# SPECIAL ECOLOGICAL ASSESSMENT (APROPRIATE ASSESSMENT) OF THE IMPORTANT BIRD AREA (IBA) GR008 'VALLEY OF FILIOURI AND EASTERN RHODOPE' IN THE CONTEXT OF THE ENVIRONMENTAL PERMIT FOR A PROPOSED WIND FARM WITH AN INSTALLED CAPACITY OF 44MW AT THE SITE 'POLEMISTIS', MUNICIPALITY OF KOMOTINI AND MUNICIPALITY OF ARRIANA, MUNICIPAL UNITS OF KOMOTINI & ORGANI, PREFECTURE OF RODOPI, REGION OF EASTERN MACEDONIA AND THRACE


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January 2023


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# 1 IDENTIFICATION OF STUDY AREA (S.A.) & FIELD INVESTIGATION AREA (F.I.A.)

## 1.1 Study Area (S.A.)

The study area is the whole of the Important Bird Area GR0008 called "Filiouris Valley and Eastern Rhodope". The total area of IBA GR0008 is 825,543 km$^2$.
The wind farm will be located within the northern boundaries of the IBA GR0008. The area of the polygon for its construction amounts to 3.762 km$^2$ and occupies only 0.46% of GR008. Of the polygon area, however, only a very small part of the area will be subject to interventions.

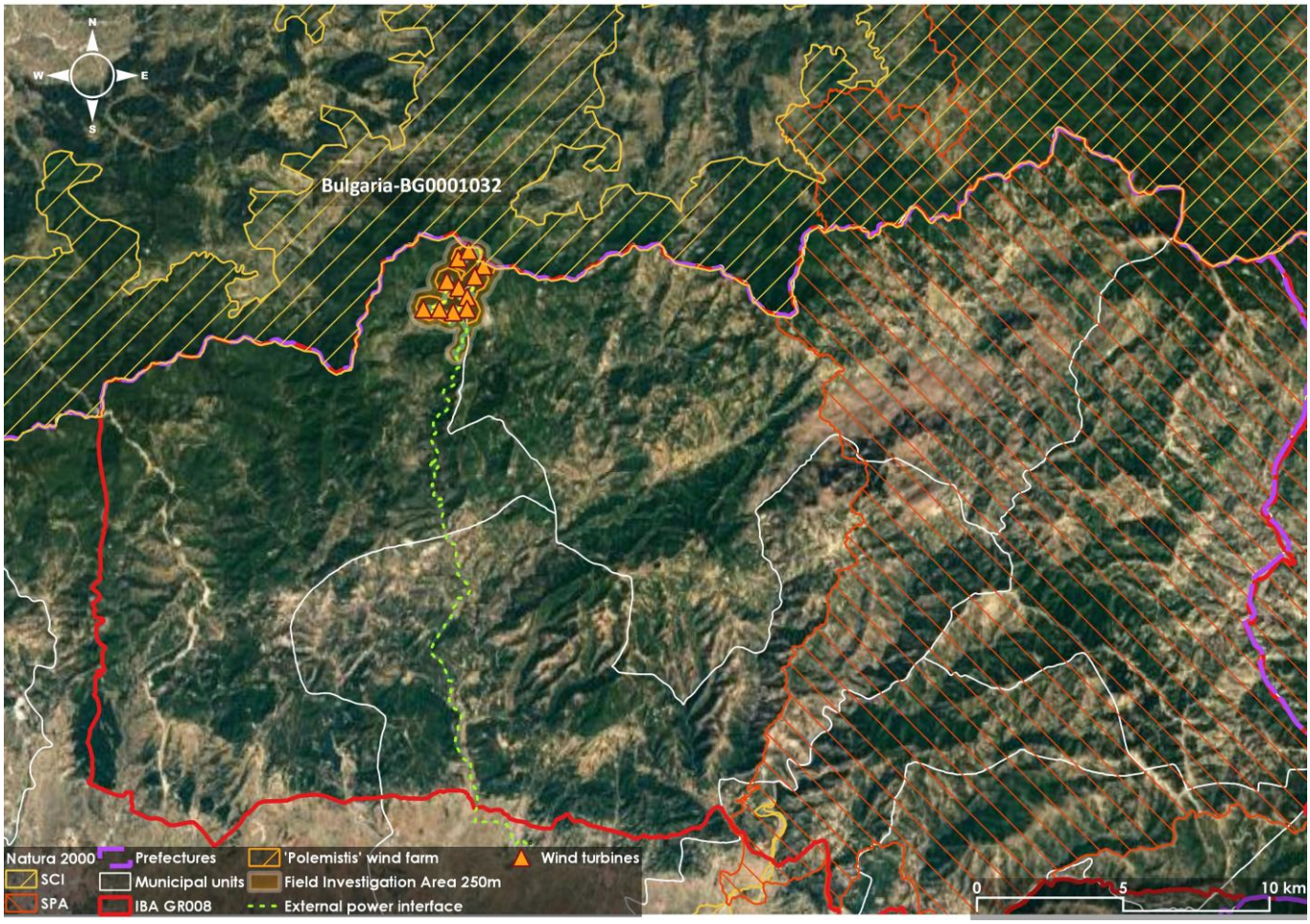



**Figure 1-1 Schematic representation of the boundaries of the Study Area (boundaries of the IBA) and the wind farm (orange colour)**

## 1.2 Field Investigation Area (FIA)

The Field Investigation Area (FIA) is defined as the area extending 500m from the boundary of the wind farm site (Class A2) and 250m at either side of the linear and point sections of the wind farm. As shown in the figure below, the field survey area extends beyond the borders of Greece, in an area of Bulgaria which is designated as a Natura 2000 Special Conservation Area and is called BG0001032 "Rodopi - Iztochni".

It is noted that according to the specifications for the SEAs of A2 category projects (such as the one), a field survey of 10-30 days is required, which in this case was carried out in 12 days with a total of 28 recordings covering the relevant specifications and requirements of the legislation.

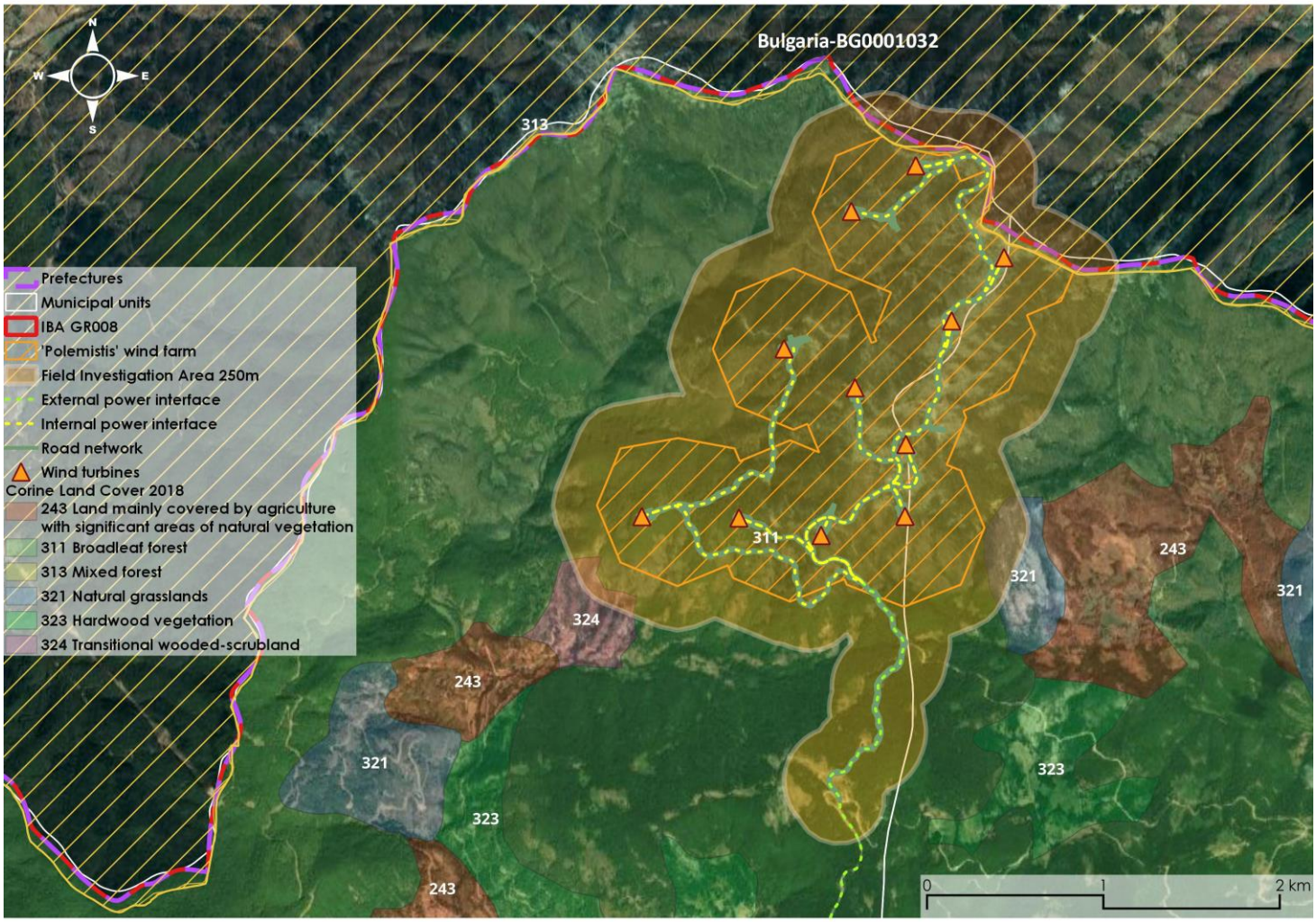



**Figure 1-2 Schematic illustration of the boundaries of the Field Survey Area (orange) and the "Polemistis" wind farm site (dashed orange polygon)**

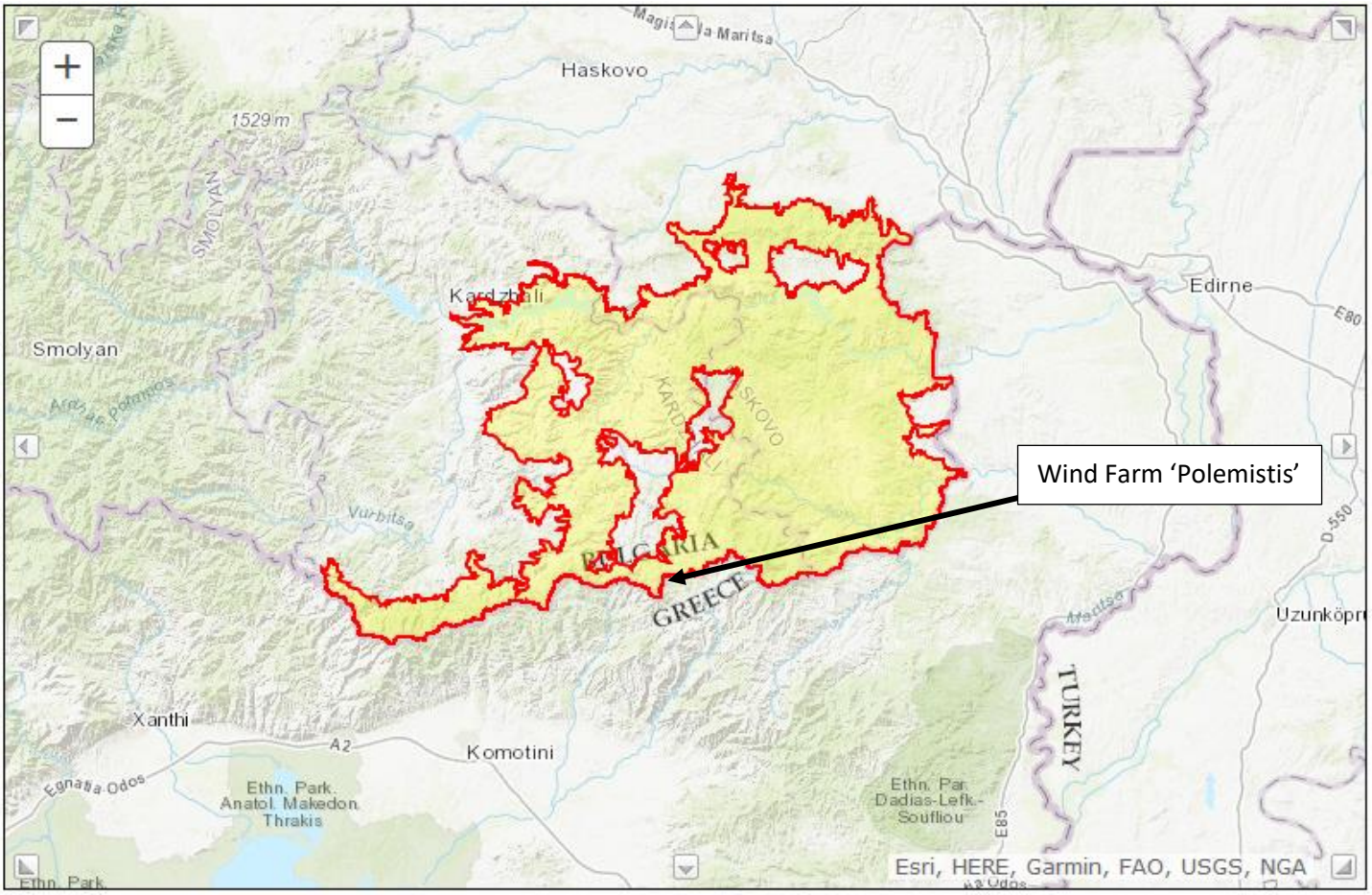



**Figure 1-3 Map of the Natura 2000 'BG0001032' «Rodopi - Iztochni» of Bulgaria, which is adjacent to the border of Greece. A small portion (10.52% - 0,4m$^2$) of the Field Investigation Area (F.I.A.) extends within the Natura 'BG0001032'.**

# 2 PRESENT STATE OF THE NATURAL ENVIRONMENT

## Checklist of flora and fauna species in the Annex II of Directive 92/43/EEC for the Natura 2000 'BG0001032' Rodopi – Iztochni

Table 2-1 contains the presence status and population data of the fauna and flora species of the Bulgarian SCI that fall under Article 4 of Directive 2009/147/EC and are included in Annex II of Directive 92/43/EC, as well as their assessment, according to the updated data of the project "Monitoring and Assessment of the Conservation Status of Species and Habitat Types of Community Interest in Greece".

