for low-mountain karstic regions with caves	Resident
12. *Myotis dasycneme* Pond bat	Found only in one locality in the Danube area around the town of Ruse	Tree hollows, basements and bunkers near big rivers	Strips of broadleaved forests along big rivers	Vagrant
13. *Myotis daubentonii* Daubenton's bat	Common around all big rivers and their tributaries	Tree hollows, sometimes under river bridges	Broadleaved forests with rivers; from the sea level up to 1400 m in the mountains	Resident
14. *Myotis emarginatus* Geoffroy's bat	Almost all over the country; very rarely found in the winter	Bunkers, attics in houses, churches, cave entrance areas	Typical for low-mountain karstic and rocky regions covered with low-growing vegetation	Resident
15. *Myotis myotis* Greater mouse-eared bat	All over the country	Only in caves, mine galleries, rarely in basements	Regions with forests and open spaces	Resident
16. *Myotis mystacinus* Whiskered bat	Almost throughout all the country, more often in the mountains, problematic to identify	In the summer – possibly in tree hollows, in the winter – in caves	Broadleaved and mixed forests in the mid-mountain belt	Resident
17. *Myotis nattereri* Natterer's bat	Mostly in Western Bulgaria	Tree hollows and crevices	Humid broadleaved and mixed forests, in mountains up to 1500 m, by exception up to 2300 m	Resident
18. *Nyctalus noctula* Noctule	Migratory species observed in the whole country, sometimes in high numbers	Tree hollows, attics of buildings, joints of residential and industrial buildings and bridges	Broadleaved and mixed forests near rocks, rivers, wetlands; settlements	Resident
19. *Nyctalus lasiopterus* Giant noctule	One of the rarest bat species found in only a few localities in south Bulgaria	Tree hollows and crevices	Broadleaved and mixed forests from the sea level up to 1500 m in mountains	Resident
20. *Nyctalus leisleri* Lesser noctule	Migratory species, few known localities, sometimes in high numbers	Tree hollows and crevices	Broadleaved forests in the hilly belt; rarely in settlements	Resident
21. *Eptesicus serotinus* Serotine	In the whole country, nowhere in very high numbers	Rocks, man-made structures, tree hollows and crevices	Rocky regions and forests; also common in settlements	Resident
22. *Eptesicus nilssonii* Northern bat	Only one locality – Rilski Ezera Hut in Rila Mt.	**?**	In southern Europe only in high mountains	? Resident

SPECIES	Distribution in Bulgaria	Roosts	Preferred Habitats in Bulgaria	Status
23. *Hypsugo savii* Savi's pipistrelle	In the whole country, rarely in the Black Sea region, the Thracian lowland and Dobrogea	Cracks in rocks, tight joints of residential buildings, bridges	Rocky regions; settlements	Resident
24. *Pipistrellus kuhlii* Kuhl's pipistrelle	So far only found in the Struma River valley, Ruse, southern Black Sea region, Plovdiv and Sofia	Residential and industrial buildings	Settlements, resorts, rarely outside urbanized territories	Resident
25. *Pipistrellus pipistrellus* Common pipistrelle	In the whole country, mostly in high numbers	Rock cracks, under roof and wall constructions in buildings, in trees	Settlements, regions with forests, rocky gorges	Resident
26. *Pipistrellus pygmaeus* Pygmy/soprano pipistrelle	Similar to the above species, found in the Eastern Rhodopes, southern Black Sea region and other localities; unknown abundance	Rock cracks, under roof and wall constructions in buildings, in trees	Settlements, regions with forests, rocky gorges	Resident
27. *Pipistrellus nathusii* Nathusius' pipistrelle	Migratory species found only in the spring and the autumn	Cracks in rocks, residential buildings, hollow trees	Forest regions with rocks, river valleys, settlements	Migratory
28. *Miniopterus schreibersii* Schreiber's long-fingered bat	Many localities in karstic regions, in many places the colonies reach several thousand individuals	Underground habitats– caves, basements, colonial species	Karstic regions, river valleys with caves, in mountains up to 1500 m	Resident
29. *Plecotus auritus* Brown long-eared bat	Typical for the mountains, 80% of the localities are above 1000 m	Hollows, cracks and under the bark of old trees	Broadleaved and mixed forests in mountains up to 2650 m (Pirin and Rila)	Resident
30. *Plecotus austriacus* Grey long-eared bat	Frequently found in lowlands and hilly regions	Hollows, under the bark of old trees, buildings, rarely in caves and galleries	Broadleaved and mixed forests, often in towns and villages	Resident
31. *Vespertilio murinus* Particoloured bat	Mainly in mountains, in the autumn and winter – in lowlands too	Cracks in rocks, joints in residential buildings, mountain huts	In the high mountains even above 2900 m, during winter in settlements	Resident
32. *Barbastella barbastellus* Western barbastelle	Isolated localities all over the country with the exception of the open spaces in the Thracian lowland and Dobrogea	Hollows, cracks and under the bark of old trees	Humid broadleaved and mixed forests from the sea level up to 1500 m in mountains	Resident
Family Mollossidae				Resident
33. *Tadarida teniotis* European free-tailed bat	Considered a rare species, 10 localities in south Bulgaria and several in north Bulgaria	Crevices in rocks	Regions with rocks, sometimes in settlements as well	Resident

Trends (V. Popov)

The new and updated Red Data Book (RDB) of animals and plants (The National Red Data Book of Republic of Bulgaria, in press) was elaborated recently. All species were evaluated according to the IUCN criteria. General distribution of the 10 species included in the RDB and trends in their population number are as follows (distribution data after Benda et al., 2003).

1. **Mediterranean Horseshoe Bat** (***Rhinolophus euryale*****)** is the most widespread and most numerous of the three species of "medium-sized" horseshoe bats on the territory of the country. It is known from over 100 localities, most of them being between altitudes of 0 – 700 m, but it has winter shelters at higher altitudes as well. Its occurrence declines to the south. The minimal summer population size is about 40 000 individuals. For the cave-dwelling species of bats, to which the Mediterranean horseshoe bat belongs, a decrease of the numbers of 20-40% at the average was registered.

2. **Blasius' Horseshoe Bat (*Rhinolophus blasii*)** is known from about 60 localities. In the southern parts of the country the species is relatively common and with a higher frequency of occurrence and abundance. The western and the central parts of the Prebalkan area and the line Veliko Tarnovo – Kotel – Primorsko outline part of the northern border of the range. The minimal estimate of the summer population is about 5 000 individuals. For the cave-dwelling species of bats, to which the Blasius' horseshoe bat belongs, a decrease of the numbers by 20-40% at the average was registered.

3. **Mehely's Horseshoe Bat (*Rhinolophus mehelyi*)** is known from 29 localities in the lowlands of the country, whereby those in Northwestern Bulgaria outline part of the northern border of its range. It has comparatively low numbers: about 10 000 individuals. It may be assumed that similar to the other cave-dwelling species of bats there is a decrease of the numbers with 20-40% at the average.

4. **Bechstein's Bat** (***Myotis bechsteinii*****).** Until the end of 2006, 34 localities were known, whereby 14 are situated at altitudes under 300 m, 8 are within altitudes of 301-1000 m, and the rest are over 1000 m. The density is highest between 1000 m and 1 400 m (an average of 8.2 individuals from 12 localities), in regions with vast and compact forest massifs (the Central Balkan range, the Western Rhodopes, Strandzha). It is rare in the Danube Plain and absent in the open parts of Thrace.

5. **Long-fingered Bat** (***Myotis capaccinii*****)** occurs throughout the country, without the highest parts of the mountains. 73 roosts are known, most of them between 100 and 600 m altitude. The total summer number is about 18 500 individuals. During the winter, when bats from the surrounding countries migrate to Bulgaria and the numbers are about 45 000 individuals. For the cave-dwelling species of bats, to which the long-fingered bat belongs, an average decrease of the numbers has been registered by 20-40%.

6. **Geoffroy's Bat (*Myotis emarginatus)*** is known from 73 localities, situated throughout the country. Most roosting sites and colonies have been registered in the low mountainous belt (at altitudes of up to 400-500 m). Single individuals have been registered at altitudes of up to about 1600 m in the Central Balkan range, Rila, and the Western Rhodopes. In the ca. 30 nursery colonies known so far, the number of

individuals is between 300 and 600. Exceptional colony of about 7 000 individuals, have been found in a cave in the Eastern Rhodopes.

7. **Western Barbastelle (*Barbastella barbastellus*):** Until the end of 2006 the species was known from 23 localities (only 6 before 1985). Most often it has been found in the Central and the Western Balkan range and in the Western Rhodopes. Most roosting sites have been registered at altitudes of over 500 m. In the lower areas, single individuals have been registered (Kresna gorge; the village of Zhernov, Pleven region; Chernomorets, Burgas region). Recent surveys indicate that this species is also frequent in the Bulgarian part of Strandzha Mt. The highest locality is in the Vodnite dupki cave in the Severen Dzhendem reserve (1420 m). The peculiarities in the distribution and the abundance show that its range in the Balkan Peninsula is of a relict nature. The numbers at some places are high but as a whole they are low.

8. **Greater Noctule** (***Nyctalus lasiopterus*)** is one of the rarest bats in Bulgaria, known from 11 localities, 10 of them being in Southern Bulgaria. Of these, 5 are in Strandzha, where it does not seem to be so rare. Since its registering in Bulgaria in 1917, only 11 individuals have been caught so far. In the Western Rhodopes it has been registered at altitudes of up to 1250 m, the village of Buynovo. These data are insufficient to determine its numbers.

9. **Lesser Noctule** (***Nyctalus leisleri*)** has been found in 16 localities, most of which are at altitudes of under 800 m. The highest altitudes at which it has been found (1 500 m) are in the Central Balkan range. More than half of its recent localities (6) are in Strandzha.

10. **Schreiber's bat** (***Miniopterus schreibersii*)** occurs throughout the country, without the highest parts of the mountains. About 170 localities are known, most of which are at altitudes between 100 and 600 m. The total numbers are about 170 000 individuals of the wintering population and about 120 000 individuals of the summer population. The difference is probably due to the bats coming from Northern Greece that winter in Dyavolskoto garlo cave (the village of Trigrad, Western Rhodopi). For the cave-dwelling species of bats, to which Schreiber's bat belongs, a decline of the numbers was found by 20-40% at the average.

3. Habitats and Roost Sites (V. Popov)

According to a process for assessment of the important bat underground habitats on European level, initiated by the Agreement on the Conservation of Populations of European Bats (EUROBATS/UNEP), a scientifically based system for assessment of the underground bat habitats in Bulgaria was elaborated and a list of the Important Bat Underground Habitats (IBUH) was provided (Ivanova, 2005a). The assessment is based on data concerning the cave-dwelling bat species in Bulgaria: *Rhinolophus ferrumequinum*, *Rh. hipposideros*, *Rh. euryale, Rh. mehelyi, Rh. blasii, Myotis myotis, M. blythii, M. capaccinii, M. emarginatus* and *Miniopterus schreibersii.* According their functional role in the life of bats underground roosts are defined as summer roosts, nurseries/maternity roosts, hibernacula and temporary or transitory roosts. For identifying the IBUH in Bulgaria the number of species and the number of individuals were taken into account, following the UK scheme (NATURE CONSERVANCY COUNCIL 1989). For IBUH is declared each underground roost - natural cave, artificial gallery or part of building, which is, inhabited in particular part of the year by:

- 4 or more species and 50 or more individuals;
- 3 or more species and 100 or more individuals;
- 2 or more species and 150 or more individuals.

On the base of the list of localities and data on species diversity in each locality the above described scheme is applied and a list of Important Bat Underground Roosts in Bulgaria is prepared. From 92 IBUH, 52 are selected according the above listed criteria as an IBUH with national (39) and international importance (13). For details see Appendix 4.

4. **Threats** (V. Popov and B. Petrov)

Importance of the major threats to bats in Bulgaria is based on expert estimation of their present state and potential for further development. Between 2004 and 2009 the following activities caused negative impact to bats.

Underground water catchments- each water catchments, including the underground cave sources, require establishment of a sanitary and security zone after the Waters Act. Bats and other animals of conservation importance are not considered in the latter thus inclusion of protective measures depend primary of the good will of the investors. In the recent years, local RIEW are trying to control building and operation of the catchments facilities at least at the caves known as IBUH and included in the NBMS. Good practices were registered together with bad cases of ignorance of the Biodiversity Act (see C11).

Management of show caves- out of nine operational show caves in Bulgaria, only two have specific recommendations concerning bats in their management plans. Such recommendations were enforced in the recent years for Dyavolskoto Garlo and Orlova Chuka caves (see C11). Both are IBUH of international importance sheltering thousands of horseshoe's and Schreiber's bats. More efforts are needed in this field to ensure that bats are properly considered.

