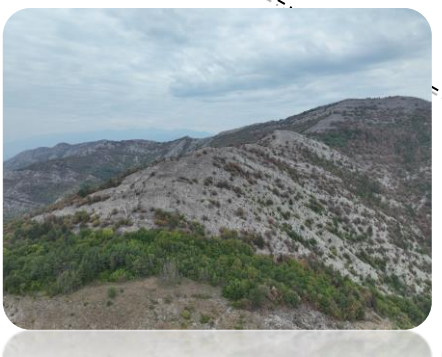
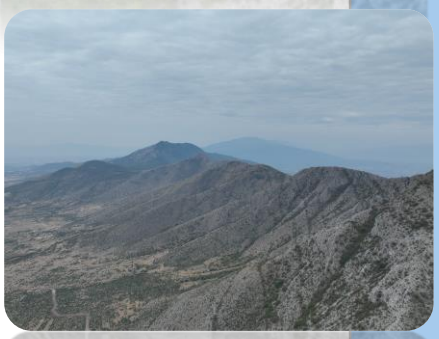
TERNA ENERGY S.R.L.O.

SPECIAL ECOLOGICAL ASSESSMENT FOR THE PROTECTED ELEMENTS OF THE SPECIAL CONSERVATION AREA WITH THE CODE GR1260005 AND THE NAME 'PEAKS OF MOUNT ORVILOS'





TERNA ENERGY
A MASDAR COMPANY

DECEMBER 2024

PROJECT PROMOTER

TERNA ENERGY S.R.O.

Table of contents

1. INTRODUCTION 8

2. DESIGN FOR THE IMPLEMENTATION OF THE STUDY 12

3. INSTITUTIONAL FRAMEWORK 17

Impacts of climate change on wildlife 17

The need for renewable energy and nature conservation 20

4. LITERATURE REVIEW OF THE POSSIBLE EFFECTS OF WIND FARMS ON FAUNA, BIRDS, HABITAT TYPES AND FLORA 31

Effects on avifauna 31

Effects on bats and appropriate handling based on existing knowledge 43

Effects on other fauna (terrestrial mammals, amphibians, reptiles, invertebrates) 48

Impact on Habitat Types and Flora 50

Mitigation and monitoring of impacts 52

Use of new technologies for monitoring or mitigation/prevention of impact effects 56

5. PRELIMINARY IMPACT ASSESSMENT 61

Definition and description of the Study Area and the Field Investigation Area ..61

EXISTING STATE OF THE NATURAL ENVIRONMENT 63

Inventory and analysis of the elements of the natural environment 63

STUDY AREA (A.M.) 63

Identification of the areas (type, registration code, name) 64

Geographical identification of the sites (coordinates, altitude, surface area) 65

Description of the general character of the site with simple reference to: habitat types, habitat categories, quality and importance of the site, vulnerability, reasons for designation 66

Detailed description of the Study Area (SSA) 75

Recording of the habitat types of Annex I of the Decree H.P.14849/853/E103/4.4.2008 (Government Gazette B΄ 645), in terms of the relevant area (if it is a Special Conservation Area, Site of Community Importance). 76

Inventory of the flora and fauna species of Annex II of the EIA. H.P.14849/853/E103/4.4.2008 (B΄ 645), in particular with regard to the size and

density of populations, their conservation status and their isolation (if it is a Special Conservation Area, Site of Community Importance).....80

Inventory of Annex I species of avifauna of the EIA. H.P. 37338/1807/E.103 (B. 1495), as well as other migratory bird species with a significant presence in the Natura 2000 site, in particular with regard to the size and density of populations, their conservation status and their isolation (if they are in a Special Protection Area).....89

Recording of the main characteristics of all habitat types of Annex I and/or species of Annex II of Directive 92/43/EEC (in case of Special Conservation Areas, Sites of Community Importance) and/or species of avifauna of Annex I of Directive 2009/147/EC and regularly migrating species (in case of Special Protection Areas) and the main characteristics of endemic, endangered and protected species.....102

Flora of the area.....259

General.....259

Omphalodes luciliae.....289

Onosma visianii.....289

Picea abies.....289

Ruscus aculeatus.....289

Oyster, eastern anchovy and mixed thermophilous forests.....293

General description of vegetation.....293

Review of the literature on the flora of the protected area.....294

Mapping of the above on Documentation Maps.....303

Reference to other existing and/or approved projects or activities in the Study Area.....366

Other relevant information relating to the Study Area.....371

Photo documentation.....374

Screening.....384

6 FIELD INVENTORIES AND IMPACT ASSESSMENT.....402

Organisation of sampling sites by groups of bird and other fauna species, according to ecological requirements and habitat suitability.....402

Timing of measurements and analysis of methodology.....402

Bird fauna.....404

Methods of recording arthropods.....409

Method for recording reptile and amphibian species.....410

Method for recording mammals (except hand-held mammals).....411
Work on the recording of Annex II flora species and Annex I habitat types of Joint Ministerial Decision H.P. 14849/853/E103/4.4.2008 413
Description of Fieldwork.....413
Work to record habitat types 413
List of habitat types of Annex I of the Joint Ministerial Decision H.P.14849/853/E103/4.4.2008 (Government Gazette B΄ 645) (if they are Special Conservation Areas, Sites of Community Importance). 419
Inventory of characteristics of the Habitat Types located within or near the study area.....420
Work to record flora species.....421
RESULTS.....467
Recording of the fauna species of Annex II of the Joint Ministerial Decision H.P.14849/853/E103/4.4.2008 (B΄ 645) in terms of the size and density of populations and their conservation status (if they are Special Conservation Areas, Sites of Community Importance). 487
Inventory of Annex I avifauna species of Joint Ministerial Decision H.P. 37338/1807/E.103 (B. 1495), as well as other migratory avifauna species with a significant presence in the Natura 2000 site, with regard to their conservation status and their isolation (if they are Special Protection Areas). 495
Mapping of the above information on Documentation Maps 511
Photographic documentation 523
Photographic documentation of the study area: Ground photographs from different viewpoints of the field survey area 523
Photographic documentation of the study area: Ground photographs from different viewpoints of the field survey area 540
Photographic documentation 540
Photographic documentation of the study area: Indicative photographs of wildlife species from the field survey.....541
Photographic documentation of the study area: Indicative photographs from the survey of biotic evidence, tracks and killed fauna individuals on the road network.....551
Photographic documentation of the study area: Indicative photographs of photo trap placement sites and of locations for recording hand-recorded 553
Photographic documentation of the study area: Indicative photographs of wildlife species from the operation of the light traps.....555

Photographic documentation of the study area: Indicative photographs from sampling of habitat and flora types....559
Photographic documentation of the study area: Important flora species of the study area....572
INVENTORY OF THE STATE OF THE NATURAL ENVIRONMENT IN THE NATURA 2000 NETWORK AREA....579
Conservation objectives of the Natura 2000 site concerned and parameters contributing to the conservation value of the site....579
The ecological requirements of the species and habitat types for which the Natura 2000 sites concerned have been designated....590
The conservation status of the above species and habitat types at national and European level....622
The threats and risks of their degradation, destruction or disturbance....622
Their national and European importance for the conservation of biodiversity....654
The overall coherence of the NATURA 2000 network....654
Conservation status of the habitat types and/or species for which the NATURA 2000 site concerned has been designated....654
For the habitat type(s) listed in Annex I to Directive 92/43/EC....654
For species listed in Annex II of Directive 92/43/EC:....656
As regards the species of avifauna listed in Annex I to Directive 2009/147 and migratory species with a significant presence....663
The existing baseline conditions, where they have been established, are....687
Main pressures and threats they face....696
Ecological functions....697
Trends in the development of the Study Area....698
7. DETAILED IMPACT ASSESSMENT - ANALYSIS AND EVALUATION OF IMPACTS....699
Impact assessment methodology/framework....699
Co-operative effects....700
Impact mortality....703
Habitat loss and degradation....705
Disturbance, displacement and barrier creation....708
Analysis of records of important bird species (species listed in Table 73) - Impact risk assessment....713

Analysis of mammal records (except for the worst mammals) 741
Analysis of the records of Bats 751
Analysis of reptile records 761
Analysis of amphibian records 767
General: Impact assessment 769
Assessment of impacts on the main species of avifauna 770
Mammals 782
Bats 803
Amphibians 805
Reptiles 805
Other species 806
Habitat types and flora species 806
Assessment of the impact of the accompanying works 810
Examination of alternatives 815
8. MITIGATION MEASURES FOR POTENTIAL IMPACTS 819
List of measures, conditions or restrictions proposed 819
9. MONITORING PROGRAMME 829
10. SUMMARY OF CONCLUSIONS 831
11. BIBLIOGRAPHY 833

1. INTRODUCTION

This Special Ecological Assessment is prepared for the protected elements of the Special Conservation Area (SAC) code GR1260005 and named "Peaks of Mount Orvilos", in the framework of the Environmental Impact Assessment for the wind farm development project of TERNA ENERGY S.A.The wind power plant has a nominal power of 58,80 MW, and is located in the location "Oxila", of the Municipality of Sintiki, of the Regional Unit of Serres, and is classified in Category A1 of the 10thGroup with *aa* 1, and project type: Electricity generation from wind energy, based on the Ministerial Decision under the Ministry of Environment and Natural Resources/DIPA/63951/4418 *"Modification of the* Ministerial *Decision under the Ministry* of Environment *and Natural Resources/DIPA/oik. 37674/2016 (B'2471) ministerial decision, for the reclassification of onshore wind power projects and onshore photovoltaic power plants in the categories and subcategories of Law 4014/2011"* (Government Gazette 3867/B/03-07-2024).

This study is prepared in accordance with the specifications resulting from the Ministerial Decision A.P. οικ. 170225. 4014/2011 (Α΄ 209), as well as any other relevant details" (Government Gazette 135/B/27-01-2014). According to Article 13 of Law 4296/2014 (Government Gazette 214/A/02-10-2014), the need to prepare a Special Ecological Assessment arises even for areas that are outside special protection zones for avifauna but have been designated as Important Bird Areas, as based on the provisions of the Law: "Article Thirteenth Article Obligation to prepare a special ornithological assessment for sites that are outside Special Protection Zones for bird fauna but designated as Important Bird Areas. Para. 3 of Article 6 of Joint Decision No 49828/12.11.2008 of the Ministers of Environment, Physical Planning and Public Works, Interior, Economy and Finance, Development, Rural Development and Food, Culture, Tourism Development, Transport and Communications, Merchant Shipping, Aegean and Island Policy (B' 2464) is replaced by the following: "3. The siting of wind farms within the Special Protection Areas of avifauna and Important Bird Areas of Directive 79/409/EEC is permitted after the required under Article 10 of Law No. 4014/2011 and on the basis of the relevant provisions of the Ministerial Decision No. 170225/2014 (Β΄135) and the ministerial decision 52983/1952/2013 (Β΄ 2436) for the projects of categories A and B of the law. 4014/ 2011, respectively. The more specific conditions and restrictions for the implementation of the above wind installations are

set out in the relevant decision approving environmental conditions for category A΄ projects under Law No. 4014/2011, or in the decision approving the Special Ecological Assessment for category B projects under the same law.').

The project (polygonal boundaries of the production licence of the power plant, based on the P.A.E. AD - 011000 production licence) is partly located within a protected area of the Natura 2000 network, which is classified as a Special Area of Conservation.

In this Special Ecological Assessment, it was chosen by the study team to examine and evaluate the potential impacts of the project under study on the protected elements of the area with the code GR1260005 and name "Peaks of Mount Orvilos", which is classified as a Special Conservation Area , covering an area of 4,871.04 ha (Government Gazette 4432/B/15-12-2017).

Also, due to the nature of the project under study, it was chosen by the study team of this Special Ecological Assessment to examine and assess the potential impacts of the project on the protected elements of the following nearest Natura 2000 network sites, which are designated as Special Protection Areas:

- The Bulgarian site BG0002078 named "Slavyanka", which is designated as a Special Protection Area, covering an area of 19,433.05 ha (https://biodiversity.europa.eu/sites/natura2000/BG0002078). This Bulgarian Natura 2000 protected area is adjacent to the planned project, less than 500 metres (approximately 160 metres) to the north-east of the boundaries of the production licence blocks of the planned project.
- The area with the code GR1260010 and the name "Mount Belles", which is classified as a Special Protection Area, covering an area of 25,310.84 ha (Government Gazette 4432/B/15-12-2017). This protected area of the Natura 2000 network is located at a distance (in a straight line) of approximately 10 km west of the boundaries of the production license blocks of the project under consideration.
- The Bulgarian area with the code BG0002098 and the name "Rupite", which is designated as a Special Protection Area, covering an area of 8,835.40 ha (https://biodiversity.europa.eu/sites/natura2000/BG0002098). This Natura 2000 protected area is located approximately 9 km (in a straight line) north-west of the boundaries of the production licence blocks of the project.

- The Bulgarian area with the code BG0002072 and the name "Melnishki piramidi", which is designated as a Special Protection Area, covering an area of 13 580.05 ha (https://biodiversity.europa.eu/sites/natura2000/BG0002072). This Natura 2000 protected area is located approximately 7,58 km (in a straight line) north of the boundaries of the production licence blocks of the projected project.

The above-mentioned nearest protected areas of the Natura 2000 network support avifauna species (raptors - scavengers and other large species), which, according to their ecology, are active in a large radius capable of covering the distance to the study area of this project.

In addition, in this Special Ecological Assessment, it was chosen by the study team to examine and assess the potential impacts of the project under study on the protected elements of the neighbouring Bulgarian protected area of the Natura 2000 network, code BG0001028 and named "Sreden Pirin - Alibotush", which is designated as a Special Conservation Area, covering an area of 68,934.72 ha (https://biodiversity.europa.eu/sites/natura2000/BG0001028), with emphasis on those species of fauna (species of fauna listed in Annex II of Directive 92/43/EEC) which, due to the distances they can travel during their daily movements and the very short distance between the site of the project and the boundaries of the above-mentioned protected area (a distance of approximately 160 metres), may be affected by the project.

The project under consideration is proposed to be installed at the location 'Oxila', in the Municipality of Sintiki, in the Regional Unit of Serres. The project has been granted a production licence and includes 14 wind turbines with a total installed capacity of 58,80 MW (individual capacity of each wind turbine 4,2 MW), type E115, with a rotor diameter of 115,70 m and a hub height of 149,0 m.

The coordinates of the project's production licence polygons (boundaries of the power plant installation site, based on the production licence no. AD 011000), as requested by the project promoter to the Energy Regulatory Authority (RAE), in a geodetic reference system ΕΓΣΑ ΄87, are shown in the following table.

Table 1. Coordinates of the vertices of the polygons of the production licence of the wind farm at the 'Oxila' site, based on a request to the Energy Regulatory Authority.

TOPS POLYGONES	COORDINATES IN WKSHA '87							
AA	X	Y	AA	X	Y	AA	X	Y
	SECTION 1			SECTION 1			SECTION 2	
1	459412	4579045	16	456344	4578018	4	461219	4580613
2	459196	4578904	17	456750	4578267	5	461303	4580811
3	459089	4578771	18	457220	4578465	6	461355	4581064
4	458927	4578679	19	457321	4578567	7	461484	4581200
5	458737	4578486	20	457488	4578851	8	461704	4581472
6	458394	4578437	21	457788	4578934	9	462044	4581453
7	458212	4578329	22	458257	4579062	10	462252	4581183
8	458037	4578309	23	458456	4579183	11	462194	4580902
9	457935	4578212	24	458793	4579421	12	462061	4580777
10	457782	4577941	25	459090	4579602	13	461983	4580616
11	457452	4577894	26	459295	4579448	14	461803	4580252
12	457251	4577731		SECTION 2		15	461569	4579974
13	457045	4577690	1	460611	4580258	16	461441	4579808
14	456717	4577491	2	460968	4580390	17	461206	4579730
15	456392	4577640	3	461109	4580473	18	460935	4579611

2. DESIGN FOR THE IMPLEMENTATION OF THE STUDY

Based on Law 4014/2011 and the provisions of Article 11, and in particular paragraphs 9 and 10 thereof:

"*9. The Special Ecological Assessment for projects and activities of category A shall be included as an annex to the Environmental Impact Study, as an integral part of it, presenting, in addition to those provided for in Article 10 of this Law: a) a detailed inventory of natural environment elements with emphasis on the protected objects of Natura sites as referred to in paragraph 6 of Article 9 of Law No. 3937/2011 (A' 60), which may be affected by the project or activity; and b) appropriate impact assessment, in accordance with paragraph 10 of this Article.*

10. The appropriate impact assessment shall include an analysis and evaluation of the estimated impacts with qualitative and quantitative data on:

(a) the habitat types listed in Annex I to the IOA H.P.14849/853/E103/4.4.2008 (B΄ 645), in particular with regard to their representativeness, relative area and conservation status,

(b) the species of flora and fauna listed in Annex II to the Decree. H.P.14849/853/E103/4.4.2008 (B΄ 645), in particular as regards the size and density of the populations, their conservation status and their isolation status,

(c) the species of avifauna listed in Annex I to the Directive. H.P. 37338/1807/E.103 (B'1495), and other migratory bird species with a significant presence in the Natura 2000 site, in particular as regards the size and density of populations, their conservation status and their isolation,

(d) qualitative and quantitative data on whether the integrity of the sites is ensured.

Where significant adverse effects are assessed as likely, the measures necessary to prevent and minimise them in order to ensure the integrity of the site shall be set out with appropriate documentation.

Where it is not possible to ensure the integrity of the site, the necessary measures to compensate for the negative impacts shall be set out, with appropriate documentation and in accordance with Article 10 of this Regulation.

In this study, the relevant fauna, avifauna and habitat types in Special Conservation Zones GR1260005 and BG0001028, and in Special Protection Zones BG0002078, GR1260010, BG0002098 and BG0002072 were studied. The compilation of this study was carried out on the basis of the above mentioned relevant to the Law

4014/2011 and the relevant to the avifauna mentioned in the more specific specifications for the Special Ecological Assessment based on the Ministerial Decision A.P. οικ. 170225 (Government Gazette 135/B/27-01-2014), taking into account also the provisions of Article 6 of Directive 92/43 and the provisions of Article 5 of Decision No. H.P. 37338/1807/E.103 KYA (Government Gazette 1495/B/06-09-2010) '*Determination of measures and procedures for the conservation of wild birds and their habitats/habitats, in compliance with the provisions of Directive 79/409/EEC, "On the conservation of wild birds", of the European Council of 2 April 1979, as codified by Directive 2009/147/EC*', as amended, supplemented and in force until today, on the basis of Directive No. H.P. 8353/276/E103 (Government Gazette 415/B/23-02-2012) "*Amendment and completion of Joint Ministerial Decision No. 37338/1807/2010 "Determination of measures and procedures for the conservation of wild birds and their habitats/habitats, in compliance with Directive 79/409/EEC...." (B 1495), in accordance with the provisions of the first subparagraph of Article 4(1) of Article 4 of Directive 79/409/EEC of the European Council of 2 April 1979 on the conservation of wild birds, as codified by Directive 2009/147/EC.*

The above project, as already mentioned, is classified in Subcategory A1 of Group 10[a]with *aa* 1, and project type: Electricity generation from wind energy, based on the Ministerial Decision under the reference YPEN/DIPA/63951/4418 *"Modification of the* Ministerial *Decision under the reference DIPA/oik. 37674/2016 (B'2471) ministerial decision, for the reclassification of onshore wind power projects and onshore photovoltaic power plants to the categories and subcategories of Law 4014/2011"* (Government Gazette 3867/B/03-07-2024), and according to Annex 3.2: Specifications of the Special Ecological Assessment Study of Ministerial Decision A.P. οικ. 170225 (Government Gazette No. 135/B/27-01-2014) "*the work/field study shall include at least the following:*

- ***Time period of fieldwork***

  Fieldwork covering the ecological requirements of an annual cycle time interval for each species and habitat type (depending on the seasonal presence of Annex I habitat types and Annex II species of Directive 92/43/EEC for which the site is designated) unless it is documented by the SEA consultant that the fieldwork time interval can be limited.

- ***Duration of fieldwork***

  Fieldwork with a total duration of 20 to 60 days, depending on the species or habitat types to be investigated, the area, topography and habitats of the site. In particular, the number of days, their distribution over time and the programme of fieldwork shall be documented taking into account the size and type of the project and the objects to be protected.

Based on the above specifications of the Special Ecological Assessment for Subcategory A1 projects and activities, the study team carried out the fieldwork within the period January 2024 - December 2024, in order to encompass the ecological requirements of an annual avifauna-fauna cycle (breeding season of avifauna-fauna species, spring and autumn migration and wintering period).

A total of 45 field days were conducted to achieve the above observation programme within the year 2024. More specifically, field visits were made for observations by team observers for three days in the month of January, three days in the month of February, four days in the month of March, five days in the month of April, five days in the month of May, five days in the month of June, four days in the month of July, two days in the month of August, five days in the month of September, four days in the month of October, two days in the month of November and three days in the month of December. On the above field days all the field work was carried out, which involved recording of fauna, avifauna (diurnal and nocturnal) and flora - habitat types. The above field days also included hours spent observing behavior and locating any nesting sites of raptors and other important fauna species, and critical habitats by study team researchers.

This Special Ecological Assessment, taking into account the entire legislative framework referred to above, includes:

- Introductory information related to the proposed project in the study area.
- Description of the study implementation design.
- Institutional framework concerning the relevant legislation on the necessity of renewable energy sources, nature protection, and environmental licensing of renewable energy projects.

- Literature review in Greek and foreign language literature regarding the types of impacts of wind farms on fauna, avifauna and habitat types, which are the protected objects of the Natura 2000 protected areas under study.
- Preliminary impact assessment including the definition and description of the study area and the field survey area, the identification of species of interest from an analysis of existing information on the area (literature data) and the description of the protected object of the study area, conservation objectives, etc., with a literature review and data collection for the area with regard to fauna - avifauna and habitat types (standard data forms, distribution maps, other literature data, etc.).
- Definition of the methodology for field surveys based on a combination of internationally accepted methods, by group of birds, mammals, reptiles and amphibians and organisation of sampling sites by species group of birds, mammals, reptiles and amphibians, according to ecological requirements and habitat suitability, definition of the timing of measurements, preparation of survey protocols by group of birds, mammals, reptiles and amphibians, and definition of data analysis methodology. Also included is a definition of the methodology and definition of the flora sampling locations in the project area.
- Impact assessment methodology and framework, with an assessment - evaluation of the potential impacts of the proposed wind farm on the selected, due to their importance, species of flora, avifauna, mammals, reptiles and amphibians, taking into account parameters such as: the ecological sensitivity of the species, the sensitivity to impacts from wind farm siting, the estimated magnitude of each impact (based on the presence, abundance and movement patterns of the species in the field survey area such as: Field records - spatial distribution, height and movement patterns (avifauna), critical nesting, roosting and foraging habitats, the spatial extent of the impact on species and their habitats, the population that may be affected, the duration and recurrence of the impact, etc.etc.) as well as an assessment of the synergistic effects both in the study area and in the area close to the wind farm under study, especially for species with a large area of endemism such as raptors.
- Analysis and evaluation of the appropriate impact assessment with analysis of field records, analysis of important species records (Special Protection Area

designation species and other important bird species), impact significance assessment, potential impacts from impacts, impacts from disturbance - containment barriers, impacts from direct habitat loss, synergistic-accumulative impacts at the study area level. Analysis and assessment of the appropriate impact assessment with analysis of field records, analysis of records of important species (Annex II species of Directive 92/43/EEC Special Conservation Area), assessment of the significance of impacts, potential impacts from impacts, impacts from disturbance - containment barriers, impacts from direct habitat loss, synergistic-cumulative impacts at the level of the study area, but also analysis and assessment of the appropriate impact assessment of other fauna species.

- Overall Due Diligence Assessment - Summary of conclusions and proposed mitigation measures.
- Proposed monitoring of avifauna - fauna during the operational phase.

