

BATS (MAMMALIA, CHIROPTERA) IN CROSS-BORDER AREAS IN BULGARIA AND GREECE

RESULTS OF PROJECT IMPLEMENTATION
„SUSTAINABLE BATS CONSERVATION IN CROSS-BORDER AREAS” (BATS CONSERVE) -
CROSS-BORDER COOPERATION PROGRAM GREECE - BULGARIA
INTERREG V-A 2014 - 2020



2019

Project co-funded by the European Union and National Funds of the participating countries.
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INTRODUCTION

This publication has been prepared in pursuance of **Activity 10: „Development of publication“** of a Contract for the performance of a public procurement with subject „Carrying out specialized activities on the project BatsConserve“, funded under a cross-border cooperation program UNTERREG V-A „Greece-Bulgaria 2014-2020“ and reflects the main results of the implementation of the project as a whole. The main focus of the project is to increase the sustainability of bat fauna conservation in the cross-border territory of Bulgaria - Greece. The approach of the project is based on the study of bat fauna, assessments and measures for the conservation of significant bat habitats, not only in the Natura 2000 sites but also in the surrounding territories. The main objective of the project is to improve the status of bat fauna (*Chrioptera*) along the Mesta River and in caves from the region of Eastern Rhodopes (Momchilgrad - Komotini) by performing joint activities for the conservation of significant habitats of bat species by Southwestern University "Neofit Rilski", Blagoevgrad and University "Aristotle", Thessaloniki.

Bats are one of the most numerous vertebrate animals on Earth. They have extremely important role in maintaining

ecological balance. Over 30 species of insectivorous bats have been identified within Europe. They are an important natural regulator for the abundance of insects that are their main food. At the same time, their low productive potential (they only give birth once a year) and the gathering of tens to thousands of individuals in one roost, most often these are karst caves, determine their high vulnerability. Population survival is largely dependent on human activity, such as agricultural and forestry management practices. Effective direct conservation measures are implemented in essential roosts.

Bats are subjects of protection as under national laws of each country of Europe as under international agreements such as the Habitats Directive of EU.

Characteristic of the bats in border regions of Bulgaria and Greece is that they consist both of species with wide distribution and abundance and of rare species with limited range.

This publication presents the main project results of „Sustainable bats conservation in the cross-border area“ (BatsConserve) and it has aim for completing the knowledge of significant habitats of bats as well as the condition of their populations under the influence of natural and anthropogenic factors.

PROJECT RESULTS

Study area

As a first step in the implementation of the project, a suitable project area within the borders of Bulgaria and Greece was selected. The fieldwork covered territories along the Mesta River, the Eastern Rhodopes, the wetlands near Porto Lagos and the Moronia area with a total area of 35075 hectares (24660 ha in Bulgaria and 10415 ha in Greece). The project area covers a total of 17 polygons. 11 polygons in Bulgarian territory (BG01 - BG11) with a total area of 24 660.15 ha and 6 polygons in Greek territory (GR01 - GR06) with a total area of 10 415.13 ha, covering a variety of habitats - cave shelters, galleries, bunkers, rock formations, karst areas, old-growth forests, wetlands, water

bodies. One of the main criteria for their selection was the absence or insufficient information on the species diversity of bat fauna.

Some of the polygons are fully covered or partly in protected areas under the national legislation on both countries and in protected sites under the Habitats Directive of the European Natura 2000 Network. The studied area is in a broad altitude range from the sea level (wetlands near Porto Lagos) to 2100 m above the sea level (Falakro mountain) with a variety of environmental conditions and the presence of roosts (karst and volcanic caves, mine galleries, bunkers, rock piles, etc.) in which the bat fauna was very poorly studied or unknown.