New cave development projects- each new project is expected to pass an EIA or EA after the new law and regulations on the EIA procedures. However in some cases the installed lighting system, visitors assess facilities, gates and grills at entrances do not meet the optimal technical specifications and design. A good step forward will be a political will to pass the Law on Caves, which was prepared in 2004-2005 and deposited in the Environment and Water Committee of the 40th National Assembly in March 2009.

Use of caves for business purposes- these practices are declining in the recent years but all abandoned projects for mushroom cultivation, dairies, wine cellar, etc. need in situ restoration.

Management of disused mine galleries- after the economic collapse and recent reorganisation in this industrial sector there are neither special legislative measures nor institutional coordination for bat's friendly management of hundreds abandoned galleries all over the country. Human safety is the guiding principle during the closure of these galleries.

Road construction- bats are rarely if ever considered in these infrastructure projects in Bulgaria. However, after a strong public pressure, routing of the new motorway in Kresna Gorge (E 79) is expected to adopt a tunnel option, which is the only feasible option to save the rich biodiversity found in the gorge, including 18 bat species and breeding colonies of *Rhinolophus ferrumequinum*, *Rh. euryale* and *Myotis emarginatus*.

Wind turbines- construction of wind turbines in Bulgaria to receive energy from renewable sources (target is 16% till 2020 after Renewable Energy Directive 2009/28/EC) is a relatively new initiative and it is quickly gaining popularity (installed 122 MWh in 2008 and 285 MWh till September 2009, more at (http://www.ewea.org/index.php?id=1677). There is a lack of practical experience in planning, construction and operation of wind farms and frequently they are sited in places where they interfere with the migration of birds and bats. Cumulative effect of many small local projects was not propely accessed by some REIW and EIA reports were not prepared at all. Out of the hundreds wind investment proposal, bats were only occasionally considered within the EIA scope. After publication of the book "Methodology for environmental impact assessment and appropriate assessment. A manual for developers, environmental experts and planning authorities" (Petrov 2008) substantial growth of public and potential investor's interest towards consideration of bats in wind turbines projects was noticed. Insufficient expert capacity to carry bat surveys on each site of interest is the key problem at present.

Opening and expanding of quarries and concessions- the opening of new quarries or expansion of existing ones in limestone massifs is highly likely to affect caves, rock crevices or other places suitable for bat roost. The EIA reports are expected to confirm the presence of or provide proof of the absence of bat roosts within the concession area.

Renovation and maintenance of buildings with bat roosts- at least five bat species (*Nyctalus noctula*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus* and *Eptesicus serotinus*) are regular inhabitants of almost all settlements in Bulgaria. The size of bat colonies in towns can vary between 5-20 individuals up to 50-150 individuals and in exceptional cases over 1000 individuals. They settle in attics, basements, bunkers, underground garages, expansion joints and building facades, shafts, chimneys, ventilation facilities, under bridges, in gaps behind cladding tiles or wood, between under-felt and boards or tiles and in many other places. The most common threat to bats is filling of the façade joints, most often involving industrial rope access techniques. In majority of the cases the plaster of such buildings fell off a long time ago and over time individual bats and even colonies have come to settle there. Although promotional activities have been realised locally and useful information how to remove bats from the crevices was published for download in several sites, there are no doubts that many bats have been killed intentionally or not by workers.

Forest management – at least ten of the 33 bat species that occur in Bulgaria belong to the group of the forest-dwelling bats. Under art. 25, para. 6 of the Forestry Act all new forest management plans and programmes must be coordinated with the MOEW, which may require and impose the inclusion of specific measures on the conservation and maintenance of forest-dwelling bat fauna. Practical bat's friendly measures are still not widely and commonly introduced within operational regulations of the forestry legislation. Signs of willingness to change were recently noticed after realisation of several targeted projects carried by Green Balkans, WWF-Bulgaria and Bulgarian Society for the Protection of Birds. In 2006, the Ministry of Agriculture and Forestry decided to certify in the next five years 30% of the country's state-owned forests, or one million hectares, under the Forest Stewardship Council (FSC) certification scheme, the leading international standard of good forest management. The FSC label is the gold standard in forest management and sustainable wood products.

The following threats were recognized for the species included in the new National Red Data Book of Republic of Bulgaria:

1. **Mediterranean Horseshoe Bat (*Rhinolophus euryale*).** Anthropogenic pressure on the shelters, the hunting habitats and the flight corridors, destruction and fragmentation of natural deciduous forest habitats. Important roosts have been the object of increased tourism that does not conform to the requirements of the conservation of bats. Urbanization also exerts a negative influence.

2. **Blasius' Horseshoe Bat (*Rhinolophus blasii*).** Anthropogenic influence on the roosts - destruction or disturbance in them, placing doors and bars that prevent or hinder the access to them and lead to a change of the microclimate. Anthropogenic pressure on the hunting habitats and flight corridors, for example the destruction and the fragmentation of the natural deciduous forests.

3. **Mehely's Horseshoe Bat (*Rhinolophus mehelyi*).** Anthropogenic pressure on the significant underground shelters, for example the caves Orlova chuka, Ruse region, Zandana, Shumen region, and Devetashka, Lovech region, are the object of increased tourism that does not conform to the requirements for the conservation of bats. At some places the underground roosts are entirely destroyed. Felling and fragmentation of natural deciduous forests degrades the quality of hunting habitats and the flight corridors. Urbanization has a negative effect.

4. **Bechstein's Bat (*Myotis bechsteinii*)**. Selective felling of old trees with hollows reduces the possibilities for finding appropriate roosts. Fragmentation of the compact forest habitats and discontinuation of the links between them.

5. **Long-fingered Bat** (***Myotis capaccinii).*** As this is a markedly colonial species, associated exclusively with underground shelters and because of the fact that most of the Balkan population winters in three caves in Bulgaria, it is vulnerable by the anthropogenic pressure on the roosts (destruction, cave tourism, agricultural and animal breeding activities), leading to a disturbance and a change of the microclimate in them, for example the caves Magurata, Devetashkata, Emenskata, etc. Anthropogenic degradation of the hunting habitats and the flight corridors linked with them. Destruction of the natural open water areas (lakes, marshes, river arms).

6. **Geoffroy's Bat (*Myotis emarginatus*).** Disturbance during the breeding period (June-July). When driven away and in the absence of an alternative shelter in the same area, the colonies fall apart and the breeding success is almost nil. Overgrowing or collapsing of the entrances of the shelters leads to their temporary or permanent abandonment.

7. **Western Barbastelle (*Barbastella barbastellus*).** Felling old tress and trees with hollows restricts the possibilities for finding appropriate roosts, especially for the nursery colonies. The direct disturbance of the cave colonies in the winter months may be the reason for the increase of mortality during that period.

8. **Greater Noctule (*Nyctalus lasiopterus*).** Felling trees with hollows and the decrease of the area of old forests reduces the possibilities for finding appropriate shelters. The insufficient quantity of large flying insects probably restricts its access to appropriate food.

9. **Lesser Noctule** (***Nyctalus leisleri).*** Felling old trees and trees with hollows restricts the possibilities for finding appropriate shelters.

10. **Schreiber's bat** (***Miniopterus schreibersii*****).** Anthropogenic pressure on the shelters - direct disturbance and driving away, hindering the access and a change of the microclimate (placing doors, bars, etc.). The caves Magura, Devetashka, Emenska, Dyavolsko garlo have turned into objects of increased tourism not conforming to the requirements for bat protection. Anthropogenic changes of hunting habitats and flight corridors, but concrete data in the country for them are absent.

5. Data collection, analysis, interpretation and dissemination (V. Popov)

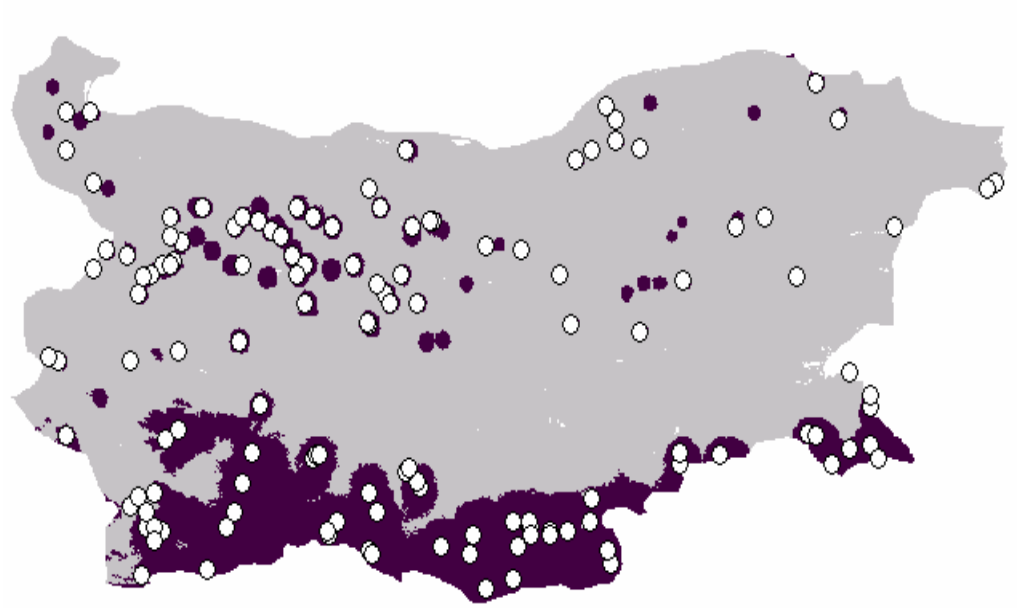
Data combined recently as a result of the preparation of the new edition of The National Red Data Book of Republic of Bulgaria were used for constructing GIS models of the distribution of 12 species of bats, representing conservation interests. The analysis was based on three modelling methods - Ecological Niche Factor Analysis (ENFA), Generalized Linear Model (GLM), and Discriminant Analysis (DA). The aim of the study was twofold: 1) to compare the accuracy of various modelling approaches in predicting the distribution using environmental data, and 2) to use the "best" models for identifying the potential impacts of the newly established Natura 2000 network (http://www.natura2000bg.org/natura/eng/index1.php). The analysis was based on four principles common for correlative modelling approaches: a. the studied territory (in this case - of Bulgaria) is modelled as a raster map, composed of izometric cells (in this study – 175503 cells of 0.63 km^2 each); b. the dependent variable is in the form of presence/absence data of the target species in a set of location data; c. independent ecogeographical variables (EGV) describe quantitatively some characteristics for each cell (data layers covered attributes of climate, land cover, and topography); d. a function of the EGVs is fitted to the presence/absence data so as to model the environmental suitability for the species as correctly as possible. To analyze the predictive success of models, for species presented by more than 35 occurrences, evaluation tests were performed by randomly splitting the original data set into training (75%) and test (25%) points. Comparisons of predicted (probability scale) and observed (presence–absence) values were based on the area under the curve (AUC) of a receiver-operating characteristic plot (ROC) and the Kappa coefficient maximized over the full range of possible probability thresholds. The best model based on ROC area of the validation data from the three possible models (ENFA, DA, GLM) for each species was chosen and mapped the presence–absence predictions using that model for each species. The threshold of max-k for this model was used to transform the continuous model output to a presence/absence prediction. The area (km^2), occupied by the predicted presence was interpreted as a national population estimate of the species. Evidently this spatial measure can not be compared between species because of the differences in species densities per km^2, but are useful for within species analyses. The distribution of predicted presence (%) in 225 locations in the Natura 2000 network is used for: 1. a general assessment of the extent of protection of species population (the sum of the percentages of all sites) and 2. to identify areas of greatest importance for the conservation of the species.

Results

Greater Horseshoe Bat *(Rhinolophus ferrumequinum*). The initial data consist of 178 presence points. The species shows a low specialization (a high tolerance), (0.91) reflecting its wide distribution across the country. The three models are good according to the cross-validation area under the curve (AUC) of the receiver–operating characteristic plot (ROC) and each one accounts for about half of the data variability (variance or deviance, R2/D2). The areas of occurrence predicted by the three models are strongly negatively correlated with distance to caves. Other predictors have a significant positive influence: forest, especially the frequency of deciduous forest. There are negative correlations with respect to open space, and especially to the frequency of cropland. Supposedly, these correlations are rather a result of the peculiarity of location of caves, rather than a direct influence of these variables on species' distribution. Usually the caves are associated with hilly, semi-mountainous and mountainous landscapes with rugged terrain where cultivated fields and pastures are scarce and forest predominates. The location of the majority of caves at a moderate altitude determines the stronger correlation with the amount of deciduous forests. The climatic ENVs show low correlations with the modelled predicted distributions. ENFA has the highest AUC value and accounts for the greatest proportion of data variability (66%). The threshold value of max-K is 0.13 resulting in a potential distribution area of 65032 km^2. About 45% of this area is covered by the proposed sites of Natura 2000 network. The most important sites (covering more than 2%) are: Western Rhodopes -3.9%, Eastern Rhodopes -3.4%, Western Balkan Mt and Prebalcan -3.4%, Central Balkan Mt, buffer -2.5%, Middle Rhodopes -2.3% .