All of the above has been recorded in sections and subsections in such a way that both the above information is included and the above is consistent with the sections of the required Special Ecological Assessment (to include all the sections required in the Special Ecological Assessment)

3. INSTITUTIONAL FRAMEWORK

This section summarises the skeleton of the institutional framework relating to the relevant legislation on the necessity of renewable energy sources as a necessary component for the implementation of an integrated rational planning for climate change mitigation, nature protection and environmental permitting of renewable energy projects. Also in this section, a brief literature review of the impacts of climate change on wildlife is first presented.

Impacts of climate change on wildlife

The global warming observed in recent decades has affected biological systems in a number of ways (Walther et al. 2002). Climate change is causing substantial shifts in species distributions and abundance patterns, and understanding these shifts is a major challenge for conservation biology (Heller and Zavaleta 2009; Parmesan 2006; Stephens et al. 2016; Bagchi et al. 2018). One of the most prominent effects is changes in the phenology and timing of the occurrence and duration of annual cycle phases in various animals and plants (Crick et al. 1997, Brown et al. 1999, Parmesan and Yohe 2003, Parmesan 2006). For example, the duration and occurrence of plant flowering, reproduction and animal migration are some of the phases of the annual cycle that are known to be affected and altered as a result of response to increased temperatures (Crick et al. 1997, Parmesan 2007, Charmantier and Gienapp 2014, Thackeray et al. 2016).

However, although some organisms exhibit very simple annual cycles with a single transition between breeding - non-breeding, others have much more complex cycles (Jacobs and Wingfield 2000, Wingfield 2008). For example, many species of birds and mammals migrate, change plumage/trim, enter hibernation/hibernation/hibernation/hibernation. These additional stages of the annual cycle have also been reported to shift in time due to climate change (Both and te Marvelde 2007; Ozgul et al. 2010; Charmantier and Gienapp 2014; Morrison et al. 2015; Zimova et al. 2016). However, not all of these stages (including reproduction) are necessarily affected in the same way by changes in temperatures (Serreze and Francis 2006, Visser et al. 2006, Visser 2008, Both et al. 2009). Furthermore, since temperatures do not change at the same rate in time or space (Easterling et al. 1997, Vose and al. 2005, Serreze and Francis 2006, Stocker et al. 2013), it is possible that within the same population different parts of the annual cycle also change at different

rates in response to unequal increases in temperatures (Crozier et al. 2008). Climate change unevenly affects annual cycle stages in birds (Van der Jeugd et al. 2009, Eichhorn et al. 2010, Valtonen et al. 2016) and mammal species (Ozgul et al. 2010, Moyes et al. 2011). Such shifts can lead to positive or negative effects that may depend on sex or phenological stage even in the same species.

Of particular concern arises from the possibility that areas that are currently important for supporting species under special protection status may not be suitable in terms of climate conditions for these species in the future (Araujo et al. 2004, Hannah et al. 2007, Bagchi et al. 2018). There is increasing evidence that although many individual sites will experience significant changes in species composition due to climate change, suitable climate for most species will continue to exist (Hole et al. 2009, Araujo et al. 2011, Bagchi et al. 2013). However, there is a high probability that in many cases the location of suitable climate will shift to areas other than where species occur (Hole et al. 2009, Araujo et al. 2011, Bagchi et al. 2013, Baker et al. 2015). Therefore, the continued effectiveness of networks of suitable areas for the conservation of the species for which they are designated will depend on the ability of these species to move between old and new suitable areas (Heller and Zavaleta 2009, Bagchi et al. 2013, Cushman et al. 2013).

In summary, the major changes that may occur in wildlife due to climate change are:

- Changes in the distribution and range of the geographical distribution of species, including local changes at different altitudes.
- Changes in the phenology of migration, including variations in the distribution of species, including local variations in the distribution of species, including local variations in the distribution of species, including local variations in the distribution of species.
- Impact on demographic factors and unpredictable case-by-case population changes.

The most important endogenous and exogenous factors that can affect the ability of species to adapt to new climatic conditions are:

✓ Lack of phenotypic/genotypic adaptability, with species unable to respond to adaptation being more vulnerable.

- ✓ Dispersal capacity, with species with low dispersal being unable to move into the new suitable areas that will result from climate change, particularly where fragmented habitats result.
- ✓ Ecological specialisation, with species that follow generalised feeding patterns and exhibit a greater range of flexibility in meeting their needs for the necessary natural resources (generalist) having a distinct advantage in adapting to new climatic conditions than species that exhibit specialisation in these requirements (specialist).
- ✓ Species with small population sizes will be more vulnerable.
- ✓ The increase in the extremes of certain climate variables as a result of climate change will have additional negative effects on the populations of vulnerable species.
- ✓ The intensity of indirect changes due to climate change in the quality of habitats to which wildlife species are directly linked

According to Huntley et al. (2007), it is predicted that, on average, each European species will shift 550 km north-east by the end of this century, with a multitude of species being negatively affected by climate change. According to them, species that are most threatened are those that are exclusively or almost exclusively distributed in Europe, species with very small current distributions, species that currently live in northern Europe and have no scope to move further north, and species with very little overlap between their current and estimated future distributions.

According to the Climate Change Impact Study Committee, climate change, especially milder winters, is responsible for the observed shift of plant species towards the north and higher altitudes (Vella et al. 2011). In general, southern European species seem to gain the most space and northern European species seem to lose the most space, partly due to limited unoccupied space in the north. It should, of course, be noted that the results that are derived should be treated with the necessary degree of caution as the models only simulate the possible future distribution of species and ideally require confirmation with monitoring data. Climate change has already caused shifts in the distribution of plant species in many parts of the world, including Europe. Future impacts are expected to increase and there are few studies aimed at a general understanding of climate change in relation to species vulnerability at the local level. In a study (Thuiller 2005), dispersal was predicted for 1,350 plant species in Europe

based on seven different climate change scenarios. Applying the IUCN Red List criteria to the projections shows that most of these plant species are likely to become critically endangered. More than half of the species studied will be considered vulnerable or threatened in the year 2080. However, estimates appear to vary widely between different climate change scenarios and between different regions. Certainly, the risks of extinction for Europe's plants may be high, even under moderate climate change scenarios and despite the variability between models. In terms of plant biological cycles, over the last decade, more than 300 plant species in Great Britain have been showing their first flowering 4.5 days earlier (Fitter and Fitter 2002). This is strong biological evidence of climate change. The greatest changes are expected during the transition between the Mediterranean and Euro-Siberian regions.

The need for renewable energy and nature conservation

As the effects of climate change are becoming increasingly noticeable, European countries are already starting to design national strategies and implement their respective national climate change adaptation plans. The impacts of climate change are becoming increasingly evident globally as higher temperatures increase the risk of extinction of certain species and the transmission of infectious diseases, melting ice affects sea levels, water supply and increases the risk of flooding, water scarcity affects both human activities and ecosystems and forced migration from the most affected areas increases the potential for conflict and insecurity.

The European Council of March 2007 noted that in order to stabilise greenhouse gas concentrations in the atmosphere at levels that prevent dangerous anthropogenic interference with the climate system, the overall annual average global surface temperature increase should not exceed 2 °C compared to pre-industrial levels. To achieve this, global greenhouse gas emissions need to be reduced by at least 50 % by 2050 compared to 1990 levels. Greenhouse gas emissions in the Community should continue to decrease beyond 2020 as part of the Community's efforts to contribute to this global emission reduction target. The European Council of March 2007 decided that, pending a global and comprehensive agreement for the post-2012 period, the Community should make a unilateral commitment to achieve at least a 20 % reduction of greenhouse gas emissions by 2020 compared to 1990. In addition, the Council has adopted a target for the Community of a 30 % reduction of greenhouse gas emissions

by 2020 compared to 1990, in order to contribute to a global and comprehensive agreement for the post-2012 period, provided that other developed countries commit themselves to comparable emission reductions and that economically more advanced developing countries contribute adequately according to their responsibilities and respective capabilities.

The European Council adopted an integrated approach to climate and energy policy aimed at combating climate change and increasing the European Union's energy security, and the requirements adopted by the Heads of State and Government included **that 20% of the EU's energy consumption should come from renewable sources.** In January 2008 the European Commission proposed binding legislation to implement the 20-20-20 targets. Known as the "climate and energy package", which was agreed by the European Parliament and the Council in December 2008 and became law in June 2009, it includes legislation including Directive 2009/28/EC "on the promotion of the use of energy from renewable sources" under which binding national targets aim at a 20% share of renewable energy sources in energy consumption at EU level to help reduce the EU's dependence on energy imports and to contribute to the reduction of the EU's dependence on energy imports. The target for the share of energy from renewable sources in gross final energy consumption in 2020, according to the above, is 18% for Greece. However, according to Law 3851/2010 (Government Gazette 85/A/4.6.2010) "Acceleration of the development of Renewable Energy Sources to address climate change and other provisions on issues within the competence of the Ministry of Environment, Energy and Climate Change", the national target for the participation of energy produced from renewable energy sources in gross final energy consumption is increased from 18% to 20%. In Greece, the promotion of changes in energy production and management is also a priority due to the increased contribution of power generation to climate change as 41% of CO_2emissions come from the use of lignite in power generation (WWF 2009, 2013).

At the European Council meeting on 23-24 October 2014, a strategic framework for climate and energy up to 2030 for the EU was agreed. The Council adopted conclusions, and in particular identified four key objectives:

- ✓ A binding EU target to reduce greenhouse gas emissions by at least 40% by 2030, compared to 1990.
- ✓ **A binding EU-wide target of at least 27% of energy consumption from renewable sources in 2030.**

- ✓ An indicative EU-wide target for at least a 27% improvement in energy efficiency in 2030.
- ✓ Support the completion of the internal energy market by achieving the current electricity interconnection target of 10% as a matter of urgency and at the latest by 2020, in particular in the Baltic States and the Iberian Peninsula, with a target of 15% by 2030.

According to the Ministry of Environment and Energy, the exploitation of the high potential of wind energy in our country, combined with the rapid development of technologies incorporated in modern efficient wind turbines, is of huge importance for sustainable development, saving energy resources, protecting the environment and tackling climate change.

Halting the loss of biodiversity is also a key EU priority. The way forward to achieve this objective is set out in the European Commission's Action Plan "Life and death, our natural capital: the EU Biodiversity Strategy to 2020" (COM/2011/244, 3.5.2011). According to Specific Objective 1 of the Annex to the above-mentioned report, full implementation of the two Directives on the conservation of wild birds (79/409/EEC updated by Directive 2009/147/EC on the conservation of wild birds) and natural habitats and wild flora and fauna (92/43/EEC) is required.

The Habitats Directive 92/43/EEC (henceforth referred to as 2009/147/EC) complements the Birds Directive 79/409/EEC, together with the Birds Directive 79/409/EEC, which are the most important Directives that have been transposed into national law and which relate to the protection of sites belonging to the Natura 2000 network and the protection of their species and habitats. According to the aforementioned European Directives, areas have been designated on the basis of specific criteria which have remarkable natural characteristics for protection. These areas are either Special Protection Areas or Sites of Community Importance, which, according to Law 3937/2011 (Biodiversity Conservation and other provisions, Government Gazette 60/A/31.3.2011) are now classified as Special Conservation Areas. In 2017, the inclusion of the new sites and the updating of the national list of Natura 2000 sites was established by means of Decree 50743 (Government Gazette B' 4432/2017) "Revision of the national list of sites of the European Ecological Network Natura 2000", as a product of the project "Monitoring and assessment of the

conservation status of species and habitat types of community interest in Greece", which was co-funded by the ERDF, within the framework of the OP OPEPERAA (NSRF 2007-2013) and implemented by the Department of Biodiversity and Protected Areas of the Ministry of Environment and Energy in the period 2014-2015, covering obligations under Directives 92/43/EEC and 2009/147/EC.

In accordance with Article 6 of Directive 92/43/EEC:

"1. *For special areas of conservation, Member States shall establish the necessary conservation measures, which may entail specific appropriate management plans or integrated into other management plans, and appropriate regulatory, administrative or contractual measures that meet the ecological requirements of the natural habitat types listed in Annex I and species listed in Annex II that occur on the sites.*

2. Member States shall adopt appropriate measures to ensure that in special areas of conservation the degradation of natural habitats and species habitats, as well as disturbances affecting the species for which the areas have been designated, are avoided where such disturbances could have significant effects in relation to the objectives of this Directive.

3. Any project not directly connected with or necessary for the management of the site, but which is likely to have a significant effect on the site in question, either alone or in combination with other projects, shall be duly assessed as to its implications for the site, taking into account its conservation objectives. On the basis of the conclusions of the site impact assessment, and except in the case of the provisions of paragraph 4, the competent national authorities shall agree on the project concerned only after having ascertained that it will not adversely affect the integrity of the site concerned and, where appropriate, after first obtaining the opinion of the public.

4. If, despite the negative conclusions of the impact assessment and in the absence of alternatives, a project must be carried out for other overriding reasons of overriding public interest, including social or economic reasons, the Member State shall take any compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. The Member State shall inform the Commission of the compensatory measures taken.

Where the site in question is a site hosting a priority natural habitat type and/or a priority species, only arguments relating to human health and public safety or to positive effects of primary importance for the environment, or, following an opinion of the Commission, other overriding reasons of overriding public interest may be invoked.

It follows from the above that this Article is to a significant extent relevant to the environmental authorisation of plans and projects likely to affect Natura 2000 sites, by defining the relationship between nature conservation and land use and providing for the need to establish the necessary conservation measures and regulatory, administrative or contractual measures to protect protected sites (paragraph 1), to avoid habitat degradation and significant disturbance of species (paragraph 2), and by defining the need to establish the necessary conservation measures and regulatory, administrative or contractual measures to protect protected sites (paragraph 3), and by defining the need to ensure the protection of protected sites (paragraph 4).

This Directive (92/43/EEC) and Article 6 have been incorporated into Greek law (KYA 33318/3028/98, Government Gazette 1289/B/28.12.1998, and amended by KYA 14849/853/E103/08, Government Gazette 645/B/11.4.2008), while other provisions relating to the environmental permitting of projects and/or the conservation of biodiversity exist in part and contain relevant provisions on the application of paragraphs 3 and 4 of Article 6 of this Directive.

Article 10 of Law 4014/11 (Government Gazette 209 A/21-9-2011): '*Environmental licensing of projects and activities, regulation of unauthorised activities in connection with the creation of an environmental balance and other provisions under the competence of the Ministry of Environment*' refers to the environmental licensing procedure for projects and activities in areas included in the Natura 2000 network, incorporating in its paragraphs the relevant provisions of Article 6 of Directive 92/43/EEC.

Article 1 of Law 3851/10 (Government Gazette 85 A/4-6-2010): 'Acceleration of the development of Renewable Energy Sources to address climate change and other provisions on issues under the competence of the Ministry of Environment, Energy and Climate Change' states that: In Article 1 of Law 3468/2006 (Government Gazette 129 A), the existing provision is renumbered as par. 1 and paragraphs 2 and 3 are added as follows: "2. **Climate protection, through the promotion of electricity production from renewable energy sources, is an environmental and energy priority of the**

highest importance for the country. 3. The national targets for renewable energy, based on Directive 2009/28/EC (OJ L 140/2009), are defined until 2020 as follows: a) 20% share of energy produced from renewable energy in gross final energy consumption. b) At least 40% share of electricity produced from renewable energy in gross electricity consumption. A decision of the Minister of Environment, Energy and Climate Change, issued within three months of the publication of this Law, shall determine the desired ratio of installed capacity and its distribution over time between the different RES technologies, the categories of producers, the distribution between them, the reasons for its revision, as well as the reasons and the procedure for any necessary suspension of the licensing procedure and its removal. Installed capacity is defined as the total capacity of the generating stations in normal and test operation. This decision shall be reviewed every two years or earlier, if there are important reasons related to the achievement of the objectives of Directive 2009/28/EC (replacement based on paragraph 8 of Article 30 of Law 3889/10, Government Gazette 182 A/14-10-10). c) Participation of energy produced from RES in final energy consumption for heating and cooling at least 20%. d) Participation of energy produced from RES in final energy consumption in transport at least 10%."

Also, according to Article 8 of the above mentioned law, which concerns the amendment of provisions to more effectively address climate change:

1. The title of Article 8 of Law 1650/1986, as amended, is amended to "Measures for the protection of the climate and the atmosphere", paragraphs 1, 2 and 3 thereof are renumbered 2, 3 and 4, respectively, and a new paragraph 1 is added as follows:

> "1. By adopting appropriate measures, priority shall be given to the promotion of renewable energy sources as a means of combating climate change, protecting the atmosphere, ensuring sustainable energy supply, achieving sustainable development and the sustainable use of the country's sources of national wealth.

2. In Article 19 of Law 1650/1986, paragraph 6 is added as follows:

> "6. Exceptionally, in the areas (a) of paragraphs 3, 4 and 5 of this Article, excluding possible parts of these areas that constitute areas of paragraph 1, wetlands of International Importance (RAMSAR wetlands) and priority habitats of areas of the Territory that have been included in the NATURA 2000 network, in accordance with Commission Decision 2006/13/EC, as well as (b)

in the adjacent areas of paragraph 4 of Article 18 of this Law, the installation of renewable energy plants is allowed as a means of climate protection, provided that the terms and conditions established within the framework of the approval of the environmental conditions of the plant ensure the preservation of the protected object of the area."

3. In par. 1 of Article 2 of Law no. 2742/1999 (Government Gazette 207 A'), the following subparagraph d' is added:

"d. To protect the climate and the atmosphere and to promote the energy self-sufficiency of the country through the use of Renewable Energy Sources."

4. Para. 2 of Article 2 of Law No. 2. 2742/1999, the following subparagraph (lb) is added as follows:

"lb. The priority promotion of Renewable Energy Sources, with a view to the sustainable exploitation of the sources of national wealth, in accordance with international and Community obligations.".

In accordance with H.P. No 37338/1807/E.103 of the Decree on the '*Establishment of measures and procedures for the conservation of wild birds and their habitats/habitats in accordance with the provisions of Directive 79/409/EEC of the European Council of 2 April 1979 on the conservation of wild birds, as codified by Directive 2009/147/EC*'. and in particular paragraphs 2, 3.1, 3.2 and 3.3 of Article 5 thereof, concerning measures for the protection and conservation of Special Protection Areas, it is stated that

2. Any plan or programme falling within the provisions of Decree No 107017/2006 (B 1225), not directly linked to or necessary for the management of a Special Protection Area, but which may have a significant impact on it, alone or in combination with other plans or programmes, shall be duly assessed in terms of its effects, taking into account the conservation objectives of the Special Protection Area concerned. On the basis of the conclusions of the assessment of the impact on the Special Protection Area, the competent authority shall agree to the approval of the plan or programme concerned only if there are no significant adverse effects on the ecological balance and integrity of the Special Protection Area.

3.1 Any project or activity not directly related or necessary for the management of a Special Protection Area, but which is likely to have a significant effect on

it, alone or in combination with other projects or activities, shall be subject to an appropriate assessment of its impact, taking into account the conservation objectives of the Special Protection Area concerned.

3.2 For each project or activity for which the approval of environmental conditions is foreseen, according to the provisions of articles 3 and 4 of Law 1650/86, as applicable, the assessment of the impacts on the Special Protection Zone is carried out during the procedure of preliminary assessment and evaluation and approval of environmental conditions of the project or activity, according to the applicable provisions, taking into account the relevant ornithological data which the interested party is obliged to submit. On the basis of the conclusions of the assessment of the impact on the Special Protection Area, the competent authority shall agree to the project or activity only if it does not have significant negative effects on the ecological balance and the integrity of the Special Protection Area.

3.3 If, despite the negative conclusions of the impact assessment and in the absence of alternatives, a project or activity must be carried out for other overriding reasons of overriding public interest, including social or economic reasons, the competent authority shall take any compensatory measures necessary to ensure that the overall coherence of the NATURA 2000 network is protected.

According to paragraph 8 of Article 5 of Law 3937/11 (Government Gazette 60 A/31-3-2011): 'Conservation of biodiversity and other provisions', it is stated that: "*In the areas: (a) of paragraphs 3, 4, 5 and 6, with the exception of parts of them that constitute areas of paragraphs 1 and 2, wetlands of international importance (RAMSAR wetlands) and priority habitats of areas of the Territory that have been included in the Natura 2000 network, in accordance with Commission Decision 2006/613/EC, and (b) in the adjacent areas of paragraph 4 of Article 18, the installation of renewable energy plants shall be permitted as a means of climate protection, provided that the terms and conditions laid down in the environmental permit for the plant ensure the preservation of the protected object of the area.*" The above-mentioned permitted areas referred to in paragraphs 3, 4, 5 and 6 of Article 5 of this Law are the areas designated as Natural Parks (National Parks and Regional Parks), Habitat / species management areas (Habitat / species

management areas) which are divided into Special Conservation Zones, Special Protection Areas and Wildlife Sanctuaries, the areas designated as Protected landscapes/seascapes, Protected natural formations and Aesthetic forests, Riparian forests, Protected forests and Protected natural monuments. The parts of these excluded and referred to in Article 5(1) and (2) above are those parts of the above which constitute Strict nature reserves and Nature reserves.

Also in the above law, and specifically in paragraph 5 of Article 9, which refers to the regulations for the protection and management of Natura 2000 sites, it is stated that: "The first subparagraph of paragraph 2 of Article 6 of the Joint Ministerial Decision of the Ministers of Interior, Public Administration and Decentralisation, National Economy and Finance, Development, Environment, Spatial Planning and Public Works, Agriculture, Merchant Shipping and Culture of 11.12.1998 (Government Gazette 1289 B) is amended as follows: In Special Conservation Zones and Special Protection Zones, outside priority habitats and habitats of priority species, the siting of projects and the approval of projects, whose impacts have been assessed as very significant in the respective environmental impact study, shall be permitted, on a case-by-case basis, only if, on the basis of sufficient documentation, they are assessed as being of imperative public economic or social interest, there is no alternative solution and adequate compensatory measures have been provided for in the case, so that Within two months of the approval of such projects and plans, the Minister for the Environment, Energy and Climate Change shall inform the European Commission of the expected impacts and the compensatory measures taken.

In accordance with Commission Decision No. H.P. 8353/276/E103: "Amendment and supplementation of Joint Ministerial Decision No. 37338/1807/2010 "Determination of measures and procedures for the conservation of wild birds and their habitats/habitats, in compliance with Directive 79/409/EEC...." (B 1495), in accordance with the provisions of the first subparagraph of Article 4(1) of Article 4 of Directive 79/409/EEC of the European Council of 2 April 1979 on the conservation of wild birds, as codified by Directive 2009/147/EC. and, in particular, in accordance with Articles 5 A and 5 B thereof, specific protection measures for the implementation of projects and activities and specific protection measures (measures, conditions and restrictions) for the installation and operation of wind power plants.

Indicative of the above are those listed in paragraphs 1, 3 and 4 of Article 5 B:

"*1. The installation of wind power plants within Special Protection Zones, whose boundaries are identical to the boundaries of Wetlands of International Importance (Ramsar), as submitted to the Secretariat of the Ramsar Convention, Law 191/74 (A 350), Law No. 1751/88 (A 26) and Law No. 1950/91 (A 84). If the boundaries of a Special Protection Area exceed the boundaries of the relevant Ramsar wetland, then the installation of wind farms is not allowed within a radius of three (3) kilometres (within the Special Protection Area) from the boundaries of the wetland.*

(...)

3. For the installation of wind farms within areas designated as Special Protection Areas, with one of the following spatial and/or colonial species: Gyps fulvus, Neophron percnopterus, Aegypius monachus, Gypaetus barbatus, Aquila chrysaetos, Haliaeetus albicilla, Hieraaetus fasciatus, Falco eleonorae, Ciconia nigra, Falco naumanni, Falco peregrinus, Circus aeruginosus, Circus pygargus, Hieraaetus pennatus, Buteo rufinus, Falco biarmicus, Pelecanus crispus, Pelecanus onocrotalus, Larus audóuinii, Calonectris diomedea and Puffinus yelkouan, it is necessary that, in order to ensure that the measures provided for in Articles 10 and 11 (par. 8, 9 and 10) of Law No. 4014/2011, in addition to the specialised ornithological data provided for in paragraph 2 of Article 5A, must also define a perimeter exclusion zone from nests and/or colonies of the aforementioned species of designation. This determination shall take into account the size and technical characteristics of the project, the locations and number of nests of the species concerned, the classification of nests into active, inactive and historical nests, the importance of colonies, the mapping of the feeding areas of the species and their flight patterns, the correlation of these with the location of the wind turbines, the protection measures and other relevant parameters.