Methods

The following common methods were used for determining the abundance and species composition of bats:

- ✓ Visual inspection of roosts (caves, bunkers, abandoned buildings, rock piles, etc.) – bats are determined on the basis of their characteristic morphological features. Colonies and individuals are photographed for their accurate photo counting (**fig. 2**);



Fig. 2. Visual inspection and photo shooting of bats 'colony in Samara cave near v. Samovila. ©I. Pandurski

- ✓ Capture – with the help of using standard polyester nets for bats and so-called traps for bats (Harp trap), placed at the entrance of caves, under bridges, near bunkers, close to rocky slopes and above water surfaces (**fig. 3**). Right after the species is identified, he is released. The field team is licensed to catch

bats for the purpose of the project, issued by the MOEW.



Fig. 3. Net for bats, placed near rocky slope. ©I. Pandurski

- ✓ Registration and analysis of emitted echolocation and social sounds of bats – there are ultrasounds detectors used for bats. The registered ultrasounds were recorded in wav-format by electronic media. For the purpose of species determination, the following basic sound characteristics were measured and reported:
 - ❖ Frequency with maximum sound energy;
 - ❖ Maximum and minimum frequency of the sound;
 - ❖ Duration of the sound;
 - ❖ Interval between emitted consecutive sounds;
 - ❖ Form of the sonogram (**fig. 4**).

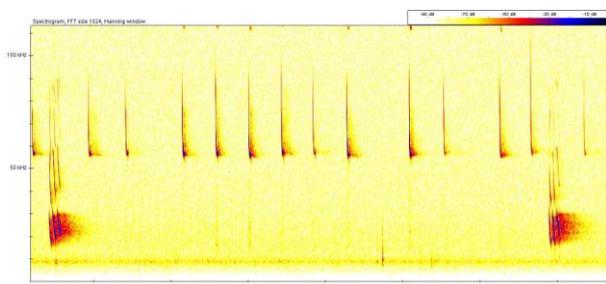


Fig. 4. Sonogram of echolocation and social sound of Soprano pipistrelle (*Pipistrellus pygmaeus*)

Results of field studies conducted on the project

In the surveyed polygons, 27 bat species were identified, or almost 70 % of the known species for Southern Bulgaria and the Aegean Sea part of Greece. The following bat species have been identified in the project area: *Barbastella barbastellus*; *Hypsugo savii*; *Eptesicus serotinus*; *Myotis aurascens*; *Myotis bechsteinii*; *Myotis blythii*; *Miniopterus schreibersii*; *Myotis capaccinii*; *Myotis daubentoniid*; *Myotis emarginatus*; *Myotis myotis*; *Myotis nattereri*; *Nyctalus lasiopterus*; *Nyctalus leisleri*; *Nyctalus noctule*; *Pipistrellus nathusii*; *Pipistrellus kuhlii*; *Pipistrellus pipistrellus*; *Pipistrellus pygmaeus*; *Plecotus austriacus*; *Rhinolophus blasii*; *Rhinolophus Euryale*; *Rhinolophus ferrumequinum*; *Rhinolophus hipposideros*; *Rhinolophus mehelyi*; *Tadarida teniotis* and *Vespertilio murinus*.

The typical composition of bats' communities inhabiting important cave roosts, on the territory of Bulgaria has been revealed, as well the territory of Greece.

A number of joint field studies were conducted within the project, involving the participation of expert teams from both the Bulgarian and Greek sides: in the Maronia Cave in September 2018, in

the Mesta River valley, in the Manuel's cave in the spring of 2019 and others. Extremely high activity and presence of a large population were found from Blasius's bat (*Rhinolophus blasii*) and Schreiber's bent-winged bat (*Miniopterus schreibersii*) during the time of autumn migration period in Maroneia cave and the rare forest species Bechstein's myotis (*Myotis bechsteinii*) was registered on the entrance of Maroneia cave together with the Lesser horseshoe bat (*Rhinolophus hipposideros*), Mediterranean horseshoe bat (*Rhinolophus euryale*) and Schreiber's bent-winged bat (*Miniopterus schreibersii*). It is interesting to note that all four types were active even at an outside temperature close to 0⁰ C.