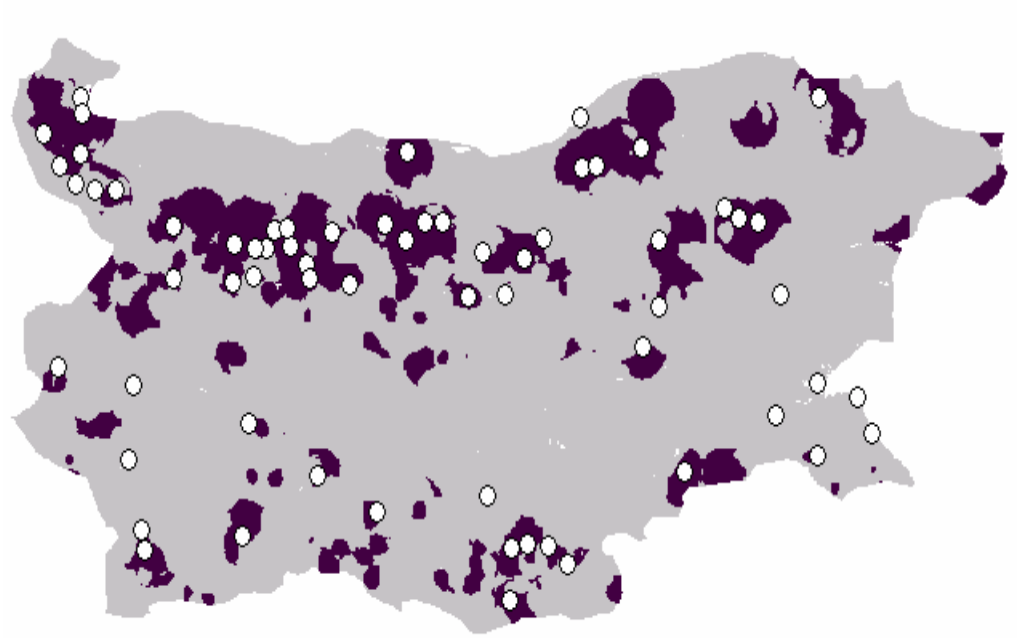
Model distribution of Greater Horseshoe Bat *(Rhinolophus ferrumequinum*)
(marked with a darker colour, 65032 km^2; circles represent the localities included in the model).

Lesser Horseshoe Bat (*Rhinolophus hipposideros*). Although the initial data (53 presence points) are less than in the previous species the tolerance is also great, indicating that its distribution covers the whole country without regional preferences. According to the validation data (values of AUC) the models are excellent, accounting for about 60% of the data set variability. The relationships between predicted occurrence and the proximity to caves and amount of forest are opposite (positive) to the relationships between predicted occurrence and the frequency of cultivated lands (negative). There are relatively high positive correlations with two precipitation ENVs,. The first one represents the gradient of spatial distribution of winter precipitation across the country with a greater amount in S and SE Bulgaria (a submediterranean precipitation seasonal pattern) and mountainous areas. The second variable has greater values in the mountainous areas of S Bulgaria. So, the positive correlations of the predicted distribution with these variables mirror the greater share of presence points in S Bulgaria. GLM is the best model in terms of both the highest ROC area and the proportion of explained deviance. The ENVs significantly retained with a positive sign are the quadratic term of CAV, accounting for about 51% of deviance and PPC3, accounting for ca. 13% of the deviance. The threshold value of max-K is 0.4, resulting in a predicted area of 23016 km2, 60% of which is covered by the Natura 2000 network. Sites covering more than 2% of this area are - Eastern Rhodopes - 9.6%, Strandzha - 4.2%, Middle Pirin -Alibotush - 3.3%, Central Rhodopes - 3.0%, Sakar - 2.1%, Rila - 2.1%, Rila-buffer - 2.0%.



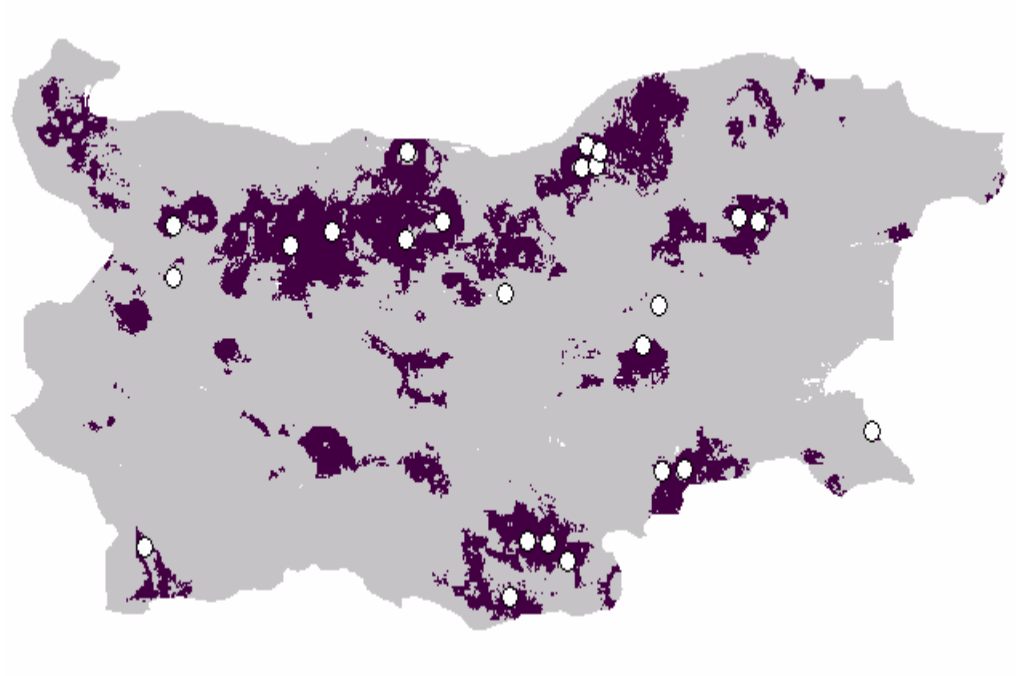
Model distribution of Lesser Horseshoe Bat (*Rhinolophus hipposideros*)
(marked with a darker colour, 23016 km^2; circles represent the localities included in the model).

Mediterranean Horseshoe Bat (*Rhinolophus euryale*). The initial data consist of 63 georeferenced localities. They are slightly more than these for the previous species, but the tolerance is lower (0.76), showing a greater specificity of its distribution across the country. The models account for less than half of the data variability. Two models are fair according to the ROC areas of validation data and one (ENFA) is poor. The predicted distributions show great correlations with CAV and low ones with the remaining ENVs. Nevertheless the negative correlations with deciduous forest and positive ones with cultivated fields should be mentioned, in contrast to the previous two species. It can be supposed that these relations represent the close species' association with the caves at low altitude, where the terrain is flat and respectively the cultivated lands cover greater area, especially in northern, central, and western parts of the country. According to AUC value GLM is the best model, which accounts for the greatest proportion of data variability. Linear terms of distance from caves (CAV) and frequency of deciduous forest (DEC) are retained with a negative sign accounting for 31% and 10% of deviance, respectively, indicating that the species is associated with caves, avoiding forested areas. The threshold value of max-K is 0.7, giving an distribution area of 20079 km^2. About 36% of this area is covered by the Natura 2000 network. Sites covering more than 2% of the predicted area are: Western Rhodopes - 3.6%, Western Stara Planina and Prebalkan - 2.8%, Eastern Rhodopes - 2.5%, Lomovete - 2.5%, Karlukovo -2.0%.



Model distribution of Mediterranean Horseshoe Bat (*Rhinolophus euryale*)
marked with a darker colour, 20079 km^2; circles represent the localities included in the model).

Mehely's Horseshoe Bat (*Rhinolophus mehelyi*). The initial data are scarce – 24 presence points. The tolerance is low. The models account for less than half of the data variability, being the lowest in ENFA – only 10%. Nevertheless, according to the cross-validation area under the curve (AUC) of the receiver–operating characteristic plot the models can conditionally evaluated as good (conditionally, because they are not tested against an independent validation data set). The correlations with CAV are great, while the remaining ENVs show low correlations with the predicted distributions. Yet, the low correlations with the frequency of deciduous forest (DEC) derive attention. These results indicate that the species is closely related with caves, especially these in lower parts of the country where the areas covered by forests are restricted. The ROC areas of the validation data are nearly equal in all models. According to the slightly higher AUC value the assessment is based on ENFA, with a threshold value of max-K of 0.25 giving an area of 19032 km^2. About 34% of this area is covered by the proposed sites of Natura 2000 network. Sites, covering more than 2% of the predicted area are: Eastern Rhodopes-4.6%, Studenets - 2.5%, Lomovete - 2.5%, Karlukovo - 2.1%.



Model distribution of Mehely's Horseshoe Bat (*Rhinolophus mehelyi*)
(marked with a darker colour, 19032 km^2; circles represent the localities included in the model).

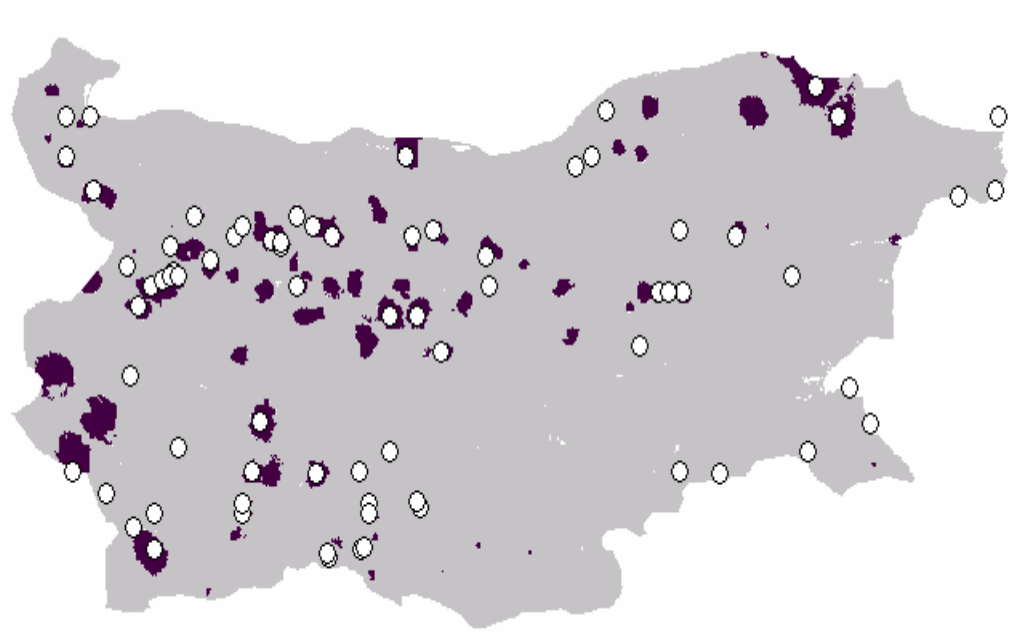
Blasius' horseshoe bat (*Rhinolophus blasii*). The initial data consist of 37 localities. The tolerance is moderate. Two models account for more than 60% of the data variability and according to validation tests can be classified as excellent. ENFA accounts for 33% of variance and should be evaluated as good. As regards correlations of modelled distributions with ENVs, the species shows similarity with *Rh. hipposideros*, having strong correlations with CAV, weaker positive correlations with forests, precipitation factors, and negative correlations with the amount of cultivated land. These results indicate that its distribution is associated with caves in semi-mountainous and mountainous land scales, predominantly in S Bulgaria. The assessment is based on the modelled distribution based on DA with a threshold value of max-K, predicting a distribution area 22314 km^2. About half of this area is covered by the Natura 2000 network. The most important sites are: Eastern Rhodopes - 7.5%, Central Rhodopes - 6.3%, Strandzha - 4.2%, Western Stara Planina (Balkan) and Prebalkan - 4.0%, Central Stara Planina (Balkan) Mt – buffer - 3.0%, Kotlenska Planina Mt - 2.6%, Central Rhodopes - 2.4%.