3.1 The impacts on the population of the species of interest considered in the definition of the perimeter exclusion zone in each case are: a) bird

strike/collision mortality, b) change in habitat structure and c) habitat displacement.

4. In the decision on the approval of environmental conditions (AEPO), issued in accordance with the relevant provisions of Law No. 4014/2011, for the installation and operation of wind farms within areas designated as Special Protection Areas, includes the obligation to use underground power cables or, where this is not feasible, twisted insulated overhead power cables for connection to the grid, and the obligation to regularly check the site of the station (weekly or more frequently as appropriate) and to remove dead animals (mainly livestock), the presence of which could attract scavenging birds of prey. Consideration should be given to the possibility of installing acoustic, visual or other signage, in relation to the layout of the wind farm, its distance from the cliff edge and nesting, feeding and resting sites, its scale and size.

4. LITERATURE REVIEW OF THE POSSIBLE EFFECTS OF WIND FARMS ON FAUNA, BIRDS, HABITAT TYPES AND FLORA

Effects on avifauna

In order to draw firm conclusions that will allow the competent authorities to verify whether the project under consideration will have a negative impact on the integrity of the site, an appropriate and justified assessment based on the Directives on the conservation of rare and endangered species and habitats of European interest is required, based on reliable scientific field data and literature. An understanding of the negative effects that wind power stations can have on bird fauna and flora is an essential tool for properly determining the appropriate assessment and evaluation of the effects that wind power stations can have on the structure and functioning of the study area, so that the question of whether or not the integrity and conservation objectives of the Natura 2000 site and the coherence of the Natura 2000 network are affected can be answered with the greatest possible certainty.

In accordance with Commission Decision No. H.P. 8353/276/E103: "Amendment and supplementation of Joint Ministerial Decision No. 37338/1807/2010 "Determination of measures and procedures for the conservation of wild birds and their habitats/habitats, in compliance with Directive 79/409/EEC...." (B 1495), in accordance with the provisions of the first subparagraph of Article 4(1) of Article 4 of Directive 79/409/EEC of the European Council of 2 April 1979 on the conservation of wild birds, as codified by Directive 2009/147/EC.

The effects on the population of the designation species considered in the definition of the perimeter exclusion zone in each case are:

- bird strike/collision mortality,
- the change in habitat structure, and
- the displacement of birds from habitats (habitat displacement).

In addition, according to Commission Decision No. οικ. 170225 (Government Gazette 135/B/27-01-2014): for the due assessment and evaluation of the impacts of the project or activity under consideration (including alternatives and synergistic and cumulative impacts with other projects or activities), the data set and methods used are described and each case where the project may:

- Causes a delay or interruption in the progress towards achieving the conservation objectives of the Natura 2000 site concerned as established.
- Reduce the extent or fragment the habitat types of the Natura 2000 site, thereby threatening its integrity, or affect the representativeness and degree of conservation of its structure and ecological functions.
- Reduce the population size of species or affect the degree of conservation of their habitats or fragment them or affect the balance between species or affect the degree of isolation of species.
- Cause changes in vital parameters (e.g. nutrient balance, soil degradation from potential erosion dynamics of the relationships between biotic and abiotic parameters) that determine how the Natura 2000 site concerned functions.
- Interact with predicted or expected natural changes in the Natura 2000 site concerned.

Based on the available Greek and foreign-language literature, the main categories of impacts from the installation and operation of wind farms are grouped into **impacts due to direct or indirect** (due to disturbance) **habitat loss**, due respectively to habitat alteration or indirect habitat loss due to noise, visual disturbance, etc, **impacts due to impact on wind turbines** resulting in the killing or injury of individuals and **impacts due to the creation of barriers-barriers to bird movement** (European Commission 2011; Gove et al. 2013; Schuster et al. 2015; Gibson et al. 2017). The topography of the installation site, the habitats affected, the number and species of birds observed in the area are some of the parameters that influence the intensity of potential induced impacts (Strickland et al. 2011), with areas that are a concentration site for large numbers of birds due to the increased presence of a habitat resource essential to the biology of these species, such as wetlands, or areas that are important migratory species passage zones appearing to be more sensitive.

Disturbance can be observed during construction and/or during the operation of wind farms, and can be caused either by the presence of wind turbines (visual or acoustic disturbance), or as a result of the movement of vehicles and personnel (Rydell et al. 2012), or by increased accessibility (to humans and predators) due to the opening of new roads, or by increased sensitivity to predation due to disturbance, etc. Birds may avoid an area completely (complete exclusion), be present but in reduced numbers

(partial displacement), or remain in the wind farm area after construction but be subject to other disturbance effects such as reduced productivity or increased mortality (Gove et al. 2013). Especially for spatially-dominant species, the presence of wind farms near nesting areas may increase, in addition to the risk of collision, the likelihood of nest abandonment by pairs, and in the absence of alternative sites, pairs are likely to remain on site without completing breeding efforts (WWF 2013). Predator species are generally more sensitive to disturbance impacts near nesting areas and their activity in the vicinity is more intense, hence it is generally recommended to avoid siting in close proximity to known nesting sites (Bright et al. 2009). Potential displacement from their foraging area may also affect their choice of nesting site. Cases of displacement from foraging - hunting areas have been reported in the literature, mainly for predatory species (Hotker et al. 2006, Pearce-Higgins et al. 2009, Smallwood et al. 2009). Distances of disturbance can vary and usually depend on the species studied. For example, Pearce-Higgins et al. (2009) in the UK report reductions in the frequency of occurrence and densities of some species (*Buteo buteo, Circus cyaneus*) at distances of 500m from turbines of 15-53%, while no changes in the flight height of raptors were observed near turbines. The movements observed are most likely to be transient in nature and then the species, accustomed to the low-level disturbance, return to their previous activity. Fielding and Haworth (2013) observed a decrease in *Aquila chrysaetos* activity in the area during the first period of wind farm operation, with activity subsequently returning to its original levels. Significant evidence of displacement of the species was reported by Fielding and Haworth (2010) at three wind farms in Scotland. A study conducted in the USA estimated a 47% reduction in raptor abundance following the construction of wind farms, with most individuals remaining within a hundred metres of wind turbines, and impact mortality was estimated to be very low (Garvin et al. 2011). However, some studies have reported an increase in flight activity of some species near wind farms (Barrios and Rodriguez 2004; Smallwood and Thelander 2004; Smallwood 2007; Smallwood et al. 2009). There are studies reporting displacement of predator species from their breeding territories and cases of nesting of predators in close proximity to wind turbines (Janss 2000, Dahl et al. 2011). According to Pearce-Higgins et al. (2012) there is evidence that disturbance during the construction phase may be more significant and more determinative than disturbance during the operational phase of the wind farm. A reduction in occupied territories after wind farm construction (partly due to disturbance effects) has been

reported for sea eagle in a region of Norway (Bevanger et al. 2010, Dahl et al. 2011), while a similar study of *Circus cyaneus* nesting in close proximity to a twenty-eight turbine wind farm in Scotland found that the species continued to nest in very close proximity to the turbines, flight density in the wind farm installation area decreased after the construction phase, and no significant impact was found on population density or breeding success (Forrest et al. 2011). Struthomorphs are not considered particularly sensitive at the population level to wind farm impacts (Gove et al. 2013) due to the different evolutionary growth strategies they use (r-selection species), and in some cases increases in some species have been recorded following wind farm construction, possibly in response to new habitat creation (Bevanger et al. 2010, Pearce-Higgins et al. 2012). In most cases, disturbance impacts on these species are limited to a short distance from the installed wind turbines, are not likely to cause changes in the abundance of breeding species and may occur during the construction phase and subsequently be eliminated (Leddy et al. 1999; Hotker et al. 2006; Devereux et al. 2008; Pearce-Higgins et al. 2009; Rydell et al. 2012; Battisti et al. 2014). In particular, Leddy et al. (1999) found increasing densities of oystercatchers in grasslands (as distance from turbines increased) and higher densities in the reference area compared to 80 m from turbines, confirming displacement, at least in this case, and similar patterns are reported by Pearce-Higgins et al. (2009) and Bevanger et al. (2010). Pearce-Higgins et al. (2009) report displacements 100 - 200 m from the turbines for *Anthus pratensis* and *Oenanthe oenanthe*. Reduced densities (~12%) are also reported by Fernandez-Bellon (2018) in Ireland (in upland areas with wind turbines compared to witness areas without wind turbines) with most obvious/significant effects within 100 m of wind turbines (~30% reduction). Hale et al. (2014), in grasslands in the USA, did not detect displacement within 500-750 m of wind turbines for the three most abundant species. In contrast, Reichenbach and Steinborn (2011), report that (during a seven-year BACI survey of grasslands in Germany) there were no displacement effects for most breeding species, while effects were more evident for stationary (migratory) species (this is also inferred from Hotker's 2017 review). Very small displacement impacts also emerge from a study in Portugal (Bernardino 2011) and Spain (Farfan et al. 2009) while studies on wintering species in agroecosystems showed very small impacts (Devereux et al. 2008). Also, a study in Italy (two years, at wind farms at an altitude of 800 - 1,300 m) (Battisti et al. 2014) showed no difference in abundance (and number) of breeding species between the wind farm site and the witness (control) site

while Bennett et al. (2014) studying bush-nesting stratiforms in the USA, report a general lack of correlation of breeding success of different species with distance from wind turbines. Another study in Italy (four years before and four years after construction) (Garcia et al. 2015) reports a small decrease in the abundance of ostrich species in the construction phase, and a gradual increase thereafter. In an extensive BACI survey in the USA (three wind farms in grassland habitats in 2003 - 2012, investigating for impacts, displacement or attraction, one year after construction or 2 - 5 years after) (Shuffer and Buhl 2015), displacement impacts were identified for 7 out of 9 breeding species (while attraction was observed for one species and no differentiation was observed for another) (Shuffer and Buhl 2015), . Displacement (and recruitment) was generally observed within 100 m and often extended to 300 m, with impacts observed one year after construction and for at least five years. In a year-round study of bird biocommunities at a wind farm in Poland (Rosin et al. 2016), among the variables affecting species diversity and abundance was the distance to the nearest wind turbine (positive correlation). For wintering wetland species (wading birds and waterfowl), disturbance distances (i.e. the distance from wind farms to which birds are absent or less abundant than expected) were 850 m (Pedersen and Poulsen 1991, Kruckenberg and Jaene 1999, Larsen and Madsen 2000, Madsen and Boertmann 2008), while 600m is considered the maximum distance that has been reliably recorded (Langston and Pullan 2003, Drewitt and Langston 2006). Thus, making the assumption that there is no 'habituation', Gove et al. (2013) propose a complete avoidance zone of 300m radius (from wind turbines) and displacement at 600m. For breeding waders, the distances of disturbance reported are generally shorter (Hötker et al. 2006, Bevanger et al. 2010), but to draw more secure conclusions, a long-term investigation of the effects is needed (to consider the reaction of new individuals in the population). In most cases, distances of disturbance up to 500 m are reported (Hötker et al. 2006, Pearce-Higgins et al. 2009, Bevanger et al. 2010), while some species show a higher sensitivity (*Numenius arquata*, 800 m). Fielding and Haworth (2015a, 2015b) studied the presence of two breeding species (*Calidris alpina, Pluvialis apricaria*, wetland/upland moorland and tundra species) at a wind farm in Scotland, did not detect changes in the abundance and location of dominance (while another study using the BACI method observed declines for *Pluvialis apricaria* at 400 m from wind turbines in the operational phase, Sansom et al. 2016). A BACI study in Bulgaria (Zehtindjiev et al. 2017), reported that when comparing patterns in wintering populations of *Branta*

ruficollis in an area with 200 wind turbines, no evidence of disturbance was detected (compared to the situation before the wind farm was built).

Direct mortality of birds can be caused by impacts on the wind farm facilities and especially on the wind turbines (but also on the pylons, cables, wind masts, etc.). The probability of impact on wind farms can be influenced by a multitude of factors related to the installation site, the characteristics of the wind farm, and the number and characteristics of species operating in the wind farm site (Marques et al. 2014, Zwart et al. 2016). Rydell et al. el (2012, 2017) in a review and meta-analysis of the literature, report that mortality rates are higher at wind farms near wetlands and in coastal areas and ridges, and generally lower in open farmland and other habitats. Greater risk on ridges, and especially in gaps and notches, is also reported by the USFWS (2003). Katzner et al. (2012), studying the flight patterns of individuals of *Aquila chrysaetos* on local movements or migration (in the US, via satellite telemetry), reported that presence was more common at low altitudes over areas with steep slopes and ridges (where updrafts are generated, especially on the foothills), while birds were observed at higher altitudes in areas with gentler slopes. Birds of large body size exhibiting limited manoeuvrability (such as swans, geese and scavengers) are generally at greater risk of impact with installed turbines (Brown et al. 1992, Janss 2000) and species that typically fly at dawn and dusk or at night are less likely to detect and avoid them (Larsen and Clausen 2002). However, according to Rydell et al. 2012, the sensitivity of nocturnal species, to impact impacts is low. For vultures in particular, there is evidence that their sensitivity to impacts is also related to their vision adaptations (for foraging, field of view towards the ground rather than in the direction of flight; Martin et al. 2012). Carrete et al. (2011) report that *Gyps fulvus* mortality is related to the distribution and concentration of the species (colonies, rookeries) in the area, concluding that it is significantly related to the relative location and distance from critical habitats of the species. The risk of collision may vary for each species depending on age, behaviour and stage of the annual cycle, and is clearly influenced by weather conditions, with an increase in collisions due to poor visibility (low cloud cover or rain), strong headwinds, etc.etc. (Karlsson 1983; Winkelman 1992b; Richardson 2000; Erickson et al. 2001; Skov and Heinänen 2015). Also, the time of year may affect the probability of collision of large scavengers due to its effect on the warm updrafts used by these species. According to Barrios and Rodriguez (2004), incidents of vulture strikes occurred at an increased rate during autumn and winter due

to the absence of thermal updrafts and the use of upslope currents near wind turbines. Also the seasonal variation in wind intensity may affect the probability of impact of these species due to its effect on the maneuverability of these birds (Barrios and Rodriguez 2004). Regarding predator species, there also seems to be a clear differentiation between hawks (lower sensitivity with the exception of the rockhopper) and other predator species. Oystercatchers and other terrestrial species show lower impact impacts (Bright et al. 2009) however may be sensitive during migration (Marques et al. 2014).

The exact location of the wind farm, the size and layout of wind turbines and rotor speed may be critical variables affecting impact mortality. A more recent post-analysis for 15 wind farms (Marques et al. 2017b) found that the important parameters were orientation (higher mortality in northwest-facing locations), vegetation type (higher mortality in shrublands) and slope (higher in relatively flat areas). Particular topographical features likely to be used by bird categories to gain height or the particular topography of the wind farm site that may 'drive' large numbers of birds towards a particular wind farm site may increase impact mortality rates. The potential effects of wind turbine lights are poorly understood with no strong correlation (Rydell et al. 2012), although cases of high mortality in migratory oystercatchers attributed to disorientation due to lights have been reported (Gauthreaux and Belser 2006).

Collision rates per wind turbine vary considerably with the average ranging from 0.01 to 60 bird collisions per year (Drewitt and Langston 2008; Gove et al. 2013). Lekuona and Ursua (2007), during a three-year study at 13 wind farms in Spain (Navarra), calculated a collision risk index (specific risk index) for species in the region, based on the proportion of observation time in the rotor sweep zone relative to the total observation time of each species. This is a risk index based on the behaviour and ecology of the species ('how often they are in the danger zone'), but without taking into account the inherent sensitivity of some species due to e.g. low manoeuvrability, etc. As expected, this index is generally higher for predators and other large species (0-27%), and very low (0-9%) for most oystercatchers and other terrestrial species (which generally move at a lower altitude than rotifers).

Although site use depends to a considerable extent on the area, it is worth mentioning that in this study, the risk index was high for *Ciconia ciconia*, two species of the genus *Milvus*, *Gypaetus barbatus*, *Neophron percnopterus*, *Hieraaetus pennatus* and *H. Fasciatus*, and *Falco tinnunculus*. With regard to oystercatcher (and other

terrestrial) species, the highest index values were for species such as *Tachymarptis melba*, *Lullula arborea*, *Anthus campestris, A. trivialis* and *Pyrrhocorax pyrrhocorax.* Finally, it should be noted that when monitoring mortality from impacts in the same study, the highest values concerned the species *Gyps fulvus*, for which the risk index was relatively low (5.5%).

In a comprehensive analysis of findings for 44 wind farms in Portugal (2005-2015, Marques et al. 2018), the most frequent findings were from *Delichon urbicum, Apus apus, Alauda arvensis, Lullula arborea, Sylvia undata, Alectoris rufa, Buteo buteo, Gyps fulvus, Falco tinnunculus, Ficedula hypoleuca, Phylloscopus collybita, Circus pygargus.* These are mainly species that feed in the air in flocks (swallows/ ashtrays, they may also be attracted near wind turbines to feed on insects) and species of the family Alaudidae that also flock (outside the breeding season), fly display flights (at high altitude) during the breeding season and their habitat often coincides with wind farm development areas. In general, it appears that species of the family Alaudidae show increased susceptibility to impacts (Erickson et al. 2014, Bastos et al. 2016, Grunkorn et al. 2016).

In a particularly extensive four-year survey in Germany at 46 wind farms at low altitudes (Grönkorn et. al. 2016 PROGRESS project) 291 findings were identified, most commonly *Columbα palumbus, Anas* platyrhynchos*, and Buteo buteo, Vanellus vanellus, Pluvialis apricaria, Milvus milvus, Falco tinnunculus.* Extrapolating the results to the wider area, this is 0.4% of the breeding population for *Columba palumbus*, 4.5% for *Anas platyrhynchos* and 7% for *Buteo buteo*, while population impacts may occur for *Buteo buteo, Milvus milvus.* According to another database, the most common victims at wind farms in Germany are *Buteo buteo, Milvus milvus, Haliaeetus albicilla* (De Lucas and Perrow 2017). In Spain the most common victims are *Gyps fulvus, Falco tinnunculus, Circaetus gallicus*, while proportionally (relative to the population) many victims are also from *Hieraaetus pennatus, Falco tinnunculus, Circus pygargus.*

Note that the relationship between site use by predators (or abundance/density) and mortality (from impacts) is not clear and it appears that such a relationship is not universal, but is highly dependent on species behaviour and site topography (Erickson 2009 , Grünkorn et al. 2017). This is also evident from Ferrer et al. (2011) who studied site use (before construction) and mortality (during operation) data for 53 wind farms in Spain. Although there was a remarkable variation in site use in the different parks,

this variation was not significantly correlated with the mortality observed during operation. Similar conclusions (lack of correlation between abundance and mortality) were reached by de Lucas et al. (2008) and Garvin et al. (2011). In contrast, Lazo et al. (2012) using a larger corresponding dataset (also in Spain, 154 wind farms), report a correlation between site use (before construction) and mortality and the same conclusion is reached by Kitano and Shiraki (2013). In the aforementioned extensive study in Germany (Grönkorn et. al. 2016, PROGRESS project), no correlation was found between flight activity for *Buteo buteo* and collision casualty detection (and estimation via the Band model led to an underestimation of casualties). Rydell et al. (2012) in a literature review estimated a median mortality value of 2.3 dead birds per wind turbine per year, with values being higher in studies in Europe than in North America. In a literature review for Canada, Zimmerling et al. (2013) reported mortality values from 0 to 26.9 birds per wind turbine per year, with a median value of 8.2. Some of the highest mortality levels have been recorded for raptors in Altamont Pass (7.000 turbines) in California (Howell and DiDonato 1991, Orloff and Flannery 1992) as well as at Tarifa and Navara in Spain, Zeebrugge in Belgium (mainly gulls and terns, Everaert and Stienen 2008) and in recent years there has been a notable mortality (impacts, 39 individuals in 2006-2010) of *Haliaetus albicilla* at a wind farm on Smoela Island (Norway, Bevanger et al. 2010, Dahl et al. 2011). These cases were of particular concern because they involved relatively rare and long-lived species (such as *Gyps fulvus* and *Aquila chrysaetos)* that have low reproductive rates and are more vulnerable to additional mortality). However, at Altamont, replacement of old-style wind turbines with new turbines appears to have resulted in a reduction in mortality (Smallwood and Karas 2009). In some cases, papers report potentially significant population impacts for some species such as *Neophron percnopterus* (Carrete et al. 2009) and *Milvus milvus* (Bellebaum et al. 2013, Sanz-Aguilar et al. 2015). The effect of tower height as well as the sweep area of wind turbines is not clear (AWWI 2014) and is highly dependent on both species and site (Marques et al. 2014). Despite the given potential impact of wind farms on avifauna, there is a plethora of published studies reporting that bird mortality at wind farms is very low compared to mortality from other causes (Erickson et al. 2001; Kerlinger 2001; Percival 2001; Langston and Pullan 2003; Marris and Fairless 2007; Zwart et al. 2016; Gibson et al. 2017), with the National Academy of Sciences (2007) reporting that only 0.003% of bird mortality from anthropogenic causes is due to wind turbines.

Impacts from collision with avian wind turbines during migration do not appear to be very high, with the exception of migratory passes, as the flight height of birds is usually greater than the height of wind turbines and therefore collision rates are usually very low and without impact on the population (Richardson 2000; Kunz et al. 2007, Erickson et al. 2006, Zehtindjiev and Whitfield 2009), and birds during the day appear to have the ability to detect and avoid wind turbines. According to de Lucas et al. (2004) in the majority of cases of birds approaching wind turbines (72%) birds appear to perceive them to change direction with the proportion being even higher when the rotors are in motion, and the above avoidance ability is reported by other studies (Smallwood and Thelander 2004, Smallwood et al. 2007, Johnston et al. 2014).

The impact of direct loss or change in habitat structure and fragmentation from the installation of a wind farm is considered to be small (Bright et al. 2009, Percival 2000, Gove et al. 2013), although this depends on the area occupied. More significant in this case are considered to be the impacts on rare species with restricted distributions likely to be present at the installation site and the cumulative effects of multiple projects on habitat area. Actual habitat loss is typically in the range of 2 to 5 % of the total area of the development site (Fox et al. 2006) or 5 - 10 % (Silva and Passos 2017). More extensive impacts may also occur in specific habitats due to hydrological changes, changes in microclimate, severe post-construction erosion, introduction of alien species, etc. (Gave et al. 2013). Habitat changes may also result in increased density for some ostrich species (Pearce-Higgins et al. 2012) or increased flight activity for some predators. In a review of a large number of wind farms in Canada (Zimmerling et al. 2013), direct habitat loss was estimated at 1.23 ha per wind turbine (including associated projects). Battisti et al. (2016) in a study of wind farm installation in a Mediterranean landscape with a mosaic of oak forests (Abruzzo, Italy), with wind turbines (and associated infrastructure) covering about 10% of the area (i.e. limited local perforation/dissection effects) did not identify differences between the wind farm area and the witness area, in terms of the composition and structure of the avifauna biocommunity (in terms of species diversity, relative abundance, etc.). Habitat fragmentation is expected to have an effect on species abundance and diversity only in cases of very large area loss, e.g. >70% (Andren 1994, Parker and Mac Nally 2002).