**Table 2-1 Species listed in Paragraph 3.2 of the SDF for Natura 2000 'BG0001032' and their assessment (in green the bat species)**

| Species | | | | | Population in the site | | | | | | Motivation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Code | Scientific name | S | NP | T | Size | | Unit | Cat. | D.qual. | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Min | Max | | | | Pop. | Con. | Iso. | Glo. |
| F | 1130 | *Aspius aspius* | | | p | 36351827 | 36351827 | area | P | P | C | B | A | A |
| I | 1093 | *Austropotamobius torrentium* | | | p | | | i | R | M | C | A | B | A |
| M | 1308 | *Barbastella barbastellus* | | | p | 725 | 1146 | i | V | M | B | B | C | B |
| F | 5088 | *Barbus cyclolepis* | | | p | | | | C | DD | B | A | C | A |
| A | 1193 | *Bombina variegata* | | | p | 129 | 129 | localities | C | G | B | A | C | A |
| M | 1352 | *Canis lupus* | | | p | 25 | 30 | i | | G | B | A | C | A |
| I | 1088 | *Cerambyx cerdo* | | | p | 719443 | 1061539 | i | R | M | B | B | C | A |
| F | 1149 | *Cobitis taenia* | | | p | 3255320 | 3255320 | i | C | G | B | B | C | A |
| I | 4045 | *Coenagrion ornatum* | | | p | 1 | 1 | localities | R | G | C | A | C | A |
| I | 4032 | *Dioszeghyana schmidtii* | | | p | 139300 | 204282 | i | C | M | B | A | B | A |
| R | 5194 | *Elaphe sauromates* | | | p | 1 | 1 | localities | V | P | B | A | B | A |

| Species | | | | | Population in the site | | | | | | Motivation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Code | Scientific name | S | NP | T | Size | | Unit | Cat. | D.qual. | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Min | Max | | | | Pop. | Con. | Iso. | Glo. |
| R | 1220 | *Emys orbicularis* | | | p | 22 | 22 | localities | C | G | B | A | C | A |
| I | 1074 | *Eriogaster catax* | | | p | 80 | 865 | i | V | P | A | A | C | B |
| I | 1065 | *Euphydryas aurinia* | | | p | 26551 | 52864 | i | C | P | B | A | A | A |
| I | 6199 | *Euplagia quadripunctaria* | | | p | 326977 | 625794 | i | C | P | B | A | C | A |
| P | 2327 | *Himantoglossum caprinum* | | | p | | | | R | | C | B | C | B |
| I | 1083 | *Lucanus cervus* | | | p | 733930 | 1443777 | i | R | M | B | B | C | A |
| M | 1355 | *Lutra lutra* | | | p | 43 | 86 | i | | G | B | A | C | A |
| I | 1060 | *Lycaena dispar* | | | p | | | | V | DD | C | A | B | A |
| R | 1222 | *Mauremys caspica* | | | p | 16 | 16 | localities | C | G | A | A | B | A |
| M | 1310 | *Miniopterus schreibersii* | | | r | 2000 | 3500 | i | C | G | B | B | C | B |
| M | 1310 | *Miniopterus schreibersii* | | | w | 250 | 500 | i | R | G | C | B | C | C |
| I | 1089 | *Morimus funereus* | | | p | 1023658 | 1189018 | i | R | M | B | B | C | B |
| M | 2617 | *Myomimus roachi* | | | p | 0 | 2 | localities | V | P | B | B | B | B |
| M | 1323 | *Myotis bechsteinii* | | | p | 973 | 1947 | i | R | M | B | B | C | B |
| M | 1307 | *Myotis blythii* | | | p | 3000 | 4500 | i | C | G | A | A | C | A |
| M | 1316 | *Myotis capaccinii* | | | w | 11 | 50 | i | V | G | C | B | C | C |
| M | 1316 | *Myotis capaccinii* | | | r | 2000 | 3500 | i | R | G | A | B | C | A |
| M | 1321 | *Myotis emarginatus* | | | r | 6000 | 10000 | i | R | G | A | B | C | A |
| M | 1324 | *Myotis myotis* | | | r | 3500 | 5000 | i | C | G | A | B | C | A |
| M | 1324 | *Myotis myotis* | | | w | 51 | 100 | i | C | G | C | B | C | C |

| Species | | | | | Population in the site | | | | | | Motivation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Code | Scientific name | S | NP | T | Size | | Unit | Cat. | D.qual. | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Min | Max | | | | Pop. | Con. | Iso. | Glo. |
| I | 1084 | *Osmoderma eremita* | | | p | 102651 | 201042 | i | R | M | B | B | C | B |
| I | 4053 | *Paracaloptenus caloptenoides* | | | p | 15 | 15 | localities | C | M | B | A | C | A |
| I | 4022 | *Probaticus subrugosus* | | | p | | | | V | DD | B | B | C | A |
| M | 1306 | *Rhinolophus blasii* | | | w | 1000 | 1500 | i | R | G | A | B | C | A |
| M | 1306 | *Rhinolophus blasii* | | | r | 800 | 1200 | i | R | G | A | B | C | A |
| M | 1305 | *Rhinolophus euryale* | | | w | 101 | 250 | i | V | G | C | B | C | C |
| M | 1305 | *Rhinolophus euryale* | | | r | 500 | 1000 | i | C | G | B | B | C | B |
| M | 1304 | *Rhinolophus ferrumequinum* | | | p | 2000 | 3000 | i | C | G | A | B | C | A |
| M | 1303 | *Rhinolophus hipposideros* | | | p | 250 | 500 | i | C | G | B | B | C | B |
| M | 1302 | *Rhinolophus mehelyi* | | | p | 250 | 500 | i | R | G | B | B | C | B |
| F | 5339 | *Rhodeus amarus* | | | p | 28981541 | 28981541 | i | C | G | C | B | C | B |
| I | 1087 | *Rosalia alpina* | | | p | 141916 | 258451 | i | R | M | B | B | C | B |
| F | 1146 | *Sabanejewia aurata* | | | p | 86478 | 86478 | i | V | G | C | A | C | A |
| M | 1335 | *Spermophilus citellus* | | | p | 11 | 11 | colonies | R | G | C | C | C | B |
| R | 1219 | *Testudo graeca* | | | p | 136 | 136 | localities | C | G | B | A | C | A |
| R | 1217 | *Testudo hermanni* | | | p | 162 | 162 | localities | C | G | B | A | C | A |
| A | 1171 | *Triturus karelinii* | | | p | 24 | 24 | localities | C | G | B | A | C | A |

| Species | | | | | Population in the site | | | | | | Motivation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Code | Scientific name | S | NP | T | Size | | Unit | Cat. | D.qual. | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Min | Max | | | | Pop. | Con. | Iso. | Glo. |
| I | 1032 | *Unio crassus* | | | p | 49425850 | 49425850 | i | R | M | B | A | C | A |
| M | 1354 | *Ursus arctos* | | | p | 1 | 2 | i | | G | C | B | B | B |
| M | 2635 | *Vormela peregusna* | | | p | 2 | 2 | localities | R | M | C | B | C | A |

**Group:** The code of the corresponding species group (A = Amphibia, B = Birds, F = Fishes, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles).

**Sensitivity (S):** This field indicates whether disclosure of the information provided for a certain species could be detrimental to its conservation, for example because the species is subject to illegal collection and disclosure of the information on the form would actually increase the threat. In this case, a 'yes' is indicated in this field.

**Non-Present (NP) (optional):** In cases where a species for which a site was originally designated is no longer found in that site, it is strongly recommended that this is indicated by the symbol 'x'.

**Type (T):** Since many species of fauna, and in particular many bird species, are migratory, the site may be important for various aspects of the species' life cycle. These aspects are classified as follows:

o Permanent (p): the species occurs at the site throughout the year (non-migratory species or plant, resident population of a migratory species).

o Reproductive (r): the species uses the site to nest and rear its young

o Concentration (c): the species uses the site for roosting or stopping during migration or for changing plumage outside its breeding site and excluding overwintering.

o Overwintering (w): The species uses the site during winter

When a non-resident population is present on a site for more than one season, this population should be reported in the appropriate fields.

**Size:** As far as population levels are concerned, it is important to always indicate the known population data, to the extent that they are known. If the population size is known, both fields (min. (min) and max (max)) with the same value. Where it is more appropriate to give a population interval, the estimated values for the lower limit (min) and the higher limit (max) of this interval shall be filled in. When the population interval is not known, but information is available on either the minimum or maximum population size, the missing value for the interval shall be estimated.

When even a rough estimate of the population size cannot be made, the population type (e.g., permanent) is indicated and a value of DD (missing data) is noted in the 'data quality' field. In this case the fields for population size can be left blank and the field for population levels (species common (C), rare (R), very rare (V), or present (P)) can be used instead.

**Unit:** The unit of the population value shall be indicated in the corresponding field. Recommended units are individuals (= i) or pairs (= p) where possible, otherwise it is recommended to use the most precise units available according to the standard list of population units and codes.

**Category of population levels (Cat.):** This field should be completed when the data are incomplete (DD) and no estimate of population size can be given or to complete quantitative estimates of population size. The same applies as mentioned in the previous paragraph for size.

**Data quality (D.qual.):** Indicates the quality of the data using the following code: G = 'Good', M = 'Moderate', P = 'Inadequate', DD = 'Data Deficient'.

**Πληθυσμός (Pop.):** the size and density of the population of the species occurring in the locality in relation to the populations occurring in the national territory. For this criterion, an estimate of the % in orders of magnitude is used based on the following scaled model: A: 100%>=p>15%, B: 15%>=p>2%, C: 2%>=p>0%, D: Insignificant population

**Conservation status (Con.):** Degree of conservation of habitat features important for a particular species and potential for restoration. A: Excellent conservation, B: Good conservation, C: Moderate or limited conservation

**Isolation (Iso.):** The degree of isolation of the population occurring at the site in relation to the natural range of the species. A: (Almost) isolated population, B: Population not isolated but on the edge of the range, C: Population not isolated within the wider range

**Global (Glo.):** Overall assessment of the value of the site in terms of conservation of the species concerned. A: Excellent value, B: Good value, C: Adequate value

**Other categories:** Justification for the entry of each item shall be given on the basis of the following categories. A: National Red List species, B: Endemic species, C: Species covered by an international convention (including the Bern, Bonn and Biodiversity Conventions), D: Other reasons

## Recording of the main characteristics of all species of bats in the study area

The Agreement on the Conservation of European Bats (UNEP/EUROBATS), recognising the adverse effects that the installation and operation of wind farms often has on bats, commissioned, already in 2003, the relevant Working Group of the Advisory Committee to investigate the problem and prepare a guidance document. The Greek version of the updated guidelines, which can be applied to larger wind farms in urban and rural areas, onshore and offshore wind farms, is available on the Ministry of the Environment's website.
The study area, although within an IBA and therefore not assessed for fauna, is within the distribution range for 10 bat species listed in Annexes II & IV of Directive 92/43/EE, *Rhinolophus hipposideros, Rhinolophus ferrumequinum, Rhinolophus euryale, Rhinolophus blasii, Rhinolophus mehelyi* and *Myotis capaccinnii, Myotis emarginatus, Myotis myotis, Myotis blythii, Miniopterus schreibersii* as shown in the following distribution maps of the "National Action Plan for 10 species of Bats" (Georgiakakis 2021). Their conservation status based on the 4th National Report under Article 17 of Directive 92/43/EEC for the period 2013-2018 is Unknown for *Rhinolophus mehelyi*, Favourable (FV) for *Rhinolophus hipposideros* and Unsatisfactory-Inadequate (U1) for the remaining eight species, while *Rhinolophus mehelyi* belongs to the Red Book in the Vulnerable (VU) category both in Greece and internationally.

In addition, as the field survey area extends to the Natura 2000 "BG0001032" of neighbouring Bulgaria, which concerns habitat types and fauna, the species that may be affected by the project will also be examined. These are the bats *Barbastella barbastellus, Miniopterus schreibersii, Myotis bechsteinii, Myotis blythii, Myotis capaccinii, Myotis emarginatus, Myotis myotis, Rhinolophus blasii, Rhinolophus euryale, Rhinolophus ferrumequinum, Rhinolophus hipposideros* and *Rhinolophus mehelyi*. Of these species, only *Barbastella barbastellus, Myotis bechsteinii* and *Rhinolophus blasii* are Vulnerable (VU) and fall within the study area according to the European Union distribution maps (https://natura2000.eea.europa.eu/?data_id=dataSource_7-Layman_Sites_4270%3A745&page=Page-1&sitecode=BG0001032&views=Sites_View_Species) and their characteristics will be presented below.

***Myotis capaccinii*: LC (GR), VU (Internationally)**

*Myotis capaccinii* is a medium-sized bat with a wingspan of 23 to 26 cm and a weight of 7-10 grams. Its fur is grey with a brownish tinge on the back and a whiteish grey on the abdomen. It has characteristically large and strong feet. *Myotis capaccinii* is a medium-sized bat with a wingspan of 23 to 26 cm and a weight of 7-10 g. Its fur is grey with a brownish tint on the back and a whiteish grey on the abdomen.
Its maternity colonies consist of 30 - 600 individuals and are formed in caves and mines, and are often mixed with other species such as *Miniopterus schreibersii*, which adds great management value to its refugia. Births take place between May and June, and in eastern Greece may start as early as late April. It gives birth to a young and the young suckle until about the end of July. Mating takes place in the autumn. Most of the females (about 70%) mature reproductively in the first year, while the males mature from the second year.

*Myotis capaccinii* is not considered a long-distance migratory species, as its maximum seasonal movements are in the range of 100 to 150 km, and it uses caves and The Footed Myotis is not considered a long-distance migratory species, as its maximum seasonal movements are in the range of 100 to 150 km, while it uses caves and mines as resting stations. During the night it can move over distances of more than 20 km (in Greece it is more than 26 km) when moving from its shelters to foraging sites. In our country, the species appears particularly mobile as during the rotation of refuges during the summer season, they can be up to 39 km apart.
It feeds mainly on arthropods (mainly insects), such as diptera (of the family Chironomidae), moths and hymenoptera. It can also capture small fish from the surface of the water.

*M. capaccinii* prefers karstic areas rich in wetlands (slow-flowing rivers or large lakes) and shrublands, at altitudes up to 1200 m (in Greece it has been found up to 1120 m). The species occurs mainly in areas with Mediterranean and mild continental climates, rich in caves or mines.
Apart from underground shelters (caves and mines), where it usually forms colonies of tens or hundreds to thousands of individuals, the species can rarely be found in other types of shelters such as buildings, bridges and rock crevices. It often forms mixed colonies with other species, which adds great management value to its shelters.
It forages over calm water surfaces (river basins with significant riparian vegetation and near large lakes). It hunts by flying in large circles very close to the water surface (even at sea or in lagoons), and captures its prey. It can also, using ultrasound, sense vibrations on the water surface and capture prey by dipping its feet below the water surface. Its dependence on water makes it vulnerable to wetland pollution. Occasionally, it forages in forests and shrublands (Davy et al. 2007).
The total population size was estimated to be approximately 7,000 - 10,000 individuals with an unknown trend. The estimate of population size is considered to be a rough estimate as it was derived using a limited amount of data (EEA 2019). According to the Database for the Bats of Greece, nearly 3800 individuals have been counted in 20 refuges (Georgiakakis and Papamichael 2020), but the actual number is probably higher.

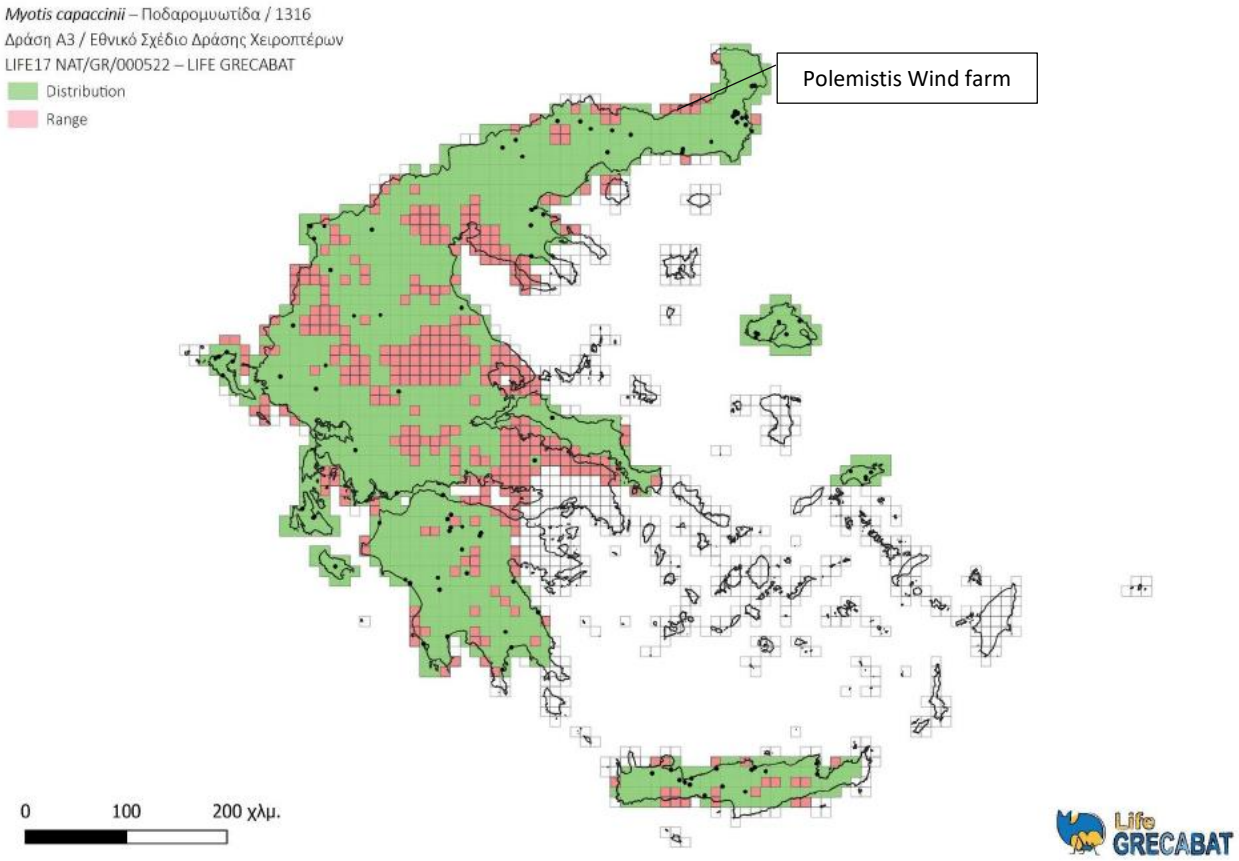



**Figure 2-1 Distribution and range map of *Myotis capaccinii*. Black dots indicate locations of confirmed presence.**

***Rhinolophus mehelyi*: VU (GR), VU (Internationally)**

*Rhinolophus mehelyi* is of medium size, slightly larger than *R. euryale* and smaller than *R. ferrumequinum*, with a wingspan of up to 34 cm and a weight ranging from 10 to 23 g (Wilson & Mittermeier 2019). The belly and facial fur are light (almost white), while on the back it is grey-brown. Most adults have dark hairs around the eyes, like a "mask", which is sometimes seen in other species of the genus.