Model distribution of Blasius' Horseshoe Bat. (*Rhinolophus blasii*)
(marked with a darker colour, 22314 km^2; circles represent the localities included in the model).

Greater Mouse-eared Bat (*Myotis myotis*). The tolerance is high, indicating that the species is not particularly specialized as regards the environmental conditions of Bulgaria. The models account for about half of the data variability. According to the ROC areas of the validation data, two models can be evaluated as excellent and one (ENFA) can be graded as good. Predicted distributions show the strongest positive correlations with the proximity of caves and the amount of forests. The frequency of open land and especially the amount of cultivated fields show negative correlations with the modelled distributions. Thus, the ecological determinants of the species are similar to those of Greater Horseshoe Bat, Lesser Horseshoe Bat, and Blasius' Horseshoe Bat. The Greater Mouse-eared Bat occurs predominantly in semi-mountainous and mountainous landscapes, especially in S Bulgaria. The best model is GLM, accounting for 63% of the null deviance (adjusted-*D*2), with the greatest proportion of deviance (about 55%) being attributed to both linear and quadratic terms of CAV and linear term of the amount of cultivated lands, accounting for about 7% of the deviance. The threshold value of max-K is 0.3, resulting in an area of 27503 km^2. About half (53%) of this area falls within the scope of Natura 2000 network, with most important sites Western Rhodopes - 6.8%, Eastern Rhodopes - 6.4%, Strandzha -3.4%, Western Stara planina and Prebalkan - 3.4%, Central Rhodopes -2.5%, Central Balkan – buffer -2.2%.

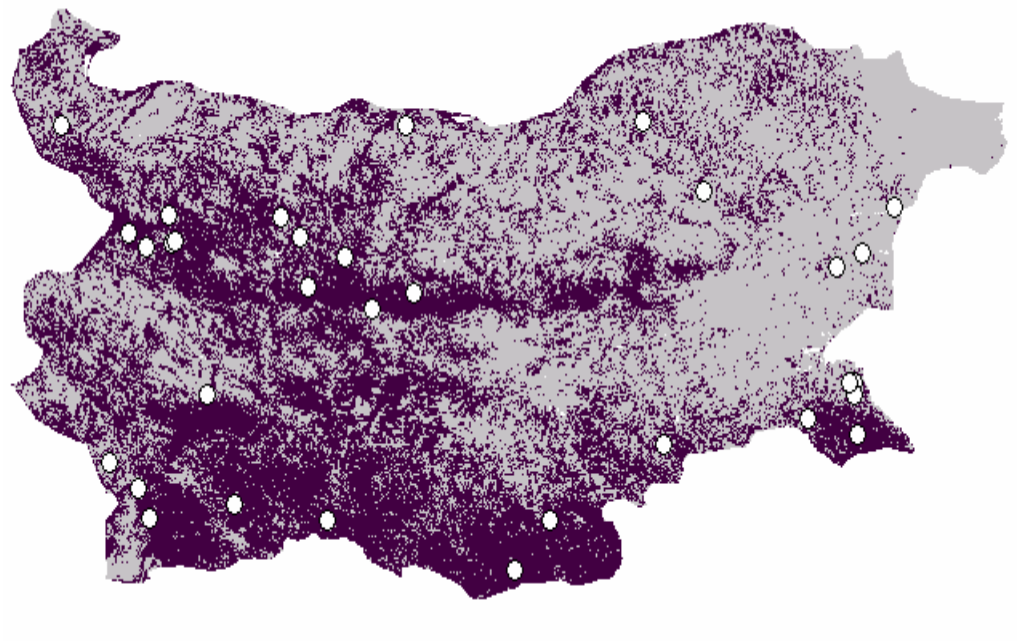
Model distribution of Greater Mouse-eared Bat *(Myotis myotis)*
(marked with a darker colour, 27503 km^2; circles represent the localities included in the model).

Lesser Mouse-eared Bat (*Myotis blythii*). The initial data consist of 68 localities. The tolerance is high indicating that the species is not particularly specialized as concerns the environmental conditions in Bulgaria. The models account for about half or slightly more of the data variability. The correlation structure is similar to that of Greater Mouse-eared Bat, but the negative relationships with the frequency of grassland are better pronounced. Beside this, there are prominent negative correlations with some precipitation and temperature factors, reflecting a poorly pronounced predominance in Northern and Western Bulgaria. The GLM is the best model, retaining negatively the quadratic and linear term of CAV (accounting for about of 58% of the null deviance) and the linear term of a precipitation variable (accounting for about of 5% of the null deviance). The threshold value of max-K is 0.9 which leads to a, probably underestimated, distribution area of 7199 km^2. The coverage by the Natura 2000 network is about 53%, with more important sites: Central Balkan – buffer - 6.6%, Western Stara Planina and Prebalkan - 5.2%, Western Rhodopes - 3.2%, Ludogorie - 2.7%, Suha reka - 2.6%, Karlukovo - 2.6%, Osogovska planina Mt - 2.4%, Harsovska reka - 2.2%, Kotlensla planina Mt - 2.1%, Zemen - 2.0%, Vrachanski Balkan - 2.0%.



Model distribution of Lesser Mouse-eared Bat (*Myotis blythii*)
(marked with a darker colour, 7199 km^2; circles represent the localities included in the model).

Bechstein's Bat (*Myotis bechsteinii*). The models are based on 32 localities and account for a small amount of data variability (8 – 21%). The tolerance is relatively high. According to AUC values two of them are acceptable and one (DA) is weak. These data show that the species' distribution is not directly related to any of the ENVs considered in the study. Nevertheless the relationships of the modelled distributions with the land cover variables agree with the known ecology of this species – a dendrophilous species, associated mainly with forested landscapes, which uses caves as swarming sites and rarely for hibernation. Bechstein's Bat shows moderate positive correlations with forests and strong negative correlations with the amount of cultivated lands. The correlations with the precipitation variables are also well pronounced –reflecting its preference to mountainous areas. The obtained results show that regardless the limited initial data and the low explanatory capacity, the models correspond fairly well to the species' autecology's. So, it can be supposed that the predicted distributions are also accurate.
GLM is the best model, retaining negatively only the linear term of the frequency of cultivated lands, accounting for only 4% of the null deviance (adjusted D^2). This ENV is strongly negatively correlated with the frequency of deciduous forest (-0.71). Evidently the model although accounting for only a small amount of deviance describes the species' absence in deforested lowland landscapes. In general, it can be concluded that the country offers good conditions for the species, but the main limiting factor is **deforestation**. Rather the greater areas covered by forests in mountains determine its distribution pattern across the country than the climatic ENVs. The threshold value of max-K is 0.5 giving an area of 49444 km^2. About 47% of this area falls within the scope of Natura 2000 network. The following sites are of particular importance: Western Rhodopes - 5.0%, Eastern Rhodopes - 4.2%, Western Stara Planina Mt and Prebalkan - 3.0%, Central Balkan – buffer - 2.9%, Central Rhodopes - 2.3%, Strandzha– 1.7%.

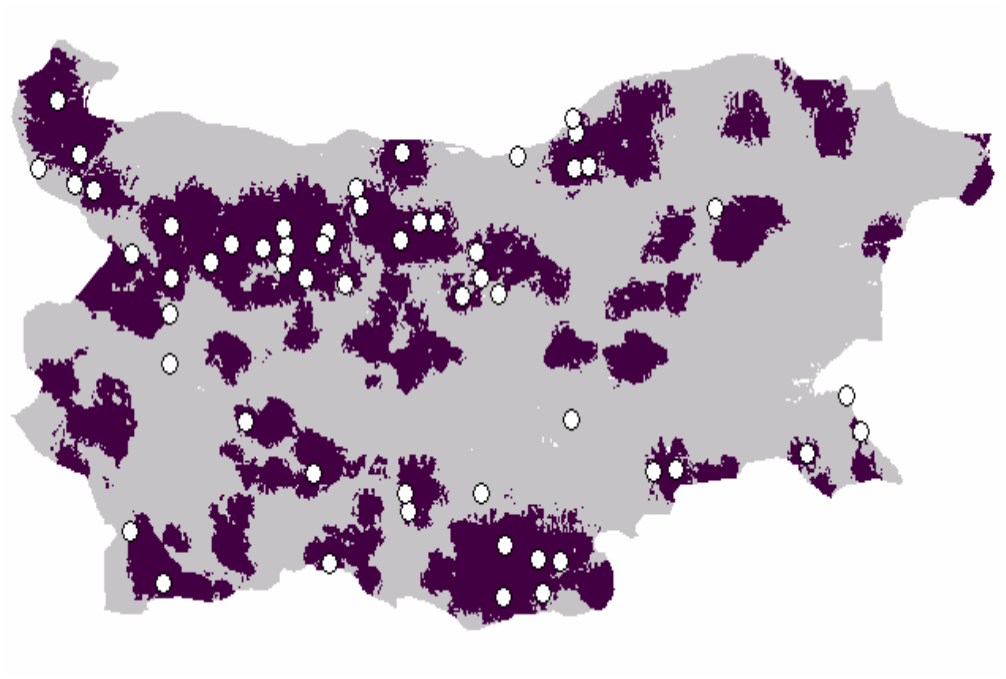


Model distribution of Bechstein's Bat (*Myotis bechsteinii*)
(marked with a darker colour, 49444 km^2; circles represent the localities included in the model).

Geoffroy's Bat (*Myotis emarginatus*). The models are based upon 53 localities and account for less than half of the data variability. Nevertheless, according to the cross-validation area under the curve (AUC) of the receiver–operating characteristic plot they can be graded as good. The tolerance is high. These peculiarities reflect the wide distribution of the species through the country. The correlations with land cover ENVs indicate that it is closely associated with caves, avoiding open landscapes, especially these dominated by cropland. As far as the climatic ENVs are concerned the correlations reflect some preference for semi-mountainous landscapes and its a somewhat wider distribution in Southern Bulgaria. Generally speaking these results correspond fairly well to the existing knowledge for ecology and distribution of the species within the country. The best model is ENFA with a max-K value of 0.12, giving an area of 58134 km^2, 46.5% of which is covered by the Natura 2000 network. The most important sites are: Western Rhodopes - 4.3%, Western Stara planina and Prebalkan - 3.7%, Eastern Rhodopes - 3.6%, Central Balkan-buffer - 3.6%, Central Rhodopes - 2.2%.

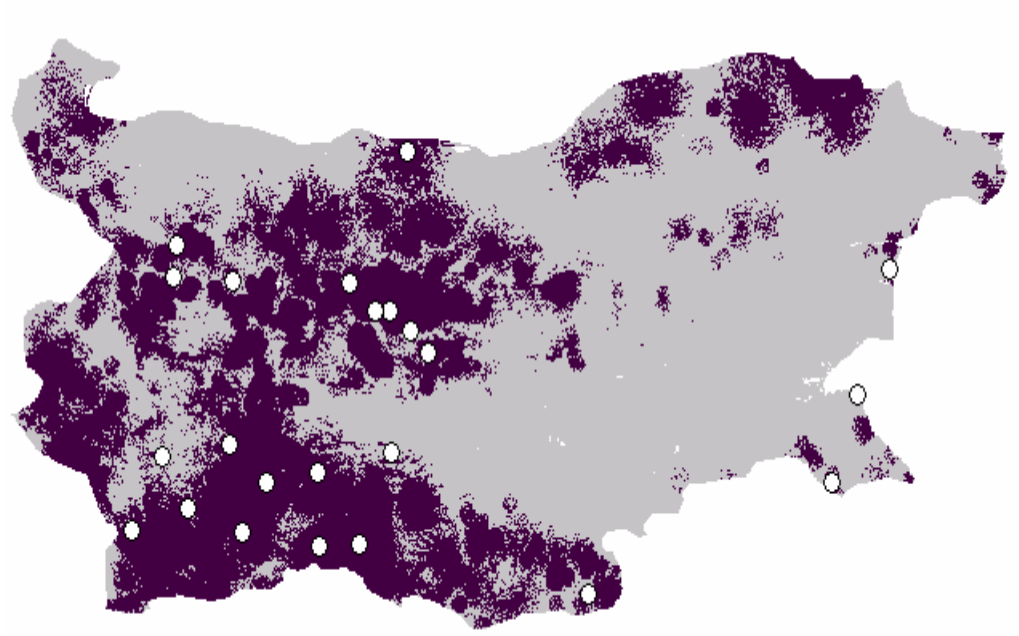
Model distribution of Geoffroy's Bat (*Myotis emarginatus*)
(marked with a darker colour, 58134 km^2; circles represent the localities included in the model).