The effect of wind farms as a containment barrier mainly relates to the fact that birds have to increase energy expenditure to avoid all the turbines when moving

between roosting, feeding, breeding, etc. The magnitude of the effect depends on the species of bird, type of movement, flight altitude, distance from the turbines and their layout, time of day, and wind strength and direction, and can range from a slight delay in flight to significant diversions that can reduce the number of birds using the wind farm airspace. However, the above impact is not usually significant for bird populations (EC 2010, Rydell et al. 2012), although cases have been reported where, although no change in species numbers and population sizes were observed following wind farm construction and operation, changes in species passage behaviour were identified, with most species flying at higher altitudes than pre-wind farm installation patterns (Tome et al. 2011, Tome et al. 2012). Although, no changes in species numbers and population sizes were observed after construction and operation, changes in species passage behaviour were detected. Thus, the movements of medium-sized predators (*Aquila fasciata*, *Hieraaetus pennatus*, *Pernis apivorus*) near the A/G were reduced, while the passage patterns of other species (e.g. *Gyps fulvus*, *Aegypius monachus*, *Circaetus gallicus*) were not affected. Also, most species passed at higher altitudes (compared to pre-wind farm patterns). In a similar study in Portugal (Tome et al. 2017 , a wind farm with 25 wind turbines), no macro-avoidance patterns were identified, but mid-avoidance patterns (wind turbines and wind turbine lines) were found for *Hieraaetus pennatus* and *Pernis apivorus* (reduction of crossings in proximity, increase in minimum distance from wind turbines, flight altitude), with *Pernis apivorus* appearing more sensitive (changing course at greater distance and making "spiral" flights when within the wind farm). The responses of *Gyps fulvus* to the presence of wind turbines were much more limited. Similarly, in the case of a wind farm in Sweden, a comparison of migratory bird passage patterns before and after construction showed clear avoidance of the wind farm area by the birds as they passed through the adjacent areas more frequently during operation (Bernhold et al. 2013), and Farfan et al. (2009) reported that most of the transits were parallel to the wind turbines rather than between them. In an extensive study in an area of significant migration in Mexico (Cabrera-Cruz and Villegas-Patraca 2016), the effect of a wind farm (~7.5 km long at the end of the investigation) on the migration patterns of migrating raptors (direction and 'crossings' with the wind farm site, before and after construction), and fewer 'crossings' were identified after construction (i.e. macro-avoidance). Macro-avoidance in terms of swan migration crossings after wind farm construction was also identified in a study in Japan (Moriguchi et al. 2017) and for

predators in an offshore wind farm between Denmark and Sweden (Jensen et al. 2017). Some cases are reported in the summary by Schuster et al. (2015), mainly for offshore wind farms (Masden et al. 2009, Pettersson 2005, 2006). For example, at a wind farm in Sweden, a very small increase in covered distance of 0.2-0.5% is reported (due to a change in migratory pathway), while an increase in "energy costs" of 0.5-0.7% is reported for a species of the genus Somateria during migration. Some additional examples are also given in the Section above on impacts (paragraph on avoidance).

Studies on the impact of wind farms on the avifauna in Greece and more specifically in the region of Thrace have been carried out, both by WWF Hellas and by other scientists, with proposals for the correct siting of wind farms. WWF Hellas (2008) presented the "Proposal for the proper siting of wind farms in Thrace", which delineates locations and areas of exclusion and increased protection, while in 2013, taking into account new field data, it published the revised proposal for proper siting for Thrace, which updates and replaces the previous one (WWF 2013), again proposing the definition of Exclusion Zones for the siting of wind farms (high use zones of *Aegypius monachus* and *Gyps fulvus*, high frequency zone of Black-backed Gull, areas of the National Park of Dadia - Lefkimi - Soufli Forest and Evros Delta, Loutroi pine forest, *Gyps fulvus* colony area in GR1110009, as well as circular areas of at least 1km radius). from active and under certain conditions from inactive nests of raptors (Vasilakis et al. 2008, Noidou and Vasilakis 2011) and Increased Protection Zones, where the siting of wind farms is allowed under certain conditions (the remaining areas within the Special Protection Zones of the area, but also areas outside these where *Aegypius monachus* is active with moderate - low use and moderate frequency of data, as well as a radius of 5 km from raptors with a large territory).

The paper by Ruiz et al. (2005) reports on impact effects and flight behaviour of raptors in the Thrace region at existing wind farms, where few cases of impact are recorded and no raptors, with mortality events concentrated at the beginning of the breeding season. Few of the birds of prey with territories in the area flew in the danger zone of the farms, with a small proportion of these flights occurring near the wind turbine sweep area, mainly at the edges of the wind farms. In contrast, for scavenging species using the above area for foraging, the proportion of flights in the danger zone was much higher and almost all of these flights were recorded in the wind turbine sweep area, with recorded instances of vultures changing direction to find a suitable access point between wind turbines.

According to the work of Carcamo et al. (2009) and Carcamo et al. (2011) carried out at existing wind farms in Thrace, four dead *Gyps fulvus* and one *Hieraaetus pennatus*, as well as individuals of eleven other non-predator bird species were detected within a 50 m radius of the turbines. More than half of the recorded flights were of *Gyps fulvus*, *Aegypius* monachus and *Buteo buteo.* In line with the work of Kret et al. (2011) and Doutau et al. (2011) again at existing wind farms in the above area, dead individuals of one *Aegypius monachus*, two *Circaetus gallicus*, three *Buteo buteo*, one *Cirucs aeruginosus* and two *Accipiter nisus* were detected, as well as a plethora of other non-predatory birds (73 individuals) with an estimated predator mortality rate of 0.152 and 0.173 predatory birds per year per wind turbine. Much higher, however, appears to be the number of expected *Aegypius monachus* mortalities in the same area, based on the application of mortality prediction models, based on primary data from field observations and radio telemetry data and extrapolation to a larger number of wind turbines, where mortality is estimated at 10-20 individuals/year (a number particularly high compared to the total population of the species in the area, Vasilakis et al. 2009), while more recent data (Vasilakis et al. 2016) predict a mortality rate of 5.6 individuals/year equivalent to 5.4% of the population when the avoidance rate scenario is 99%, and when this is 98% then the population loss rate doubles (10.8%). Also according to data and using models to predict mortality of *Aegypius monachus* in scenarios of simultaneous operation of all wind farms planned to be installed in the Thrace region then in the worst case scenario it is estimated that we may have a total annual mortality of 45 individuals of the species corresponding to 44% of the current estimated population (Vasilakis et al. 2017). However, in the above publication, predictions are also made under much more optimistic scenarios, such as the case where wind farms were operated only in the peripheral zone and where even with their simultaneous operation the mortality rate of the species would be negligible.

Effects on bats and appropriate handling based on existing knowledge

In accordance with the revised version of the guidelines for bat surveys in wind farms (Rodrigues et al. 2014), several recent studies have demonstrated the negative effects of wind farms on populations of wrens (Arnett et al. 2008; Baerwald and Barclay 2014; Rydell et al. 2010a; Lehrnet et al. 2014). Mortality of bats at wind turbines is mainly due to collision and/or injury (Arnett et al. 2008, Baerwald et al. 2008, Grodsky et al. 2011, Rollins et al. 2012). As shown in EUROBATS IWG Meeting 23 (2018)

wind energy projects have less impact on Annex II-listed bat species than those listed in Annex IV. Species of *Nyctalus* and *Pipistrellus*, which are not listed in Annex II, account for more than 90% of recorded losses to wind farms, while Annex II species, collectively, account for less than 0.5% of losses (European Commission 2020).

There are a variety of reasons for the presence and subsequent mortality of bats around wind turbines.

- The location of wind turbines is one of the most important parameters (Dürr and Bach 2004). Appropriate impact assessment has led in several cases to the abandonment of wind farm construction due to inappropriate siting of wind turbines in relation to bats at European level.
- At low wind speeds, insect flight and bat activity takes place at higher altitudes, increasing the potential presence of bats near the rotating blades of wind turbines.
- The safety lights at the base of the tower, the colour of the turbines and the sounds they emit are also likely to attract insects and bats to the danger zone (Horn et al. 2008; Rydell et al. 2010b; Long et al. 2011). It has been suggested that civil aviation lights located above the fuselage may also attract bats, with Bennet and Hale (2014) however rejecting this hypothesis.
- The high speeds that the outer edges of the wings develop (they can even reach speeds of 250 - 300 km/h) make them undetectable to echolocating bats (Long et al. 2009, 2010a).
- In addition to the risk of direct impact, the wake effect drastically changes the atmospheric pressure near the rotating wings, widening the danger zone and causing fatal injury to bats (Baerwald et al. 2008).

Bats are present almost everywhere and mortality at wind turbines is recorded in almost all habitat types. Therefore, it is likely that bats will be affected by most wind farms. When planning the siting of a wind farm, impacts such as mortality and disturbance of bats, severance of roosts from foraging areas, severance from movement or migration corridors and/or loss or destruction of habitat, and monitoring of the effects of wind turbines on bats in the post-construction phase should be considered when planning the siting of a wind farm. According to the mitigation hierarchy strategy, mitigation should be based on (a) avoiding impacts, (b) minimizing (or mitigating) impacts, and finally (c) offsetting residual impacts, in that order.

Each phase of the construction and operation of a wind farm (before, during and after construction) can have an impact. During the siting phase, wind turbines should be located away from migration routes and bat migration corridors, as well as areas where feeding sites and/or bat roosts are located. Wind turbines may act as landmarks during migration or movement, which may exacerbate the impact problem. Neutral zones should be established around refuges of national or regional importance.

The presence of habitats likely to be used by bats during their life cycle, such as woodland, trees, hedgerows, wetlands, water bodies, watercourses and mountain passes, should be taken into account. The presence of such habitats increases the likelihood of bats being present. For example, large rivers may serve as migratory corridors for bat species such as *Nyctalus noctula* or *Pipistrellus nathusii*. However, high bat mortality has been recorded in wind farms even in large, open agricultural areas (Brinkmann et al. 2011). Therefore, knowledge about habitats and locations where wind turbines may have an impact helps in decision making.

In several European countries, many wind turbines that were initially proposed in unsuitable locations, where they would have caused impacts on bats, were not installed due to proper environmental impact assessment. For example, projects to install wind turbines near the internationally recognised hibernacula reserves at Montagne Saint-Pierre/Sint-Pietersberg on the Belgian-Dutch border were rejected by the authorities on bat conservation grounds.

Wind turbines should not be installed within or within 200 m of forest areas of all types due to high mortality (Dürr 2007, Kelm et al. 2014) and the severe habitat impacts that such siting can cause to all bat species. Mature broadleaf forests are the most important habitats for bats in Europe in terms of both species diversity and abundance (Walsh and Harris 1996a, 1996b; Meschede and Heller 2000; Russo and Jones 2003; Kusch and Schotte 2007). However, even young forests or even pure pine forests can support a remarkable bat fauna (Barataud et al. 2013; Kirkpartrick et al. 2014; WoJciuch -Ploskonka and Bobek 2014). When wind farms are constructed within forests, it is often necessary to clear trees to clear the ground on which wind turbines and supporting infrastructure will be built. This may result in a significant loss of shelter. Also, the subsequent increase in forest edge area increases foraging habitat for bats (Kusch et al. 2004; Müller et al. 2013; Walsh and Harris 1996a, 1996b), and thus may lead to an increase in bat activity near wind turbines, and thus

mortality risk. Additionally, such extensive habitat changes reduce the effectiveness of pre-construction studies in predicting the potential impacts to bats from projects. In Northern European countries with high forest cover, forests may be included in the selection of sites for wind farms due to the absence of alternative sites. The importance of such sites for bat populations should be considered at a strategic level during the planning process. In these circumstances, particular attention should be paid in the national regulatory framework and planning process to ensure that wind turbines are not sited in areas of importance to bats. Despite the recommendation that wind turbines should not be installed in or within 200 metres of forests, wind farms have been licensed and are already operating in forests in European countries.

Buffer zones of 200 m should also apply to other habitats that are particularly important for bats, such as tree rows, hedgerow networks, wetlands, water bodies and streams (Limpens et al. 1989, Limpens & Kapteyn 1991, De Jong 1995, Verboom and Huitema 1997, Walsh and Harris 1996a, b, Kelm et al. 2014). The same is true for all sites where high bat activity has been identified from impact assessments.

Low levels of bat activity prior to the construction phase does not necessarily mean that there will be no impacts to bats in the post-construction phase, because bat activity can change due to the presence of wind turbines and supporting infrastructure, as well as from year to year. The boundaries of the neutral zone should be measured from the outer edge of the blades and not from the axis of the tower.

Activities within the construction phase that may have an impact on bats should, whenever possible, be carried out at times of the day and year that do not affect bats. This requires local knowledge of the bat species present in the area, knowledge of the presence of hibernacula and maternity colony roosts, and an understanding of their annual life cycle. A typical year in the life of most European bat species includes a period when they are active and a period when they are hibernating. In central Europe bats are generally active from April to October and less active or hibernating from November to March. In the warmer south and coastal climates of the west, hibernation may only occur from December to February (while in milder winters, some populations do not hibernate at all). The period of activity and hibernation varies according to geographical location (longitude, latitude), but may also vary from one year to the next, depending on weather conditions. Species behaviour also plays a role, with some bat species that are more cold tolerant being more active than others during winter.

The construction of wind turbines and all supporting infrastructure of a wind farm is a potential source of disturbance to bats. Supporting infrastructure includes wind turbine bases, crane treads, temporary or permanent access roads, cables to connect to the grid, and buildings. Construction should take place at an appropriate time to minimise the effects of noise, vibration, lighting and other associated disturbances on bats. Construction activities should be clearly identified in the relevant plan to ensure that they are limited to the least sensitive periods for bats in the area concerned. Based on reports, wind turbine nacelles may be used as roosts by bats. Openings and gaps should therefore be made inaccessible to bats.

Tables summarising the types of impacts of the installation and operation of wind farms on chimpanzees over the life cycle of onshore wind energy projects (Table 2) and the sensitivity of the risk of impact to European (including Mediterranean) species from wind turbines in open habitats (Table 3) are provided below.

Table 2. Types of impacts on bats during the life cycle of onshore wind energy projects (Source: European Commission 2020)

Types of impacts	Before Before construction	Before construction	Operation	Paraplegia	Upgrade
Loss and degradation habitat degradation	X	X	X	X	X
Disturbance and displacement in places of refuge	X	X	X	X	X
Fragmentation of habitats		X	X	X	
Impact			X	X	
Barrier impact			X	X	
Barotrauma			X	X	
Loss or displacement of corridors flight paths and places of refuge		X	X	X	
Increased availability of invertebrate prey and therefore, increased risk of collision, due to night lighting			X	X	
Indirect effects		X	X	X	X

Table 3. Impact risk for European (including Mediterranean) species from wind turbines in open habitats (Source: Rodrigues 2015, as cited in European Commission 2020 document)

High risk	Medium Risk	Low risk Low risk
Species of the genus *Nyctalus*	Species of the genus *Eptesicus*	Species of the genus *Myotis*
Species of the genus *Pipistrellus*	Species of the genus *Barbastella*	Species of the genus *Plecotus*
Vespertilio murinus	*Myotis dasycneme*[2]	Species of the genus *Rhinolophus*
Hypsugo savii		
***Miniopterus schreibersii*[1]**		
Tadarida teniotis		

[1]*Miniopterus schreibersii is the only species in Annex II in the high risk category*
[2]*In water-rich areas*

Effects on other fauna (terrestrial mammals, amphibians, reptiles, invertebrates)

From the review of international literature, as derived from the guidance document on wind energy projects and EU nature protection legislation (European Commission 2020), no very significant impacts of the installation and operation of wind farms on other fauna (except for avifauna and cephalopods) are found, with the exception of large mammals. A review of the interactions between mammals and wind energy projects, conducted by the Swedish Environment Agency, (Helldin et al. 2012) found that there is little evidence to suggest that significant impacts exist. However, significant avoidance by large carnivorous mammals was reported (Helldin et al. 2017). While species that require large areas of undisturbed habitat are more likely to be at risk of significant impacts, impacts to disturbance-resistant species may also occur when conditions change in parts of the undisturbed habitat landscape (Helldin et al. 2017). Other research, demonstrated that *Meles meles* in the UK had elevated levels of stress induced by wind turbine noise (Agnew 2016). Cortisol levels from badger hairs were used to determine whether stress was induced in their physiology. Badger hairs living less than 1 km from a wind farm had cortisol levels 264 % times higher than badgers living more than 10 km from a wind farm. No differences were found between cortisol levels of badgers living close to wind farms from in 2009 and 2012, suggesting that the animals are not accustomed to wind turbine disturbance. Higher cortisol levels in affected badgers may have an impact on their immune systems, which may result in an increased risk of infections and disease in badger populations. Łopucki (2018) observed no adverse effect on the spatial distribution of *Cricetus cricetus* within

wind farms in Poland. Łopucki, R., and Mróz, I. (2016) found no impact of wind energy projects on the diversity and abundance of small mammal species. For larger mammals, Costa et al. (2017) recorded displacement of *Canis lupus lupus* nest (shelter) sites up to 2.5 km in wind energy projects in Portugal. The authors also observed lower breeding rates during construction and the first years of operation. Łopucki et al. (2017) found that both *Capreolus capreolus* and *Lepus europaeus* avoided the interior of the wind power project and that there was a decrease in habitat use frequency up to 700 m. For these species, which rely on their hearing to detect predators, this displacement may be a result of their reduced ability to detect predators, particularly where predator pressure is high. *Vulpes vulpes* was observed to visit the interior wind energy project less frequently, possibly as a result of both less prey availability (*Lepus europaeus*) and reduced ability to hear when hunting. *Vulpes vulpes* are likely, to use the access roads and feed on the carcasses of birds killed by impact with the wind turbines in operation.

The following is a summary of parameters related to the impacts of wind farms on mammals (Source: Helldin et al. 2012, as reported in the relevant European Commission 2020 document):

- Disturbance during construction may be temporary.
- The significance of impacts is likely to depend on habitat availability and existing levels of disturbance within the wider landscape.
- Avoidance of large areas around relevant infrastructure such as transmission lines may be observed.
- Displacement of nest sites for larger predators may be observed.
- New access roads may facilitate movement of individuals (but consequently bring them into contact with road traffic).
- Significant impacts are likely to occur in more remote, mountainous and currently inaccessible areas where improved access for recreation, hunting and leisure purposes is likely to result in increased human presence and road traffic.
- Species habituation cannot be taken for granted, as it depends on variation according to species, sex, age, individual, time of year and type of disturbance, as well as the frequency and predictability of disturbance.
- The significance of impacts is likely to be directly proportional to the size of the wind energy project.

- The accumulation of many small impacts may be significant at the population level.

A review of the impacts of wind energy projects on reptiles and amphibians found that published data are scarce (Lovich et al. 2018). The operation of wind energy projects was found to cause occasional mortality in reptiles, resulting in long-term displacement from areas with the highest concentration of wind turbines. The Greek tortoise (*Testudo graeca*) - classified as a vulnerable species under the IUCN Red List of Threatened Species - may be affected by habitat loss and fragmentation near access roads due to wind farm construction in southeastern Europe, particularly when wind farms are constructed in rocky or steppe habitats. Research in Portugal, using modelling and simulations based on empirical data, has shown that vertebrate species diversity was reduced by almost 20 % after the installation of two large wind turbines. Indirect effects, however, may occur in cases where wind energy projects reduce the abundance of prey-seeking species in the reptile fauna, as indicated by the increase in reptile density and changes in their behaviour, physiology and morphology in a wind energy project in India (Thaker et al. 2018).

There is little empirical data available on impacts on insects and other invertebrates. Long et al. (2011) observed differences in insect abundance in relation to wind turbine colour and Foo et al. (2017) found that insect communities remained relatively stable between years of monitoring. While the attraction of insects such as moths (butterflies and moths) to wind turbines may potentially cause problems in terms of the risk of impact to foraging bats, there is currently no evidence that wind energy projects pose a threat to insect populations.

Impact on Habitat Types and Flora

As stated in the guidance document on wind energy projects and EU nature protection legislation (European Commission 2020), the following habitats should be taken into account as part of the due assessment:

- the natural habitat types listed in Annex I
- the habitats of species listed in Annex II of the Habitats Directive
- the habitats of wild bird species listed in Annex I to the Birds Directive
- habitats of migratory species of regularly migrating birds

The strictly protected plant species listed in Annex IV(b) to the Habitats Directive and the breeding sites or resting places of the strictly protected animal species listed in Annex IV must also be taken into account.

The types of impacts on habitats include the following:

- Direct loss - the reduction in the area of habitat due to its removal, reshaping or covering (e.g. by the deposition of construction materials or suspended sediment)
- Fragmentation - the conversion of an adjacent area of habitat into two or more small, isolated areas
- Degradation - the reduction in habitat quality as a result of a reduction in the abundance and/or biomass of species from the characteristic communities that define it
- Disturbance - a temporary change in average environmental conditions (e.g. an increase in suspended sediment or dust deposition or an increase in human presence, light and noise)
- Habitat creation - the creation or restoration of habitat as part of a set of mitigation measures
- Changes in microclimate - minor changes in air temperature and atmospheric humidity due to the movement of the wind turbine blades
- Indirect impacts - loss, fragmentation and habitat degradation due to, for example, soil compaction, drainage, changes in grazing pressure, erosion/excavation or the introduction of invasive non-native species and pollutants.

Table 4 below lists the types of impacts to habitat types over the project life cycle for onshore wind projects.

Table 4. Types of impacts on habitats during the project life cycle for onshore wind energy projects (Source: European Commission 2020)

Types of impacts	Project phase				
	Before construction	Pre-construction type	Operation	Paraplasting	Upgrade
Habitat loss and degradation	X	X		X	X
Habitat fragmentation	X	X	X	X	X
Habitat disturbance	X	X	X	X	X
Habitat creation		X	X	X	X
Changes in microclimate		X	X	X	X
Soil compression		X	X	X	X
Indirect effects	X	X	X	X	X

The most significant impact on plants comes from the loss, degradation and fragmentation of the substrate in which they grow. Annex II and IV protected plants which are not included in Annex I of the protected habitat types are protected under the species protection regime.

Although some studies have found evidence of changes in microclimate as a result of wind farms, it has not been reported that they have a consequential effect on the reproductive success, physiology or morphology of plants.

Mitigation and monitoring of impacts

In this section, we will discuss the mitigation measures and guidelines for mitigating the impacts of wind farms on biodiversity and the compensatory measures proposed based on international practices implemented to date, taking into account the most recent proposals of international organisations and existing literature (Dimalexis A. 2009, WWF Proper siting of wind farms in Thrace 2008 and 2013, European Commission 2010, Vasilakis et al. 2017, Rodrigues et al. 2014, European Commission 2020), the results of research projects, the good practice guidelines for mitigating the impacts of wind farms on biodiversity resulting from such research projects , while testing the effectiveness of the use of modern technologies to achieve these objectives (Windfarms and Wildlife, LIFE program 2013-2018).

These measures are divided into:

- Avoidance measures
- Avoidance measures (avoidance measures): avoidance measures (avoidance measures)
- Compensation measures

It is generally accepted that proper siting of any project is the safest option for minimising impacts on protected species. International evidence to date demonstrates that with proper siting and planning, wind energy development generally does not pose a risk to biodiversity (EU Guidance document). Furthermore, sensitivity mapping is an essential planning tool that allows permitting authorities to make informed decisions during the permitting phases of projects. In relation to the overall protected area of Natura sites (habitat types, flora and fauna including avifauna), the appropriate siting of wind projects through strategic planning is the most effective way to avoid negative impacts on species. As a second measure, the associated infrastructure of individual wind turbines should be carefully sited to reduce the magnitude of impacts.

The various techniques proposed in the international and domestic literature for mitigation are not fully documented and there is usually conflicting research on the effectiveness of these techniques. The most commonly proposed techniques with regard to the siting of projects of this type are:

-Avoiding siting Wind Power Plants on parallel ridges due to the creation of barriers to the movement of bird species.

-Encouraging the siting of wind turbines in clusters to create communication corridors (flight paths) that will be safe zones through which birds can pass. It is suggested that a hill range with its branches be left free, and a minimum flight path without wind farms be left free for crossing the hill ranges (WWF 2008). During the installation and operation of wind farms it is recommended that various measures are taken and implemented that will minimise any potential impacts on the avifauna of the area. These measures are listed below:

-Resting or observation areas: no perching structures that enable birds to perch or congregate should be used in any installation.

-Lighting of the runner: Birds are not able to perceive the runner as something impenetrable once they are very close to it (motion smear). This phenomenon occurs at a distance of 20 m for small blades and 50 m for larger ones. This explains the incidents

of collision in conditions of good visibility. There are indications that painting the wings with a high colour contrast design (e.g. black and white discontinuous stripes) may help to reduce the risk of collision. For this reason, a possible suggestion may be to mark the blades with the relevant paint, but this is not common practice by wind turbine manufacturers.