Valuable information on species composition and territorial distribution for the following bat species has been collected:

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1. Greater horseshoe bat (*Rhinolophus ferrumequinum*) - typical species on the Balkan Peninsula without the highest parts of the mountains. Characteristic of karst areas (BENDA et al 2003). In the studied area it is one of the most common species. There is a hibernation colony of about 100 individuals in Samara cave, v. Samovila. Single bats (1 – 7) inhabit the karst caves (Maroneia cave, the cave “Folia Drakou”, caves around v. Kremen, artificial galleries and as well abandoned military fortification facilities on Greek territory (“Bartisheva fortress”, “St. Nikolas fortress”, “Kastillo fortress” and „Fortress Pyramidoides”) (fig. 5).



Fig. 5. Hibernating Greater horseshoe bat (*Rhinolophus ferrumequinum*) in cave near v. Kremen, Eastern Rhodopes. ©I. Pandurski

2. Lesser horseshoe bat (*Rhinolophus hipposideros*) - typical species for the territory of the Balkan Peninsula, found around 1500 m altitude. It mainly uses underground habitats – natural caves and artificial galleries. It is connected with karst regions with rich vegetation. It is often found in settlements. The species is found in the study area in a total of 14 fields almost always along with the Greater horseshoe bat, representing natural karst caves, military bunkers and artificial mine galleries with single individuals. (1-7) (fig. 6).



Fig. 6. Hibernating Lesser horseshoe bat (*Rhinolophus hipposideros*) in a cave near v. Kremen, Eastern Rhodopes. ©I. Pandurski

3. Mediterranean horseshoe bat (*Rhinolophus euryale*), Blasius' horseshoe bat (*Rhinolophus blasii*), Mehely's horseshoe bat (*Rhinolophus mehelyi*): in study area the three types of horseshoe bats, forms most often mixed colonies (**fig. 7 and 8**). Hibernation colony was registered in Samara cave, village of Samovila, numbering around 70 individuals. Especially high flight activity was registered on the entrance of Maroneia cave in September 2018, as more than 90 % of the registered echolocation ultrasounds belonged to Mediterranean horseshoe bat. Manuel's Cave near the village of Ribnovo is a breeding roost for the mentioned horseshoe bats. Mediterranean and Blasius' horseshoe bats are registered in the cave "Folia Drakou".



Fig. 7. Mixed colony of hibernating horseshoe bats in Samara cave. ©I. Pandurski



Fig. 8. Part of mixed colony of hibernating horseshoe bats in Samara cave. ©I. Pandurski

4. Lesser mouse-eared myotis (*Myotis blythii*) and Greater mouse-eared bat (*Myotis myotis*) – both species often occur together, forming mixed colonies. Their species differentiation on the terrain is often difficult, because of their similar morphological features of the two species. Most habitats are between 100 and 800 m altitude. Yearly, inhabit underground shelters – karst, volcanic and sea caves and mine galleries. Single hibernating individuals, were established in Samara cave, v. Samovila, in old bridge constructions of river Mutnitsa and r. Mesta in Bulgaria, on the Greek territory – over the water surface of the Potamoy dam, in abandoned military bunkers ("Fortress Pyramidoides"), and a breeding colony from around 100 individuals had occupied the entrance parts of the Maroneia cave in April (**fig. 9**).



Fig. 9. Breeding colony, probably mixed of two species Lesser mouse-eared myotis (*Myotis blythii*) and Greater mouse-eared bat (*Myotis myotis*) in Maroneia cave. ©Y. Yankov

5. Western barbastelle (*Barbastella barbastellus*) - a typical inhabitant of humid and old deciduous, mixed and coniferous forests in the sub-mountainous and mountainous regions of the country (**fig. 10**). The highest is the number roost found in over 500 m altitude (BENDA et al. 2003). Flight activity of the species during the autumn period was recorded in the region of Ribnovo village, over the Mesta river and around water area near Musomishte village.