Long-fingered Bat (*Myotis capaccinii*). The models are going on 53 occurrence points and can be graded as good (values of AUC). The tolerance value is moderate indicating some specialization in relation to ENVs included in the analysis. The species shows a very high correlation with CAV and a moderate relationship with some precipitation parameters. The last correlations most probably describe the lack of species registrations in Eastern Bulgaria. Most probably this circumstance is rather a result of the peculiarities of topography and geology than a direct influence of precipitation pattern described by these variables. It can be said that the distribution of long fingered bat through the country is determined by the availability of suitable cave roosts. The best model is DA. The threshold value of max-K is 0.5 leading to an area of 41770 km^2, 43% of which is covered by the Natura 2000 network. The most important sites are as follows: Eastern Rhodopes - 4.3%, Western Stara planina and Prebalkan - 3.6%, Western Rhodopes - 3.6%, Central Balkan – buffer - 2.4%.



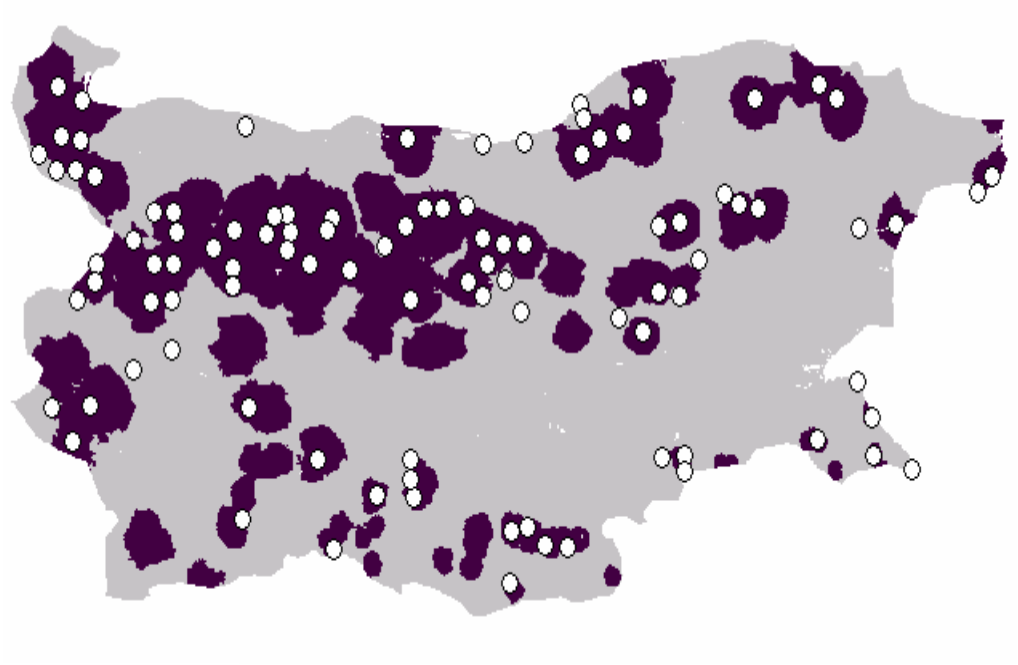
Model distribution of Long fingered bat (*Myotis capaccinii*)
(marked with a darker colour, 41770 km^2; circles represent the localities included in the model).

Western Barbastelle (*Barbastella barbastellus*). The models are based on a limited number of points– 16 and account for only a small or modest amount of variability (7 – 45%). The tolerance is relatively low, indicating for some differentiation of the species' distribution across the country. The relationships with CAV are relatively well pronounced, although somewhat weaker compared with the above considered cave dwelling bat species. The positive correlations with the amount of forest, especially coniferous one, are well pronounced. The best model is DA, accounting for the greatest amount of variance, with a max-K value of 0.4 leading to an area of 42018 km^2. About 47% of this area is covered by Natura 2000 with the following most important sites: Western Rhodopes - 6.2%, Eastern Rhodopes - 3.2%, Central Balkan – buffer -3.2%, Western Stara planina and Prebalkan - 2.7%, Central Rhodopes - 2.4%.



Model distribution of Western Barbastelle (*Barbastella barbastellus*)
(marked with a darker colour, 42018 km^2; circles represent the localities included in the model).

Schreiber's Bat (*Miniopterus schreibersi*). Models are based on 95 localities and according to AUC values should be graded as excellent. The tolerance is high reflecting the species' wide distribution across the country without any well manifested spatial presences. Among the land cover ENVs, only correlations with CAV are well expressed. As concerns the climatic ENVs the high correlations with a precipitation parameter, indicating some preferences toward Northern Bulgaria and mountainous areas of Southern Bulgaria. The correlations with some other climatic parameters can be interpreted in the same direction emphasizing its occurrence in mountainous and semi-mountainous areas along the southern and south-eastern boundary of the country. These relationships describe the association of the species' distribution with the caves in Northern Bulgaria and semi-mountainous and hilly landscapes in Southern Bulgaria. GLM is the best model accounting for 54% of the null deviance (adjusted-D^2), with the greatest proportion of deviance (20.8%) being attributed to linear and quadratic terms of CAV. The other ENVs significantly retained are frequency of cropland (3.5%) and a precipitation variable (6%). The threshold value of max-K is 0.5 leading to an area of predicted distribution of 37383 km^2, 41% of which are covered by the Natura 2000 network. Important sites are: Western Stara planina - 4.8%, Central Balkan – buffer - 3.4%, Western Rhodopes -2.5%.



Model distribution of Schreiber's Bat (*Miniopterus schreibersi*)
(marked with a darker colour, 37383 km^2; circles represent the localities included in the model).

C. Measures Taken To Implement Article III Of The Agreement (B. Petrov)

6. Legal measures taken to protect bats, including enforcement action

All species of bats in Bulgaria are strictly protected under the provision of the **Biodiversity Act** (SG 77/9.08.2002, last amended SG 103/29.12.2009). **33 species** are listed in Annex 3 of the act. **12 species** of them are additionally listed in Annex 2 of the Act, following the implementation of the provisions of the Habitats Directive. The recent conservation status of all species is presented in the following table.

Table: Conservation status of bats in Bulgaria according to national and international legislation (2009).

Order Chiroptera	BA	Bern	Bonn	EUROBATS	92/43 EEC	RDB
1. *Rhinolophus ferrumequinum* Greater horseshoe bat	2/3	II	II	+	2/4	near threatened
2. *Rhinolophus hipposideros* Lesser horseshoe bat	2/3	II	II	+	2/4	least concern
3. *Rhinolophus euryale* Mediterranean horseshoe bat	2/3	II	II	+	2/4	**vulnerable**
4. *Rhinolophus mehelyi* Mehely's horseshoe bat	2/3	II	II	+	2/4	**vulnerable**
5. *Rhinolophus blasii* Blasius's horseshoe bat	2/3	II	II	+	2/4	**vulnerable**
6. *Myotis myotis* Greater mouse-eared bat	2/3	II	II	+	2/4	near threatened
7. *Myotis blythii* Lesser mouse-eared bat	2/3	II	II	+	2/4	near threatened
8. *Myotis bechsteinii* Bechstein's bat	2/3	II	II	+	2/4	**vulnerable**
9. *Myotis emarginatus* Geoffroy's bat	2/3	II	II	+	2/4	**vulnerable**
10. *Myotis capaccinii* Long-fingered bat	2/3	II	II	+	2/4	**vulnerable**
11. *Barbastella barbastellus* Western barbastelle	2/3	II	II	+	2/4	**vulnerable**
12. *Miniopterus schreibersii* Schreiber's long-fingered bat	2/3	II	II	+	2/4	**vulnerable**
13. *Myotis nattereri* Natterer's bat	3	II	II	+	4	least concern
14. *Myotis mystacinus* Whiskered bat	3	II	II	+	4	least concern
15. *Myotis aurascens* Steppe whiskered bat	3	II		+	4	data deficient
16. *Myotis brandtii* Brandt's bat	3	II	II	+	4	least concern
17. *Myotis alcathoe* Alcathoe whiskered bat	3	II	II	+		data deficient
18. *Myotis daubentonii* Daubenton's bat	3	II	II	+	4	data deficient
19. *Myotis dasycneme* Pond bat	3	II	II	+	2/4	-
20. *Plecotus auritus* Brown long-eared bat	3	II	II	+	4	near threatened
21. *Plecotus austriacus* Grey long-eared bat	3	II	II	+	4	least concern
22. *Nyctalus noctula* Noctule	3	II	II	+	4	least concern
23. *Nyctalus lasiopterus* Giant noctule	3	II	II	+	4	**vulnerable**
24. *Nyctalus leisleri* Lesser noctule	3	II	II	+	4	**vulnerable**
25.*Pipistrellus pipistrellus* Common pipistrelle	3	III	II	+	4	least concern
26.*Pipistrellus pygmaeus* Pygmy/soprano pipistrelle	3	II	II	+	4	-
27.*Pipistrellus nathusii* Nathusius' pipistrelle	3	II	II	+	4	least concern

Order Chiroptera	BA	Bern	Bonn	EUROBATS	92/43 EEC	RDB
28.*Pipistrellus kuhlii* Kuhl's pipistrelle	3	II	II	+	4	-
29.*Hypsugo savii* Savi's pipistrelle bat	3	II	II	+	4	least concern
30.*Eptesicus serotinus* Serotine	3	II	II	+	4	least concern
31.*Eptesicus nilssonii* Northern bat	3	II	II	+	4	data deficient
32.*Vespertilio murinus* Particoloured bat	3	II	II	+	4	least concern
33.*Tadarida teniotis* European free-tailed bat	3	II	II	+	4	data deficient

Legend:

2/3, II – number of the Annex, where the species is listed

- **BA** – Biodiversity Act (SG 77/2002)
- **BERN** - Bern Convention on the Conservation of European Wildlife and Natural Habitats (SG 23/1995)
- **BONN** - The Bonn convention on migratory species of wild animals (SG 16/2000)
- **EUROBATS** - Agreement on the Conservation of Populations of European Bats (SG 16/2000)
- **92/43/EEC** - Directive 92/43/EEC on the Conservation of Natural Habitats and the Wild Flora and Fauna (HABITAT DIRECTIVE)
- **RDB-** Red Data Book of Bulgaria. Vol 2, Animals (new edition, exp. 2010).

On the grounds of art. 49, para. 1, item 1 of the Biodiversity Act and by virtue of Regulation № 8 (published SG 4/16.01.2004) on the terms and procedures for granting derogations from the bans introduced under the BDA in respect to the animal and plant species listed in Annex's № 3 and 4 and the use of non-selective means and methods for capturing and killing (Annex № 5), everyone who is engaged in bat studies and has direct contact with them must possess a valid permit issued by the MOEW. The permits apply for a specific term and are issued for a certain person(s) (physical or legal) and a specifically defined territory within the country. The document stipulates the species, the number of specimens, the time and place, the means and methods, the ways of handling species and the other conditions under which the derogation can be granted. The documents determine also the Regional Inspectorate of Environment and Water which should act as supervisery body, responsible to control over the activities, specified by the derogation.
There are issued 23 derogations on bats from MOEW after the entry into force of the Regulation № 8. There are issued to Bulgarian Academy of Science, Directorate of Nature Parks, NGO. All these are issued for scientific purposes only, allowing capturing, ringing, measuring, sampling and collecting of dead specimens.

In 1997 MOEW has promulugated the Tariff of indentites for damages caused to natural objects (SG 116/09.12.1997), which enetered into force since the date of promulugation. There are listed 27 species of Bulgarian bats, which cost between 5 and 13 EURO (10 to 25 BGN).

In 2006 MOEW has promugated the Tariff of indenites for damages caused to plant and animal species, included in Annex № 3 of the biodiversity act (SG 76/15.09.2006), which entered into force since the date of promugation . Each harmed, crippled, killed or took away from nature bat specimens costs 25 EURO (50 BGN).

On the grounds of art. 278c of the Penal Code of the Republic of Bulgaria (SG 26/2.04.1968 with amends in SG 88/4.11.2005), anyone who is claimed damages on bats shall be punished with imprisonment of up to two years and assess with fine from 250 to 1000 EURO (500 to 2000 BGN).

7. Sites identified and protected which are important to the conservation of bats

Protected Areas

Out of the **5900 caves** in Bulgaria, there are about **125 caves** and cave's complexes declared as Natural Monuments. Amongst them, **52 caves** are known as Important Bat Inderground Habitats (IBUH) of national and **13** of international importance as summer and/or winter roosts, and/or transitory roosts during migration. Within the borders of 17 Protected Sites there are about at least **120 caves**, many of them with importance to bats. Additionally, **817 caves** fall within the borders of National and Nature Parks and **173 caves** are part of Strict or Managed Nature Reserves. Bats are virtually present in different number within nearly all caves in the country however formal legal measures hardly protect each of these caves. Management plans (MP), which in fact are the only effective tool to enforce the law, are prepared and approved only for the three National Parks, some of the Nature Parks, most Managed Reserves, and some Strict Reserved and Protected Sites. MP are prepared but not approved by MOEW for many Protected Sites and Nature Parks with high concentration of caves.