-Lighting in the wind farm: There is a general consensus that fixed lighting of wind turbines should be avoided to reduce the risk of impact. If this is unavoidable, white strobe flashing lighting could be considered as less attractive to birds. This measure, with its irregularly rhythmic strobe lighting, is now used in almost all new-technology wind turbines.

-Size of wind turbines: The literature review highlights the significant differences in the effects of wind farms on avifauna relative to the density of turbine placement.

-Grounding of cables: Structures such as power transmission cables should be sited after careful planning. Electricity transmission infrastructure (in general, but also in the case of wind farms) should be underground or, if this is not technically possible, may be above ground, but it should be ensured that it is properly insulated and marked to minimise the risk of electrocution and birds striking it.

-Removal of dead animals: there should be a requirement for the immediate removal of dead animals (dogs, sheep, goats, horses, cows, etc.) found within 400 metres of the turbine base. These dead animals should be transported to safe places away from the wind farm (for example to organised supplementary feeding areas), while remaining available for scavenging birds. This will reduce the risk of scavengers colliding with the wind turbines when they spot each dead animal, while preserving the food available to them. The responsibility for collecting and transporting dead animals should be the responsibility of the wind farm construction and operation company and the personnel employed on a daily basis will have, as part of their duties, the responsibility of removing such potential food that could attract predators, particularly scavenging species. Suitable disposal sites should be indicated by the competent authorities after scientific study and licensing, and the costs of design, establishment and proper operation of such sites should be borne by the competent regional bodies.

- Restriction on the use of access roads only for the purposes of maintenance of the wind farm facilities, for research (monitoring programmes, etc.) or to meet the needs of the competent authorities and bodies for the protection and management of the

natural environment in order to keep traffic to a minimum. After the installation of the wind farms and the transport of the bulky components of the wind farms, to restore the parts of the pavements necessary for the installation and to limit the width of the roads to the minimum necessary for the passage of vehicles.

After the construction of wind farms, it is also necessary to actively manage the habitats in and around them, so that birds are not attracted to the zone of influence of wind turbines and are removed to locations that do not pose a risk of collision. The responsibility for the design and implementation of these management measures lies with the wind farm operator.

-Active management of the habitats under the turbines: In those cases where post-construction monitoring identifies some impacts (increased concentration or mobility of species on the site, incidents of impact of specific species) on specific wind turbines, it is proposed to design active management actions for the areas under the wind turbines (creation of undesirable habitats for birds) after appropriate studies. These studies should necessarily take into account other flora and fauna species in the area that may be affected by the above management.

-Active management of habitats around wind farm projects: In cases where a wind farm is located in an area where there is a need for bird protection measures, require active habitat management around the periphery of the wind farm to create suitable habitats that will attract birds away from the wind turbines. Such management actions could for example include ploughing and seeding of abandoned fields and clearing of forested fields after appropriate studies, so that species of interest likely to be affected by the wind farm are driven to safe alternative sites and indirectly favoured. These studies should necessarily take into account the potential impacts that will be assessed during the first period of operation of the wind farm and the other flora and fauna species in the area.

-Restoration of the surrounding area: Following the completion of the construction works it is proposed that all unnecessary roads and encroachments are reinstated in order to limit access to the area resulting in disturbance.

-Monitoring of potential impacts: There should be an explicit obligation to monitor the effects of the park, particularly on bird species, after construction, for a period of at least two years. The method of monitoring should meet specific standards to be defined by the Ministry of the Environment and Energy or the consultative bodies or as suggested by the international literature. It is proposed that monitoring be carried

out by existing park staff, following training and information, in consultation with a team of experts (foresters, ornithologists), following a specific monitoring protocol. This way can ensure the continuous acquisition of data, which can be made available to all stakeholders and interested parties.

-The possibility of stopping or shutting down wind turbines: Provision should be made for the occasional or seasonal interruption or permanent cessation of operation of wind turbines that, based on monitoring data, cause mortality.

-In the amendment and supplementation of Decree No. 8353/276/2012 amending and supplementing Decree No. 37338/1807/2010, the obligation for wind farms within Special Protection Areas that have been designated as migratory passages-constrictors, to have an automated system for stopping wind turbines and activating deterrent means is mentioned.

Use of new technologies for monitoring or mitigation/prevention of impact effects

In recent years, technology for monitoring and recording of avifauna and flying birds in general (including manatees) has evolved considerably, resulting in the availability on the market of modern systems and methods that allow the collection of significant and higher quality and quantity of data, compared to conventional recording methods, on the movements and use of airspace by flying birds in general (including manatees), as well as on the movements and use of airspace by flying birds in general (including manatees), and on the use of airspace by flying birds in general (including manatees), as well as on the use of airspace by flying birds in general (including manatees), and on the use of airspace by flying birds in general (including manatees).

New technologies in the field of wind farm monitoring and mitigation consist of three main categories, which are:

A) A) Ornithological radar, B) Optical systems and C) Bio-acoustic systems.

The technologies used include vibration sensors, acoustic sensors, visible spectrum cameras, infrared cameras and radar. The available systems that make use of these technologies are most useful during the operation of a project, as they record incidents at the wind farm, and some of them also provide the ability to record the presence and use of the site by the species present in the area. In combination with specific software, they can provide the possibility to react in real time, contributing to

the prevention of impacts (e.g. automated wind turbine shutdown system, etc.). The main categories of new monitoring and mitigation technologies are presented below:

Ornithological radar

Ornithological radar has the capability to scan the surrounding airspace in 3D to record (a) the birds passing through the area, (b) the altitude at which they are moving, (c) the paths they follow. Radar systems vary and involve either naval radars scanning parts of the airspace, automated naval or meteorological radar systems or a combination of two or more radars in a system to scan the entire airspace. The system shall allow continuous and simultaneous monitoring of large numbers of birds over long distances and in low or zero visibility situations. In addition, it allows the estimation of the vertical profile of bird and bat movements, particularly useful when estimating the night migration of birds, where radar is the most powerful tool available. Mitigation in the case of bird radar use is directly related to the immobilisation of one or more wind turbines, where based on radar information there is an increased risk of collision. For this purpose, real-time recording of the movement of flying fauna and decision-making on immobilisation is required.

This can be accomplished using the following:

- Automated bird radar system, which has decision making software based on whether or not birds on a collision course are detected, and is directly linked to the SCADA to provide a stall command.

- Non-automated ornithological radar system, where recording and real-time decision making is performed by field investigators. Communication for immobilisation command is done with the wind farm operator at the control centre

Visual systems

Optical systems are based on high-resolution image analysis and target identification. These systems are capable of providing visual coverage of the entire airspace of the wind turbine on which they are installed. Optical systems can be installed on the wind turbine tower without any interference with the tower and with high-resolution cameras to cover a $^{360°}$ surveillance area around the wind turbine. These systems have a range of a few tens to a few hundred metres, depending on the size of the bird species being monitored. A system can usually cover from one to three turbines depending on the wind farm siting and the type of turbines. Operation is continuous and

powered by the wind turbine. The system allows monitoring of the airspace it covers during the day and under good visibility conditions. The detectability of flying fauna can be improved by adjusting the detection criteria based on additional information about the area in question. The system allows the monitoring of bird activity near wind turbines and can therefore be a complementary method to GPS telemetry and ornithological radar for determining flying fauna habitat use in wind farms. Monitoring is carried out using an automated recording system and the subsequent evaluation - processing of the video recordings collected, both for species identification and for the rejection of other flying targets such as aircraft and insects. Mitigation in the case of using an optical system is related to the repelling of birds and/or the immobilisation of one or more wind turbines in cases where birds are on a collision course with them. This requires real-time recording of the movement of flying birds and immediate decision-making. This is accomplished using decision making software and directly connected to a SCADA system to activate the wind turbine immobilization, and for the repelling command it is connected to a loudspeaker system that emits sound signals of varying intensity depending on the estimated risk of impact.

Bioacoustic systems

Bat bioacoustic systems (bat detectors) are based on ultrasound recording. A bat bioacoustic system, or bat detector, is a device used to detect the presence of bats by converting their ultrasonic readings, as emitted by the bats, into acoustic frequencies, usually at 120 Hz to 15 kHz. The systems are usually mounted on the wind turbine, the microphone at the base of the fuselage and the data collection system inside the wind turbine. Operation is continuous with power supplied by the wind turbine. The recorded data are stored in the recording unit inside the wind turbine. The systems can also be mounted on a meteorological mast, prior to the construction of the wind farm, but can also be used as handheld systems. All bioacoustic systems require subsequent data processing by a handheld specialist to identify species. The system allows monitoring of the immediate rotor area of a wind turbine 24 hours a day, and the system can be adapted to make recordings only during the hours when bats are active. Monitoring is carried out using an automated recording system and, at a later stage, the data collected is evaluated and processed by experts using a specialised handheld ultrasound processing program. Mitigation in the case of using a bioacoustic system is directly related to regulating the operation of wind turbines under specific temperature/wind

conditions and time of year or immobilising specific wind turbines at certain times of the year or potentially by adjusting the cut-in speed, if technically feasible. Any intervention in the operation of the wind turbine requires the notification and agreement of the wind turbine manufacturer.

New ultrasonic technologies have been used as a mitigation tool to deter bats from wind turbines and thus reduce mortality. Arnett et al. (2013) provide evidence that broadband ultrasound emissions can reduce bat mortality by discouraging bats from approaching sound sources. The effectiveness of the ultrasound deterrents studied at this time was limited by the distance and extent of the area where ultrasound has the potential to be emitted, which, in part, is due to the rapid attenuation of ultrasound in humid conditions. Since then, in the US, more effective deterrents have been developed and will soon be commercially available.

Painting of wind turbine blades with black paint

According to research conducted by the Norwegian Institute for Nature Research in 2020, the visibility of wind turbines by birds was studied when one of their blades was painted black. The experiment took place at the Smøla wind farm in Norway using the BACI (Before-After-Control-Impact) approximation method to look for impact mortality. The main species of interest at this site was the sea eagle. This wind farm started operation in August 2005 and consists of 68 wind turbines (20 turbines with 2.1MW and 48 turbines with 2.3MW). In the first week of August 2013, one of the three blades of the turbines in 4 turbines with 2.1MW were painted black, as dead birds due to impact had been recorded in these turbines in the past. The neighbouring turbines were designated as control turbines for mortality searches, even though dead birds had previously been recorded on them as well, in order for the scientists/researchers to compare results in similar spatial conditions.

As previously mentioned, the BACI method was used to properly estimate impacts. There were dead bird search data available from early 2006, 7.5 years before this experiment started and 3.5 years of data available until the end of the project (end of 2016). The search for dead birds, even their feathers, was carried out at regular intervals with the help of trained dogs, within a 100 m radius around the wind turbines, as well as by staff and passers-by. Typically, the bodies were located near the turbines or on maintenance roads. After the experiment, it was observed that, the number of

recorded corpses increased at the control turbines and decreased at those where the manipulation was carried out. In addition, no effect on birds was found, during which there would be a higher probability of impact on the neighbouring control turbines. This was checked by comparing the annual mortality rates at the control turbines with the other turbines before and after the experiment.

Specifically, after painting, **there was an average 71.9% reduction** in the annual mortality rate **compared to the control turbines.** In addition, seasonal mortality rates decreased sharply in the dyed turbines during spring and autumn, while they increased during summer. Finally, this experiment was more effective on predators, as they have higher visual acuity and sharp vision over long distances.

However, the above collision avoidance measure, in the opinion of the manufacturers, is detrimental to the operation of wind turbines, as it leads to an increase in temperature and therefore to increased stress. Therefore, the issue seems to require further investigation, as further research is needed to demonstrate both the effectiveness of the measure - as the research is based on only one application and in an area with very low ambient temperatures (Norway) - and the safe operation of the turbines. In any case, the measure raises safety issues, as the CAA makes it a condition in its opinions: 'For the daily marking, the tower (at least the upper two-thirds of its height), the fuselage (nacelle) **and the blades of the wind turbine** must be painted **white'.**

In conclusion, the application of modern technologies should be considered on a case-by-case basis, taking into account both the characteristics of the wind project and the sensitivity of the area, the composition of the sensitive fauna and its ecological requirements, as well as the possibilities and limitations of each technology. During the operational phase of a wind farm, it is necessary to monitor and evaluate the effectiveness of the technologies selected throughout the lifetime of the project. At all stages of their design, operation and monitoring, the involvement of qualified experts is required to ensure their correct selection and siting, as well as to evaluate their effectiveness. The comparison and evaluation of data collected prior to wind project construction and during operation is an important factor in assessing the potential impacts of the wind project on biodiversity. Continued development of these systems will help to optimise their operation in terms of the range and efficiency of the functions and services they provide, reduce their cost, minimise interference with wind turbine operation, and optimise their performance for the protection of flying fauna.

5. PRELIMINARY IMPACT ASSESSMENT

This section presents all the necessary data on the basis of which it is examined whether the described project, taking into account the other corresponding projects in the area, may cause negative impacts on the protected Natura 2000 Special Conservation Area GR1260005, partially within which it is located, of the nearest protected Natura 2000 Special Protection Areas BG0002078, GR1260010, BG0002098 and BG0002072, as well as the neighbouring Special Conservation Area BG0001028, with emphasis on those species of avifauna (raptors - scavengers, but also other important large species), and other fauna (as far as the neighbouring Special Conservation Area is concerned), which, according to their ecology, are active over a large radius, sufficient to cover the distance to the site of the project in question, in order to establish the need for further investigation of the impacts through the necessary due assessment.

Definition and description of the Study Area and the Field Investigation Area

As already mentioned in previous sections, the project under study, with a nominal power of 58,80 MW, is to be installed in the location "Oxila", in the Municipality of Sintiki, in the Regional Unit of Serres, and is partially located within a protected area of the Natura 2000 network, which is classified as a Special Conservation Area.

More specifically, the project under study is located outside areas of absolute protection of nature, natural parks: national or regional parks, outside Special Protection Areas and outside Protected Landscapes and Landscape Features or Protected Natural Formations. The nearest National Park is the Lake Kerkini Wetland National Park, whose nearest boundary is located at a distance (in a straight line) of more than four kilometres (4,08 km) west of the area of interest of the wind farm under study. The proposed project is also located outside National Parks and wetlands of international importance under the Ramsar Convention and outside Conservation of Nature Monuments and Aesthetic Forests. In addition, the project site is located outside of Landscapes of Outstanding Natural Beauty (SSSIs). Finally, the project siting area is also located outside the Wildlife Refuges of the wider region, the closest of which is the Wildlife Refuge Livaditsa - Rupel of the Municipality of Sidirokastro, the nearest boundary of which is located at an average distance (in a straight line) of more than five

kilometres (5.05 km) west-southwest of the area of the production licence blocks of the proposed project.

The following documentation maps section presents all of the above information regarding the location of the project in relation to Natura 2000 sites, National Parks, Wildlife Refuges, Important Bird Areas of Greece, and the field survey area as defined by the relevant specifications of the Special Ecological Assessments for projects and activities of Subcategory A1. The mapping of habitat types is also presented. Finally, a map showing land cover types is presented, according to the Corine land cover 2018 mapping, which also shows the location of the production licence blocks of the wind farm under study and the field survey area.

According to the Special Spatial Planning Framework for Renewable Energy Sources (SPF-RE) (Government Gazette 2464/B/03-12-2008), which has been deemed legal and valid by the Decision of the E Division of the Supreme Court of Justice No. 1421/2013, and in particular according to para. 3 of Article 6, as replaced by Article 13 of Law 4296/2014 (Government Gazette 214 A/2-10-2014). 4014/2011 and on the basis of the relevant provisions of the Ministerial Decision No. 170225/2014 (B΄135) and the ministerial decision 52983/1952/2013 (B΄ 2436) for the projects of categories A and B of the law. 4014/ 2011, respectively. The more specific conditions and restrictions for the implementation of the above wind installations are set out in the relevant decision approving environmental conditions for category A΄ projects under Law No. 4014/2011, or in the decision approving the Special Ecological Assessment for category B projects under the same law'.

The Study Area is defined **as** the wider area of the installation of the OXEILA wind farm, with the description and characteristics mentioned referring to all the protected features of the Special Conservation Area GR1260005, partially within which the project under study is located, all the protected characteristics of the nearest Special Protection Areas BG0002078, GR1260010, BG0002098 and BG0002072, while the protected characteristics of the neighbouring Special Conservation Area BG0001028 (concerning the most important fauna species of Annex II of Directive 92/43/EEC, with a large area of endemism) have been taken into account. It is obvious that while the production licence polygons of the project under consideration, covering an area of approximately 366.76 ha, are small compared to the 4,871.04 ha of GR1260005, and it is not possible to have a minimal impact on its values and purpose of protection. It is

emphasised that the project under consideration is partially located within the main Special Conservation Area under consideration, with only 86.08 ha of the total area of the production licence blocks of the project being located within it. Finally, it is worth noting that within the above 86.08 ha, the part of the production licence blocks located within the protected area, a much smaller intervention will take place.

The Field Investigation Area was defined as an area with a radius of 2,000 meters (a radius twice that defined in the specifications for the preparation of Special Ecological Assessments -170225/20.01.2014 Decree-FEK 135/B/27-01-2014, for projects and activities of Subclass A1) from the boundaries of the project production polygons and in practice covers the entire mountainous area of the project installation. However, observations and recordings were made over a much larger radius, since from the viewpoints the observation of raptors (as well as other large important species) could be made at a distance of even more than 5,000 m (using a telescope).

EXISTING STATE OF THE NATURAL ENVIRONMENT

Inventory and analysis of the elements of the natural environment

The study presents, analyses and evaluates the specific characteristics and environmental conditions prevailing in the wider project area, based on data collected from both literature sources and field survey records in the study area. In addition, an assessment of the potential impacts of the project installation and operation on the conservation objectives of the Natura 2000 protected areas under study, on the integrity of the areas, as well as on their protected objects (species of designation, Annex I avifauna species of Directive 2009/147/EC, Annex II fauna and flora species of Directive 92/43/EEC, Annex I habitat types of Directive 92/43/EEC) is carried out.

STUDY AREA (A.M.)

Summary description of Special Conservation Areas GR1260005 and BG0001028 and Special Protection Areas BG0002078, GR1260010, BG0002098 and BG0002072

The following is a brief description and identification of the areas defined in the framework of this study as Study Area (Special Conservation Areas GR1260005, BG0001028 and Special Protection Areas BG0002078, GR1260010, BG0002098, BG0002072).

Identification of the areas (type, registration code, name)

GR1260005

According to the standard form of the area data form (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260005)
Code: GR1260005
Site name: Peaks of Mount Orvilos
Site category: Special Conservation Area

BG0001028

According to the standard data form of the site (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001028)
Code: BG0001028
Site name: Sreden Pirin - Alibotush
Site category: Special Conservation Area

BG0002078

According to the standard data form of the site (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002078)
Code: BG0002078
Site name: Slavyanka
Site category: Special Protection Area

GR1260010

According to the standard data form of the site (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260010)
Code: GR1260010
Site name: Mount Beles
Site category: Special Protection Area

BG0002098

According to the standard data form for the area (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002098)
Code: BG0002098
Site name: Rupite
Site category: Special Protection Area

BG0002072

According to the standardised site data form (TED/SDF) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002072)
Code: BG0002072
Site name: Melnishki piramidi
Site category: Special Protection Area

Geographical identification of the sites (coordinates, altitude, surface area)

GR1260005

According to the standard data form of the site (TED/SDF) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260005)
Code: GR1260005
Longitude: 23.661096
Latitude: 41.381697
Total area (ha): 4 885,37
Regions: Eastern Macedonia and Thrace and Central Macedonia

BG0001028

According to the standardised area data form (TED/SDF) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001028)
Code: BG0001028
Longitude: 23.566700
Latitude: 41.510600
Total area (ha): 68 934,72
Region: Yugozapaden

BG0002078

According to the standardised data form of the region (TED/SDF) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002078)
Code: BG0002078
Longitude: 23.693333
Latitude: 41.439722
Total area (ha): 19 433,05
Region: Yugozapaden

GR1260010

According to the standard data form of the region (TED/SDF) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260010)
Code: GR1260010
Longitude: 23.118971
Latitude: 41.298790
Total area (ha): 25 189,30
Region: Central Macedonia

BG0002098

According to the standard data form of the region (TED/SDF) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002098)
Code: BG0002098

Longitude: 23.281944
Latitude: 41.463056
Total area (ha): 8,835,40
Region: Yugozapaden

BG0002072

According to the standard data form of the region (TED/SDF) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002072)
Code: BG0002072
Longitude: 23.434722
Latitude: 41.504167
Total area (ha): 13 580,05
Region: Yugozapaden

Description of the general character of the site with simple reference to: habitat types, habitat categories, quality and importance of the site, vulnerability, reasons for designation

With regard to the main Natura 2000 protected area under study, GR1260005, within which the project is partly located, according to the information given in the Standard data forms, it consists of Mount Orvilos. From a geological point of view, Mount Orvilos belongs to the Rhodope crystalline massif. The climate is the same as in the inland areas of northern Greece. It is an intermediate type of climate between Mediterranean and continental. The areas at high altitudes (above 1 400 m) belong to the very humid zone, with erosion during the winter period, while the lower altitudes belong to the humid or sub-humid zones with a harsh or mild winter climate.

In terms of the quality and importance of this Special Conservation Area, it includes areas with high peaks and extensive alpine and subalpine grasslands. There are also forests with coniferous (*Abies borisii regis, Pinus leucodermis, Pinus sylvastris*) and deciduous species (*Fagus sp., Quercus sp., Fraxinus angustifolius, Ostrya carpinifolia*). As regards wild plants, the quality of the site is indicated by the occurrence of other important taxa. The species *Haplophyllum balcanicum, Inula ensifolia, Sempervivum kindingeri, Viola perinensis* (incentive D) are included in the European Red List. The species *Androsace villosa, Arctostaphylos uva-ursi, Cephalanthera damasonium, Corallorhiza trifida, Dianthus gracilis ssp drenowskianus, Dianthus petraeus, Himantoglossum hircinum, Lilium martagon, Nigritella nigra, Orchis ustulata, Paronychia rechingeri, Platanthera bifolia, Platanthera chloriadigasalas* (motif D) are protected by the Greek Presidential Decree

(67/1981). The species *Centaurea parilica, Cytisus agnipilus, Dianthus noeanus, Festuca pirinica, Genista subcapitata, Hypericum rochelii,* Potentilla *apeninna ssp. stoianovii, Saxifraga stribrnyi, Stachys recta ssp. Anthyllis vulneraria ssp. bulgarica, Arenaria filicaulis ssp. graeca, Asperula aristata ssp. nestia, Colchicum doerfleri, Erysimum drenowskii, Iris reichenbachii, Laserpitium siler ssp. laeve, Paronychia macedonica, Sideritis scardica, Silene balcanica, Silene radicosa ssp. radicosa* (Motivation D) are endemic to the Balkans. *Saxifraga sempervivum* and *Thymus thracicus* (locus D) occur in the Balkan Peninsula as their main range. Seven species of reptiles and two species of amphibians listed in Annex IV have also been recorded.

The Annex I habitat types of Directive 92/43/EEC, listed in the Standard Data Forms for the site, are presented in the table below:

Table 5. Habitat types of Annex I habitats of Directive 92/43/EEC referred to in the standard data forms for site GR1260005 (End 2022_12/03/2024)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260005)

Habitat type	Name
4060	Alpine and boreal forests
5210	Tree formations with *Juniperus spp.*
62A0	Eastern sub-Mediterranean dry grassland (*Scorzoneratalia villosae)*
8210	Calcareous rocky slopes with grassy vegetation
9150	Meso-European calcareous beech forests of the Cephalanthero-Fagion
91CA	Pine forests of the Balkan and Rhodope forests
9530*	Sub-Mediterranean black pine forests
9540	Mediterranean pine forests with endemic Mediterranean pine species
95A0	Upper Mediterranean high altitude pine forests (*Pinus heldreichii* or *Pinus peuce*)

** with an asterisk indicating the priority habitat types listed in Annex I to Directive 92/43/EEC*

The important fauna species listed in Annex II to Directive 92/43/EEC, listed in the TAPs of Natura Special Conservation Area GR1260005 are listed below.