Fig. 10. Western barbastelle (*Barbastella barbastellus*). ©I. Pandurski

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6. Schreiber's bent-winged bat (*Miniopterus schreibersii*) - it is spread throughout the country without the highest parts of the mountains. Most habitats are between 100 and 600 m altitude. A frequent and numerous inhabitant of the caves in the lower parts of the country, as it forms one of the most numerous bat colonies in Europe, numbering tens of thousands of individuals. Breeding colony of the species of about 1200 individuals was formed in April in the Samara cave in the village of Samovila (**fig. 11**). Permanent inhabitant of the Maroneia cave, where it was registered as during the autumn period as well in the spring. A significant breeding roosts is also the Manuel's Cave near village of Ribnovo. The species is hunting far from its roosts, as being registered with relatively high flying activity over the rocky seaside of Maroneia, illuminated port of Agios Charalampos, valley of Varbitsa river in Eastern Rhodopes.



Fig. 11. Breeding colony of Schreiber's bent-winged bat (*Miniopterus schreibersii*) in Samara cave. ©I. Pandurski

7. Long-fingered bat (*Myotis capaccinii*) - it occurs in the whole country, in the mountains up to 1500 m. Extremely cave-dwellers – forming large colonies (up to several thousand individuals). Most habitats are between 100 and 600 m. It is typical inhabitant of karst areas – often in forest landscapes. No significant colonies were found during the current research – a single bat was recorded in the Maroneia cave in September 2018, and in April 2019 – 7 individuals.

8. Geoffroy's bat (*Myotis emarginatus*) – it inhabits karst regions, parklands, without caves areas, and is found in basements of abandoned buildings, churches and houses, old military bunkers and other shelters. It prefers areas with bush and woody vegetation. Most roosts are in low-mountain belt (400-500 m) (BENDA et al. 2003). Flight activity of the species was recorded in the area of Maroneia cave in September 2018 and April 2019, during October around rock niches over Mesta river, small ponds Domus dere river near Petrelik and near bridge constructions above Matnitsa river.

9. Bachstein's myotis (*Myotis bechsteinii*) - characteristic forest species in beech and mixed forests in the 800-1450 m. The species is known as stationary and does not perform large seasonal migrations (BENDA et al. 2003). His presence was confirmed in the Manuel's Cave near village of Ribnovo, where probably hibernates.

10. Noctule bat (*Nyctalus noctula*) - common and often species. Forest-dwellers, often settled in tree hollows. Attached to areas with widespread of deciduous and mixed forests, parks, gardens, settlements. It is also found in the mountains above 1200 m. During the study, the Noctule bat was registered relatively rare – single flying individuals were observed in Maroneia and in the valley of the Varbitsa river, the Eastern Rhodopes, around rock niches of Mesta river (September), diluted forests, volcanic niches to water bodies and stone bridges in Eastern Rhodopes (Tihomir village).

11. Lesser noctule (*Nyctalus leisleri*) - probably occurs in the lower parts of the country, and in the mountains up to 1500 m. It inhabits forest areas with a relatively warm climate. It is registered in October and November along the Mesta river, in the lower stream on the Kazalach river, Dolno Kapinovo village, on Kesibir river (Tihomir village), around rock formations near the village of Tatul, in April on Sap dere river in mixed forest.

12. Greater noctule bat (*Nyctalus lasiopterus*) - a rare, forest species with insufficiently well researched biology. The roosts (summer and winter) are hollows and rock crevices, which sometimes are shared with the Common noctule or species from genus *Pipistrellus*. (BENDA et al. 2003). Characteristic of the type of echolocation sounds were recorded during autumn period in the region of Ribnovo village, Western Rhodopes.

13. Grey big-eared bat (*Plecotus austriacus*) - it is mainly found in the lower parts of the country. In the mountains up to 1400 m. Prefers low, open spaces with steppe character, farmlands, river valleys, settlements (BENDA et al 2003). He was once found in karst cave near the village of Samovila, Eastern Rhodopes. A larger number of species were registered on Greek territory – in the entrance parts of the bunkers "Bartisheva fortress" – October, "Fortress Pyramidoides" – April, the entrance parts of the "Folia Drakou" – October and Maroneia caves – April.