Its maternal colonies rarely exceed 500 individuals. In autumn it forms dense aggregations of males and females in caves at close distances, where mating takes place. In both winter and summer, they often form dense aggregations with other species (R. *ferrumequinum, Miniopterus schreibersii*, which adds great management value to their shelters). Births occur from early June to mid-July. Females mature reproductively in their second or third year of life and give birth to single young, which begins to fly out of their shelter after about a month. Males reach reproductive maturity in their second year of life. The maximum recorded age is 12 years.

It is a mostly non-migratory species and the maximum recorded seasonal movements are 90 and 94 km in Portugal and Bulgaria respectively. Its diet consists mainly of moths (moths), and to a lesser extent of beetles, tooth beetles, diptera and other insects.
*R. mehelyi* prefers karstic areas of low or moderate altitude (up to 535 m in Greece) with caves, which it uses as shelters. It also forms colonies in mines and less frequently in buildings and cellars.
It forages in areas with low vegetation (arable land, steppe areas) and few trees, but also in oak forests and olive groves. It has a flexible flight that allows it to forage close to the ground. It occasionally hangs from branches of tall plants and scans the surrounding area for passing insects. The total population size was estimated at approximately 500 - 1,000 individuals with an unknown trend. The estimate of population size is considered to be rough as it was derived using a limited amount of data (EEA 2019). According to the Database for the Bats of Greece, nearly 1,300 individuals have been counted in 6 refuges (Georgiakakis and Papamichael 2020), but the actual number is undoubtedly higher.

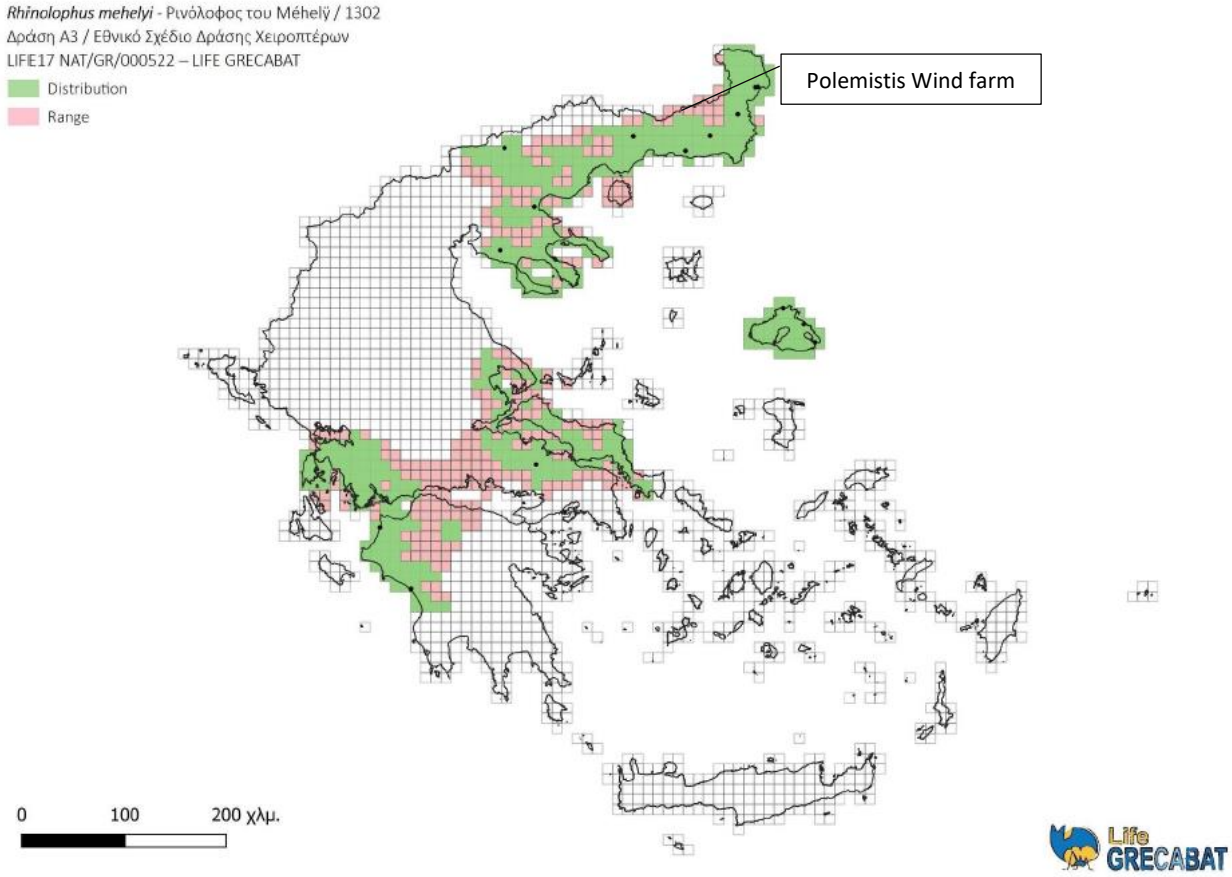
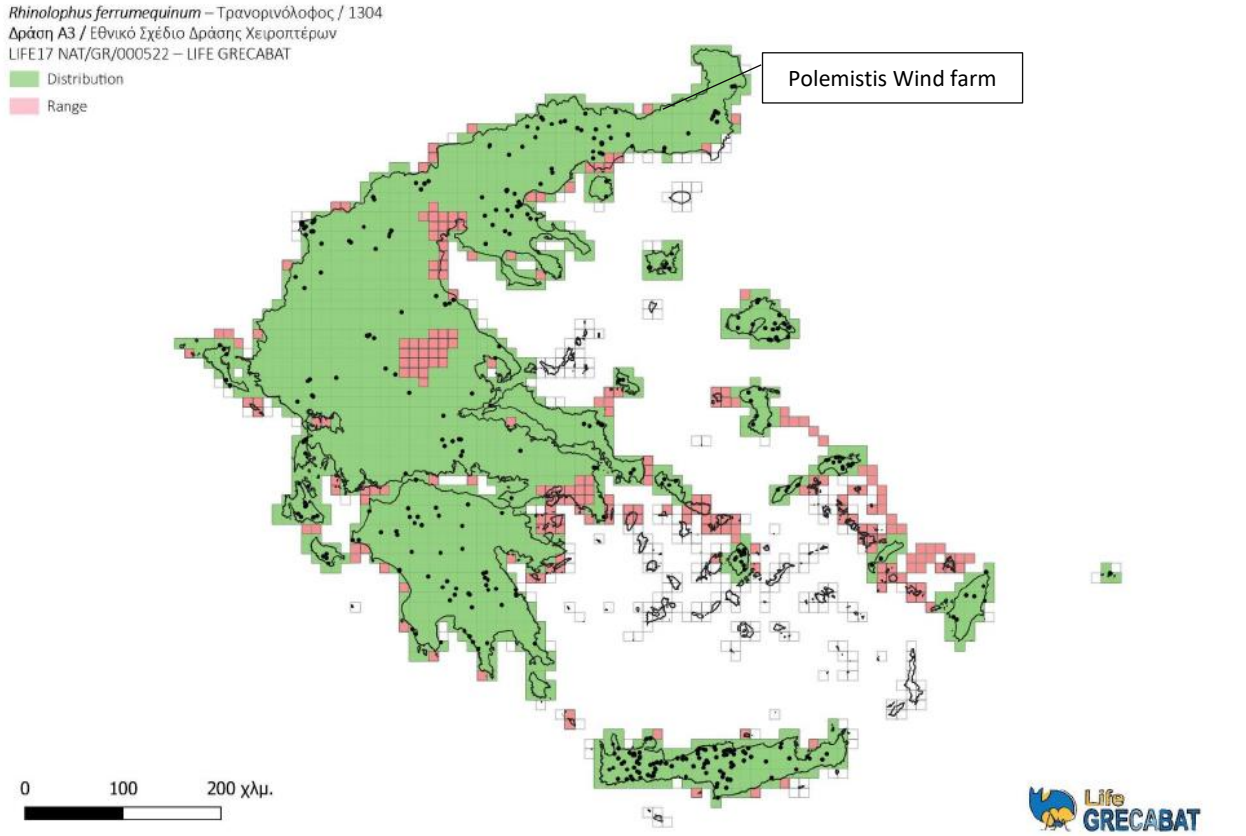



**Figure 2-2 Distribution and range map of *Rhinolophus mehelyi*. Black dots indicate locations where the species is known to occur.**

### *Rhinolophus ferrumequinum*

*Rhinolophus ferrumequinum* is a European species of bat found mainly in Europe, Africa, South Asia and Australia. It has a characteristic horseshoe-shaped nostril. It is the largest species of all other similar European bats and is thus easily distinguishable from them. This bat prefers to stay permanently in one area, travelling between 20 and 30 km to change roosts in winter and summer, with the longest movement recorded at 180 km. It feeds on beetles, moths and other insects of fields and forests. The species is known to be the longest-lived (among European bats) with some individuals living more than 30 years.



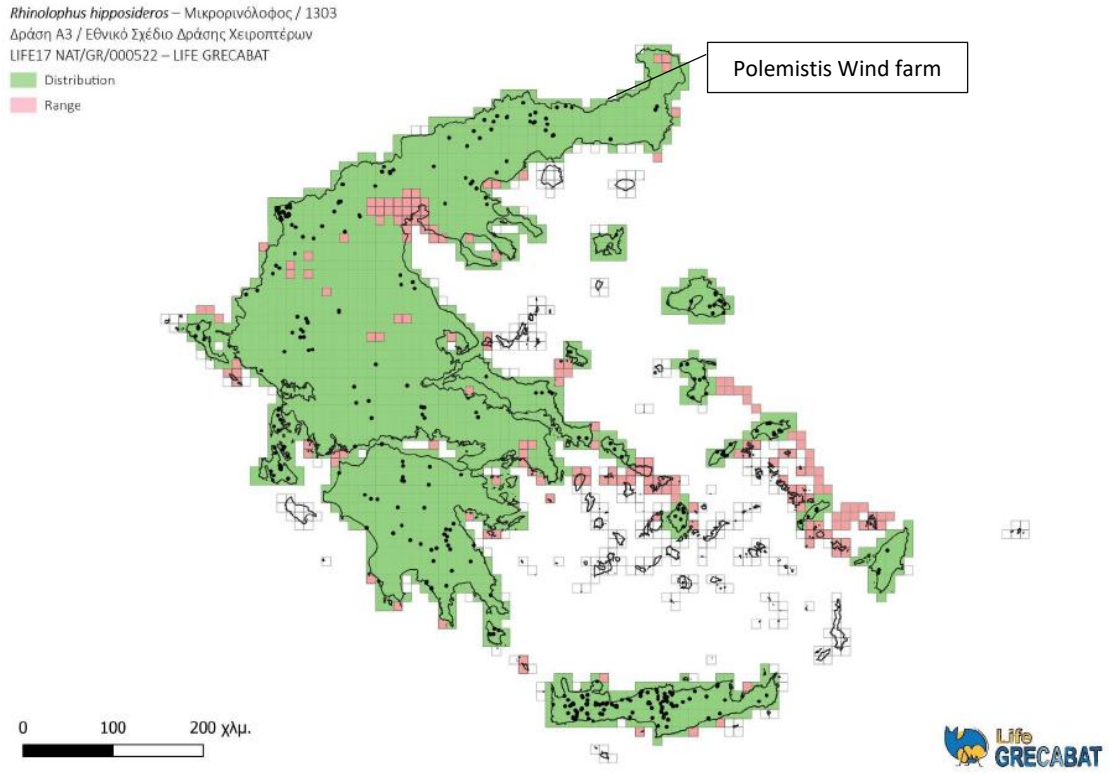

Εικόνα ΙΙ-2. Χάρτης εξάπλωσης (Distribution) και εύρους (Range) του είδους *Rhinolophus ferrumequinum*. Με μαύρες κουκίδες δείχνονται οι θέσεις επιβεβαιωμένης παρουσίας.

**Figure 2-3 Distribution and range map of *Rhinolophus ferrumequinum*. Black dots indicate locations where the species is known to occur.**

### *Rhinolophus hipposideros*

*Rhinolophus hipposideros* is one of the smallest bats in the world, weighing only 5-9 grams, with a wingspan of 192-254 mm and a body length of 35-45 mm. The species gets its name from its characteristic horseshoe-shaped nose. *Rhinolophus hipposideros* lives in caves located near small forests of holly or even toadstools.

It has strong legs that it uses to cling to rocks and branches, and can see well despite its small eyes. Like most bats, *Rhinolophus hipposideros* lives in colonies and hunts its prey by echolocation, i.e., emitting ultrasound from its mouth. *Rhinolophus hipposideros* do not move far from their roosting site, with the average distance between their summer and winter roosts being 5-10 km, although the longest distance recorded is 153 km.




Εικόνα ΙΙ-1. Χάρτης εξάπλωσης (Distribution) και εύρους (Range) του είδους *Rhinolophus hipposideros*. Με μαύρες κουκίδες δείχνονται οι θέσεις επιβεβαιωμένης παρουσίας.

**Figure 2-4 Distribution and range map of *Rhinolophus hipposideros*. Black dots indicate locations where the species is known to occur.**

### *Rhinolophus euryale: VU (EU)*

*R. euryale* is distributed in all countries and some Mediterranean islands (Corsica, Sardinia, Sardinia, Sicily, Rhodes, possibly also Cyprus), except Libya and Egypt. It is present in all Balkan countries and an isolated population is found in southern Slovakia and northern Hungary. It is also found in SW Asia in a zone between the Caucasus and the Persian Gulf and on the Iranian border with Turkmenistan.

In Greece, *R. euryale* has been found in almost all of the mainland and on 12 islands (including the Peloponnese and Euboea, Figure II-3), but is absent from the Cyclades and Crete. Its distribution in our country is probably wider. Most of the known sites of the species are in Macedonia and Thrace, but the seven largest colonies (200-500 individuals) are scattered throughout its range: Eastern Macedonia and Thrace, Western Macedonia, Central Greece, Central Greece, Peloponnese, North Aegean and Ionian Islands. The highest abundance of the species has been observed in these regions.