Table 6. Species of Annex II to Directive 92/43/EEC listed in the standard data forms for site GR1260005 (End 2022_12/03/2024)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260005)

Latin name	Common name
Bombina variegata	Yellow Bombina
Dactylorhiza kalopissii	Dactylorhiza kalopissii
Elaphe quatuorlineata	Lapwing
Gladiolus plaustris	Gladiolus gladiolus
Lutra lutra	Otter
Testudo graeca	Grey turtle
Testudo hermanni	Mediterranean turtle

The main threats listed in the Standard Data Forms for the Natura 2000 network site of Special Conservation Area GR1260005 are presented in Table 7 below.

Table 7. Pressures and threats as reported in the Standard Data Forms of the GR1260005 site (End 2022_12/03/2024)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260005)

Codes	Pressures and threats	Classification	In/out Natura
A01	Crops	Medium	Outside
A04	Grazing	Low	Within
A04.01.01	Intensive grazing of cattle	Low	Within
A04.02	Non-intensive grazing	Low	Within
A04.03	Abandonment of extensive farming/lack of grazing	Low	Within
A10.01	Clearance of bushes and hedges	Medium	Within/outside
B02.02	Clearance of forests	Medium	Within
D01.01	Trails, cycle routes	High	Within
D01.01	Trails, cycle routes	Low	In/out
D01.02	Roads and motorways	Low	Within/outside
D02.02	Pipelines (e.g. gas pipelines)	Medium	Within
E01	Urbanisation of areas/human settlements	Low	Within/outside
E04.01	Rural constructions/buildings in the area	Low	Within/outside
F03.01	Hunting	Low	Within/outside
F03.02	Illegal capture and removal of terrestrial fauna	High	Within
F03.02.03	Trapping, poisoning, poaching	Medium	In/out
G05.11	Death or injury from collision/collision	Low	In/out
J03.01.01	Reduction in the availability of game (including carcasses)	Moderate	Within
J03.02	Anthropogenic reduction of habitat connectivity	Moderate	Within/outside
J03.02.03	Reduction of genetic exchange	Low	In/out
K03.06	Competition with domestic animals	Medium	Within/outside
L09	Fire (natural)	Medium	Within/outside

Concerning the adjacent Bulgarian Natura 2000 network site of Special Protection Area BG0002078, according to the information provided in the TADs for this site, it is located in south-western Bulgaria south of Mount Pirin. The boundaries of the area follow the orographic boundaries of Mount Slavyanka, and also include a part of southern Pirin, north of the Goleshevska River, and some of the western slopes of Mount Sturgach. The northern boundary of the protected area runs south through the villages of Sadovo, Teshovo and Goleshovo, coincides east with the road from Sadovo to the border checkpoint of Ilinden, and reaches the village of Petrovo in the west. The state border with Greece coincides with the southern boundary. The highest peak is Gotsev Vrah (2,242 m). Mount Slavyanka consists of Proterozoic limestones and marbles, this is the reason for the karstic mountainous relief. Due to the karstic, it is poor in surface flowing water, but in its foothills there are many karstic springs. This geological peculiarity of the mountain, its geographical position and its climate create the conditions for the development of a specific diverse area, with both mountain and Mediterranean elements. Almost all the phytogeographical zones characteristic of Bulgaria can be distinguished in Slavyanka. At the foot of the mountain there are mainly oak forests and bushy areas dominated by *Carpinus orientalis*. In the higher parts of the mountain there are forests of *Fagus moesiaca* and *Ostrya carpinifolia*, as well as large forests of *Pinus nigra*. There are also communities of *Abies borisii-regis*. The coniferous zone is dominated by *Pinus heldreichii* forests, which are typical of the limestone mountains in the southern and western Balkan peninsula. There are also a large number of Mediterranean and sub-Mediterranean species of invertebrate and vertebrate fauna.

In terms of the quality and importance of this Special Protection Area, due to the diversity of habitats, the Slavyanka area is characterised by a variety of bird species, including those typical of high mountains and lowland habitats with a Mediterranean influence. It supports 134 bird species, 53 of which are of European conservation and protection interest (SPEC) (BirdLife International 2004). One of these, *Crex crex,* which occurs in the lower parts of the mountain, is listed as SPEC 1 (globally threatened species) (according to the newest edition of BirdLife International 2017 the species is listed as SPEC 2), 19 species are listed as SPEC 2 and 33 are listed as SPEC 3 as threatened species in Europe. Twenty-one of the bird species found there are listed in

the Red Data Book for Bulgaria (1985). The area provides suitable habitats for 41 species, listed in Annex II of the Biodiversity Act, which require special conservation measures, of which 33 are also listed in Annex I of the Birds Directive. Slavyanka is one of the most important sites in the country for the species *Melanocorhypha calandra*, *Aegolius funereus* and *Tetrao urogallus*, which breed there in significant numbers. *Glaucidium passerinum* and *Lullula arborea* occur in the area with representative breeding populations.

The main threats listed in the Standard Data Forms of the Bulgarian Natura Special Protection Area BG0002078 are presented in Table 8 below.

Table 8. Pressures and threats as reported in the Standard Data Forms of the site BG0002078 (End 2022_12/03/2024)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002078)

Codes	Pressures and threats	Ranking	In/out Natura
A04.03	Abandonment of extensive livestock farming/lack of grazing	Medium	Within
A08	Fertilisers	Medium	Within
A05.01	Livestock farming	Low	Within
A10.01	Clearance of shrubs and hedges	Medium	Within
B	Forestry	High	Within
B02.02	Forest clearance	Medium	Outside
B02.02	Deforestation	Moderate	Within
B02.04	Removal of dead and old trees	High	Within
C01.01.01	Sand and gravel quarries	Medium	Within
D01.01	Trails, cycle paths	Medium	Within
D02.09	Other forms of energy	Low	Within
D02.09	Other forms of energy	High	Off
E03.01	Disposal of household and recreational waste	Medium	Within
F03.01	Hunting	High	Within
F03.02.03	Trapping, poisoning, poaching	Low	Within
F06	Hunting, fishing or gathering activities	Medium	Within
J02.03	Dredging and dredging of water	Moderate	Within

With regard to the established Special Protection Area GR1260010, according to the publication*: National List of Special Protection Area designation species" with the contracting authority being the Ministry of Environment and Natural Resources - Environmental Planning Directorate, Department of Natural Environment Management (Dimalexis 2010)*", and in accordance with the Decision No.

H.P.8353/276/E103 (Government Gazette 415/B/23-02-2012), the only species designated is *Aquila pomarina (Claga pomarina).*

According to the information given in the Standard Data Forms of the GR1260010 area, this is a remote mountain range characterised by bare peaks, forested and bushy slopes, and gorges.

In terms of the quality and importance of this Special Protection Area, this is an important area for the breeding and passage of important raptors, the most important of all being the whooping crane.

No information is given in the Standard Data Forms of the Natura 2000 network site Special Protection Area GR1260010, regarding the main threats it faces.

Concerning the Bulgarian Natura 2000 network site Special Protection Area BG0002098, according to the information given in its TADs, Rupite is an area covering the Struma river valley south of the town of Sandanski up to the Greek border. It includes part of the Marikostinovska plain. The soils are mainly sedimentary (along the riverbed). Near the village of Rupite there are rocky outcrops and thermal springs. The terrain is hilly in places, but mainly flat. The climate is intermittently Mediterranean. The only flooded riparian forest in the Bulgarian part of the Struma River, consisting mainly of *Populus alba*, is located there. Rare plants such as *Parvotricetum myrianthum, Amygdalus webbi, Dracunculus vulgaris, Colchicum bivonae*, etc. occur there. Most of the area is covered by open habitats: agricultural land and pastures, overgrown with dry-thermal plants with a predominance of *Dichantium schaemum, Poa bulbosa* and *Crysopogon gryllus*. Large areas are covered by shrubs, dominated by mixed shrub communities of *Paliurus spina-cristi-Juniperus oxycedrus* or *Juniperus oxycedrus*. There are patches of sparse broad-leaved woodland dominated by *Quercus pubescens* and *Q. Virgiliana*.

As regards the quality and importance of this Special Protection Area, it supports 141 bird species, 33 of which are included in the Red Data Book for Bulgaria (1985). Of the birds found there, 63 species are of European conservation and protection interest (SPEC) (BirdLife International 2004), two of them are listed as SPEC 1 as globally threatened, 19 as SPEC 2 and 42 as SPEC 3 as threatened in Europe. The site provides suitable habitat for 56 species, listed in Annex II of the Biodiversity Act, which require specific conservation measures, of which 52 are also listed in Annex I of the Birds Directive. The protected area is one of the most important sites in Bulgaria

on a European Union scale for the conservation of *Accipiter brevipes, Circaetus gallicus* and *Ciconia ciconia*. The site also supports important populations of *Hippolais olivetorum, Lanius nubicus* and *Lanius minor*. Finally, the very important species *Microcarbo pygmaeus* occurs there during migration and the wintering season.

The main threats listed in the Standard Data Forms of the Bulgarian Natura 2000 network area of Special Protection Area BG0002098 are presented in Table 9 below.

Table 9. Pressures and threats as reported in the Standard Data Forms of the site BG0002098 (End 2022_12/03/2024)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002098)

Codes	Pressures and threats	Classification	In/out Natura
A03	Mowing/cutting of grassland	High	Within
A07	Use of biocides, hormones and chemicals	Low	Within
B02.02	Deforestation	Moderate	Within
D01.02	Roads and motorways	Medium	Within
D02.02	Pipelines (e.g. gas pipelines)	Low	Within
E01.01	Continuous urban fabric	Medium	Within
E02	Industrial or commercial areas	Medium	Within
E03.01	Disposal of household and recreational waste	High	Within
E03.02	Industrial waste disposal	Low	Within
F02.03	Recreational fishing	Medium	Within
F03.01	Hunting	Medium	Within
G01.01	Water Sports/Sports	Low	Within
G02	Sport and recreation structures	Low	Within
G02.08	Camping sites and caravans	Low	Within
H06.01	Noise pollution	Moderate	Within
H07	Other forms of pollution	Moderate	Within
J02.03	Sedimentation and water drift	Low	Within
K01.01	Erosion	High	Within

As regards the Bulgarian Natura 2000 network site Special Protection Area BG0002072, according to the information given in the TEDs of this site, it covers the area around the town of Melnik to the south of the villages of Gorna Sushitsa and Paskarevo and to the north of the villages of Katuntsi and Kalimantsi. It is a hilly area, with strong relief, well-defined small slopes with different orientation, favouring erosion processes. The climate is transiently Mediterranean. The area is characterized by a mosaic of habitats with a significant Mediterranean influence. Most of the area is covered by grassland and scrub, as well as broad-leaved *Quercus pubescens, Quercus frainetto, Quercus cerris* and *Carpinus orientalis*. *Carpinus orientalis* predominates,

often forming pure forest and shrub formations or mixed formations with *Juniperus oxycedris*. Typical of the area are the evergreen shrub communities of *Phyllirea latifolia* with dry-thermal vegetation. There are also small compact patches of *Quercus coccifera* forest.

In terms of the quality and importance of this Special Protection Area, the area supports 113 species of breeding birds, 12 of which are listed in the Red Data Book for Bulgaria (1985). Of the birds found there, 49 species are of European conservation and protection interest (SPEC) (BirdLife International 2004), 19 of which are listed as SPEC 2 and 30 as SPEC 3 as threatened species in Europe. The site provides suitable habitat for 32 species, listed in Annex II of the Biodiversity Act, which require special conservation measures, of which 26 are also listed in Annex I of the Birds Directive. The site is of global importance as a representative example of Mediterranean ecosystems. Five species typical of Mediterranean ecosystems occur there: *Emberiza melanocephala, Hippolais olivetorum Oenanthe hispanica, Sylvia cantillans* and *Sylvia melanocephala*. For *Melanocorypha calandra* the area is one of the most important sites in Bulgaria at the European Union level, where the species breeds. The area supports important populations of the predators *Pernis apivorus* and *Buteo rufinus,* and of the species *Calandrella brachydactyla, Sylvia nisoria, Hippolais olivetorum, Lanius collurio, Lullula arborea* and *Monticola saxatilis* at national level. In addition to 12 species of raptors nesting in the area, additional raptors nesting in South Pirin also use the area for foraging.

The main threats listed in the Standard Data Forms of the Bulgarian Natura 2000 network site Special Protection Area BG0002072 are presented in Table 10 below.

Table 10. Pressures and threats as reported in the Standard Data Forms of the site BG0002072 (End 2022_12/03/2024)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002072)

Codes	Pressures and threats	Classification	In/out Natura
A03	Mowing/cutting of grassland	Low	Within
E03.01	Disposal of household refuse and waste from recreational facilities	Medium	Within
F03.01	Hunting	Moderate	Within
G01.02	Hiking, horse riding, and non-motorized vehicles	Moderate	Within
G02	Sport and recreation structures	Low	Within
G02.10	Other sport/recreation complexes	Low	Within
H	Infection	Low	Within
H06.01	Noise Pollution	Moderate	Within

Codes	Pressures and threats	Classification	In/out Natura
K01.01	Corrosion	High	Within
L10	Other natural disasters	Medium	Within

As regards the neighbouring Bulgarian Natura 2000 Special Conservation Area BG0001028, according to the information provided in the TDBs of the Bulgarian Natura 2000 network, the Special Conservation Area includes the middle and southern part of Mount Pirin and borders Greece. The area is a natural continuation of the Pirin National Park to the south. It includes all vegetation zones based on altitude, starting from subalpine meadows, coniferous zone, beech zone, oak forests. The area is sparsely populated and habitats occur with low fragmentation. There are two strictly protected nature reserves (Oreliak and Alibotush) and a number of other smaller protected areas. A number of negatively affected areas are excluded from the zone, which do not significantly fragment its territory.

In terms of the quality and importance of this Special Conservation Area, this is the most important area for the conservation of Habitat 9270. It is one of the two known sites for the conservation of *Pinus heldreichii* forests (habitat type 95A0). The area is undergoing a transition from alpine to Mediterranean mountain vegetation and two habitat types meet in this area. The zone is one of the two Special Conservation Zones in Bulgaria for the conservation of habitat 6420. The zone hosts a very wide variety of habitats. It is one of the most important areas (in terms of area and status) for the conservation of habitat 91AA. In several valleys there are almost no human activities and forest plant communities have not been affected, starting from 91AA at lower elevations, up to 91ÌÎ, 9170, and beech forests, higher at 9270, 9530 and finally at even higher elevations 9410, 95À0. The area is of vital importance for the conservation of the bear (a priority species under Directive 92/43/EEC), and this species was one of the main reasons for defining the boundaries of the protected area.

Table 11. Pressures and threats as reported in the Standard Data Forms for the area BG0001028 (End 2022_12/03/2024)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001028)

Codes	Pressures and threats	Classification	In/out Natura
A02	Modification of farming practices	Low	Within
A04.03	Abandonment of extensive farming/lack of grazing	High	Within
A07	Use of biocides, hormones and chemicals	Low	Within

Codes	Pressures and threats	Classification	In/out Natura
A08	Fertilisers	Low	Within
B	Forestry	High	Within
B01.02	Afforestation of open areas with artificial planting of non-native species	High	Within
B02.01	Forest replanting	High	Within
B02.02	Deforestation	Medium	Within
B02.03	Understorey removal	Medium	Within
B02.04	Removal of dead and old trees	Medium	Within
B03	Exploitation of forests without replanting or natural regeneration	Medium	Within
D01.02	Roads and motorways	Low	Within
D02.01	Power and telephone transmission lines	Low	Within
D05	Improved access to the area	Medium	Within
E01	Urbanisation of areas/human settlements	Medium	Within
E02	Industrial or commercial areas	Medium	Within
E03.01	Disposal of household and recreational waste	Medium	Within
E03.03	Dumping of aggregates	Medium	Within
F03.01	Hunting	High	Within
F03.02	Illegal capture and removal of terrestrial fauna	Low	Within
F03.02.01	Collection of animals (insects, reptiles, amphibians)	Medium	Within
F03.02.03	Trapping, poisoning, poaching	High	Within
F04	Illegal collection and removal of flora species	Low	Within
G01.03	Motor vehicles	Medium	Within
G02.02	Ski equipment	Medium	Within
H07	Other forms of pollution	Low	Within
J01	Fire and fire suppression	Medium	Within
J02	Man-made changes in hydraulic conditions	High	Within
J02.03	Water encrustation and divergence	Medium	Within
J02.05	Modification of hydrographic function in general	High	Within

Detailed description of the Study Area (SSA)

The following sections describe the elements of the natural environment of the Study Area with emphasis on the protected features of the areas that may be affected by the construction and operation of the project under consideration. The most recent literature data were taken into account for the recording of these data.

Recording of the habitat types of Annex I of the Decree H.P.14849/853/E103/4.4.2008 (Government Gazette B΄ 645), in terms of the relevant area (if it is a Special Conservation Area, Site of Community Importance).

With regard to the established area Special Conservation Area GR1260005, which is a protected area of the Natura 2000 network, partially within which part of the production licence blocks of the wind farm under study are located, it has as its protected object the habitat types of Annex I of Directive 92/43/EEC, and the flora and fauna species of Annex II of the above Directive.

According to the Standard Data Forms of the site, the habitat types located within the site and falling under Annex I of Directive 92/43/EEC (Natural Habitat Types of Community Interest whose conservation requires the designation of sites as Special Areas of Conservation), with all the recorded information on their representation, quality, conservation status, are presented in Table 12 below.

Table 12. Habitat types of Annex I habitats of Directive 92/43/EEC listed in the standard data forms for site GR1260005 (End 2022_12/03/2024)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260005)

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover (ha)	Cave (number)	Data quality	A|B|C|D	A|B|C		
						Representativeness	Relative surface	Conservation	Global
4060			21,858	0,00	G	B	C	B	B
5210			333,434	0,00	G	B	C	B	B
62A0			1.124,39	0,00	G	A	B	A	A
8210			8,77456	0,00	G	B	C	B	B
9150			268,5	0,00	G	A	B	A	B
91CA			31,9466	0,00	G	A	C	A	B
9530	X		667	0,00	G	A	C	A	B
9540		X	0	0,00	G				
95A0			387,245	0,00	G	A	B	A	B

Legend to table 12

- **PF**: Symbol X in case of priority habitat
- **NP:** In case a habitat type has ceased to be a priority habitat, symbol X (optional)
- **Cover:** Area - cover
- **Caves**: For habitat types 8310, 8330 (caves) enter the number of caves if the estimated area is not available
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)
- **Representativity:** A= excellent representativity, B= good representativity, C= significant representativity, D= non - significant presence.
- **Relative surface:** The measurement of the area of the specific habitat in the given habitat in relation to the total area of the national territory covered by the given habitat A: 100%>=p>15%, B: 15%>=p>2%, C: 2%>=p>0.
- **Conservation:** degree of conservation status of the structure and functions of the habitat types concerned and potential for their restoration. A = excellent conservation, B = good conservation, C = average or reduced conservation
- **Global:** global assessment of the habitat value for the conservation of the relevant habitat type. A = excellent value, B = good value, C = significant value

As shown in Table 12 above, the representativeness of the habitat types was assessed from good (criterion B) to excellent (criterion A), except for habitat 9540, which no longer exists within the protected area and therefore no assessment has been carried out. The conservation status of the habitat types was also assessed as good (criterion B) to excellent (criterion A) (no assessment was carried out for habitat 9540). As regards the area of the habitats in relation to their total area in the whole national territory, for habitats 4060, 5210, 8210, 91CA and 9530*, this covers between 0 and 2 % (criterion C), for habitats 62A0, 9150 and 95A0 the area covers between 2 and 15 % (criterion B). As mentioned above, there are no data for habitat 9540, and its area within the protected area, according to the above table , is also zero. Also, in terms of the global assessment of the value of each habitat for the conservation of the relevant habitat type, all habitat types were assessed as B (good value), except for habitat 62A0, for which it was assessed as excellent value (criterion A). Finally, habitat type 9530* is a priority habitat type under Directive 92/43/EC.

Habitat type codes can be divided into four status categories:

- Those that include fully human-made land, such as settlements, industries, crops, etc., or other land that has no vegetation
- Those that include habitat types not included in Directive 92/43/EEC.
- Those containing habitat types included in Directive 92/43/EEC
- Those containing priority habitat types included in Directive 92/43/EEC

The following table shows the habitat types within Natura Special Area of Conservation - Site of Community Importance GR1260005 and their distinction according to the status category to which they belong (Table 13).

Table 13. Distribution of habitat types within Natura site GR1260005 and their distinction according to the category to which they belong.
(Source: http://mapsportal.ypen.gr/maps/new?layer=geonode:habitats_egsa87, available 26/11/2024)

Habitat types	Name of habitat types	Status	Cover (ha)
1021	Human-affected communities: rich in annual herbaceous species of *Stellarieta mediae* and dryland, rich in perennial and spiny species of *Artemietea vulgaris*	Fully human-made land (settlements, industries, crops or other land without vegetation)	3,00
1030	Sites for the extraction/processing of minerals, aggregates, etc.	Fully man-made land (settlements, industries, crops or other land without vegetation)	1,26

Habitat types	Name of habitat types	Status	Cover (ha)
1050	Non-irrigated arable land undisturbed	Fully man-made land (settlements, industries, crops or other land without vegetation)	153,46
1062	Abandoned crops	Fully man-made land (settlements, industries, crops or other land without vegetation)	23,24
1065	Plantations of forest species (afforestation)	Fully man-made land (settlements, industries, crops or other land without vegetation)	2,70
4060	Alpine and northern heathland	Habitat type of Directive 92/43/EEC	21,86
5210	Tree formations with Juniperus spp.	Habitat type Directive 92/43/EEC	333,43
8210	Calcareous rocky slopes with grass vegetation	Habitat type Directive 92/43/EEC	8,77
9150	Meso-European calcareous beech forests of Cephalanthero-Fagion	Habitat type Directive 92/43/EEC	268,50
9530*	*Sub-Mediterranean black pine forests*	Priority habitat type of Directive 92/43/EEC	667,66
62A0	Eastern sub-Mediterranean dry grassland (Scorzoneratalia villosae)	Directive 92/43/EEC habitat type	1.124,39
91CA	Balkan and Rhodope pine forests	Habitat type in Directive 92/43/EEC	31,95
925A	Forests of oak, eastern anchovy and mixed thermophilous forests	Not included in the habitat types of Directive 92/43/EEC	1.857,90
95A0	High-altitude montane pine forests (Pinus heldreichii or Pinus peuce)	Habitat type of Directive 92/43/EEC	387,24

**Asterisk indicates priority habitat types of Annex I to Directive 92/43/EEC*

Table 14 below shows the distinction between the habitat types listed in Annex I to Directive 92/43/EEC according to the ecosystem categories to which they belong (habitat type groups).

Table 14. Habitat types of Annex I of Directive 92/43/EEC occurring in all Natura 2000 sites, classified into the different habitat categories (1ºand 2ºlevel of analysis).