14. Common pipistrelle (*Pipistrellus pipistrellus*) - one of the most common species of bats in Bulgaria and in the project territory. Daily roosts are tree hollows in different semi-enclosed spaces and crevices in man-made buildings. It is also considered for

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synanthropic species. It hunts over various habitats – open areas with single trees, forest and scrubland facies, very often within the boundaries of the settlements. The species is registered with high hunting activity from the sea level to the high mountainous area of the mountain Falakro: rocky coastal habitats in Maroneia, along the coastal residential areas, the wetlands in Porto Lagos, the valley of the Varbitsa river in Eastern Rhodopes and the high mountain ridges of the Bald mountain (Falakro).

15. Soprano pipistrelle (*Pipistrellus pygmaeus*) - common bat species: from the high parts of the mountains to the coastal areas. It inhabits deciduous, coniferous and mixed forests, often found in settlements, gardens, parks, adheres to water areas – lakes, large rivers. It is located in the vicinity of the village of Ribnovo. With a relatively high flying activity was recorded in the forest territories of the Western Rhodopes near the village of Ribnovo.

16. Natterer's bat (*Myotis nattereri*) - it occurs all over the country in the middle mountain range – usually up to 1500 m altitude, in parks, forests, orchards, often near water bodies and in settlements. They usually fly around 5 m high, between tree crowns and rarely around 15 m above their tops. The species is set once at the entrance of the Maroneia cave (**fig. 12**) during April 2019.



Fig. 12. The entrance of Maroneia cave. ©I. Pandurski

17. Savi's pipistrelle (*Hypsugo savii*) – it inhabits rocky and karst areas, mountain pastures, grassy terrains and valleys, forests regions, open arable lands. The daily and winter roosts of the species are mainly associated with rocky habitats. It is located in the area of the rocky seashore of Maroneia (**fig. 13**).



Fig. 13. Rocky seashore of Maroneia. ©I. Pandurski

18. Nathusius' pipistrelle (*Pipistrellus nathusii*) – migratory species with pronounced yearly dynamics of their abundance on the territory of the Balkan Peninsula. During the autumn period it is numerous on the Bulgarian Black sea coast when migratory from many thousands of groups of individuals is observed. It occupies tree hollows and sticks to water bodies (IVANOVA & GUEORGUIEVA, 2005; PANDOURSKI, 2004). The species is extremely numerous during the autumn migration period in the wetland area along the coast of the White sea coast and the forest areas near Ribnovo village in Western Rhodope.

19. Kuhl's pipistrelle (*Pipistrellus kuhlii*) – a species characteristic of the southern parts of the Balkan Peninsula. It is closely related to rocky habitats but also has a high degree of synanthropic species. During the survey, it was often found in rocky habitats along the Maroneia coast (**fig. 14**).



Fig. 14 Rock piles, preferred habitat from Kuhl's pipistrelle (*Pipistrellus kuhlii*). ©I. Pandurski

20. Serotine bat (*Eptesicus serotinus*) - widespread to about 1600 m above the sea level. The species is considered as stationary, but migrations of several tens of kilometers have been observed. Prefer open areas with group of trees as well as rock areas. It is often found in settlements. It is mainly found in the mountainous parts of the studied polygons – the Western Rhodopes in the region of the village of Ribnovo and open pit areas of Bald mountain (Falakro) at altitude of 1900 m.