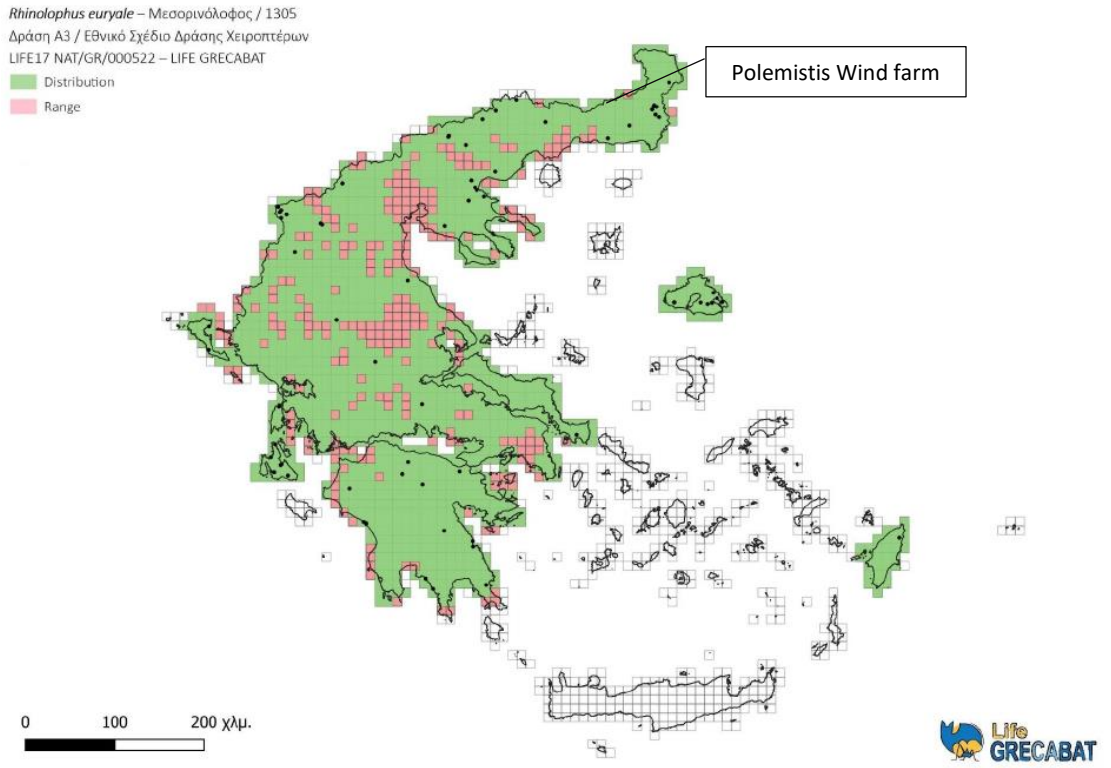
Populations of *R. euryale* usually consist of large central summer and winter colonies surrounded by smaller satellite colonies. Central colonies may consist of a few thousand individuals, although usually no more than 1000, while satellite colonies may consist of a few tens to hundreds of individuals (Dietz and Kiefer, 2016). Both summer and winter refugia are caves and mines (outside of limestone areas). In the northern part of its distribution, however, it forms maternity colonies mainly in buildings, as caves in these areas are very cold. They usually form dense aggregations with other Rhinolophus species, and also with species of the genera *Myotis* and *Miniopterus*, which adds great management value to its refugia.

It prefers karstic areas of low to moderate altitude (usually below 1000 m) with caves, which it uses as refuges. It is a mainly non-migratory species and the distances between summer and winter refuges are usually less than 50 km.

Its foraging sites are located in forested areas, mainly broadleaf forests, riparian forests, Mediterranean shrubs and tree plantations (olive groves etc.), but it avoids coniferous forests and open areas. The known distances between its shelters and foraging sites range from 1,5 to 24 km.

*R. euryale* hunts its food at the edge of forests or above trees, but its highly agile flight allows it to hunt among dense vegetation. It consumes its food in flight, although it occasionally hangs from perches and scans its surroundings for passing insects. It feeds mainly on small moths, but also on diptera (family Tipulidae) and small beetles.

Females are reproductively mature usually after their second year of age and give birth to a young after mid-June or July, which becomes independent after about 4 weeks. Young females have their first litter at the age of 2-3 years. The maximum recorded age is 13 years.




Εικόνα II-3. Χάρτης εξάπλωσης (Distribution) και εύρους (Range) του είδους *Rhinolophus euryale*. Με μαύρες κουκίδες δείχνονται οι θέσεις επιβεβαιωμένης παρουσίας.

**Figure 2-5 Distribution and range map of *Rhinolophus euryale*. Black dots indicate locations where the species is known to occur.**

***Myotis emarginatus***

It is distributed throughout the Mediterranean region, including several islands. Its distribution lies in the north as far as Belgium, South Holland and South Poland. In Germany it occurs only in climatically warmer areas (e.g., Rhine valley), and there is a notable gap in the distribution of the species between Luxembourg and Poland. It is also present along the Balkan Peninsula, parts of Ukraine and the Southern Caucasus. In addition, it is found in NW Africa and Asia Minor. In the Near East, the Arabian Peninsula and Central Asia as far as Afghanistan.

In Greece it is a common species, as it has been reported in several locations throughout the mainland, as well as in Crete, Euboea, Peloponnese and 15 islands of the Aegean and Ionian Seas. Most known locations and several important colonies are found in Eastern Macedonia and Thrace, Crete and the Peloponnese, but the greatest abundance has been recorded in central Macedonia, as one of the world's largest colonies is hosted near Sidirokastro.

In the southern part of its distribution, including Greece, the Pyrrhomyotis forms colonies mainly in caves and mines throughout the year, less frequently in buildings and rock shelters. It occurs from sea level to 1800 m altitude, but in Greece so far it has been found up to 1380 m.

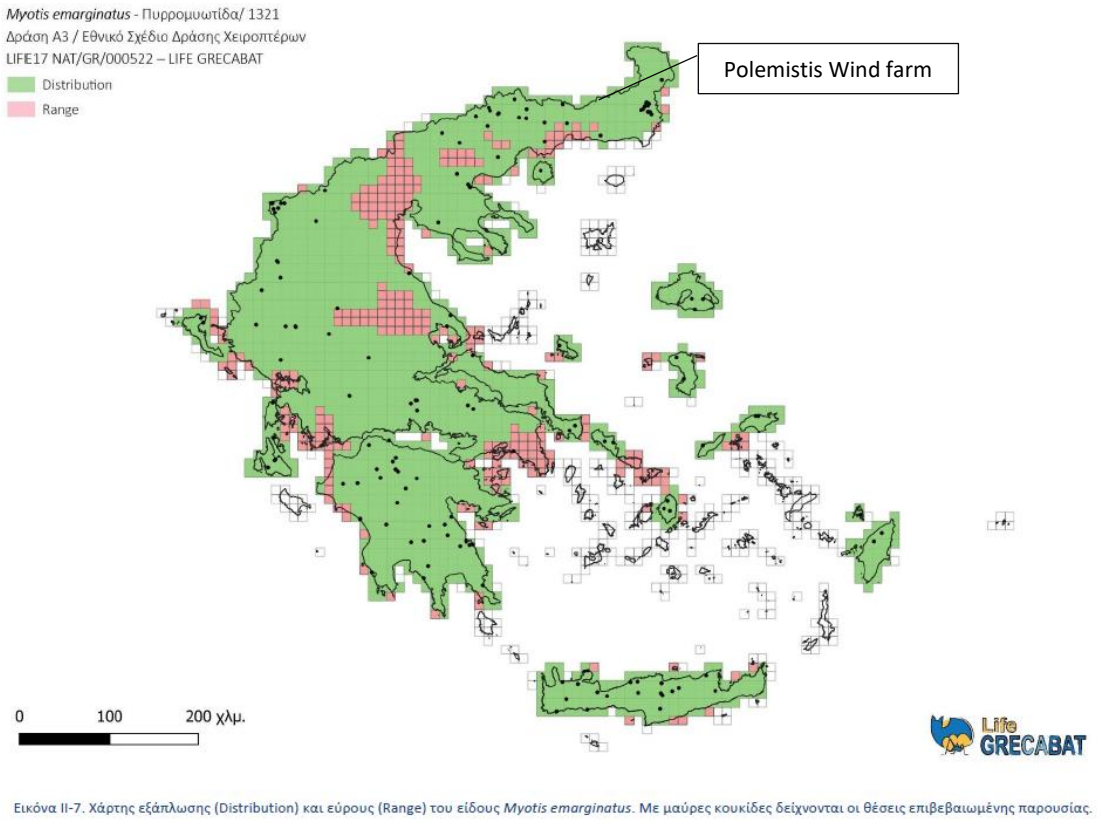
It is usually found in broad-leaved forests with a clear preference for deciduous trees and shrubs. It prefers landscapes with a variety of habitats, as well as riparian forests and ecosystems with low vegetation. It prefers sloping sites rather than open areas used by other species. In eastern and northern Europe, it is often observed feeding in anthropogenic habitats such as cattle and sheep pens, orchards, parks and gardens. It appears to avoid coniferous forests or uses them little in relation to their availability. It usually moves along forested ledges and watercourses.

*Myotis emarginatus* captures most of its prey by aerial gliding over surfaces. It hunts near vegetation, but also within the canopy, collecting insects above leaves. It may also search for prey near the ground. It typically forages in lush scrub and grasslands, and also around livestock facilities, where it finds abundant flies around the droppings of livestock. It is dependent on the presence of unevenly structured forests, woodland grasslands and traditional orchards.

Maternity colonies consist of dense aggregations of mainly adult females and juveniles, sometimes or in mixture with other species (genera *Rhinolophus*, *Myotis*, and *Miniopterus*), which adds great management value to its refugia. Breeding colonies use a network of adjacent refugia and often number 20 to 500 females, sometimes up to several thousand, and include some adult males. She gives birth to one young, rarely two, from late May to mid-July. The lactation period lasts 25-35 days. A few females mate from the first autumn, with the majority of them mating in the following year. Maternal colonies are often abandoned in August. The maximum recorded age is 18 years.

*Myotis emarginatus* is considered an non-migratory species, as the longest recorded seasonal movement distance is only 105 km. Since few wintering sites are known, the species is likely to move over longer distances. In some areas the species disappears during the winter and is not found again until spring. In search of food, the species moves up to 12.5 km from its foraging grounds. The foraging grounds are 50-70 ha in size, within which there are up to 6 central foraging grounds, which it visits every night.

The diet of *Myotis emarginatus* consists mainly of spiders and opiliones, secondarily of diptera, lepidoptera and neuroptera, and to a lesser extent of coleoptera and hymenoptera. Flies of the genus *Musca* constitute the major proportion of the residues in the faeces of individuals feeding in barns.




Εικόνα ΙΙ-7. Χάρτης εξάπλωσης (Distribution) και εύρους (Range) του είδους *Myotis emarginatus*. Με μαύρες κουκίδες δείχνονται οι θέσεις επιβεβαιωμένης παρουσίας.

**Figure 2-6 Distribution and range map of *Myotis emarginatus*. Black dots indicate locations where the species is known to occur.**

### *Myotis myotis*

It is found throughout Europe, as far north as Poland and Ukraine, with a few records in the southern end of Great Britain and Sweden. Eastwards it is found as far east as Turkey and the Middle East.

In Greece, *Myotis myotis* has been reported in several continental areas of all geographical regions, Euboea and the Peloponnese, and some large islands of the Ionian Sea (Corfu and Lefkada) and the northern Aegean Sea (Lesvos and Lemnos) but is absent from Crete. Its actual distribution in our country is rather poorly known, due to its very close affinity and similarity to M. blythii. Most of the known locations, the most important colonies (100-1500 individuals) and therefore the highest abundance have been recorded in Eastern Macedonia and Thrace, Central Macedonia and Central Greece.

*Myotis myotis* occurs in a variety of habitats from deciduous forests (mainly open forests and forest margins) to semi-open and open grasslands and pastures, agricultural land, orchards and olive groves, from sea level to 2000 m altitude. In Greece it has been found up to 1950 m, but only four sites are above 1400 m. The species is usually associated with habitats with large gaps and little ground cover, because it hunts its prey on the ground and needs space for its manoeuvres. Although in smaller numbers, it also occurs in high altitude grasslands and pastures.

In Greece, as in other Mediterranean countries, colonies of the species are found in caves and mines throughout the year. In Central Europe, breeding colonies are mainly formed in buildings and occasionally in cellars or bridges. In summer the males are usually solitary in

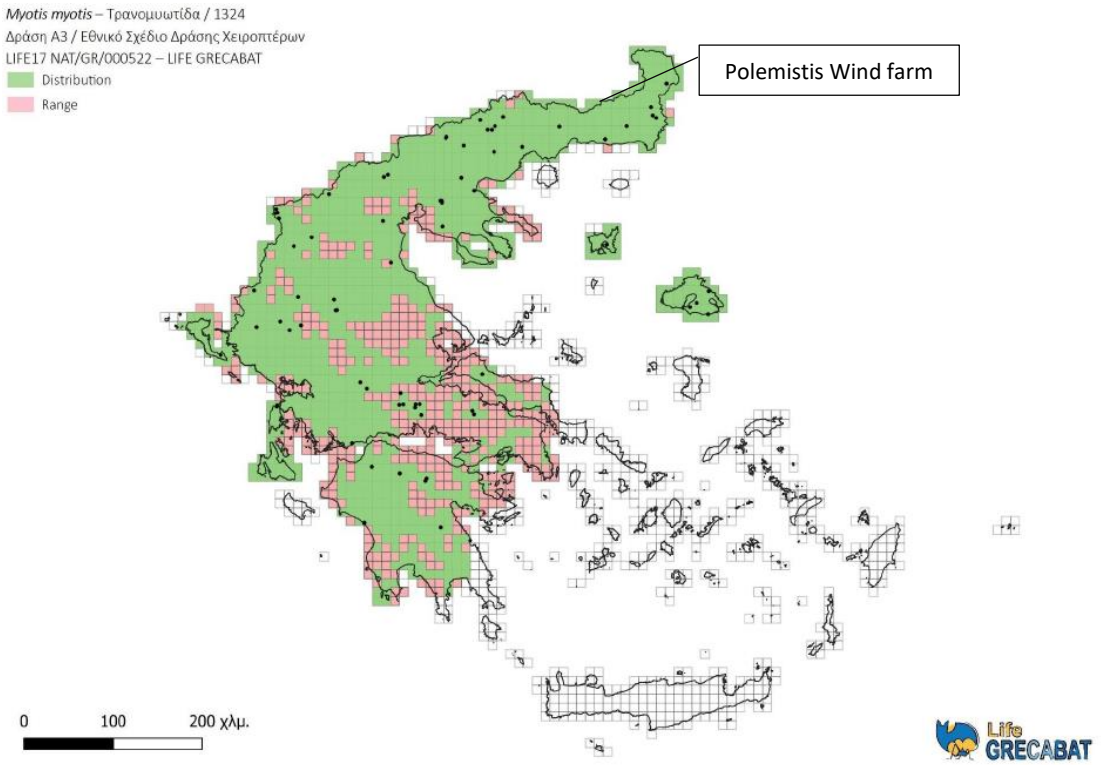
various types of shelters. In winter they take refuge in caves and mines, as well as in rock crevices.

When searching for prey, the species flies very slowly, at a height of 30-70 cm above the ground surface, in order to increase the chances of finding its prey. In addition to echolocation, prey detection is based on hearing and smell. When it detects prey by sound (rustling of insect wings, movement), it pounces, covering the prey first with its wings and then capturing it with its mouth. It consumes the small prey in flight while for the consumption of larger insects it hangs.