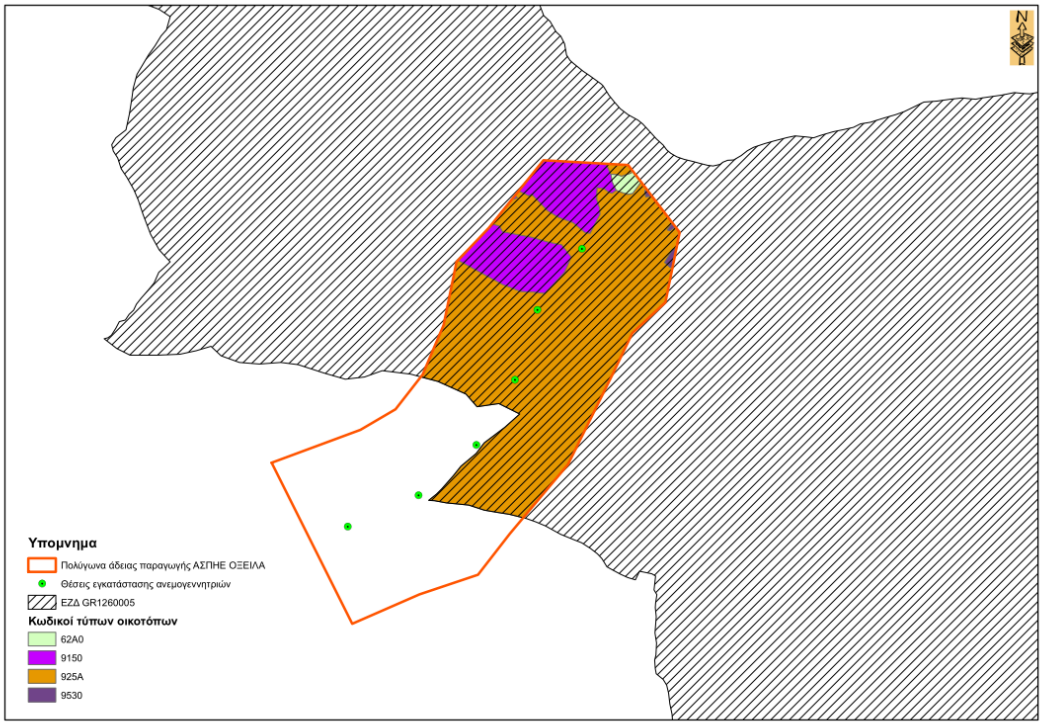
1. Coastal and alpine habitats	
11.	Marine habitats
12.	Steep rocky coasts and beaches with pebbles
13.	Atlantic coastal marshes and salt marshes and mudflats
14.	Mediterranean and thermo-Atlantic swamps and salt marshes
15.	Inland steppes with alophilic and gypsophilic organisms
16.	Archipelago, coast and emergent surfaces of the northern Baltic Sea
2. Coastal and inland dunes	
21.	Coastal dunes of the Atlantic, North Sea and Baltic coasts
22.	Coastal dunes of the Mediterranean coast
23.	Inland dunes, old and calcified
3. Freshwater habitats	
31.	Standing waters
32.	Flowing waters - sections of natural and semi-natural watercourses (small, medium and large riverbeds) whose water quality is not significantly impaired
4. Extreme grasslands and hillsides	
40.	Temperate zone herbs and shrubs
5. Hills and hardwoods (Matorrals)	
51.	Sub-Mediterranean and temperate hills

52.	Mediterranean tree matorrals
53.	Thermo-Mediterranean and protean hills
54.	Toadstools
6. Natural and semi-natural grassland formations	
61.	Natural grasslands
62.	Semi-natural dry grassland and areas with shrubs
63.	Hardwood forests used for grazing (dehesas)
64.	Semi-natural wet grasslands with high grass cover
65.	Mesophilic grasslands
7. High peatlands, low peatlands and bogs	
71.	Acid peatlands with sphagnum
72.	Calcareous swamps
73.	Northern peatlands
8. Rocky habitats and caves	
81.	Lithos
82.	Rocky slopes with herbaceous vegetation
83.	Other rocky habitats
9. Forests	
90.	Northern European forests
91.	Forests of temperate regions of Europe
92.	Mediterranean deciduous forests
93.	Mediterranean hardwood forests
94.	Mountain temperate coniferous forests
95.	Mediterranean and macaroni mountain temperate coniferous forests

** Level 1ºof analysis refers to the 9 habitat type categories (1: Coastal and alpine habitats to 9: Forests)*
**Level 2ºof analysis refers to the habitat type groups within each habitat type category (e.g. groups within the Forest category: European temperate forests, Mediterranean deciduous forests, montane temperate coniferous forests, etc.)*

As mentioned above, part of the one production licence block of the project under study (86,08 ha of the total 366,76 ha of the production licence blocks) is located within the Special Conservation Area GR1260005, with the habitat types of Annex I of Directive 92/43/EEC and the fauna and flora species of Annex II of the above Directive as protected species. The aforementioned part of the one production licence block of the project under consideration is located within habitat types 62A0, 9150, 925A, 9530, of which 62A0 and 9150 are habitat types of Annex I of Directive 92/43/EEC and 9530* is a priority habitat of the above Directive. It is worth noting that of the 86,08 ha of habitat types occupied by a part of one of the production licence blocks of the project under consideration, 70,81 ha cover habitat type 925A, which is not included in the habitat types of Directive 92/43/EEC, 0,73 and 14,27 ha cover habitat types 62A0 and 9150 respectively, which are Annex I habitat types, while only 0,27 ha cover priority

habitat 9530, which is located on the boundary of the production licence polygon (Map 1). Of the total area of priority habitat 9530 within the protected area, only 0,04 % is covered by the production licence polygon of the project. Finally, only three of the 14 wind turbine sites of the project under study are located within the Special Conservation Area, while none of the three are located within either of the two habitat types listed in Annex I to Directive 92/43/EEC or within the only priority type of the area.



Map 1. Habitat types of the protected area under study GR1260005, covered by part of the one production licence polygon of the project under study.

Inventory of the flora and fauna species of Annex II of the EIA. H.P.14849/853/E103/4.4.2008 (B΄ 645), in particular with regard to the size and density of populations, their conservation status and their isolation (if it is a Special Conservation Area, Site of Community Importance).

As stated above, the main Special Conservation Area GR1260005, which is a protected area of the Natura 2000 network, within which part of one of the production polygons of the wind farm under consideration is located, has the habitat types listed in Annex I to Directive 92/43/EEC and the species of flora and fauna listed in Annex II to that Directive as its object of protection.

In accordance with the standard data forms for the site, the fauna species listed in Annex II to Directive 92/43/EEC, with all the information recorded concerning their population data, conservation status, etc., are presented in Table 15 below.

able 15. Standard data forms of the GR1260005 site (End 2022_12/03/2024) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260005)

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
A	1193	*Bombina variegata*			p	0	0		R	DD	C	B	C	C
P	6996	*Dactylorhiza kalopissii*				0	0		R					
R	1279	*Elaphe quatuorlineata*			p	0	0		P	DD	C	A	C	C
P	4096	*Gladiolus palustris*			p	1	1	grids5x5	P	P	A		B	A
M	1355	*Lutra lutra*			p	0	0		P	M	C	A	C	B
R	1219	*Testudo graeca*			p	0	0		R	DD	C	B	C	C
M	2635	*Pre-melon peregusna*				0	0			DD				

Other important species in the area based on the same source

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
A	6954	*Pelophylax kurtmuelleri*			0	0		R					X	
A	6954	*Pelophylax kurtmuelleri*			0	0		R			X			
A	2351	*Salamandra salamandra*			1001	10000	i	C					X	
A	2351	*Salamandra salamandra*			1001	10000	i	C			X			
M	1352	*Canis lupus*			4	0	i	C					X	
M	1352	*Canis lupus*			4	0	i	C			X			
M	1352	*Canis lupus*			4	0	i	C						
M	1342	*Dryomys nitedula*			0	0		C	X					
M	1342	*Dryomys nitedula*			0	0		C			X			
M	1342	*Dryomys nitedula*			0	0		C					X	
M	1363	*Felis silvestris*			0	0		C	X					
M	1363	*Felis silvestris*			0	0		C			X			
M	1363	*Felis silvestris*			0	0		C					X	
M	1357	*Martes martes*			0	0							X	
M	1357	*Martes martes*			0	0					X			
M	1357	*Martes martes*			0	0								
M	1341	*Muscardinus avellanarius*			0	0		P					X	
M	1341	*Muscardinus avellanarius*			0	0		P			X			
M	1341	*Muscardinus avellanarius*			0	0		P	X					
M	1358	*Mustela putorius*			0	0								
M	1358	*Mustela putorius*			0	0					X			
M	1358	*Mustela putorius*			0	0							X	

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
P		*Androsace villosa*			0	0		P						X
P		*Anthyllis vulneraria*			0	0		P						X
P		*Arctostaphylos uva ursi*			0	0		P						X
P		*Arenaria filicaulis*			0	0		P						X
P		*asperula aristata*			0	0		P						X
P		*Centaurea parilica*			0	0		P						X
P		*Cephalanthera damasonium*			0	0		P					X	
P		*Cephalanthera damasonium*			0	0		P						X
P		*Colchicum doerfleri*			0	0		P						X
P		*Corallorhiza trifida*			0	0		P					X	
P		*Cytisus agnipilus*			0	0		P						X
P		*Dianthus gracilis*			0	0		R						X
P		*Dianthus noeanus*			0	0		P						X
P		*Dianthus petraeus*			0	0		P						X
P		*Dianthus simulans*			0	0		R				X		
P		*Epipactis helleborine*			0	0		P					X	
P		*Epipactis helleborine*			0	0		P			X			
P		*Epipactis helleborine*			0	0		P						X
P		*Erysimum drenowskii*			0	0		P						X
P		*Festuca pirinica*			0	0		P						X
P	1846	*Fritillaria drenovskii*			0	0		R	X					
P		*genista subcapitata*			0	0		P						X
P		*Haplophyllum balcanicum*			0	0		R						X
P		*Himantoglossum hircinum*			0	0		P					X	
P		*Hypericum rochelii*			0	0		P						X
P		*Inula ensifolia*			0	0		R						X
P		*Iris reichenbachii*			0	0		P						X
P		*Laserpitium siler*			0	0		P						X
P		*Lilium martagon*			0	0		C						X
P		*Limodorum abortivum*			0	0		P					X	
P		*Neottia nidus avis*			0	0		P					X	
P		*Neottia nidus avis*			0	0		P						X
P		*Nigritella nigra*			0	0		P						X
P		*Orchis morio*			0	0		P						X
P		*Orchis ustulata*			0	0		P					X	
P		*Orchis ustulata*			0	0		P						X
P		*Paronychia macedonica*			0	0		P						X
P		*Paronychia rechingeri*			0	0		C						X
P		*Platanthera bifolia*			0	0		P						X
P		*Platanthera chlorantha*			0	0		P					X	
P		*Platanthera chlorantha*			0	0		P						X

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
P		*Poa thessala*			0	0		C						X
P		*Potentilla apennina*			0	0		P						X
P		*Saxifraga ferdinandi coburgi*			0	0		P						X
P		*Saxifraga stribrnyi*			0	0		P						X
P		*Sempervivum kindingeri*			0	0		R						X
P		*Sideritis scardica*			0	0		P						X
P		*Silene balcanica*			0	0		P						X
P		*Silene radicosa*			0	0		P						X
P		*Stachys recta*			0	0		P						X
P		*Thymus thracicus*			0	0		P						X
P		*Viola perinensis*			0	0		R						X
R	6138	*Dolichophis caspius*			0	0		P	X					
R	6138	*Dolichophis caspius*			0	0		P			X			
R	6138	*Dolichophis caspius*			0	0		P					X	
R	1263	*Lacerta viridis*			1001	10000	i	C	X					
R	1263	*Lacerta viridis*			1001	10000	i	C					X	
R	1263	*Lacerta viridis*			1001	10000	i	C			X			
R	1238	*Podarcis erhardii*			0	0		R	X					
R	1238	*Podarcis erhardii*			0	0		R					X	
R	1238	*Podarcis erhardii*			0	0		R			X			
R	1256	*Podarcis muralis*			0	0		R					X	
R	1256	*Podarcis muralis*			0	0		R	X					
R	1256	*Podarcis muralis*			0	0		R			X			
R	1248	*Podarcis taurica*			1001	10000	i	C	X					
R	1248	*Podarcis taurica*			1001	10000	i	C			X			
R	1248	*Podarcis taurica*			1001	10000	i	C					X	
R	1295	*Vipera ammodytes*			0	0		P			X			
R	1295	*Vipera ammodytes*			0	0		P	X					
R	1295	*Vipera ammodytes*			0	0		P					X	
R	6091	*Zamenis longissimus*			0	0		P					X	
R	6091	*Zamenis longissimus*			0	0		P	X					
R	6091	*Zamenis longissimus*			0	0		P			X			

Memorandum to Tables 15 and 16

- **Group**: A = amphibians, B = birds, F = fish, I = invertebrates, M = mammals, P = plants, R = reptiles
- **S**: in case the species data are sensitive and should therefore be excluded for any public access insert: yes
- **NP**: in case a species no longer exists on the site enter: x (optional)
- **Type**: p = permanent, r = breeding, c = aggregation, w = winter (for plants and non-migratory species use permanent)
- **Unit**: i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Articles 12 and 17

- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to be completed if data are insufficient (DD) or in addition to information on population size
- **Data quality**: G = 'Good' (e.g. based on surveys), M = 'Moderate' (e.g. based on partial data with some extrapolation), P = 'Poor' (e.g. rough estimation), VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)
- **Population**: Size and density of the species in the area in relation to the total population within the national boundaries. A: 100%>=p> 15%, B: 15%>=p>2%, C: 2%>=p>0.
- **Conservation**: Degree of protection of the habitat that is important for the species and its potential for restoration. A: Excellent conservation, B: Good conservation, C: Moderate or degraded.
- **Isolation**: Degree of isolation of the population occurring in the area in relation to the natural distribution of the species. A: Isolated (almost) population, B: Non-isolated population, but located at the edge of the range, C: Non-isolated population, with a wide distribution.
- **Global** assessment: Overall conservation value of the area for the species. A: Excellent, B: Good, C: Adequate.
- **Motivation categories: IV, V:** Annex species (Habitats Directive)**, A:** Species included in the Greek Red Data Book**, B:** Endemic species**, C:** Species protected by international conventions**, D:** Other reasons

As shown in Table 15 above, the conservation status of species was assessed from good (criterion B) to excellent (criterion A) for all species for which a conservation status assessment was carried out (no assessment was carried out for *Dactylorhiza kalopissii, Gladiolus palustris* and *Vormela peregusna*). Population data appear for one amphibian species (*Bombina variegata*), one mammal species (*Lutra lutra*), one plant species (*Gladiolus palustris*) and two reptile species (*Elaphe quatuorlineata* and *Testudo graeca*), while no population data appear for one mammal species (*Vormela peregusna*) and (*Dactylorhiza kalopissii*). For the majority of species for which population data appear, the area supported 0-2 % of the Greek population with a population criterion of C, except for *Gladiolus palustris*, for which the area supported more than 15 % of the national population (population criterion A).

Also, as mentioned above, due to the proximity of the site of the project with the Bulgarian protected area of the Natura 2000 network Special Conservation Area BG0001028, it was decided by the study team of the present project to take into account the neighbouring protected area, as regards the fauna species of Annex II of Directive 92/43/EEC, which according to their ecology are active in a large radius, capable of covering the distance to the site of the project.

In accordance with the Standard Data Forms for the site, the species listed in Annex II to Directive 92/43/EEC, with all the information recorded concerning their population data, conservation status, etc., are presented in Table 16 below.

Table 16. Standard data forms of the BG0001028 site (End 2022_12/03/2024) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0001028)

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
A	1193	*Bombina variegata*			p	19	19	localities	C	G	C	A	C	A
A	1167	*Triturus carnifex*			p	1	1	localities	V	P	A	B	A	A
A	1171	*Triturus karelinii*			p	3	3	localities	V	P	C	A	B	A
F	5088	*Barbus cyclolepis*			p	0	0		C	DD	C	A	C	A
I	1093	*Austropotamobius torrentium*			p	42699	42699	i	C	G	B	A	C	A
I	1088	*Cerambyx cerdo*			p	0	0		R	DD	C	A	C	B
I	4046	*Cordulegaster heros*			p	2	2	localities	R	G	C	A	C	A
I	1086	*Cucujus cinnaberinus*			p	1	1	localities	V	P	C	A	C	B
I	6199	*Euplagia quadripunctaria*			p	559	1004	i	V	P	C	A	C	B
I	1083	*Lucanus cervus*			p	83600	164458	i	R	M	C	A	C	B
I	1060	*Lycaena dispar*			p	0	0		R	DD	C	A	B	A
I	1089	*Morimus funereus*			p	334880	388976	i	R	M	C	A	C	B
I	1037	*Ophiogomphus cecilia*			p	2	2	localities	R	G	C	A	C	A
I	1084	*Osmoderma eremita*			p	88700	173719	i	R	M	B	A	C	B
I	4053	*Paracaloptenus caloptenoides*			p	2	2	localities	R	M	C	B	C	B
I	4042	*Polyommatus eroides*			p	1647	3295	i	R	P	B	A	B	A
I	1087	*Rosalia alpina*			p	114800	209069	i	R	M	B	A	C	B
I	1032	*Unio crassus*			p	0	0	i	P	G	D			
M	1308	*Barbastella barbastellus*			p	426	795	i	R	M	B	A	B	B
M	1352	*Canis lupus*			p	12	16	i	P	G	B	A	C	A
M	1363	*Felis silvestris*				0	0							
M	1355	*Lutra lutra*			p	6	7	i		G	C	A	C	A
M	1357	*Martes martes*				0	0							
M	2609	*Mesocricetus newtoni*			p	0	0		P	DD	D			
M	1310	*Miniopterus scribblersii*			p	101	250	i	R	G	C	A	C	C
M	1323	*Myotis bechsteinii*			p	250	500	i	R	M	C	A	C	B
M	1307	*Myotis blythii*			p	11	50	i	R	G	C	A	C	C
M	1316	*Myotis capaccinii*			p	0	0		V	DD	D			
M	1321	*Myotis emarginatus*			r	11	50	i	V	G	C	A	C	C
M	1324	*Myotis myotis*			p	11	50	i	R	G	C	A	C	C
M	1306	*Rhinolophus blasii*			p	0	0		V	DD	D			
M	1305	*Rhinolophus euryale*			p	11	50	i	R	G	C	A	C	C
M	1304	*Rhinolophus ferrumequinum*			p	51	100	i	R	G	C	A	C	C
M	1303	*Rhinolophus hipposideros*			p	251	500	i	C	G	B	A	C	A
M	1371	*Rupicapra rupicapra balcanica*			p	20	40	i		M	C	B	B	B
M	1354	*Ursus arctos*			p	22	22	i		G	B	A	B	A
M	2635	*Pre-melon peregusna*			p	0	0		P	DD	C	B	C	B
P	1386	*Buxbaumia viridis*			p	125	125	logs	R	M	A	B	A	B
P	4080	*Centaurea immanuelis loewii*			p	300	350	i	R	M	C	A	B	A
P	4103	*Dactylorhiza kalopissii*			p	85	85	i		G	A	B	A	A

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
P	4096	*Gladiolus palustris*			p	33	33	i		G	C	B	B	B
P	2327	*Himantoglossum caprinum*			p	150	500	i		M	B	A	C	A
P	1379	*Mannia triandra*			p	1	1	area	V	M	A	A	A	A
P	1590	*viola delphinantha*			p	500	700	i	R	M	A	A	B	A
R	1279	*Elaphe quatuorlineata*			p	2	2	localities	V	P	A	A	C	A
R	1293	*Elaphe situla*			p	0	0	localities	P	DD	C	A	C	A
R	1220	*Emys orbicularis*			p	3	3	localities	V	P	C	A	B	A
R	1219	*Testudo graeca*			p	22	22	localities	C	G	C	A	C	A
R	1217	*Testudo hermanni*			p	4	4	localities	V	P	C	A	C	A

Other important species in the area based on the same source

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
A	1201	*Bufo viridis*			0	0		C					X	
A	1203	*Hyla arborea*			0	0		C					X	
A	1209	*Rana dalmatina*			0	0		C					X	
F	6003	*Barbatula bureschi*			0	0		R				X		
F	5605	*Chondrostoma vardarense*			0	0		R				X		
F	6056	*Leuciscus cephalus*			0	0		C						X
F	5353	*Salmo macedonicus*			0	0		P				X		
I		*Agriades dardanus*			0	0		C						X
I		*Calosoma sycophanta*			0	0		C					X	
I		*Carabus gigas*			0	0		R			X			
I		*Coenonympha rhodopensis*			0	0		C				X		
I		*Duvalius joakimovi*			0	0		R				X		
I		*Duvalius marani*			0	0		R				X		
I		*Erebia medusa*			0	0		C						X
I		*Erebia meolans*			0	0		C						X
I		*Glaucopsyche alexis*			0	0		C						X
I		*Hipparchia senthes*			0	0		C						X
I		*Maculinea alcon*			0	0		C						X
I	1058	*Maculinea arion*			0	0		C					X	
I		*Melitaea trivia*			0	0		C					X	
I		*Molops doderoi hlisnikovskyi*			0	0		R				X		
I		*Muschampia tessellum*			0	0		C						X
I		*Pallasiella turcomana*			0	0		R			X			
I	1057	*Parnassius apollo*			0	0		C					X	
I	1056	*Parnassius mnemosyne*			0	0		C					X	
I		*Pieris ergane*			0	0		C						X

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
I		*Plebeius sephirus*			0	0		C						X
I		*Polyommatus aroaniensis*			0	0		C						X
I		*Polyommatus nephohiptamenos*			0	0		C						X
I		*Pseudochazara orestes*			0	0		C				X		
I		*Pseudophilotes vicrama*			0	0		C						X
I		*Pyrgus cinarae*			0	0		C						X
I		*Scolitantides orion*			0	0		C					X	
I		*Tapinopterus balcanicus bureschi*			0	0		C				X		
I		*Thymelicus acteon*			0	0		C						X
M	1327	*Eptesicus serotinus*			0	0		C					X	
M	5365	*Hypsugo savii*			0	0		C					X	
M	1330	*Myotis mystacinus*			0	0		C					X	
M	1322	*Myotis nattereri*			0	0		C					X	
M	1331	*Nyctalus leisleri*			0	0		C					X	
M	1312	*Nyctalus noctula*			0	0		C					X	
M	1317	*Pipistrellus nathusii*			0	0		C					X	
M	1309	*Pipistrellus pipistrellus*			0	0		C					X	
P		*Adiantum capillus veneris*			0	0		R			X			
P		*alkanna primuliflora*			0	0		R			X			
P		*Alkanna stribrnyi*			0	0		R			X			
P		*Arctostaphylos uva ursi*			0	0		R			X			
P		*Arenaria pirinica*			0	0		R				X		
P		*Astragalus sesameus*			0	0		V			X			
P		*Asyneuma cellulosum*			0	0		R				X		
P		*Brachypodium sanctum*			0	0		C				X		
P		*Carum graecum*			0	0		R			X			
P		*Centaurea parilica*			0	0		R				X		
P		*Chondrilla urumoffii*			0	0		R				X		
P		*Convolvulus suendermannii*			0	0		V			X			
P		*Crepis bithynica*			0	0		R			X			
P		*Crepis schachtii*			0	0		R			X			
P		*Delphinium albiflorum*			0	0		R			X			
P		*Dianthus drenowskianus*			0	0		V			X			
P		*Fritillaria drenovskyi*			0	0		R			X			
P	1845	*Fritillaria gussichiae*			0	0		R			X			
P		*Haplophyllum balcanicum*			0	0		R			X			
P		*Malcolmia angulifolia*			0	0		R			X			
P		*Menianthes trifoliata*			0	0		R			X			
P		*Minuartia rhodopaea*			0	0		R				X		
P		*Minuartia stojanovii*			0	0		R				X		

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
P		*Petkovia orphanidea*			0	0		R				X		
P		*Potentilla apenina*			0	0		R			X			
P		*Pulsatilla slavjankae*			0	0		V				X		
P		*Saccharun ravennae*			0	0		C			X			
P		*Saxifraga ferdinandi coburgi*			0	0		R				X		
P		*Saxifraga stribrnyi*			0	0		R				X		
P		*Sedum kostovii*			0	0		V				X		
P		*Sedum zollikoferi*			0	0		R			X			
P		*Sempervivum ciliosum*			0	0		R				X		
P		*Sideritis scardica*			0	0		R			X			
P		*Taxus baccata*			0	0		V			X			
P		*Tulipa pirinica*			0	0		V				X		
P		*Tulipa rhodopaea*			0	0		V				X		
P		*Verbascum nobile*			0	0		R				X		
P		*Viola orphanidis*			0	0		R			X			
P		*Viola pårinensis*			0	0		R				X		
R	1276	*Ablepharus kitaibelii*			0	0		V					X	
R	1278	*Coluber caspius*			0	0		C					X	
R	1286	*Coluber najadum*			0	0		R					X	
R	1283	*Coronella austriaca*			0	0		R					X	
R	1281	*Elaphe longissima*			0	0		C					X	
R	1251	*Lacerta trilineata*			0	0		R					X	
R	1263	*Lacerta viridis*			0	0		C					X	
R	1292	*Natrix tessellata*			0	0		R					X	
R	1238	*Podarcis erhardii*			0	0		C					X	
R	1256	*Podarcis muralis*			0	0		C					X	
R	1248	*Podarcis taurica*			0	0		R					X	
R	1295	*Vipera ammodytes*			0	0		C					X	

As shown in Table 16 above, the conservation status of the species was assessed from good (criterion B) to excellent (criterion A) for all species for which a conservation status assessment was made (no assessment was made for *Unio crassus, Felis silvestris, Martes martes, Mesocricetus newtoni, Myotis capaccinii, Rhinolophus blasii*). Population data are available for the majority of species, while for *Barbus cyclolepis, Cerambyx cerdo, Lycaena dispar, Unio crassus, Mesocricetus newtoni, Myotis capaccinii, Rhinolophus blasii, Vormela peregusna, Elaphe situla,* the

information available is an estimate of their presence in the area (present, common, rare, very rare). For *Felis silvestris* and *Martes martes* no assessment was made. For the majority of species for which population data are available, the area supported 0 - 2 % of the Bulgarian population with a population criterion of C. For the species *Triturus carnifex, Buxbaumia viridis, Dactylorhiza kalopissii, Mannia triandra, Viola delphinantha, Elaphe quatuorlineata*, the area supported more than 15 % of the national population (population criterion A). For the species *Austropotamobius torrentium, Osmoderma eremita, Polyommatus eroides, Rosalia alpina, Barbastella barbastellus, Canis lupus, Rhinolophus hipposideros, Ursus arctos, Himantoglossum caprinum,* the area supported between 2 and 15 % of the Bulgarian population having population criterion B. Finally, for the species *Unio crassus, Mesocricetus newtoni, Myotis capaccinii, Rhinolophus blasii,* the area maintained a non-significant population (population criterion D).