21. European free-tailed bat (*Tadarida teniotis*) - the habitats of the species are mostly rock areas, high buildings, bridges. It forms small colonies of several dozen individuals. He flies out during dusk, moving far away from the roost and it flies at a height of dozens of meters. His flight is at high altitude – fast. Summer and breeding colonies are in rocks and walls of buildings. It is active during the late autumn period (BENDA et al. 2003, PAPADATOU et al, 2008). The species was found during previous studies from PANDOURSKI (2014) near Dolna kula village in the Eastern Rhodopes, Slavyanka mountain (POPOV etc., 2014) and “Borovo” Forestry in Western Rhodopes. Our studies have shown that the species is common in Greek territory (Maroneia and Bald mountain (Falakro) at a height above 2000 m at temperature around 4 degrees (**fig. 15**), the entrance areas of the bunkers zones “Bartisheva fortress” and “Fortress Pyramidoides”, rock piles, around groups of old tree hollows along the river and artificial pond near village of Volakas. In Bulgaria, has been found in the valley of Varbitsa river in Eastern Rhodopes, around the rock niches on the right side of Mesta river, near a small dam close to village of Teplen.



Fig. 15. Entrance of a precipice cave Chionotrypa under peak Profitis Ilias (Profitis Ilias), Bald mountain (Falakro), where activity of the European free tailed bat (*Tadarida teniotis*) and Particoloured bat was registered (*Vespertilio murinus*). ©I. Pandurski

22. Particoloured bat (*Vespertilio murinus*) - migratory species, which is why there is a pronounced seasonal dynamic in its abundance. It inhabits predominantly mountain forests during the summer and during autumn migration it can be found in variety of habitats with an abundant supply of food, even at sea level. The species is common in autumn, as well in the wetlands of Porto Lagos and in the high parts above 1000 m above the sea level in the Western Rhodopes and Bald mountain (Falakro).

23. Daubenton's myotis (*Myotis daubentonii*) – forest species, with its hunting areas mostly large water bodies, along the rivers and lakes, in cultural landscapes. The hunting takes place in small groups or in pairs. Summer roosts are in tree hollows, crevices in buildings (PANDOURSKI, 2004). Foraging individuals are recorded above water surface of the Varbitsa river in Eastern Rhodopes.

The established rich species composition of bat assemblage is related to the diversity of geomorphologic conditions in the studied cross-border area. In natural and artificial underground habitats (caves, mine galleries) (fig. 16) three medium-sized horseshoe bat species are dominating – *Rhinolophus euryale*, *Rh. blasii* and *Rh. mehelyi*, as well as the Greater horseshoe bat (*Rh. ferrumequinum*), Lesser horseshoe bat (*Rhinolophus hipposideros*) and Shreiber's bent-winged bat (*Miniopterus schreibersii*), whose abundance exceeds 1200 individuals in April. The mountain range of species is enriched

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with the presence of the only representative of the family Molossidae – European free-tailed bat (*Tadarida teniotis*) (**fig. 17**). The role of wetlands in the region of Porto Lagos is particularly important (**fig. 18**), as it provides food for numerous migrating populations during the autumn of Nathusius's pipistrelle (*Pipistrellus nathusii*), Common pipistrelle (*Pipistrellus pipistrellus*) and Particoloured bat (*Vespertilio murinus*). Among the dominating species in the dry rocky habitats we should mention also Savi's pipistrelle (*Hypsugo savii*) and species from genus *Pipistrellus*.



Fig. 16. The entrance of native karst cave near v. Samovila, Eastern Rhodopes©I. Pandurski