*M. myotis* forms, in underground shelters, large maternal colonies of 50-1000 females or more. Maternity colonies usually form in late March and last until August. They usually consist of adult females and their young, plus a few adult males. These males are not the most successful from a reproductive standpoint because the females prefer to mate with males outside the colony, which they expect in small aggregations and colonies in nearby locations. In Greece, it shares its refugia with other species (genera *Rhinolophus, Myotis* and *Miniopterus*), which adds great management value to its refugia. It gives birth in May to June (April in some Mediterranean countries) to young that becomes independent after 5 to 8 weeks. Colonies disperse in mid to late August, when they begin to mate. Most females mature reproductively during their first and second year of life. Usually males attract females by "singing" from their shelters, where they form harems of up to 5 females. Maximum recorded age to date is 25 years.

*M. myotis* is not clearly a migratory species, although movements of up to 436 km have been recorded. Movements between summer and winter refuges are in the order of 50-100 km. During the night they travel 5 to 26 km to reach foraging grounds.

It usually feeds on large (> 1 cm) species of terrestrial arthropods, mainly beetles of the family Carabidae, and other arthropods such as spiders and beetle larvae. Seasonally or only sporadically it feeds on beetles of other families, onion-eaters, diptera of the family Tipulidae and orthopterans. In the Mediterranean region spiders may form a high proportion of its prey.




Εικόνα II-8. Χάρτης εξάπλωσης (Distribution) και εύρους (Range) του είδους *Myotis myotis*. Με μαύρες κουκίδες δείχνονται οι θέσεις επιβεβαιωμένης παρουσίας.

**Figure 2-7 Distribution and range map of *Myotis myotis*. Black dots indicate locations where the species is known to occur.**

### *Myotis blythii*

Its distribution includes south-central and southern Europe (including Sicily, Cyprus, Crete and other smaller islands in the Mediterranean), south-west Asia from Asia Minor to the Caucasus region, Palestine and North Jordan to Kashmir, the Altai Mountains, Nepal, North India and North and Central China.

In Greece it has been found in a large number of locations throughout the mainland, Euboea, Peloponnese, Crete and 14 other islands of the northern and southern Aegean and Ionian seas. The most known locations of the species are in Crete (51), Eastern Macedonia and Thrace (24) and the Peloponnese (22). The highest abundance has been recorded in Western Greece, Crete and the Peloponnese, while several large colonies (more than 250 individuals) have been recorded in the rest of the country, except in Western Macedonia, Epirus, the Ionian Islands and Attica.

It is usually found in shrub and grassland habitats, steppes, pastures, karstic fields and agricultural land from sea level to 2000 m altitude (1700 m in Greece). It largely avoids large, enclosed wooded areas, which are dominated by *M. myotis*. In Greece, as in other Mediterranean countries, the species forms colonies almost exclusively in underground shelters (caves, mines, etc.). In Crete in winter, it is found only in mountain caves (above 1000 m), where it hibernates. Its winter shelters in the rest of Greece are largely unknown. In the northern part of its range, it forms mother colonies in attics.

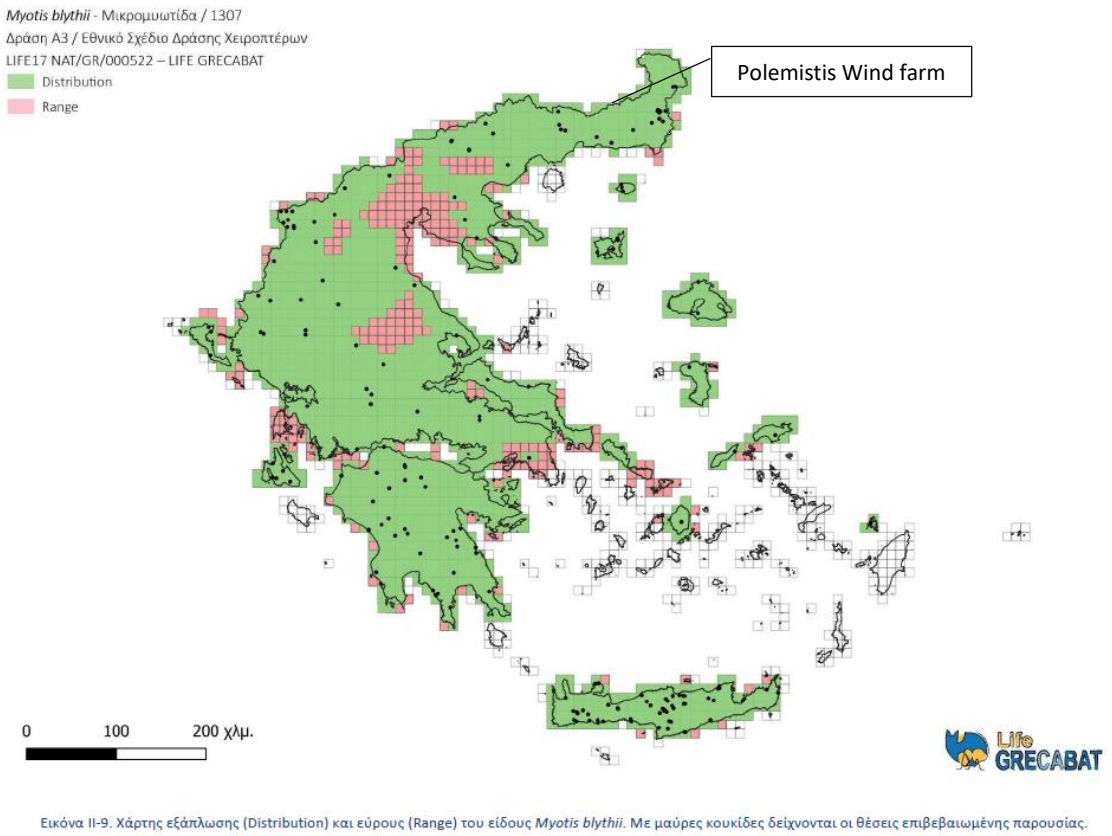
*Myotis blythii* may capture its prey either in flight or directly from the ground, depending on insect availability and vegetation. It flies slowly, at a height of 1-2 m above the ground, scanning the surface for potential prey. If a prey is spotted, it briefly hovers over and pounces

on it with outstretched wings. It generally chooses open areas for foraging and may also hunt in tall grass pastures rich in orthopterans. It also chooses forest margins for foraging where insect availability tends to be higher than in more homogeneous habitats.

Mother colonies can be hundreds or thousands of individuals in size and consist mainly of adult females and their young. Males are scarce in breeding colonies, as they are mainly found in other refuges, singly or in small aggregations close to the parent colony. In Greece, breeding colonies in caves are usually mixed with other species (genera *Rhinolophus*, *Myotis* and *Miniopterus*) and number up to hundreds or a few thousand females, which adds great management value to its refuges. Females give birth between May and mid-June from a young. Juveniles begin to fly at 5-6 weeks of age. Colonies disperse in August, when mating begins. The maximum age recorded to date is 33 years.

*Myotis blythii* is considered an non-migratory or occasional migratory species and its seasonal movements are usually limited to a few tens to 150 km. The longest recorded movement for the species is 488 km in a straight line, indicating that at least occasionally the species may at least make longer movements. Its summer and winter refuges are usually 15 km apart. The average recorded distance between shelters and foraging grounds is 4-7 km, with longer distances for some foraging grounds reaching 9-25 km.

It feeds on relatively large arthropods, with a preference for orthopterans (mainly crickets, grasshoppers and onion-eaters) and terrestrial coleopterans. However, when food availability is low*, M. blythii* can also prey on other species which suggests that its hunting strategy is quite flexible. Given the wide geographical distribution of the species, its diet is also quite broad and, in addition to orthopterans and coleopterans, includes lepidopteran larvas, mantises (especially in the Mediterranean), dipterans of the family Tipulidae, hymenopterans and spiders, indicating that the species is opportunistic.




Εικόνα ΙΙ-9. Χάρτης εξάπλωσης (Distribution) και εύρους (Range) του είδους *Myotis blythii*. Με μαύρες κουκίδες δείχνονται οι θέσεις επιβεβαιωμένης παρουσίας.

**Figure 2-8 Distribution and range map of *Myotis blythii*. Black dots indicate locations where the species is known to occur.**

***Miniopterus schreibersii*: VU (EU)**

*M. schreibersii* distribution includes southern Europe from the Iberian Peninsula east to northern and western Anatolia (Turkey) and western Georgia, north to central France, Slovakia and Romania and south to Morocco, northern Algeria, Tunisia, northwestern and northeastern Libya, Syria, Lebanon, Israel and possibly Jordan, as well as most Mediterranean islands. Historical reports or occasional records exist for SW Germany, Switzerland and the Czech Republic.

In Greece, *M. schreibersii* is quite common, as it has been found in numerous locations in all geographical regions of Greece. Apart from Evia and the Peloponnese, it has been found on 13 other islands, in the Ionian, North and South Aegean and the Cretan Sea. It may have been recorded on Naxos and it is possible that it is present on other islands of the Cyclades. It has been recorded in very many places in Crete (53), the Peloponnese (47) and western Greece (38), while it seems to be relatively rare in the Cyclades, Attica and Epirus. Its greatest abundance has been recorded in western Greece, eastern Macedonia and Thrace, and the Ionian Islands, where its most important colonies are located. Very important colonies (more than 2000 individuals) are also found in Crete, Western Macedonia and Thessaly.

It is found in a wide range of habitats, from semi-arid steppes (in the south of its range), wet deciduous forest areas (in the north of its range) and Mediterranean scrub and woodland, generally at altitudes up to 1400 m. It forms colonies mainly in karst caves, which it occupies all year round, as well as in mines and other underground sites. Small aggregations or single individuals of the species can be found in numerous other locations, such as bridges, building

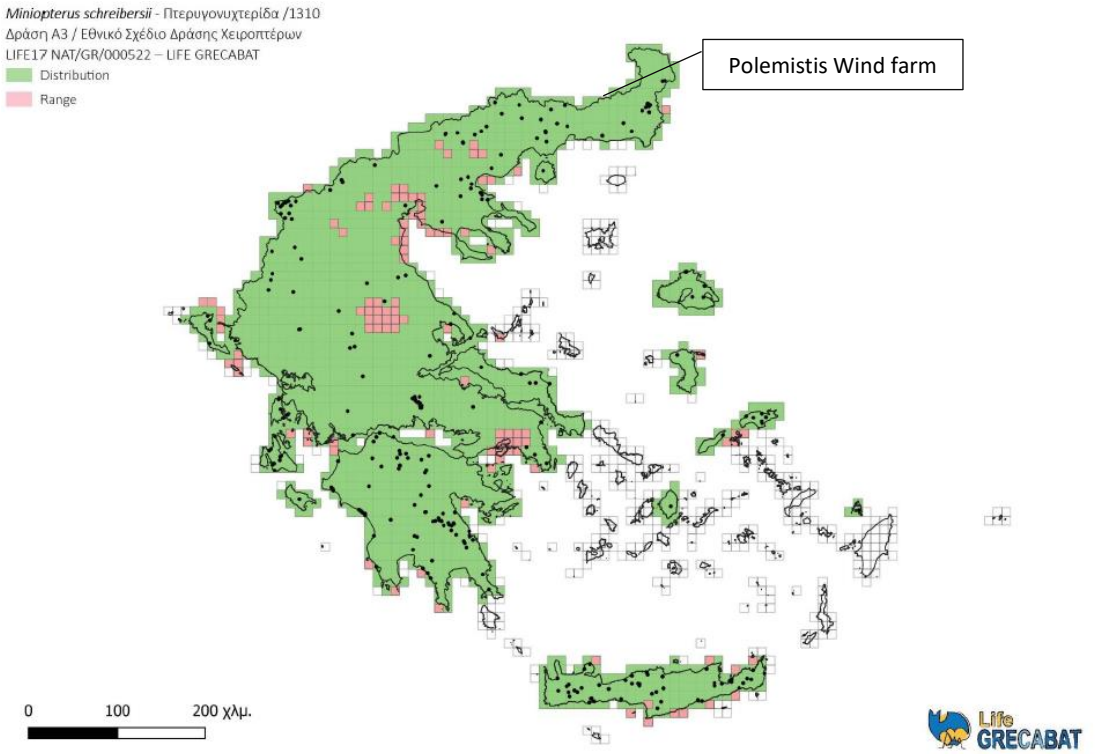
attics and elsewhere. At the northern end of its range individual maternity colonies are formed on the roofs of buildings.

*M. schreibersii* preys mainly on moths in open areas, but it has particular flexibility in flight which allows it to forage in forest edges, gaps, under the forest canopy and close to vegetation. It also hunts over water bodies, but also around street lights, in orchards and parks. In contrast, dense pine forests and closed uniform deciduous or mixed forests are avoided. Its long wings allow it to fly fast (up to 55Km/h), but when needed, it maneuvers sharply with the help of its broad tail membrane. The species uses linear features of the landscape, such as forest boundaries, hedgerows and riparian forests, to move around.

*M. schreibersii* mates in September and early October and fertilization occurs immediately (not in the spring, as in most bats), but implantation of the zygote takes place after hibernation. It gives birth to one young, in June or July. The young begin to fly at 40 days and are fully developed at 60-70 days. Females mature reproductively at one year of age and give birth to their first young at two years of age. Some colonies (both breeding and wintering) of the species number in the tens of thousands, but often the colonies are much smaller. The maximum recorded age is 16 years.

The species migrates seasonally between its winter and summer refuges. These are on average 40 to 100 km away, with maximum recorded movements of 422, 525 and 833 km in France and Spain. Foraging grounds are located up to 40 km from its refuges (usually 15 to 20 km). During the night individuals of the species visit one to nine individual foraging areas.

The diet of the species consists mainly of Lepidoptera (over 70%) and secondarily of Neuroptera and Diptera. It also feeds to a lesser extent on Trichoptera and Coleoptera.




Εικόνα ΙΙ-10. Χάρτης εξάπλωσης (Distribution) και εύρους (Range) του είδους *Miniopterus schreibersii*. Με μαύρες κουκίδες δείχνονται οι θέσεις επιβεβαιωμένης παρουσίας.

**Figure 2-9 Distribution and range map of *Myotis schreibersii*. Black dots indicate locations where the species is known to occur.**

***Barbastella barbastellus*: VU (IUCN - EU)**

*Barbastella barbastellus* is found from Portugal to Azerbaijan and from Sweden to the Canary Islands, where a subspecies was found. It has a short nose, small eyes and wide ears.

*Barbastella barbastellus* roost in crevices or behind loose tree bark all year round, generally in mature deciduous forests, as well as in crevices in rocks and inside human buildings. They migrate to underground roosting sites during the winter, although they may remain in tree roosts at the beginning of the breeding season. Winter roosting sites include natural caves and human structures such as basements, mines and warehouses. They are relatively hardy to cold conditions and usually hibernate in cold locations and exposed sites.

They feed mainly on moths, as well as flies and moths. The diet of *Barbastella barbastellus* appears to be one of the most restricted among European bats. This specificity in foraging habits probably indicates a higher vulnerability of this species to negative changes in moth population abundance. This could explain its current rarity throughout its range.

Below is a map showing the distribution range of the species in the study area based on data from the European Union website (https://natura2000.eea.europa.eu/?sitecode=BG0001032&views=Sites_View).