NATURA 2000 bat sites in Bulgaria

In many existing and established protected areas there are important bat underground habitats. Some of the areas have been protected precisely because of the existence of caves with large breeding or hibernating bat colonies (see table). The majority of the remaining areas, particularly those covering large areas (for example BG0001040 the Western Stara Planina Mountains and the Predbalkan, BG0001030 the Western Rhodopes, BG0001007 Strandzha Mountain, etc.), also contain a large number of bat caves, foraging habitats and migration corridors. In each of these areas management plans are to be developed, that will specify the management and conservation of all components of the biological diversity, including bats.

The most important/priority bat underground sites according to Habitats Directive (92/43/EEC):

№	NATURA 2000 ID	Site Name
1	BG0000266	Mandrata Cave (Mikre Village))
2	BG0000269	Lyastovitsata Cave (Glozhene Village)
3	BG0000304	Golak Mine Gallery (Golak Village)
4	BG0000587	Varkan Cave (Tsar Petrovo Village)
5	BG0000589	Marina Dupka Cave (Targovishte Town)
6	BG0000591	Sedlarkata Cave (Rakita Village)
7	BG0000593	Bilernitsite Cave (Botunya Village)
8	BG0000594	Bozhiyat Most-Ponora Cave System (Lilyache-Chiren)
9	BG0000601	Kalenskata Peshtera Cave (Kalen)

№	NATURA 2000 ID	Site Name
10	BG0000605	Bozhkova Dupka Cave (Krivnya Village)
11	BG0000615	Devetaki Plateau (Devetaki Village)

General information about the NATURA 2000 coverage in Bulgaria and the full list of sites (including site's descriptions) can be found at http://www.natura2000bg.org/natura/eng/index1.php

8. Consideration given to habitats which are important to bats

Roosting habitats. (see C7) Despite the legal protection of many important bat roosts, many of them have conservation problems. The **Protected Areas Act** is rarely if ever enforsed to ensure protection of bats due to poor field control and lack of funds for monitoring the implementation of the management plans.

Foraging habitats. No special activities has been given yet carried to protect foraging habitats of bats.

Migratory habitats. Although it is difficult to fully protect linear landscape elements, some sections of the larger river valleys and the coastal areas are either NATURA 2000 sites or a Protected Area. Nonetheless their legal status wind turbines were recently (after 2007) installed at many sites along the Northern Black Sea coast. Some of these facilities were installed without proper site and Impact Assessments and became a risk barrier for the migration of birds and bats following Via Pontica route (see also B4).

9. Activities to promote the awareness of the importance of the conservation of bats

Between 10th and 14th of June 2004 a workshop "Research on bats in forests: sharing the experience from Bulgaria and the knowledge from Central Europe" took place in Ropotamo Reserve (Bulgarian Black Sea Coast south of Burgas). The workshop was organised in frame of a project between the University of Zürich and the National Museum of Natural History in Sofia. Several invited experts (Dr. Gerald Kerth, University of Zürich; Dr. Eric Petit, University of Rennes and Dr. Arjan Boonman, University of Tübingen) shared their experience with modern research methods and bat monitoring techniques. Thirteen students and researchers from Bulgaria, Turkey, Serbia and Germany presented different bat projects and worked together in the field during several days and nights.

In 2007-2008, NMNH- BAS in partnership with the Romanian Bat Protection Association and the Dutch Mammal Study and Protection Society (VZZ) carried the project "Bats and Environmental Impact Assessments: Tools for implementation of European Habitats Directive and EUROBATS Agreement in Bulgaria and Romania". The project was funded by a grant from the Dutch Ministry of Agriculture, Nature and Food Quality through the action plan of BBI MATRA. In course of the project, two national meetings were carried with EIA experts, bat specialists, experts from the Ministry of Environment and Water, Executive Environmental Agency, Regional Inspectorates of Environment and Water, departments of the national and nature parks and various NGO. The manual "Bats-

methodology for environmental impact assessment and appropriate assessment. A manual for developers, environmental experts and planning authorities" was presented during the final project meeting carried in November 2008 in Sofia. Experts on bats from Macedonia, Greece, Turkey, the Netherlands and the Executive Secretary of UNEP/EUROBATS Andreas Streit, took part in this meeting.

The Manual was printed in Bulgarian and English (including a CD) and contains the following sections:

Practical section – it provides the algorithm for assessment of impact on bats, which inhabit the region of a certain infrastructure project (investment proposal). It presents the sequence of actions, which need to be undertaken, so that a correct assessment of the impact on bats can be made. It includes reference tables, the best methods and periods of study, as well as the possibilities of avoiding, reducing and offsetting the negative impact in the most problematic zones. A practical key is enclosed for a quick evaluation of reports and assessments. It summarizes the laws which have bearing on the methodology.

Expert section – it presents all important aspects of the life cycle of bats, the specific characteristics of their biology and behavior. The main research methods have been described. This section examines the most frequent problem situations which have bearing on bats, as well as the measures on how to avoid them, mitigate their negative effect and possibly compensate them. Additional information on bats living in forests and human settlements (which in fact is not a subject to impact assessment) is also enclosed to facilitate controlling institutions in avoidance and decision making in conflict issues, where bats are involved.

Tables with references (Annexes) – the most important information on bats organized by types of habitats, functions, research methods, periods, measures.

This manual can be found in Bulgarian and English on the following website:
http://www.nmnhs.com/downloads/brcc/bats-bg.pdf
http://www.nmnhs.com/downloads/brcc/bats-en.pdf

European Bat Nights

Within the frame of the period covered by this report only two EBN were organized in Sofia. Information for both events was posted on the EUROBATS web site.

XII EBN 2008

The XIIth EBN was organized by the BRCC and hosted by the Sofia Zoo. The event was carried on 6th September 2008 in the semi-dark hall with large carnivores and terrariums. More than 250 kids, pupils, parents, students and journalists attended. Each of the guests took a kit with materials on bats and all kids received the newest "NG Kids" magazine. All children were asked to draw a bat on a clipboard as they think these animals look like. Each of the "painters" got a dark brown bat cookie, especially produced by a confectionery. A presentation on bats- species in Bulgaria, distribution, habitats, threats and conservation was carried by a biology student from Sofia University. It was showed to the public how to make a wooden bat-box and invited all interested visitors to help constructing several boxes at the tables, which were sitting nearby. A quiz with 10 questions on bat's life and biology was also carried. Each correct answer was rewarded with an interesting book as a prize. The winner of the bat painting competition was selected by a jury and got the album "How to draw wild animals". The event ended with a

walk with bat detectors around a lake in the Zoo. In result, the Bat Night 2008 was widely announced and fully covered by several TV stations and some interviews appeared in the press during the next days. In September and October, 15 calls from people who had bats in trouble in their flats were registered by the BRCC. A short paper covering the celebration of the bat night appeared in the November issue of the popular magazine "National Geographic- Bulgaria". More at:
http://www.eurobats.org/news_events/Bat_Nights/EBN12(2008)/Bulgaria_Sofia_report2008.htm

XIII EBN 2009

The XIIIth EBN, organised by the BRCC and the Forum Democrit, took place on the 25th September 2009 in Sofia. The Water Tower in Lozenets Housing Estate was chosen as a natural scenery for commemorating the event.

A winding staircase ascending to the top of the old tower acted as a stage for six spectacular performances of the 45-minute theatrical production of Eva Bechstein's 'The Night of the Bats.' The text was written and the presentation was directed by a professional artist. The actors took the role of narrators, hanging from the tower ceiling as real bats. The role of the scientist-bat hunter was played by a biology student, working on bats.

The park in front of the tower accommodated a unique scientific market offering free bat literature. Lectures on different subjects like 'Let's get to know bats. Where do they live? What do they eat? How do they accumulate reserve foods? Interesting facts. What is common between men and bats? Localities and threats. How can we help bats? Superstition and prejudice about bats. Research methods — science in action were given at several "stalls". There was a separate table where participants in the event could make bat boxes, which the most enthusiastic of them were allowed to carry and hang up in their own yards.

A short presentation, informing the guests of bats' peculiarities, methods of their investigation, threats and the ways people can help with their protection, was given during the official opening.

Green Balkans activities on bats

Green Balkans is a leading Bulgarian NGO in the field of conservation of rare species and habitats in Bulgaria. A group of bat enthusiasts and experts undertakes different public initiatives and monitoring projects on bats. Between 2004 and 2009 the following projects were carried:

The field guide of Dietz & von Helversen (2004) "Illustrated identification key to the bats of Europe" was translated in Bulgarian and published as an online publication at
http://greenbalkans.org/prilepi/indexdetails_file_download.php?elem_id=63

Web-site **"Conservation of bats in Bulgaria"** was created: http://greenbalkans.org/prilepi/. The site was developed with the financial support of The Bat Conservation Trust and the Zoological Society of London. It provides useful popular and expert information on bat biology and conservation. The site will be regularly updated with news, pictures and papers on bats. An English version will be developed in the nearest future.
The following sections are active at present:

-For bats (common to bats, anatomy and morphology, flight, taxonomy, ecology, refuges, research methods, threats, bat species in Europe;
-Bats in Bulgaria (species and conservation status);
-Bats in underground roosts (bats and caves, important bats' caves in Bulgaria, urbanization of caves);
-Bats in towns (bats in towns, bats at home);
-Legislation;
-Protection, monitoring protocols, bats and NATURA 2000, bats and environmental impact assessment, bats and wind farms, bats and forests' management;
-Library (a complete list of articles in Bulgaria concerning bats with many titles available for free download).

A leaflet **"Bats- our neighbours and friends"** was published (1000 copies) with a grant from TOYOTA Bulgaria and distributed in the region of Plovdiv and Stara Zagora. It contains useful information on bats, their ecology and legal status. A limited number of copies on safe removal and management of bats in buildings was printed and distributed amongst rope access technicians and other citizens.

The brochure **"Bats in Buildings: An Information and Exclusion Guide"** (The Bat Conservation International, Barbara French, Laura Finn, Mark Kiser) was translated in Bulgarian and used in several public campaigns on bat conservation.

A **database** on bat distribution and occurrence was developed and regularly updated by the end of 2009. There are more than 250 records for different species of bats, including biometric data and recordings of bat calls. A **presentation** "Bats" with attractive pictures and information for bats was created and presented to nearly 150 children and young people from schools in Pomorie, Plovdiv, Stara Zagora

The project **"Monitoring bat biodiversity: indicators of sustainable development in Eastern Europe"** as a part of the Indicator Bats Program (iBats), a partnership project between The Zoological Society of London, The Bat Conservation Trust and The Green Balkans Federation for Bulgaria (funded by DARWIN INITIATIVE) was carried between 2007 and 2009. The program is aiming to track changes in the global biodiversity by organizing number of national and local bat monitoring projects (more info at http://www.ibats.org.uk).

The major purpose of the project was the establishment of statistically defensible long-term bat monitoring protocol for Bulgaria, network of personnel trained in monitoring techniques, temporal database on bat species abundances and distributions alongside road networks and transfer of equipment and analysis.

More than 80 volunteers from Green Balkans, IZ-BAS, Natural History Museum-Ruse, RIEW Ruse and Nature Park Rusenski Lom took part in this project. Over 230 monitoring transects were carried in Bulgaria (11 102 km). Two national workshops were organized in Tabachka Bat Reserarch Station, Bulgaria (2007) and in Shkorpilovtsi, Bulgaria (2008). Two practical trainings on bat calls recording and analysis were carried by Dr. Ivan Pandourski (IZ-BAS). In 2009, the project team took part in a workshop in Cluj-Napoca, Romania. For complete project report see: The DARWIN INITIATIVE web-site: http://www.darwin.gov.uk/.

Map of the road transects in Bulgaria.

Tabachka Bat Reserarch Station, Sensory Ecology Group, Max Planck Institute for Ornithology, Seewiesen, Germany

A field station on bat research was established in Bulgaria in 2005 as a part of the Sensory Ecology Group at Max Planck Institute for Ornithology in Seewiesen, Germany. The station is based in Tabachka village, Ruse District. It is equipped with facilities for various behavioral, ecological, bioacoustic and sensory-physiological experiments. Bats are the major study group however other mammals and birds living in the region are also explored. Each summer the station hosts Ph.D. and M.Sci students, field assistants and guests. The goal of the Sensory Ecology Group is to analyze the evolutionary interaction between the sensorial and cognitive abilities of an organism and its ecological niche. For further details and research projects see http://www.orn.mpg.de/nwg/abtsiemers_en.html or contact the leader of the station Dr. Björn Siemers, bjoern.siemers@orn.mpg.de.