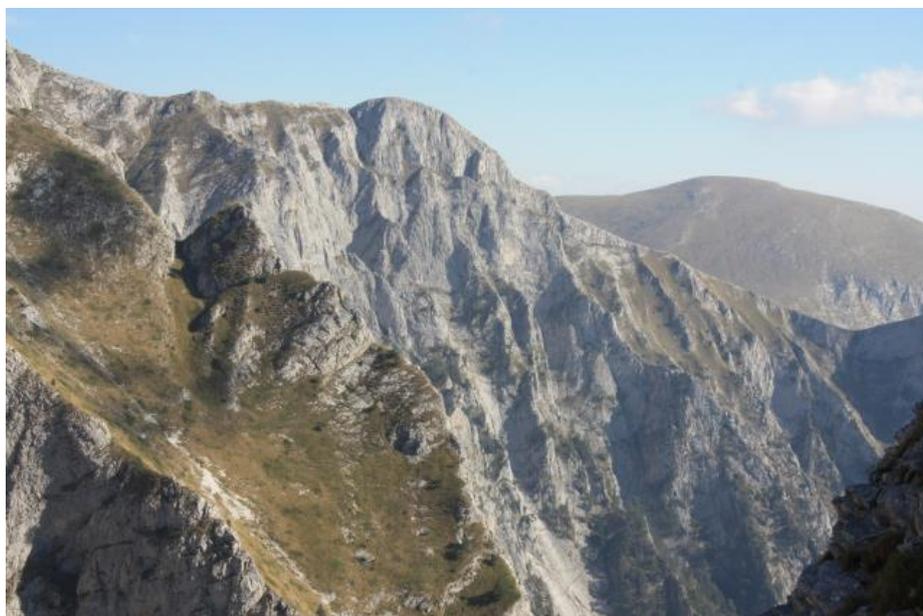


Fig. 17. Rocky habitats, inhabited by European free-tailed bat (*Tadarida teniotis*) – the marble massifs of Bald mountain (Falakro). ©I. Pandurski



Fig. 18. Wetlands near Porto Lagos provides an extremely rich food base for migratory and local bat populations. ©I. Pandurski

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As a result of the field studies, a publicly available database on the distribution of bats in the project polygons was prepared. The database collects and organizes all available information about bat fauna in the project area, as well as the spatial information collected during the project implementation. The database is available on the project website at: <https://batsconserve.eu/>

Geoportal has been created too. The Geoportal contains the main spatial results of the project implementation. The Geoportal is also accessible through the project's website at: <http://185.17.146.169/>. The Geoportal allows visualization of the spatial data and information, a product of the project activities.

Within the framework of the project implementation, models for the level of suitability of the territory for each bat species or potential occurring in the project territory are also developed (**fig. 18**). They can serve to implement specific conservation measures for the conservation of bat fauna. Models are also available in the database and the Geoportal.

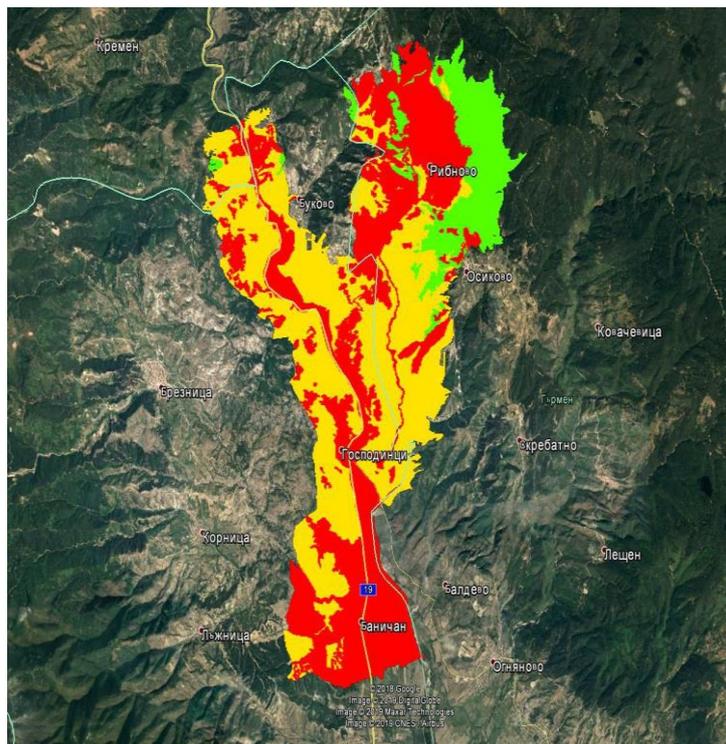


Fig. 18. Model of suitability of habitats for Bechstein's myotis (*Myotis bechsteinii*) in polygon BG 01: in green – areas with a high degree of suitability; in yellow – areas with medium degree of suitability and red – areas without special significance

Threats

The main objectives of the research were to determine the species composition of bats and to identify specific threats to the populations. Bats are vulnerable to many anthropogenic impacts that affect not only their roosts, but also neighboring habitats of importance during different stages of their life cycle.