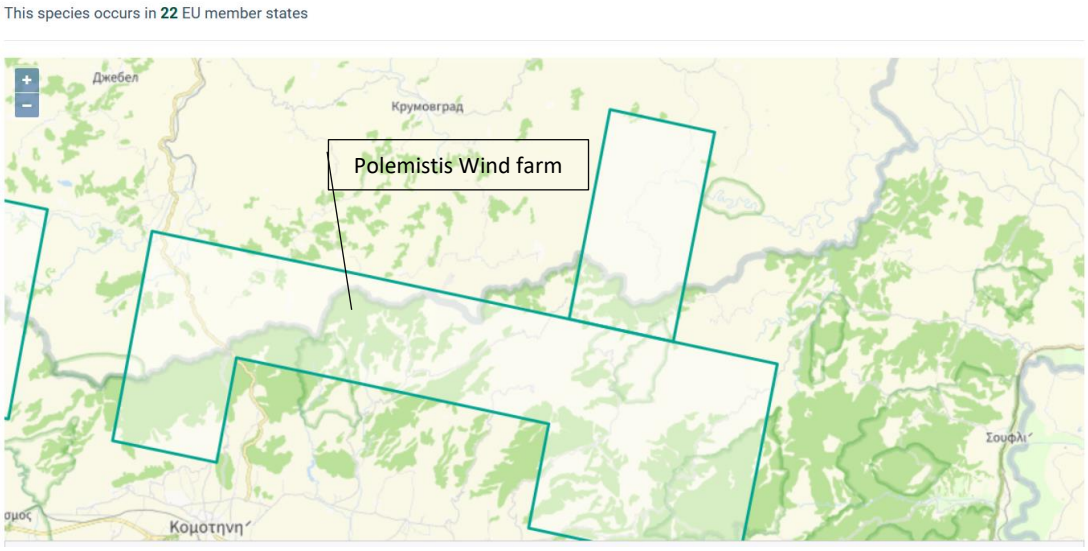



**Figure 2-10 Distribution and range map of *Barbastella barbastellus*.**

***Myotis bechsteinii*: VU (IUCN - EU)**

*Myotis bechsteinii* is a species of bat found in Europe and western Asia, living in extensive woodlands.

It feeds mainly on flying prey such as moths, diptera, neuroptera and other small nocturnal insects. Populations that have been cut off from forested areas turn to a diet of terrestrial insects and spiders that they catch from the ground. They usually forage within a mile or two of their roost and hunt mainly in the forest.

They use holes in trees, usually woodpecker holes, for roosting. They have also been recorded using artificial nest boxes, but rarely take up residence in human buildings. During winter, it hibernates in underground places and tree holes. Mating takes place in autumn and spring, and late fertilisation means that young (one per female) are born early the following summer. Maternal colonies usually form in late spring.

*Myotis bechsteinii* is specialised to inhabit woodland areas and is rarely found outside them. It is recorded in mixed forests in southwest Asia, but European populations prefer deciduous forests with high proportions of old trees. Beech and oak woodlands form a large part of the animal's habitat. They are also occasionally found in orchards, gardens and other cultivated areas.

Below is a map showing the distribution range of the species in the study area based on data from the European Union website (https://natura2000.eea.europa.eu/?sitecode=BG0001032&views=Sites_View).

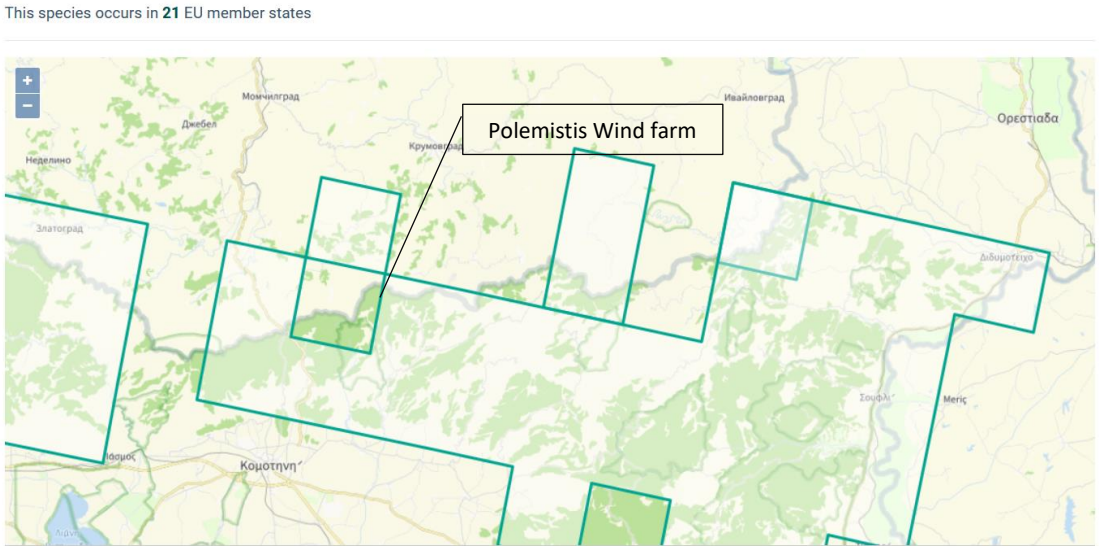



**Figure2-11 Distribution and range map of *Myotis bechsteinii*.**

***Rhinolophus blasii*: VU (IUCN - EU)**

*R. blasii* is a species with a broad but fragmented distribution. It occurs in the Balkans and the eastern Mediterranean (including several islands), Armenia, Azerbaijan, West Iran, SE Arabian Peninsula, Iran, Afghanistan and Pakistan, eastern sub-Saharan and NW Africa.

It has recently disappeared from Italy and Slovenia. In Greece, the *Blasius rhinolophus* is a fairly common species and is found throughout the mainland, and so far, it has been found on 22 islands of the Ionian and Aegean Seas, as well as in Evia, the Peloponnese and Crete. Most of its presence has been recorded in Crete (60) and Eastern Macedonia and Thrace (23). In these regions it has been recorded in comparatively high abundance, but Thessaly is the leader, as several hundreds of individuals have been recorded in the Melissotrypa cave. The next smallest colonies (a few hundred individuals) have been found in Eastern Macedonia and Thrace, Western Macedonia, Central Greece and Crete.

Little is known about the breeding habits of *R. blasii*, but mating takes place in autumn within the shelters. In Crete, juveniles fly as early as the beginning of June, probably when the climate of the previous spring is favourable, while in southern Bulgaria, births take place in late June. Females mature reproductively after their second year of age and give birth to a single young.

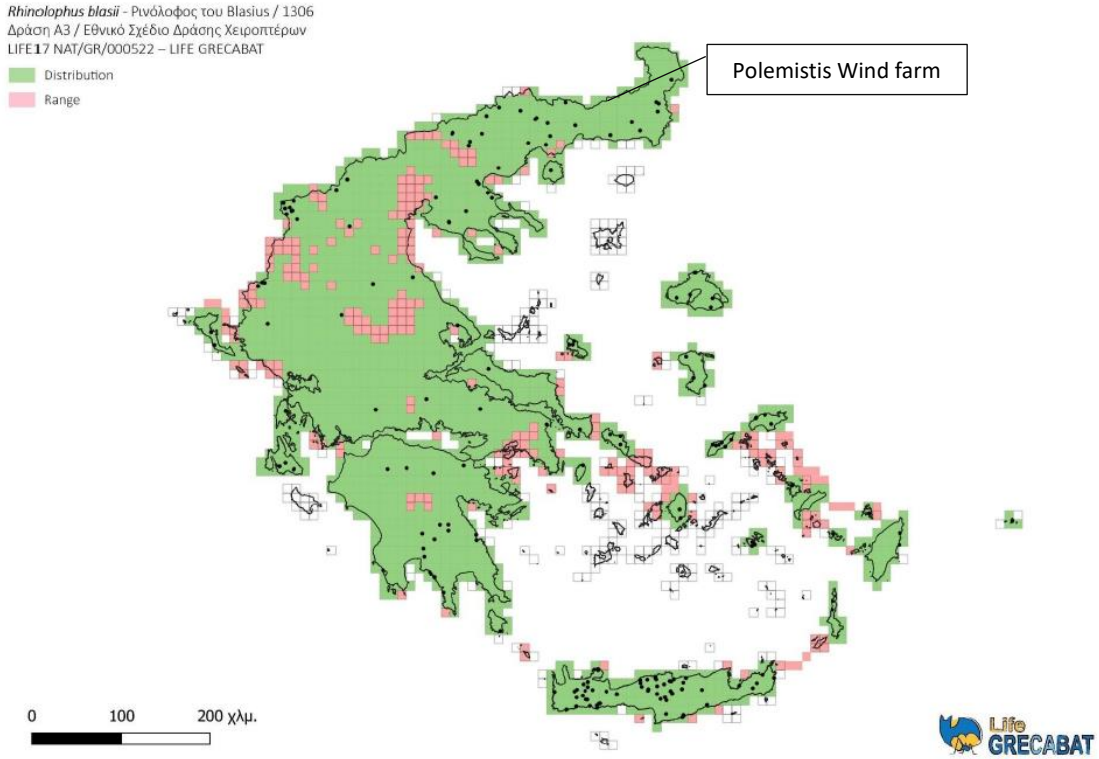
It is a non-migratory species, with its summer and winter refuges being located at relatively close distances. Its foraging sites are located within a few kilometres of its refuges. In the area of the Bulgarian and Greek Rhodopes, the species feeds almost exclusively on moths, while studies in other areas of its range have found that it also feeds on diptera, trichoptera, hemiptera, neuroptera, etc.

*R. blasii* prefers karstic areas of low and moderate altitude (rarely above 1000 m in Greece) with low vegetation and sparse trees. It usually forms colonies, with dense aggregations of a few hundred individuals, in karst caves and mines. It often shares its refugia with other species of the genera *Rhinolophus*, *Myotis* and *Miniopterus*, which gives its refugia great management value. It inhabits caves with mild temperatures (13.8 - 17 degrees Celsius).

It is a typical species of the Mediterranean landscape with a small-scale mosaic of open habitats and shrublands. It usually hunts in scrub, oak woodland and along ecotones in fragmented landscapes. It hunts exclusively in flight and systematically searches for insects. It can and does move very flexibly and captures its food close to vegetation or ground. It is a species that is quite dependent on the presence of water and is associated with water surfaces.

The Conservation Status *of R. blasii*, based on the 4th National Report under Article 17 of Directive 92/43/EEC for the period 2013-2018, was assessed as Unfavourable - Inadequate (U1) and the overall trend of the Conservation Status as Unknown (Unk) (EEA 2019). The total population size was estimated to be approximately 2100 - 5000 individuals with an unknown trend. The population size estimate is considered to be rough, as it was derived using a limited amount of data (EEA 2019). According to the Database for the Bats of Greece, nearly 6300

individuals have been counted in 36 refuges (Georgiakakis and Papamichael 2020), but the actual number is undoubtedly higher.




Εικόνα II-5. Χάρτης εξάπλωσης (Distribution) και εύρους (Range) του είδους *Rhinolophus blasii*. Με μαύρες κουκίδες δείχνονται οι θέσεις επιβεβαιωμένης παρουσίας.

**Figure 2-12 Distribution and range map of *Rhinolophus blasii*. Black dots indicate locations where the species is known to occur.**

Below is a map showing the distribution range of the species in the study area based on data from the European Union website (https://natura2000.eea.europa.eu/?sitecode=BG0001032&views=Sites_View).

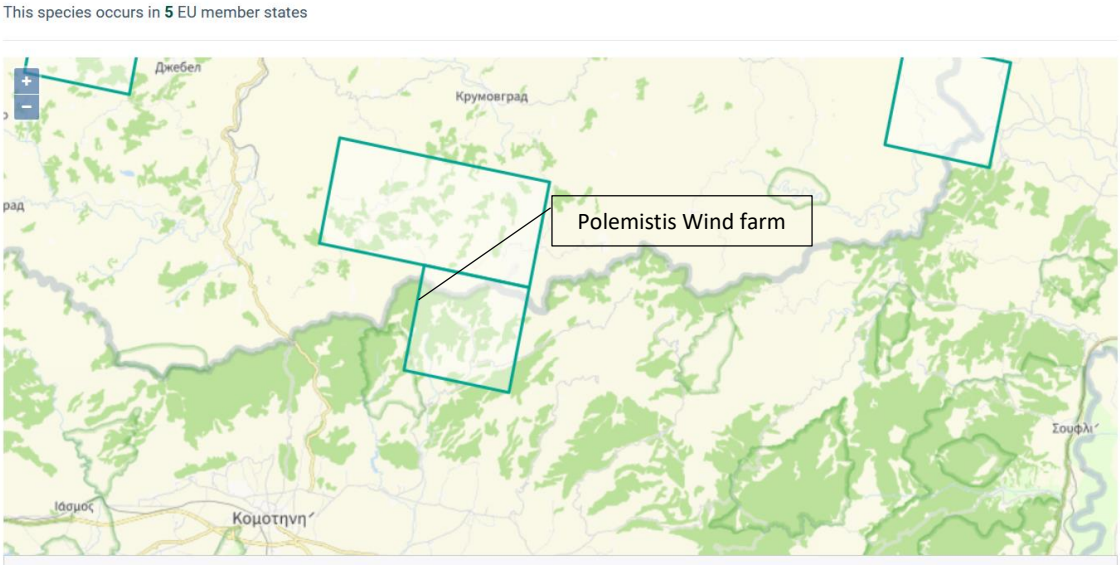



**Figure 2-13 Distribution and range map of *Rhinolophus blasii*.**

## Methodology of the bat survey in the Field Investigation Area (FIA)

The field investigation area (FIA) within which the survey of protected bird species of the GR008 IBA was conducted, is the buffer zone of 500m around the wind turbines and 250m on either side of the linear elements of the project (roads and electricity network). In addition, the protected species of the Bulgarian EEZ BG0001032 "Rodopi - Iztochni" that may be affected by the project i.e., the bats, were also surveyed. The FIA depicted in the figure below constitutes 0.72% of the area of GR008. The field survey carried out covered an area of 5,857 $km^2$. A small part (10,52 % - 0,4$m^2$) of the FIA extends within the Natura 2000 'BG0001032'.

The bat survey was carried out on 25-26 October 2023 under conditions of mild temperature 18-22 °C, low wind intensity and a period of mild rainfall. Special recording devices were placed at specific locations in the FIA. The method used is based on the recording of the bat echolocation sounds (usually ultrasonic) and social calls emitted during flight. Ultrasonic receivers with an integrated digital audio recorder, type BATLOGGER A (Elekon AG, Luzern, Switzerland) were used for the recordings. The recorders were placed at a height of 2.5-3 m. BatExplorer 2.1.9.1 software was used to manage the recordings and to analyse the recorded sequences. The analysis was mainly based on calls originating from the search phase (phase 1) of the sequence, based on the European bats - Elekon library. The calls of this phase are emitted when bats "scan" the surrounding area in search of solid bodies (e.g., insects, trees, rocks) and are the most stereotypical and characteristic of the species.

To investigate the bat fauna of the project area, recording devices were installed at 8 locations within the project and adjacent FIA, six of which were installed in the wind park installation area and two of which were installed near the underground power line that goes through the bat foraging area. The weather conditions were appropriate for surveying bats even though it was late October, which is also evident by the large number of recordings. Despite being the end of the reproductive period for these organisms the high temperatures and mild weather contributed to obtaining representative data for the biodiversity of the area regarding bats.

## Results of the bat survey

A total of 8.789 sound sequences (recordings-indicator of species' presence frequency), 60.644 calls (indicator of species' presence duration in the area) were recorded and identified at the species level. 19 species of bats were identified and most recordings per sampling occurred in the installation area with an average of 591 recordings per sampling and 8.643 calls, while in the foraging area the recordings per sampling were about half (218 recordings and 4.395 calls). The results from the sampling for the project are summarized in the table below.