10. Responsible bodies nominated for the provision of advice on bat conservation and management

The **Ministry of Environment and Water** (http://www.moew.government.bg) is the responsible body for nature conservation in Bulgaria. The department of **National Nature Protection Service** (NNPS) is particularly in charge for the management and

implementation of the legislation concerning protection of all bat species, roosts and habitats.

The National Museum of Natural History (http://www.nmnhs.com) and the Institute of Zoology (http://www.institutezoology.com) at the Bulgarian Academy of Sciences are officially nominated for the provision of advice on bat conservation and management in Bulgaria. Specialists on bats, which carry different research and conservation projects are working in both institutions.

A Bat Research and Conservation Centre (BRCC) was founded in 2003 as a section in the National Museum of Natural History at the Bulgarian Academy of Science. The Centre was basically established to study the distribution and biology of bats in Bulgaria, to promote their importance and to develop plans and strategies for protection and management of their important habitats. Experts and volunteers from BRCC are carrying various research and conservation projects on bats on the territory of the whole country.

BRCC is regularly involved in:

- Expert statements on new cave development projects;
- Expert statements on bats at new wind turbines parks;
- Expert statements on water catchments from bat caves;
- Signals for inappropriate infrastructure facilities (e.g. bad cave grills, gates) and crimes against bats;
- Consultations about species composition and number of bats living in established or new protected areas;
- Participations in research teams for preparation of management plans for national and nature parks and NATURA 2000 sites.
- Field trainings of experts from the Regional Inspectorates of Environment and Water, Departments of the national and nature parks and NGO's.
- Practical courses for students on the methods of bat studies;
- Regular public talks and presentations in the Faculty of Biology at the Universities of Sofia and Plovdiv.
- Rescue operations for bats in houses, apartments and public buildings;
- Interviews for radio, TV, newspapers and electronic portals.

More information at http://www.nmnhs.com/display_en.php?id=bat-research-and-conservation-centre

In 2006, the **Bat Research & Protection Group** has formally assigned all its activities, projects, international and national connections and library to the BRCC.

Since 2005, a working group on bats was formed within the Green Balkans Federation. It primarly deals with conservation and education activities but also runs research projects on bats in the region of Plovdiv and Stara Zagora towns.

11. Additional action undertaken to safeguard population of bats

A **Methodology** for assessing the conservation status of habitats and species was developed and electronically (so far) published in frame of the BBI/Matra project 2006/014 "Favourable Conservation Status of Natura 2000 Habitat types and Species in Bulgaria". The project was carried by the Bulgarian Biodiversity Foundation, Balkani Wildlife Society, Orbicon (DK) and Wageningen International. The publication consists matrices for

accessing the status of habitats included in Annex 1 and species listed in Annex 2 of the Habitat Directive, which occur in Bulgaria.

The importance of a method for assessing the conservation status of habitats and species is based on the main goal of the **Habitats Directive:** achieving favourable conservation status of species and habitats of European importance. But the method for assessing the conservation status of habitats and species serves more goals. First of all it provides guidance to setting up a monitoring plan for these habitats and species.
It also provides guidance to the elaboration of management plans and it forms a base for formulating restrictions and regimes to be included in designation orders of Natura 2000 sites. Last but not least the method for assessing the conservation status is an indispensible tool for organisations that carry out the so called Appropriate Assessment (AA) as required by article 6 of the Habitats Directive. This AA is meant to evaluate the impact of plans and projects on habitats and species listed in the Habitats Directive.
For assessing the conservation status of habitats and species at site level 163 matrixes have been developed giving parameters and threshold values for favourable and unfavourable conservation status for each relevant habitat type and species.

Included in the Methodology are matices for accessing the Favourable Conservation Status of **13 species of bats** in Bulgaria (*Rhinolophus blasii*, *Rhinolophus euryale*, *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros*, *Rhinolophus mehelyi, Barbastella barbastellus*, *Miniopterus schreibersii*, *Myotis bechsteinii*, *Myotis blythii*, *Myotis capaccinii*, *Myotis dasycneme*, *Myotis emarginatus*, *Myotis myotis*) and two natural habitats with importance to bats (8310 “Caves not open to public” и 8330 “Submerged or partially submerged sea caves”).

Since 2003, in all management plans prepared for protected territories with IBUH are included terms and conditions for controlling the access to the known bat roosts. For instance, the management plan of the Trigrad Gorge protected area imposes a special regime of winter tourist visits at the show cave Dyavolskoto Garlo- the most important hibernaculum for *Miniopterus schreibersii* in S Bulgaria and N Greece with up to 42 000 bats during the winter. Between December 15th and March 15th film and video productions, organized caving events and visits by large groups are strictly forbidden. Order № 663/21.08.2007 from MEW forbids tourist access to the show cave Orlova Chuka (Ruse Distr.) from November 1st to April 1st due to the presence of a large hibernating colony of *Rhinolophus ferrumequinum*, *Rhinolophus mehelyi*, *Rhinolophus blasii* and *Rhinolophus euryale*.

Relocation of a hibernation colony of noctules (*Nyctalus noctula*) during the reconstruction of Gerdzhika Bridge in Plovdiv. The end of 2005 saw the start of planned reconstruction works on the Gerdzhika Bridge in the town of Plovdiv. There were plans to reconstruct the pavement, shift the slabs, break the pillars and close the hollows underneath the bridge. At the very start of the repairs the workers found that many of the joints below the bridge were full of bats in torpor which got squashed when the slabs were shifted, buried under construction debris or fell into the water of Maritsa river. After the alarm was raised by concerned citizens, volunteers from the local NGO Green Balkans took urgent action to save the hibernating noctules (*Nyctalus noctula*). Over 6 days a total of **977 live bats** were taken out one by one (an average of 80 individuals in a joint). Considering the number of individuals who fell in the river, the found dead bodies and the ones who managed to escape, the total number of wintering bats was calculated as approximately 1500. After coordination with RIEW Plovdiv all the bats were transported and temporarily accommodated in the Wildlife Rehabilitation and Breeding Center in Stara

Zagora town. Meanwhile, consultations were held with the BRCC at the NMNH-BAS and the bats were later transported and released in the Devetashkata cave.

In October 2009, during a visit to Zandana Cave (=Biserna Cave), an IBUH, NBMS and a NATURA 2000 site (BG0000382) in SE Bulgaria, Shumen Distr., a BRCC team has found that the entrance was blocked with a solid conrete wall. After entering the cave via an alternative narrow passage they have found more than 200 dead *Miniopterus schreibersii* near the new concrete wall at the entrance. In result the overall number of bats, which usually exceed several thousand was less than 100 individuals. The cave is regionally very important for both, breeding and hibernation of 11 bat species: *Miniopterus schreibersii, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus euryale, Rhinolophus mehelyi, Myotis myotis, Myotis blythii, Myotis capaccinii, Myotis emarginatus, Myotis nattereri* and *Myotis daubentonii*. A written message with photos was posted to RIEW Shumen. On November 10th 2009, the RIEW has sent an instruction (№326/10.11.2009) to the local Water Supply Company to remove the concrete wall and install a metal gate with min. 35cm between the horizontal bars till 16.11.2009. The case is not closed and further progress is expected to follow.

12. Recent and ongoing programmes relating to the conservation and management of bats

THE NATIONAL BIODIVERSITY MONITORING SYSTEM (NBMS) is a complex mechanism for monitoring and reporting on changes in the biological diversity of Bulgaria in the long run. This is achieved through a system for assessment and analysis of the impacts on biodiversity, its state and the measures that need to be undertaken to prevent its loss. The NBMS is the basic instrument for assisting decision-makers in protecting and conserving Bulgaria's biodiversity at a national level, and to provide information to as many other users as possible. The monitoring focuses on species of different biological groups and selected types of habitats. The information is gathered regionally and summarized nationally. Regional databases are kept in the RIEW and the departments of national parks. The whole database is stored and managed by the Executive Environment Agency (http://nfp-bg.eionet.eu.int/ncesd/eng/index.html). Methodology for monitoring of bats includes standart data protocol forms for monitoring of 26 underground roosts, ca. 200 Schwegler 2FN bat boxes in seven natural forests and two wetlands can be downloaded (only in Bulgarian) at:
http://nfp-bg.eionet.eu.int/eea/bg/publicat/normative/zpo/NSMBR.html. For additional information on NBMS and database of bats' monitoring: Mr. Radoslav Stanchev: e-mail: pafmon@nfp-bg.eionet.eu.int, tel. (+359 2) 940 6473; fax (+359 2) 955 9015, Executive Environment Agency, Departament of Monitoring of Lands, Biodiversity and Protected Areas, 136 "Tsar Boris III" Blvd., 1618 Sofia, Bulgaria.

HIGH MONITORING PRIORITY

1. Schreiber's Long-fingered Bat — *Miniopterus schreibersii*
2. Bechstein's Bat — *Myotis bechsteinii*
3. Lesser Mouse-eared Bat — *Myotis blythii*
4. Long-fingered Bat — *Myotis capaccinii*
5. Geoffroy's Bat — *Myotis emarginatus*
6. Greater Mouse-eared Bat — *Myotis myotis*
7. Blasius' s Horseshoe Bat — *Rhinolophus blasii*
8. Mediterranean Horseshoe Bat — *Rhinolophus euryale*
9. Greater Horseshoe Bat — *Rhinolophus ferrumequinum*

MEDIUM MONITORING PRIORITY

1. Lesser Horseshoe Bat — *Rhinolophus hipposideros*
2. Mehely's Horseshoe Bat — *Rhinolophus mehelyi*
3. Noctule — *Nyctalus noctula*
4. Serotine — *Eptesicus serotinus*

All the listed bat species are monitored by expert teams, who visit underground habitats such as caves, disused mine galleries and bunkers, which are known to have been inhabited in recent years by hibernating or breeding bat colonies. The list of monitoring sites corresponds with the caves and galleries included in the document "Important Bat Underground Habitats in Bulgaria" (IVANOVA, 2005a). The document was drafted in compliance with Resolution 4.3 MoP4 ("Guidelines for the protection and management of important underground bat habitats") and represents the official Bulgarian position (through MOEW) for the EUROBATS Convention. This national report evaluates all the important underground habitats (**92 in total**) in terms of the number of species and the seasonal character of the habitat, their number, protection status and level of importance (regional, national or European/world). **Fifty two** caves and galleries are considered to be highly important on a national and European level (Appendix 4).

NBMS is a long-term initiative, which if it is regularly funded will turn into an important source of information for the state about the changes in bat populations and the number of bats in their winter hibernaculas and summer roosts for each of the 13 priority species. However, since the launch of NBMS in 2006 no targeted funds are available (though planned by EEA) for bat monitoring projects run by organisations, which are not in the institutional system of the MOEW. This led to accumulation of limited and inconsistent amount of field data, which is not sufficient to draw conclusions about the changes and planning of proper management measures for mitigations and avoidance of threats to bats and their roosts. At present, field data is collected in course of different bat research projects but it is occasionally submitting to EEA.

A comprehensive GIS map (including a layer of most important sites and migration corridors for the conservation of bats in the country) is currently under preparation in frame of the projects "Strategical Environmental Review of wind power development in Bulgaria" (exp. in April 2010) and "Action Plan for Development of Renewable Water Sources" (exp. in June 2010).