Within the project implementation, potential threats and factors affecting bat populations in the project area were identified. The information collected on the field about the potential threats to the bat fauna was summarized in descriptive and spatial data (included in the database and the geoportal). The identification of threats on field was made for each polygon in the project area.

An analysis of the state of bat communities and threats in the project area showed that:

- ❖ In the project territory, both in Bulgarian and Greece, no threats and impacts on bats with a significant degree (3) have been identified.
- ❖ The analysis of the status of bat assemblage in the border area along the Mesta river, has shown that a major threat to bats in Greek territory is the open marble extraction method, which leads to a lasting change in the natural character of ecosystems. Significant bat roosts (Manuel's Cave, for example near village of Ribnovo in Bulgaria and Maroneia cave in Greece) have been affected by unregulated visits and vandalism.
- ❖ In the region of Komotini the main factor of impact is intensive agriculture – cotton growing on large areas close to wetlands (**Fig. 19**), of particular importance during the migration periods. A concomitant threat is the use of chemicals in agriculture. On Bulgarian territory significant threats occurs as a result of unregulated penetration into bat's cave-roosts and from pollution – unregulated landfills and pollution of river flows (**Fig. 20.**) due to the absence of sewage systems in settlements and direct discharge of wastewaters into natural water bodies.
- ❖ In 3 of 17 polygons, threats have been identified that can be ignored because they do not in any way affect the current conservation status of bat populations, both in the relevant polygon and throughout the project area. These are polygons BG05, BG07 and BG11.



Fig. 19. Extensive cotton growing areas near the wetlands of Porto Lagos. ©I. Pandurski



Fig. 20. Unauthorized landfill in the valley of the Varbitsa river, part of the hunting area of bats. ©I. Pandurski

Conservation status

As part of the project implementation, an assessment was made of the conservation status of bat species within the project area. The assessment of the conservation status of the bat species in the project area is based on the principles of Annex B and Annex C of the reporting formats approved by the EC (Assessment and reporting under Article 17 of the Habitats Directive, Explanatory Notes & Guidelines). An assessment was made of all bat species established in the project area, as well as those reported to be potentially inhabited but not identified during field studies.

The results of the assessment of the conservation status show that of the 27 bat species established in the project area:

- ❖ 18 species have conservation status – favorable;

- ❖ 9 species have conservation status – unfavorable-unsatisfactory.

Installation of bat boxes (houses)

As part of the project implementation, suitable sites for the installation of bat houses were selected in the project area.

For this purpose:

- ❖ During field studies, information was collected on the presence of threats and factors affecting bats in the project area;
- ❖ The habitats of bat species and their distribution within the project area are also mapped.
- ❖ A joint database with up-to-date information on bat fauna, bat habitats and threats in the project territory has been developed;
- ❖ Distribution maps, maps of habitats and threats have been drawn up;

- ❖ The nature conservation status of all bat species within the project area was also evaluated.
- ❖ All the above mentioned information and data has been taken into account and analyzed in order to identify suitable places for the placement of bat houses.

Choosing a place to put bat houses is a key issue whose decision is essential to the success of their settlement. Bats are constantly on the lookout for alternative havens, especially after mid-summer, when newborns have grown up, able to fly and hunt independently. During this

period, active local migrations were carried out in order to settle the colonies and to occupy new suitable roosts.

A total of 810 bat houses were placed at 596 pre-selected sites in the project area. Of these, 684 houses are placed in the project area within the borders of Bulgaria and 126 within Greece. This distribution is the result of the analysis made to determine the appropriate places for the placement of houses.

The location of the houses, incl. relevant attribute information is included in the database and geoportal.

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