**Table 2-2 Bat species that were recorded in the installation and the foraging area and number of recordings and calls.**

| a/a | Taxon | Installation area | | Foraging area | | Total | |
|---|---|---|---|---|---|---|---|
| | | # recordings | # calls | # recordings | # calls | # recordings | # calls |
| 1 | ***Barbastella barbastellus*** | 32 | 135 | 4 | 36 | 36 | 170 |
| 2 | ***Hypsugo savii*** | 9 | 187 | 0 | 0 | 9 | 187 |
| 3 | ***Miniopterus schreibersii*** | 4 | 34 | 0 | 0 | 4 | 34 |
| 4 | ***Myotis alcathoe*** | 39 | 305 | 0 | 0 | 39 | 305 |
| 5 | ***Myotis capaccinii*** | 2 | 7 | 0 | 0 | 2 | 7 |
| 6 | ***Myotis daubentonii*** | 11 | 95 | 2 | 37 | 13 | 133 |
| 7 | ***Myotis myotis*** | 15 | 232 | 0 | 0 | 15 | 232 |
| 8 | ***Nyctalus lasiopterus*** | 157 | 357 | 0 | 0 | 157 | 357 |
| 9 | ***Nyctalus leisleri*** | 36 | 123 | 11 | 71 | 47 | 194 |
| 10 | ***Nyctalus noctula*** | 679 | 2332 | 4 | 49 | 683 | 2381 |
| 11 | ***Pipistrellus kuhlii*** | 94 | 1715 | 13 | 281 | 107 | 1995 |
| 12 | ***Pipistrellus nathusii*** | 94 | 1092 | 0 | 0 | 94 | 1092 |
| 13 | ***Pipistrellus pipistrellus*** | 615 | 14072 | 398 | 8280 | 1014 | 22352 |
| 14 | ***Pipistrellus pygmaeus*** | 1644 | 30215 | 0 | 0 | 1644 | 30215 |
| 15 | ***Plecotus auritus*** | 43 | 445 | 4 | 36 | 47 | 481 |
| 16 | ***Plecotus kolombatovici*** | 24 | 211 | 0 | 0 | 24 | 211 |
| 17 | ***Rhinolophus euryale*** | 34 | 264 | 0 | 0 | 34 | 264 |
| 18 | ***Rhinolophus hipposideros*** | 7 | 24 | 0 | 0 | 7 | 24 |
| 19 | ***Vespertilio murinus*** | 7 | 9 | 0 | 0 | 7 | 9 |
| **Total** | **Species** | **19** | | **7** | | **19** | |
| | **Recordings/Calls** | **3546** | **51855** | **436** | **8789** | **3981** | **60644** |
| | **Recordings/Calls per sample** | **591** | **8643** | **218** | **4395** | **1991** | **30322** |

The following diagrams show the species composition per sampling area i.e., at the installation and the foraging area (where the underground electricity interconnection passes through). In the installation area the dominant species with a total of 46% recordings is *Pipistrellus pygmaeus*, and the co-dominant species is *Pipistrellus pipistrellus* with 17% and *Nyctalus noctula* with 19%. In the foraging area, the majority of the recordings belonged to *Pipistrellus pipistrellus* with a total of 91%.

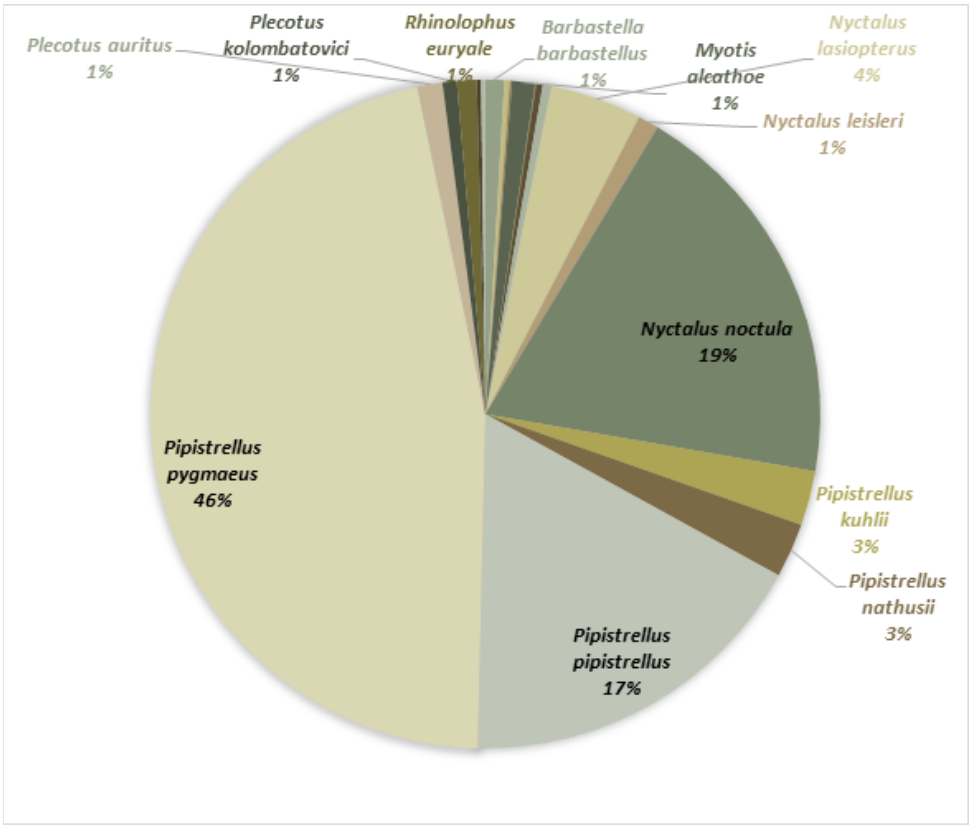



**Figure 1.2-1 Percentage of recordings per species at the installation area (species with > 1%).**

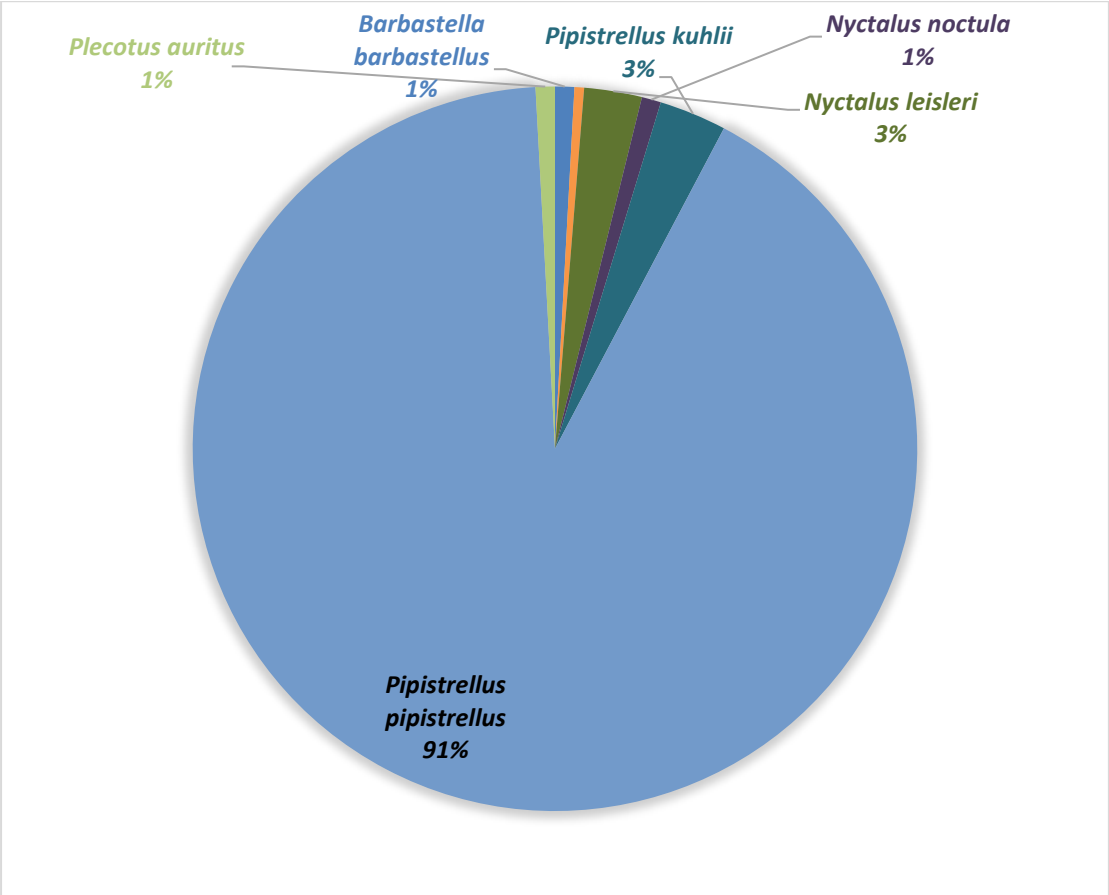



**Figure 1.2-2 Percentage of recordings per species at the foraging area (species with > 1%).**

Of all the bat species recorded in the two areas only one, *Myotis capaccinii,* is considered Vulnerable Internationally according to the IUCN red list, but its presence was rare (only 7 detections of calls in a total of 60.644 i.e., 0,01% and 2 recordings in a total of 3.981 i.e., only 0,05%).

**Table 2-3 List of bat species recorded in the field survey area, their protection and conservation status according to Directive 92/43/EEC, risk status in Greece and Europe.**

| a/a | Species | Annex to Directive 92/43/EEC | Conservation status | IUCN | Greek Red Data Book | Collision risk |
|---|---|---|---|---|---|---|
| **1** | *Barbastella barbastellus* | II, IV | U1 | NT | EN | M |
| **2** | *Hypsugo savii* | IV | FV | LC | LC | H |
| **3** | *Miniopterus schreibersii* | II, IV | U1x | NT | NT | M |
| **4** | *Myotis alcathoe* | IV-HTL | XX | DD | DD | M |
| **5** | *Myotis capaccinii* | II, IV | U1 | VU | NT | L |
| **6** | *Myotis daubentonii* | IV-HTL | XX | LC | VU | L |
| **7** | *Myotis myotis* | II, IV | U1x | LC | NT | L |
| **8** | *Nyctalus lasiopterus* | IV-HTL | U1 | NT | VU | M |

| | | | | | | |
|---|---|---|---|---|---|---|
| **9** | *Nyctalus leisleri* | IV-HTL | U1x | LC | LC | H |
| **10** | *Nyctalus noctula* | IV | U1 | LC | DD | H |
| **11** | *Pipistrellus kuhlii* | IV-HTL | FV | LC | LC | H |
| **12** | *Pipistrellus nathusi* | IV | U1 | LC | DD | H |
| **13** | *Pipistrellus pipistrellus* | IV-HTL | FV | LC | DD | H |
| **14** | *Pipistrellus pygmaeus* | IV | U1x | LC | DD | H |
| **15** | *Plecotus auritus* | IV-HTL | U1 | LC | VU | L |
| **16** | *Plecotus kolombatovici* | IV-HTL | XX | LC | DD | L |
| **17** | *Rhinolophus euryale* | II, IV | U1x | NT | NT | L |
| **18** | *Rhinolophus hipposideros* | II | FV | LC | LC | L |
| **19** | *Vespertilio murinus* | IV-HTL | U1 | LC | DD | H |

*(Conservation status FV=Satisfactory U1=Unsatisfactory X=Unknown/ Red Data Book characteristics DD=Deficiently known LC=Low Concern NT= Near Threatened VU=Vulnerable/ Collision Risk H=High, M=Medium, L=Low).*

According to the table above, the 4 species belonging to the Greek Red Book's risk categories are *Barbastella barbastellus, Myotis daubentonii, Nyctalus lasiopterus* and *Plecotus auritus*. According to the IUCN, one species*, Myotis capaccinii* is Vulnerable internationally (but not in Greece), with negligible presence in the FIA (only 7 call detections out of a total of 60,644 i.e., 0.01% or 2 recordings out of a total of 3,981 i.e., only 0.05% of the total).

# 3 APROPRIATE ASSESSMENT AND EVALUATION OF IMPACTS

## 3.1 Bat species

The species of bats that can be identified in the area based on their distribution maps (previous section) belong to the species that occur in Greece and Bulgaria. The species listed in the Red List of Greece under the category Vulnerable (VU) is *Rhinolophus mehelyi*, however this species does not have its main distribution in the wind farm area. Of the species relevant to Greece *Rhinolophus euryale, Rhinolophus blasii, Miniopterus schreibersii* and *Myotis capacinii* are in the Vulnerable (VU) category of the Red List of Europe (the latter does not have a baseline distribution in the project area), although they are common in our country. They also have an Insufficient Conservation Status (U1). Regarding the bat species from the Bulgarian Natura 2000, in the Red List of Europe in the Vulnerable (VU) category are *Barbastella barbastellus, Myotis bechsteinii* and *Rhinolophus blasii*. Although impact mortalities of individual bats cannot be ruled out, the number of these, due to the characteristics of the wind farm and the area, is estimated to be small and may not have an impact on the bat population. In addition, based on their (wide) distribution maps and confirmed presence locations (dots), the field survey area does not appear to be critical habitat for bats. Similarly, no impacts from habitat fragmentation and displacement are expected, especially after protection measures have been taken.

In addition, these conclusions are reinforced by the fact that the area of the studied Wind farm is located outside the zone of Foraging areas and Important Caves and Shelters of Bats according to the results of actions A3 and C3 of the LIFE17 NAT/GR/000522 – LIFE GRECABAT project, 2021-2023. The closest foraging area is called "Supajin Ine Cave" and is located at a distance of about 3 km.

Additionally, a field visit was conducted in which the bat species of the area were recorded.
To assess the impact of the installation and operation of the project, the following are taken into account:
- the intensity of the presence of bats as the number of sound recordings during overnight counts
- the direct loss or change of foraging habitat or any other habitat
- the presence of a colony of bats in the vicinity of the study area
- the presence of species listed in Annexes II and IV to Directive 92/43/EEC

From the results of the data analysis, it is evident that a high number of species is present and there is high activity. In total, 19 species of bats were identified, 5 of which belong to a risk category of the Greek Red List and/or the European Red List (IUCN), all species belong to Annex II and/or IV of the Directive 92/43/EEC, and the conservation status at national level for 12 species is inadequate (U1) and for 4 species satisfactory (FV).

## 3.2 Impact on the nearest colony of bats

As mentioned earlier, part of the underground electrical interconnection passes through the foraging area of the bats that take refuge in the "Supajin - Ine" cave. This section is more than 4 km away from the important cave/shelter for the bats. Moreover, the nearest wind turbine of the project is more than 8 km away from this important cave. Results during the field survey period indicate that the colony is inactive at least in terms of its use as a breeding refuge, consistent with the literature which notes that the active period is during March and April. For the other months of the year, the use of the cave by bats is not known in the literature. However, field results from the project area show some presence of cave species (*Miniopterus*

*schreibersii, Rhinolophus ferrumequinum and Rhinolophus euryale*) during this period of measurement as well.

As the electric cables will be underground and follow the alignment of the existing road, no new land will be occupied. Similarly, the road improvement does not practically increase land occupation.

With respect to construction noise, the noise associated with each phase of construction varies significantly. The equipment used in each of these phases varies in intensity, duration and frequency of noise generation. Based on literature, the range of noise ranges from 52 to 162 dBA (U.S. Fish and Wildlife Service, 2006), with the most frequent noisy operations ranging from 80 to 110 dBA. All sounds diminish with increasing distance from the source. Noise from point sources, when diffused over soft ground, decreases by 7.5 dBA each time the distance is doubled (The California Department of Transportation, 2016).