Project on bats (2004-2009)

Period / Donor	Project name	Partners
2001-2005 Swiss National Science Foundation/ SCOPES Program	Ecology, behaviour and population genetics of the forest-living Bechstein's bat (*Myotis bechsteinii*) in Europe	NMNH, University of Zurich-Irchel
2004-2005 Peoples Trust for Endangered species, UK	Survey and legal protection of Mediterranean group of horseshoe bats in Bulgaria	Institute of Zoology Sofia

Period / Donor	Project name	Partners
2003-2005 Rufford Small Grants and FORD-MOTO-PFOHE	Conservation Measures for the Protection of some Vulnerable Large Bat Colonies in Bulgaria	Institute of Zoology Sofia
2005 Municipality of Ruse/ Phare programme	The wonders of Orlova Chuka cave	Municipality of Ruse, Bat Research & Protection Group
2005 UNDP/Rodope Project	Study of caves and bats in three karstic regions in the Western Rhodopes	NMNH/BRCC
2005-2006 Municipality of Gabrovo/ Phare programme	Uzana-door to the heart of Central part of Stara planina Mountain	Nature park "Bulgarka"
2005-2008 MOEW	Red Data Book of Bulgaria, vol. 2, Animals (new edition)	BAS Insitutes, University of Sofia
2006 UNDP/Rodope Project	Study of caves and bats in four karst regions in the Western and the Eastern Rhodopes	NMNH/BRCC
2006-2008 National Geographic Research Fund	Population structure and ecology of the endangered forest-living Bechstein's bat in its glacial refuge, the Bulgarian-Turkish Strandja Mountains	NMNH, Trakya University Edirne, University of Zurich-Irchel
2006-2008 Swiss National Science Foundation/ SCOPES Program	Ecology, behaviour and population genetics of the forest-living Bechstein's bat (*Myotis bechsteinii*) in two glacial refuges: South-Eastern Europe and the Caucasus	NMNH, University of Zurich-Irchel, University of Novi Sad, Institute of Ecology of Mountain Territories Krasnodar, Field Researchers Union - Campester Tbilisi
2006-2008 BBI MATRA	Favourable Conservation Status of Natura 2000 Habitat types and Species in Bulgaria	BBF, Balkani, National Forestry Board, Orbicon, Wageningen International
2007-2008 Municipality of Kostinbrod	Bats of Kostinbrod Municipality-current state, conservation importance and protection measures	Institute of Zoology Sofia

Period / Donor	Project name	Partners
2007-2008 BBI MATRA	Bats and Environmental Impact Assessments: Tools for implementation of European Habitat Directive and EUROBATS Agreement in Bulgaria and Romania	NMNH, Romanian Bat Protection Association, Dutch Mammal Study and Protection Society (VZZ)
2007-2009 Darwin Initiative	Monitoring bat biodiversity: indicators of sustainable development in Eastern Europe	Green Balkans, Zoological Society of London, The Bat Conservation Trust, Institute of Zoology, Sofia, Romanian Bat Protection Association
2008 Nature Park "Strandzha"/ NatuRegio (DE)	"Train trainers" (project for monitoring and research on bats)	University of Kiel, Germany; NOCTALIS Center, Green Balkans, Nepiast speleological club, City of Burgas, Peace Corps
2008 BBI MATRA	Bats (Mammalia, Chiroptera) & Tourism Perspectives at Lomovete Protected Area BG0000608	WWF- Danube-Carpathian Programme, Nature Park Rousenski Lom
2008 Nature Park "Strandzha"	Research on bats along the coastal line of "Strandzha" Nature Park	Institute of Zoology, Sofia
2008-2009 Nature Park "Strandzha" / Eurobats Secretariat	Strandja Nature Park: The hot spot in bat diversity	NOCTALIS Center, Green Balkans, Nepiast speleological club, City of Burgas
2008-2009 Nature Park "Golden sands"/State budget	Research on Bats (Mammalia: Chiroptera) in Zlatni Pyasatsi Nature Park	Ivailo Borisov
2008-2009 UNDP/Rodope Project	Survey on breeding colonies of cave dwelling bats in the Rhodope Region – 2008.	NMNH/BRCC

Period / Donor	Project name	Partners
2009 Nature park "Vratchansky Balkan"/ Operational Programme Environment 2007-2013	Establishment of a center for key conservation activities within the Nature park "Vratchansky Balkan"	Municipality of Vratsa

13. Consideration being given to the potential effects of pesticides on bats and efforts to replace timber treatment chemicals which are highly toxic to bats

No surveys and actions have been undertaken in this field.

D. Functioning of the agreement (B. Petrov)

14. Cooperation with other Range States

Bulgarian experts on bats have carried joint projects (see table above) between 2004 and 2009 with colleagues from the following Range States and institutions:

- **Germany** (University of Tuebingen, Max Planck Institute for Ornithology, Seewiesen, NOCTALIS Center, Bad Segeberg, University of Kiel, University Hospital and the Virological Institute of Bonn)
- **Switzerland** (University of Zurich)
- **United Kingdom** (Zoological Society of London, The Bat Conservation Trust)
- **Romania** (Romanian Bat Protection Association)
- **Czech Republic** (National Museum, Prague)
- **Turkey** (Trakya University, Edirne)
- **Serbia** (University of Novi Sad)
- **Russia** (Institute of Ecology of Mountain Territories, Krasnodar)
- **Georgia** (Field Researchers Union Campester)

Appendices (B. Petrov)

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Posters

Bats in caves of Bulgaria.

Appendix 3. Glossary of abbreviations.

BAS	Bulgarian Academy of Sciences
BBF	Bulgarian Biodiversity Foundation
BFS	Bulgarian Federation of Speleology
BRCC	Bat Research and Conservation Centre
EA	Ecological assessment
EEA	Executive Environmental Agency
EIA	Environmental Impact Assessment
IBUH	Important Bat Underground Habitat/s
IZ	Institute of Zoology – Bulgarian Academy of Sciences
MOEW	Ministry of Environment and Water
NBMS	National Biodiversity Monitoring System
NFB	National Forestry Board
NGO	Non-governmental organization
NMNH	National Museum of Natural History – Bulgarian Academy of Sciences
NNPS	National Nature Protection Service
RIEW	Regional Inspectorate of Environment and Water

Appendix 4. List of 52 Important Bat Underground Habitats in Bulgaria with national and international importance (after Ivanova, 2005a)

Name of IBUH	Village	District	Type	Rhf	Rhh	Rhb	Rhe	Rhm	Mmyo	Mbly	Mcap	Mem	Msch	N SP	Type of roost	STATUS	DATA	Importance
Aina Ini	Ribino	Kardzhali	cave	X	X	X	X	X	X		X	X	X	9	S/N/T/H	PA		E
Andaka	Dryanovo	Gabrovo	cave	X	X		X		X		X		X	6	S/T/H	NO		N
Bacho Kiro	Dryanovo	Gabrovo	cave	X	X									2	S/T/H	NL	ND	N
Bilernitzite	Botunya	Vratza	cave	X			X		X		X		X	5	S/N	NO		N
Bozhiyat Most	Lilyache	Vratza	cave	X			X		X		X		X	5	S/N	NL		N
Vodnata Dranchi Dupka	Melnitza	Yambol	cave	X		X	X		X		X		X	6	S/T/H	NL		N
Vodni Pech	Gorna Luka	Montana	cave	X			X		X		X		X	5	S/N/T	NO	ND	N
Varkan	Tzar Petrovo	Montana	cave	X		X								2	S/N	NO	ND	E
Gargina Dupka	Mostovo	Plovdiv	cave	X	X				X		X		X	5	S/T/H	NL		N
Golashkata Peshtera	Gabrovitza	Pazardzhik	mine gallery	X	X		X		X		X		X	6	S/N/T/H	NL		E
Golyamata Mikrenska Peshtera	Mikre	Lovech	cave	X	X		X							3	S/T/H	NO	ND	N
Gabarnika	Krasen	Ruse	cave	X	X		X	X	X	X	X		X	8	S/N/T/H	NO		E
Devetashkata Peshtera	Devetaki	Lovech	cave	X	X		X	X	X	X	X	X	X	9	S/N/T/H	NL		E/W
Derventskata Peshtera	Prolaz	Targovishte	cave	X			X		X					3	S/N	NL		N
Dinevata Peshtera	Gintzi	Sofia	cave	X	X				X	X			X	5	T/H	NL		N
Dyavolskoto Garlo	Trigrad	Smolyan	cave	X							X		X	3	S/N/H	PA		E/W
Emenskata Peshtera	Emen	Veliko Tarnovo	cave	X	X		X	X	X	X	X	X	X	9	S/N/T/H	PA		E
Zandana	Shumen	Shumen	cave	X	X		X	X	X	X	X	X	X	9	T/H	?		N
Zandana (Divdyadovskia Zandan)	Divdyadovo	Shumen	cave	X			X		X	X			X	5	S/N	NO		N
Zorovitza	Cherven	Ruse	cave	X	X		X	X	X	X	X	X	X	9	S/N/T	NO		E
Ivanova Voda	Dobrostan	Plovdiv	cave	X	X				X		X		X	5	S/T/H	PA		E/W
Kalenskata Peshtera	Kalen	Vratza	cave	X	X				X		X		X	5	S/T/H			N
Kalna Matnitza	Beli Izvor	Vratza	cave	X	X		X	X	X	X	X		X	8	S/N/T/H	NO		E
Karangin	Oreshari	Kardzhali	cave						X		X		X	3	S/N/T	NL		N
Kozarnika (Vodnata)	Lipnitza	Sofia	cave	X			X					X	X	4	S/N/T	NO	ND	N
Vodnata	Lipnitza	Sofia	cave	X			X					X	X	4	T/H	NO	ND	N
Kresna	Kresna	Blagoevgrad	bunker	X			X					X		3	S/N/T	NO		N

Name of IBUH	Village	District	Type	Rhf	Rhh	Rhb	Rhe	Rhm	Mmyo	Mbly	Mcap	Mem	Msch	N SP	Type of roost	STATUS	DATA	Importance
Lednitzata	Kotel	Sliven	cave	X	X				X		X		X	5	T/H	NL		N
Lyastovitzata	Glozhene	Lovech	cave	X	X				X				X	4	S/N/T/H	NL		N
Magura	Rabisha	Vidin	cave	X	X		X		X				X	5	S/N/T	NL		N
Mandrata	Chavdartzi	Lovech	cave	X	X		X	X	X	X	X	X	X	9	S/N/T/H			N
Marina Dupka	Targovishte	Targovishte	cave						X				X	2	S/N/T	NO	ND	N
Maslen Nos	Primorsko	Burgas	coastal cave				X				X		X	3	S/N/T	NL		N
Mishin Kamak	Gorna Luka	Montana	cave	X	X	X			X	X	X		X	7	S/N/T/H	NL		N
Morovitza	Glozhene	Lovech	cave	X	X	X	X	X	X	X	X	X	X	10	S/N/T/H	NL		N
Nanin Kamak	Muselievo	Pleven	cave	X	X		X	X	X	X	X	X	X	9	S/N/T	NL		N
Orlova Chuka	Pepelina	Ruse	cave	X	X		X	X	X	X	X		X	9	S/N/T/H	NL		E/W
Orlovata Peshtera	Kotel	Sliven	cave	X	X		X		X	X			X	6	S/N/T	NL		N
Parnitzite	Bezhanovo	Lovech	cave	X	X	X	X	X	X	X	X	X	X	10	S/N/T/H	NL		E/W
Ponora	Chiren	Vratza	cave	X	X		X		X		X	X	X	7	S/N/T/H	NL		N
Prilepnata Peshtera	Yantra	Gabrovo	cave				X		X		X		X	4	S/N/T	NO		N
Sedlarkata	Rakita	Pleven	cave	X	X		X	X	X	X	X	X	X	9	S/T/H	NL	ND	N
Serapionovata Peshtera	Lyutibrod	Vratza	cave	X	X				X	X			X	5	S/N/T	NL		N
Subatta	Kotel	Sliven	cave				X						X	2	S/N/T	NL	ND	N
Suhi Pech	Gara Oreshets	Montana	cave	X			X		X	X	X		X	6	S/N/T	NL		N
Troevratitza	Karlukovo	Lovech	cave	X			X		X	X	X		X	6	S/N/T	NO		N
Tyulenovata Peshtera	Sveti Nikola	Varna	coastal cave						X				X	2	S/T	NO	ND	N
Urushka Mara	Krushuna	Lovech	cave	X	X		X	X	X	X	X	X	X	9	S/N/T	NO		N
Haidushkata Peshtera	Deventzi	Pleven	cave	X	X	X	X		X		X		X	7	S/N/T/H	NL		N
Hilyadite Ochichki	Madara	Shumen	cave	X			X	X	X	X			X	6	S/N/T	NL		N
Chelovechata Dupka	Kunino	Vratza	cave	X	X				X	X	X		X	6	S/T/W	NO		N
Yaarasa Ini	Visoka Polyana	Kardzhali	volcanic cave	X	X	X	X		X		X		X	7	S/N/T/H	PA		E

N SP Number of species
Type of roost **S-** summer; **N-** nursery; **T-** transitional; **H-** hibernaculum
STATUS **NL-** natural landmark; **PA-** protected area
DATA **ND** no recent data
Importance **N** national importance **E** European importance

Rhf *Rhinolophus ferrumequinum*
Rhh *Rhinolophus hipposideros*
Rhe *Rhinolophus euryale*
Rhm *Rhinolophus mehelyi*
Rhb *Rhinolophus blasii*

Mm *Myotis myotis*
Mb *Myotis blythii*
Mcap *Myotis capaccinii*
Mem *Myotis emarginatus*
Msch *Miniopterus schreibersi*