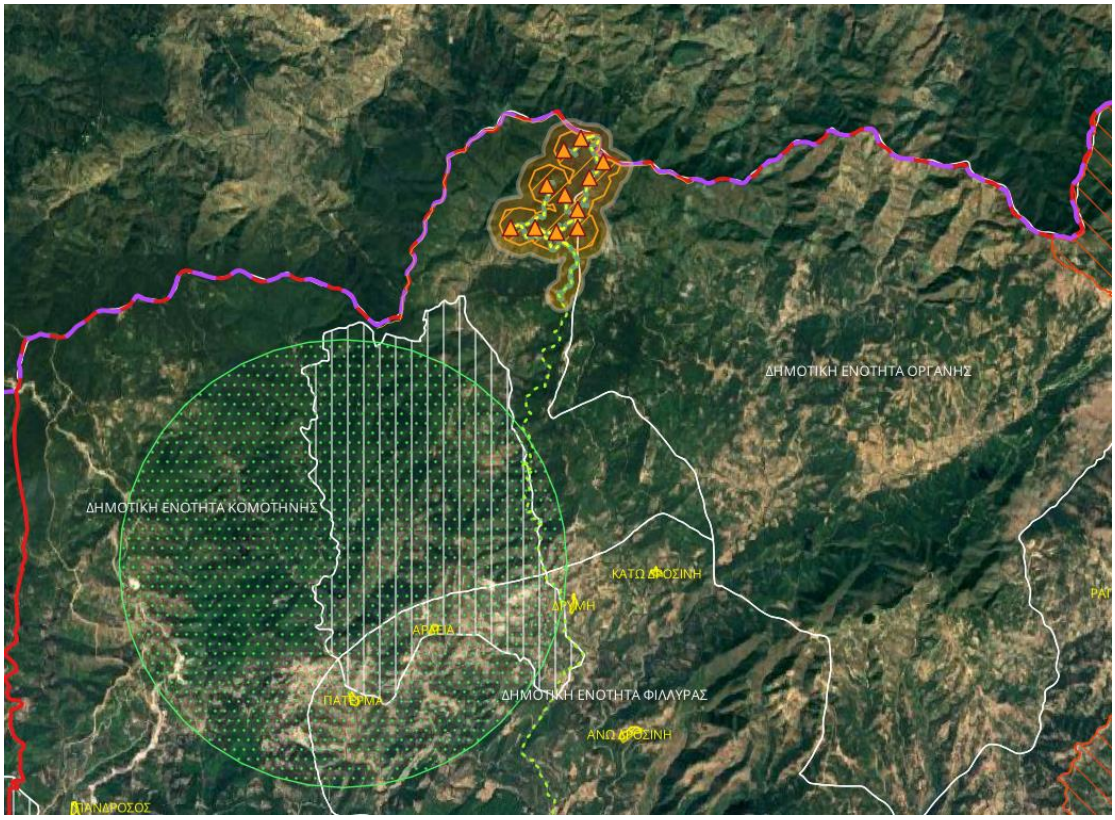



**Figure 3.2-1 Foraging areas of the bat colony around the "Supajin - Ine" cave (green dotted circle) in relation to the project area and the FIA (orange polygon).**

The minimum distance of the colony from the underground cable line and access road improvement is over 4 km, while the internal road construction and wind turbine installation are even further (over 7 and 8 km respectively). According to the project's Environmental Impact Assessment (EIS) report, the noise from the construction of the road (and underground electric line) at a distance of 600 m from the project is reduced to 39.7 dB(A) i.e., it reaches approximately the background value (taken as 35-40 dBA). Therefore, the cave, which is more than 4 km away, will not suffer any impact. Similarly, there will be little disturbance even in the part of the foraging area close to the access road, since, according to the EIS, at a distance of 300 m from the road axis, the noise is reduced to 46.2 dBA i.e., only a slight increase compared to the background. It is pointed out that the length of the road in contact with the foraging area is 5.350 m, and according to the EIS, the construction time for this section is estimated at 26 days. Therefore, the construction of the access road to the section within the

foraging area will have no impact on the bat species of the "Supajin - Ine" Cave due to the distance, throughout the year. In addition, any disturbance (if any) will last less than one month, during which the construction will be completed. Similarly, the road construction operations will not have any impact on the colony's bats as the nearest cave is about 8 km away.

## 3.3 Impact due to occupation/habitat change and disturbance at the installation area

Construction of the wind park project may result in the reshaping of the landscape and removal of surface vegetation. Through this process existing habitats may be altered, damaged, fragmented or destroyed. The extent of habitat loss and degradation depends on the size, location and design of a project and the sensitivity of the habitats affected (EU, 2018). However, in the case of this project, it is located outside the Natura 2000 network, and the area covered by deciduous forests on the Rhodope Mountains is particularly large. In fact, according to the EIA, the wind park occupies an area of 0.14 square kilometers (140 acres) which is only 0.10% of the land use area per Corine 2018 "311 Broadleaf Forest" in the SPA. Therefore, the loss of potential habitat is negligible compared to the large area in the region and therefore impacts from habitat occupation of the project are expected to be insignificant.

It is also noted that, due to the existing density of vegetation in the project area, it is currently very difficult to forage for bat species with lower maneuverability. The removal of vegetation during construction practically results in the opening of corridors within the dense vegetation and the formation of habitats that provide foraging habitat for a wide range of species, not only bats, but also insects, mammals and birds. Therefore, it is likely that the diversity and activity of bat species in the project site will increase. However, this positive effect on the population may be offset by a potential increase in interspecific competition for the most prevalent species due to the attraction of more bats to the site.
In any case, based on the EIS, no significant impact is expected on the acoustic environment during construction since the noise will approach or reach background noise levels within a few hundred meters. Moreover, any disturbance will be short-lived. After all, the excavation, backfilling and concreting operations (which are the main noise emitters), as described in the EIS, are all carried out during the daytime, when the bats are not active. Therefore, the impacts of the construction phase are not expected to be significant.

## 3.4 Impact due to the operation of the project

Over the past fifteen years, data have been compiled documenting negative impacts of the wind farms on bat populations (Dietz et al. 2009; Dietz & Kiefer 2016; Rodriguez et al. 2017). These studies document instances of bat mortality caused by wind turbines. Bats are killed both due to impact with the rotating blades of the wind turbines and due to "barotrauma", i.e., internal bleeding caused by reduced pressure (underpressure), mainly near the tips of the blades. However, as mentioned in the EIS, according to the latest studies the initial estimates over the significance of the impacts caused by barotrauma are overestimated compared to the mortality impact. This is because the area of increased underpressure behind the blade tips is very small compared to the swept area of the blades. Thus, the probability of bats passing through this surface is much lower than the probability of bats passing through the swept surface (Lawson M. et al., 2020, as cited in: "...we conclude that it is unlikely that barotrauma is responsible for a significant number of turbine-related bat fatalities, and that impact trauma is the likely cause of the majority of wind-turbine-related bat fatalities"). The recording of bat activity by acoustic methods before construction shows a positive correlation

with post-construction mortality. However, these results cannot be used to accurately predict wind turbine related mortality because of the many other factors involved, some of which are poorly known (Hein et al. 2013). Recent studies (Donald et al., 2020) suggest that in some cases bats are attracted to wind turbines increasing their activity and thus, mortality probabilities.

In the case of this project, the activity of bats, according to the field survey, is characterized as high, and the most prevalent species *Pipistrellus pygmaeus, Pipistrellus pipistrellus* and *Nyctalus noctula* are prone to collisions (Table 2-3; EU, 2010). However, taking into account the fact that these species are common and non-endangered, it is estimated that the overall impact from wind turbine collision would be moderate on the populations of bat species in the area. In addition, no impacts from habitat loss are expected as the occupied area is an extremely small percentage of the area of existing habitat in the surrounding area.

## 3.5 Transboundary effects on the species of pests

Of the 19 species observed in the field, 5 of them (*Barbastella barbastellus, Miniopterus schreibersii, Myotis capaccinii, Myotis myotis* and *Rhinolophus hipposideros*) are also included in the protected species in the SDF (Table 2-1) of the neighbouring SCI "BG0001032" in Bulgaria. Of these, only *Barbastella barbastellus* is Vulnerable (VU) and had a presence rate well below 1%. The same is true for the other species which had an equally very low presence rate of less than 1%. In conclusion, based on the results of the field survey, no significant transboundary impacts on the populations of the bats of the Natura 2000 site "BG0001032" - Rodopi - Iztochni are expected.

## 3.6 Conclusions of the Impact Assessment

Based on the above, there is no evidence of any significant deterioration in the conservation status of the bat species. The results and conclusions of the study are the following:

- High activity and a high diversity of bat species was recorded in the project area. In the foraging area of the nearest known colony around the cave "Supajin - Ine" the diversity and activity are moderate.
- A total of 19 species of bats were recorded, with 5 of them in an endangered category of the Greek Red List and/or the European Red List (IUCN), while all species belong to Annexes IV and/or II of Directive 92/43/EEC.
- The dominant species in the project area was *Pipistrellus pygmaeus*, followed by *Pipistrellus pipistrellus* and *Nyctalus noctula*. These species are not in any of the risk categories in the Greek Red Data Book (and the IUCN list).
- In the project area there was a low presence of the species of the nearest recorded colony of bats, around the cave "Supatzin - Ine". It is possible that the colony was not fully active during the field survey.
- No disturbance is expected that may affect the bat colony in the "Supajin - Ine" cave from the construction and operation of the wind farm project as it is located more than 8 km away and the associated electricity cables are more than 4 km away from the major cave/refuge (as depicted on Figure 3.2-1).
- Landscape change and occupation of project features in the installation area are not expected to result in significant impacts to existing bat fauna.
- No significant disturbance is expected that may affect the bats feeding at the installation site during the construction phase.

- Moderate impact is expected from the potential bat collisions with the wind turbines which will mainly affect populations that are not in a risk category of the Greek Red Data Book (and IUCN list).
- Should significant numbers of bat mortalities from collision (or barotrauma) occur during post-project monitoring, mortality reduction measures such as increasing the minimum wind speed of wind turbine activation should be taken.

# 4 MITIGATION MEASURES

Although no significant impacts are anticipated from the construction and operation of the wind farm on avifauna, bats and their habitats, it is proposed that precautionary mitigation measures be implemented to further reduce any potential impacts, even non-significant ones, and ensure the integrity and conservation objectives of the protected areas.

In order to minimize, mitigate or significantly avoid potential impacts from the construction and operation of the wind farm, it is proposed to implement the following measures for each type of impact.

## 4.1 Bat species

### Mitigation measures for collisions

All wind turbines, and especially turbine nacelles, should be designed, constructed and maintained in such a way that they do not support their use as shelters by bats - all openings and gaps should be inaccessible.

Insects are attracted to lights (security lights at the bottom of the tower, Beucher et al. 2013), to the heat generated by some types of turbine blades (Ahlén 2002, Hensen 2004, Horn et al. 2008, Rydell et al. 2010b), the colour of wind turbines (Long et al. 2011) and some generated sounds (Kunz et al. 2007). Insect concentrations in areas around wind turbines therefore entice bats to hunt in these areas, and this can lead to mortality (Kunz et al. 2007; Horn et al. 2008; Rydell et al. 2010b). Therefore, wind turbines and their immediate surroundings should be managed and maintained in such a way that they do not attract insects (i.e., the concentration of insects near wind turbines should be reduced as much as possible, but without affecting their abundance elsewhere in the study area).
Some of the measures that can achieve this and that should be applied to all wind farms are:

- the use of lighting that does not attract insects,
- the use of lighting only when necessary unless it is mandatory for safety reasons,
- avoiding water retention and the growth of weeds and new bushes in the immediate area around the construction of wind turbines (wind turbine operating zones, access roads, etc.),
- new vegetation fences, other shrub and tree clusters, as well as forests and orchards, should not be allowed to be installed within the 200 m zone around wind turbines and such structures should not be used as compensation measures within the given distance.

### Mitigation measures for disturbance and displacement

Disturbance to foraging and movement should be prevented by limiting certain construction work during periods of the day when bats are active (construction should generally be carried out during the daytime) as much as possible. In any case, no lighting should be used unless it is mandatory for safety reasons, but always in compliance with the above-mentioned conditions.

### Mitigation measures for habitat fragmentation

There is no necessity for measures because there will be no habitat fragmentation.

# 5 MONITORING PROGRAM

The process of environmental monitoring refers to the systematic periodic measurement of key indicators for different parameters of the protected areas that may be affected by the construction and operation activities of the wind farm. The implementation of the proposed monitoring program will contribute to:

- Compliance with the environmental conditions and measures of the wind farm and therefore the preservation of the integrity of the site.
- Provision of important information for the evaluation of the effectiveness of the proposed measures, depending on the trends of the monitored parameters and their expected changes.
- Early notification of potential problems and their early resolution, reducing the environmental and economic costs and the scale of the necessary interventions.
- Creation of an important database of scientific information on the status of the inhabiting the area, which can be used as a tool in any decision-making process of the competent authorities for the area.

For the implementation of a monitoring programme, it is a prerequisite that baseline data or predefined reference values are available in order to better evaluate the monitoring data and thus the mitigation measures applied.
In the case of this wind farm, the baseline data obtained from the fieldwork carried out in the context of this Special Environmental Assessment (SEA) will be used.
The proposed indicators, general objectives and monitoring frequency per environmental parameter are summarised in the following table, with a more detailed presentation of the monitoring methodology in the following paragraphs.

| Environmental Parameter | Index | Objectives | Project phase | Frequency of surveys |
|---|---|---|---|---|
| NATURAL ENVIRONMENT | *Collision of birds and bats* | Survey for dead birds and bats at the site of the wind farm and associated structures | Operation | Monthly field surveys for any dead birds and bats during operation for 3 years |
| NATURAL ENVIRONMENT | *Avian fauna* | 1.Record of any potential changes in the size, density, and passage rate of populations of important bird species in the FIA during wind farm construction and operation relative to the baseline data in this SEA.<br>2.Assessment of the data against the Satisfactory Reference Values and Conservation Objectives for these species at national level to be reflected in the forthcoming Reporting Reports implementing Directive 92/43/EEC. | Construction<br>Operation | Continuous monitoring of the collision avoidance system.<br>Monthly field surveys for any dead birds.<br>Seasonal measurements during and outside the breeding season (4 per year) |
| NATURAL ENVIRONMENT | *Habitats* | 1.Identification of possible reduction in size of the habitats or deterioration of their quality from various causes | Operation | Once a year, for three consecutive years |

| | | | | |
|---|---|---|---|---|
| NATURAL ENVIRONMENT - ground | *Solid waste management* | 2.Checking compliance with conservation measures during construction concerning excavation waste and waste from site machinery and workers<br>3.Protection of the soil from erosion, pollution or cover by earthworks | Construction | Seasonal (4 times/year) |

Field monitoring activities will be carried out in the FIA of this IBA to ensure optimal comparison with the baseline data and recording of any changes, as well as sufficient correlation between the measured parameters.

Finally, it is recommended that field monitoring of fauna should preferably be carried out by the same experts, if possible, in order to ensure that comparable methods and techniques are applied and to minimise observer bias. This need is of course reduced (without losing its importance, if it is possible to apply it) when electronic equipment (e.g., call recording microphones, cameras) is used in the recordings.

## 5.1 Proposed monitoring indicators

**Index of Bird and Bat collision**

**Description**. It is an indicator of species mortality monitoring, i.e., the survey for dead birds and bats on the wind farm site and associated structures.

**Objectives**. The main objective of the monitoring is to investigate the possibility of any birds and bats colliding with the wind farm.

**Methodology**. Visual searches for dead birds tend to be most effective in bright light, with a light breeze that can move feathers and down on dead birds, making them more visible, especially when it hasn't rained recently (rain tends to make feathers stick together). Searches should be carried out regularly on a monthly basis for the first 3 years of operation. The order of visits should be the same on each iteration so that the sampling interval is the same for each wind turbine. For each dead bird or bat found, the following data shall be recorded:

- The date and time it was found.
- The extent and type of wound (if identifiable).
- The species (or the best estimate of the species if it is in very poor condition and cannot be fully identified).
- The coordinates of the location where the dead animal was found (to be used for control/ verification purposes).
- A digital photograph of the dead animal at the place where it was found.

## 5.2 Data Collection - Processing - Evaluation

The effectiveness of a monitoring programme lies in the reliability and timeliness of the data and the conclusions drawn from it. The primary data from the specific field forms will be collected and also entered digitally into the programme database and a schedule of monitoring activities will be kept. The database will be structured in a suitable way to cover all fields of monitoring and to allow for spatial presentation of the data and its processing.

The proposed programme will comply with the principles of the Environmental Management Plan according to the ISO 14001-2015 environmental quality systems standards. In this context, it is proposed

that an annual report be prepared by an environmental consultancy firm or an expert ornithologist summarising the results of the monitoring programme under the responsibility of the project developer and sent to the relevant departments of the central or decentralised administration for information and confirmation of compliance with environmental conditions. The correct implementation of the programme and the control of compliance with all the procedures laid down shall be the responsibility of the project developer.

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