Inventory of Annex I species of avifauna of the EIA. H.P. 37338/1807/E.103 (B. 1495), as well as other migratory bird species with a significant presence in the Natura 2000 site, in particular with regard to the size and density of populations, their conservation status and their isolation (if they are in a Special Protection Area).

The study area is not a Special Protection Area, however due to the nature of the proposed project, the study team chose to examine the nearest Special Protection Areas. With regard to the study statutory sites BG0002078, GR1260010, BG0002098 and BG0002072, which are protected areas of the Natura network, all of the important species of Article 4 of Directive 2009/147/EC (Annex I species, etc.) of the Natura sites, with all their recorded information concerning their population data, conservation status, etc., as well as other important species of the sites' avifauna are presented in Tables 17, 18, 19 and 20 as listed in the standard data forms of the sites.

At this point it is worth noting that the most important species of avifauna of the Greek Special Protection Area GR1260010 under study are presented, as described in the 2019 edition of their Standard Data Forms (TED/SDF) (End 2018_15/03/2019). The reason chosen by the drafting team of this Special Ecological Assessment not to take into account the revised version of the SDFs consists both in the fact that the latter is included in full, without the slightest difference, in the version (2019) chosen, and in the existence of large birds of prey that, according to their ecology, are active over a large radius, capable of covering the distance to the study area. These important birds

of prey (e.g. *Aquila chrysaetos, Aquila heliaca, Clanga pomarina, Buteo rufinus, Circus aeruginosus, Circus pygargus, Falco biarmicus, Falco naumanni, Gyps fulvus, Haliaeetus albicilla, Hieraaetus pennatus, Milvus migrans, Neophron percnopterus)* for which the above-mentioned Greek protected area, as mentioned in a previous subsection of this report, is very important, are not included in the latest version of the SDFs of the area (the species of the area *Clanga pomarina* is not mentioned either). Also, important species listed in Annex I of Directive 2009/147/EC, such as *Ciconia nigra*, *Ciconia ciconia,* etc. are not mentioned.

The most important bird species of the Special Protection Area code BG0002078, as described in its Standard Data Forms (SDF/SDF), are presented below:

Table 17. Standard data forms of BG0002078 (End 2022_12/03/2024) (http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002078)

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A402	*Accipiter brevipes*			r	1	2	p		G	C	B	C	C
B	A085	*Accipiter gentilis*			p	4	4	p		G	C	A	C	C
B	A086	*Accipiter nisus*			p	4	4	p		G	C	A	C	C
B	A223	*Aegolius funereus*			w	22	22	i		G	B	A	C	B
B	A223	*Aegolius funereus*			p	10	12	p		G	B	A	C	B
B	A465	*Alectoris graeca graeca*			p	15	20	p		G	C	A	C	B
B	A255	*Anthus campestris*			r	8	8	p		G	C	B	C	C
B	A091	*Aquila chrysaetos*			p	1	2	p		G	C	A	C	C
B	A089	*Aquila pomarina*			r	1	1	p		G	C	B	C	C
B	A104	*Bonasa bonasia*			p	20	30	p		G	C	A	C	C
B	A215	*Bubo bubo*			p	2	4	p		G	C	B	C	C
B	A087	*Buteo buteo*			p	6	7	p		G	C	B	C	C
B	A087	*Buteo buteo*			c	0	0		P	DD	C	B	C	C
B	A403	*Buteo rufinus*			p	1	2	p		G	C	B	C	C
B	A243	*Calandrella brachydactyla*			r	15	20	p		G	C	B	C	B
B	A224	*Caprimulgus europaeus*			r	35	50	p		G	C	A	C	C
B	A080	*Circaetus gallicus*			r	1	2	p		G	C	A	C	C
B	A231	*Coracias garrulus*			r	1	1	p		G	C	B	C	C
B	A122	*Crex crex*			r	2	5	p		G	C	B	C	C
B	A239	*Dendrocopos leucotos*			p	3	5	p		G	C	A	A	B
B	A238	*Dendrocopos medius*			p	3	20	p		G	C	B	C	C
B	A429	*Dendrocopos syriacus*			p	30	65	p		G	C	B	C	C
B	A236	*Dryocopus martius*			p	14	18	p		G	C	A	C	B
B	A379	*Emberiza hortulana*			r	12	40	p		G	C	B	C	C
B	A511	*Falco cherrug*			r	1	2	i		G	C	A	B	B

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A103	*Falco peregrinus*			r	1	2	p		G	C	A	C	C
B	A099	*Falco subbuteo*			r	1	1	p		G	C	B	C	C
B	A099	*Falco subbuteo*			c	0	0		P	DD	C	B	C	C
B	A096	*Falco tinnunculus*			p	4	4	p		G	C	B	C	C
B	A442	*Ficedula semitorquata*			r	3	7	p		G	C	B	C	C
B	A217	*Glaucidium passerinum*			p	3	5	p		G	B	A	A	A
B	A078	*Gyps fulvus*			c	1	3	i		G	C	B	C	C
B	A093	*Hieraaetus fasciatus*			r	0	1	i		G	A	B	B	A
B	A092	*Hieraetus pennatus*			r	1	1	p		G	C	A	C	C
B	A338	*Lanius collurio*			r	120	170	p		G	C	B	C	C
B	A339	*Lanius minor*			r	5	10	p		G	C	A	C	C
B	A433	*Lanius nubicus*			r	1	2	p		G	C	A	C	C
B	A246	*Lullula arborea*			p	120	550	p		G	C	A	C	A
B	A242	*Melanocorypha calandra*			p	8	75	p		G	C	A	C	A
B	A230	*Merops apiaster*			r	22	22	p		G	C	B	C	C
B	A230	*Merops apiaster*			c	0	0		P	DD	C	B	C	C
B	A073	*Milvus migrans*			r	2	2	p		G	C	A	B	C
B	A072	*Pernis apivorus*			r	2	4	p		G	C	A	C	B
B	A241	*Picoides tridactylus*			p	1	3	p		G	B	A	A	A
B	A234	*Picus canus*			p	10	14	p		G	C	A	C	B
B	A307	*Sylvia nisoria*			r	30	60	p		G	C		C	B
B	A108	*Tetrao urogallus*			p	15	25	males			C	A	A	A

Other important species in the area based on the same source

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
B	A247	*Alauda arvensis*			100	100	p						X	
B	A218	*Athena noctua*			12	12	p						X	
B	A366	*Carduelis cannabina*			125	125	p						X	
B	A363	*Carduelis chloris*			120	120	p						X	
B	A347	*Corvus monedula*			3	3	p							X
B	A113	*Coturnix coturnix*			7	7	p						X	
B	A377	*Emberiza cirlus*			175	175	p						X	
B	A382	*Emberiza melanocephala*			40	40	p						X	
B	A269	*Erithacus rubecula*			170	170	p						X	
B	A359	*Fringilla coelebs*			525	525	p						X	
B	A244	*Galerida cristata*			45	45	p						X	
B	A251	*Hirundo rustica*			125	125	p						X	
B	A233	*Jynx torquilla*			21	21	p						X	

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
B	A271	*Luscinia megarhynchos*			185	185	p						X	
B	A383	*Miliaria calandra*			250	250	p						X	
B	A280	*Monticola saxatilis*			5	5	p						X	
B	A278	*Oenanthe hispanica*			7	7	p						X	
B	A214	*Otus scops*			20	20	p						X	
B	A329	*Parus caeruleus*			100	100	p						X	
B	A443	*Parus lugubris*			60	60	p						X	
B	A235	*Picus viridis*			35	35	p						X	
B	A345	*Pyrrhocorax graculus*			15	15	p				X			
B	A317	*Regulus regulus*			185	185	p						X	
B	A276	*Saxicola torquata*			29	29	p						X	
B	A210	*Streptopelia turtur*			90	90	p						X	
B	A311	*Sylvia atricapilla*			330	330	p						X	
B	A304	*Sylvia cantillans*			60	60	p						X	
B	A333	*Tichodroma muraria*			1	1	p				X			
B	A283	*Turdus merula*			450	450	p						X	
B	A285	*Turdus philomelos*			325	325	p						X	
B	A282	*Turdus torquatus*			90	90	p						X	

Memorandum to Tables 17, 18, 19 and 20

- **Group**: A = amphibians, B = birds, F = fish, I = invertebrates, M = mammals, P = plants, R = reptiles
- **S**: in case the species data are sensitive and should therefore be excluded from any public access insert: yes
- **NP**: in case a species no longer exists on the site enter: x (optional)
- **Type**: p = permanent, r = breeding, c = aggregation, w = winter (for plants and non-migratory species use permanent)
- **Unit**: i = individuals, p = pairs or other units according to the standard list of population units and codes according to Articles 12 and 17
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to be completed if data are insufficient (DD) or in addition to information on population size
- **Data quality**: G = 'Good' (e.g. based on surveys), M = 'Moderate' (e.g. based on partial data with some extrapolation), P = 'Poor' (e.g. rough estimation), VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)
- **Population**: Size and density of the species in the area in relation to the total population within the national boundaries. A: 100%>=p> 15%, B: 15%>=p>2%, C: 2%>=p>0.
- **Conservation**: Degree of protection of the habitat that is important for the species and its potential for restoration. A: Excellent conservation, B: Good conservation, C: Moderate or degraded.
- **Isolation**: Degree of isolation of the population occurring in the area in relation to the natural distribution of the species. A: Isolated (almost) population, B: Non-isolated population, but located at the edge of the range, C: Non-isolated population, with a wide distribution.
- **Global** assessment: the overall conservation value of the site. A: Excellent, B: Good, C: Adequate.
- **Motivation categories: IV, V:** Annex species (Habitats Directive)**, A:** Species included in the Greek Red Data Book**, B:** Endemic species**, C:** Species protected by international conventions**, D:** Other reasons

As shown in Table 17 above, detailed population data for the specific site BG0002078, exist for all 43 total species that appear in the TDB of this site. Of the total number of species, 36 are Annex I species of Directive 2009/147/EC.

During the reporting period for the site, the conservation status was assessed for the majority of species as good (B) to excellent (A), except for *Sylvia nisoria,* for which no conservation status assessment was carried out. For the majority of species, the site supported 0-2% of the national Bulgarian population (population criterion C). For the species *Aegolius funereus, Glaudicidium passerinum* and *Picoides tridactylus,* the site supported 2-15% of the Bulgarian population (population criterion B), while for *Hieraaetus fasciatus (Aquila fasciata),* the site supported more than 15% of the Bulgarian population (population criterion A).

The most important species of the avifauna of Special Protection Area GR1260010 are presented below, as described in the 2019 version of its Standard Data Form (TED/SDF):

Table 18. Standard data forms of the GR1260010 area (End 2018_15/03/2019) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260010).

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A402	*Accipiter brevipes*			r				P	DD	C	A	B	B
B	A223	*Aegolius funereus*			p				P	DD	B	A	B	B
B	A079	*Aegypius monachus*			p	4	4	i		M	A	B	B	B
B	A247	*Alauda arvensis*			c	43	43	i/sq.km		M	D			
B	A229	*Alcedo atthis*			p				P	DD	C	B	C	B
B	A255	*Anthus campestris*			r				P	DD	C	B	C	B
B	A228	*Tachymarptis melba*			r				P	DD	C	B	C	B
B	A226	*Apus apus*			r				P	DD	C		C	B
B	A091	*Aquila chrysaetos*			p	4	5	i		G	B	B	C	B
B	A090	*Aquila clanga*			c				P	DD	C	B	B	B
B	A404	*Aquila heliaca*			c				P	DD	B	B	B	B
B	A089	*Aquila pomarina*			r	4	6	i		G	B	B	B	B
B	A699	*Ardea cinerea cinerea*			c				P	DD	C	B	C	B
B	A215	*Bubo bubo*			p	2		p		M	C	A	C	B
B	A087	*Buteo buteo*			r	7	7	p		M	C	A	C	B
B	A403	*Buteo rufinus*			c				P	DD	C	B	B	B
B	A243	*Calandrella brachydactyla*			r				P	DD	C	C	C	C
B	A224	*Caprimulgus europaeus*			r				C	DD	C	A	C	B

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A667	*Ciconia ciconia*			c				P	DD	C	B	C	B
B	A030	*Ciconia nigra*			r	4	6	i		G	B	B	B	B
B	A080	*Circaetus gallicus*			r	8	10	i		G	B	A	C	B
B	A081	*Circus aeruginosus*			c				P	DD	C	B	C	B
B	A082	*Circus cyaneus*			c				P	DD	C	A	C	B
B	A083	*Circus macrourus*			c				P	DD	C	B	B	B
B	A084	*Circus pygargus*			c				P	DD	C	B	C	B
B	A231	*Coracias garrulus*			r	19	19	i/sq.km		M	C	B	C	B
B	A113	*Coturnix coturnix*			r				P	DD	C	B	C	B
B	A212	*Cuculus canorus*			c				C	DD	C	B	C	B
B	A212	*Cuculus canorus*			r				P	DD	C	B	C	B
B	A738	*Delichon urbicum*			r				C	DD	C	B	C	B
B	A239	*Dendrocopos leucotos*			p				P	DD	C	A	B	B
B	A238	*Dendrocopos medius*			p				P	DD	C	B	C	B
B	A429	*Dendrocopos syriacus*			p	11	11	i/sq.km		M	C	A	B	B
B	A236	*Dryocopus martius*			p				P	DD	C	B	B	B
B	A697	*Egretta garzetta*			c				P	DD	D	B		
B	A447	*Emberiza caesia*			r				P	DD	C	C	C	B
B	A379	*Emberiza hortulana*			r				P	DD	C	A	C	B
B	A098	*Falco columbarius*			c				P	DD	C	B	C	B
B	A100	*Falco eleonorae*			c				P	DD	C	B	B	B
B	A095	*Falco naumanni*			c				P	DD	C	B	C	B
B	A709	*Falco peregrinus*			p				P	DD	C	B	C	B
B	A097	*Falco vespertinus*			c				P	DD	C	B	C	B
B	A321	*Ficedula albicollis*			c				P	DD	C	A	C	B
B	A320	*Ficedula parva*			c				P	DD	C	B	C	B
B	A442	*Ficedula semitorquata*			r				P	DD	C	B	C	B
B	A076	*Gypaetus barbatus*			c				V	DD	D	B		
B	A078	*Gyps fulvus*			c				P	DD	C	B	C	B
B	A078	*Gyps fulvus*			w				P	DD	C	B	C	B
B	A707	*Hieraaetus fasciatus (Aquila fasciata)*			c				P	DD	C	B	B	B
B	A092	*Hieraetus pennatus*			r	3	6	p		G	B	B	C	B
B	A439	*Hippolais olivetorum*			r				P	DD	C	B	C	B
B	A251	*Hirundo rustica*			r	61	61	i/sq.km		M	C	B	C	B
B	A233	*Jynx torquilla*			r				P	DD	C		C	B
B	A338	*Lanius collurio*			c	53	53	i/sq.km		DD	C	B	C	B
B	A338	*Lanius collurio*			r				C	M	C	B	C	B
B	A339	*Lanius minor*			r				P	DD	C	B	C	C
B	A433	*Lanius nubicus*			r				P	DD	C	B	C	B
B	A246	*Lullula arborea*			p				P	DD	C	A	C	B
B	A242	*Melanocorypha calandra*			r				P	DD	C	B	C	B
B	A230	*Merops apiaster*			r				P	DD	C	B	C	B

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A073	*Milvus migrans*			c				P	DD	C	B	C	B
B	A074	*Milvus milvus*			c				P	DD	B	A	B	B
B	A260	*Motacilla flava*			c				P	DD	C	A	C	B
B	A260	*Motacilla flava*			r				P	DD	C	A	C	B
B	A077	*Neophron percnopterus*			r	2	3	p		G	B	B	C	B
B	A533	*Oenanthe pleschanka*			r				P	DD	C	C	C	C
B	A337	*Oriolus oriolus*			c				P	DD	C	A	C	B
B	A337	*Oriolus oriolus*			r				P	DD	C	A	C	B
B	A094	*Pandion haliaetus*			c				P	DD	C	C	C	B
B	A771	*Passer hispaniolensis*			p				C	DD	C	B	C	B
B	A072	*Pernis apivorus*			r	8	10	i		G	C	A	C	B
B	A234	*Picus canus*			p				P	DD	C	B	C	B
B	A210	*Streptopelia turtur*			c				P	DD	C	B	C	B
B	A210	*Streptopelia turtur*			r				C	DD	C	B	C	B
B	A307	*Sylvia nisoria*			r				P	DD	B	B	B	B
B	A282	*Turdus torquatus*			c				P	DD	C	B	B	B

As shown in Table 18 above, detailed population data for the GR1260010 site are limited and for the majority of species the information available is an estimate of their presence in the site (present, common, rare, very rare). Population data are available for *Aquila fasciata, Aquila clanga (Clanga clanga), Aquila pomarina (Clanga pomarina), Bubo bubo, Buteo rufinus, Ciconia nigra, Circaetus gallicus, Falco eleonorae, Falco peregrinus, Gyps fulvus, Haliaeetus albicilla, Hieraaetus pennatus, Neophron percnopterus.* The 13 species mentioned above include the only species of the *Natura* site [*Aquila pomarina* (*Clanga pomarina*)], while all the above species are species of Annex I of Directive 2009/147/EC.

During the reporting period for the site, the conservation status was assessed for almost all species from good (B) to excellent (A), except for *Gyps fulvus*, for which the conservation status was assessed as moderate or degraded (C). For *the* only species designated in this Natura site, *Aquila pomarina* (*Clanga pomarina*). For the majority of species, except for the above designation species, the area supported 0-2% of the Greek population (population criterion C), with *Haliaeetus albicilla* occurring with population criterion A (the area supported more than 15% of the Greek population), and *Circus pygargus* occurring with population criterion D (the area supported a non-significant population).

According to the Red Book of Threatened Animals of Greece, *Aquila heliaca* is no longer breeding in Greece, while it is a rare and local winter visitor, with an average of 6-10 individuals per year, mainly in the large wetlands of northern Greece (Evros Delta, L. Kerkini, Kalamas Delta etc.), while a few individuals, mainly juveniles, migrate south in autumn along the Ionian coast (Messolonghi, western Peloponnese etc.) (Chandrinos 1992, Handrinos and Akriotis 1997) (Legakis and Maragou 2009): "*Common in Greece and widely distributed species in the pre-war years and until the 1960s, the population of Aquila heliaca suffered a dramatic decline and today it is probably no longer breeding in Greece: The last known pairs survived in the southern part of southern Evros until the mid-1980s, although perhaps 1 pair still nests (Handrinos and Akriotis 1997; BirdLife International 2004). Today Aquila heliaca is a rare and local winter visitor, with an average of 6-10 individuals per year, mainly in the large wetlands of northern Greece (Evros Delta, L. Kerkini, Kalamas Delta, etc.). A few individuals, mainly juveniles, migrate south in autumn along the Ionian coast (Messolonghi, Western Peloponnese, etc.) (Chandrinos 1992; Handrinos and Akriotis 1997). There are 10 recoveries in Greece of ringed individuals in Hungary (5), Slovakia (4) and Bulgaria (Akriotis and Handrinos 2004).*

The most important species of the avifauna of Special Protection Area BG0002098, as described in its Standard Data Forms (TED/SDF), are presented below:

Table 19. Standard data forms of BG0002098 (End 2022_12/03/2024) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002098)

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A402	*Accipiter brevipes*			r	5	8	p		G	A	A	C	A
B	A402	*Accipiter brevipes*			c	20	35	i		G	A	A	C	A
B	A085	*Accipiter gentilis*			p	2	4	p		G	C	A	C	C
B	A086	*Accipiter nisus*			p	2	2	p		G	C	B	C	C
B	A168	*Actitis hypoleucos*			c	25	60	i		G	C	B	C	C
B	A229	*Alcedo atthis*			p	5	6	p		G	C	A	C	C
B	A465	*Alectoris graeca*			p	10	15	p		G	C	B	C	B
B	A053	*Anas platyrhynchos*			c	50	150	i		G	C	B	C	C
B	A053	*Anas platyrhynchos*			w	0	11	i		G	C	B	C	C
B	A053	*Anas platyrhynchos*			p	10	25	p		G	C	B	C	C
B	A055	*Anas querquedula*			c	100	350	i		G	C	B	C	C
B	A255	*Anthus campestris*			r	5	5	p		G	C	B	C	C
B	A404	*Aquila heliaca*			c	0	1	i		G	B	B	C	B

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A089	*Aquila pomarina*			c	5	15	i		G	C	B	C	C
B	A028	*Ardea cinerea*			c	20	80	i		G	C	B	C	C
B	A028	*Ardea cinerea*			w	0	34	i		G	C	B	C	C
B	A029	*Ardea purpurea*			c	5	15	p		G	C	B	C	C
B	A024	*Ardeola ralloides*			c	10	25	i		G	C	B	C	C
B	A021	*Botaurus stellaris*			w	0	3	i		G	C	B	C	C
B	A021	*Botaurus stellaris*			c	0	0		P	DD	C	B	C	C
B	A215	*Bubo bubo*			p	3	3	p		G	C	B	C	C
B	A133	*Burhinus oedicnemus*			c	5	10	i		G	C	A	C	C
B	A133	*Burhinus oedicnemus*			r	2	4	p		G	C	A	C	C
B	A087	*Buteo buteo*			c	0	0		P	DD	C	A	C	C
B	A087	*Buteo buteo*			p	5	15	p		G	C	A	C	C
B	A403	*Buteo rufinus*			p	3	3	p		G	C	B	C	C
B	A243	*Calandrella brachydactyla*			r	5	10	p		G	C	A	C	C
B	A224	*Caprimulgus europaeus*			r	10	15	p		G	C	B	C	C
B	A224	*Caprimulgus europaeus*			c	0	0		P	DD	C	B	C	C
B	A136	*Charadrius dubius*			r	15	35	p		G	C	A	C	C
B	A136	*Charadrius dubius*			c	55	55	i		G	C	A	C	C
B	A196	*Chlidonias hybridus*			c	15	50	i		G	C	B	C	C
B	A031	*Ciconia ciconia*			c	100	250	i		G	C	A	C	A
B	A031	*Ciconia ciconia*			r	57	57	p		G	C	A	C	A
B	A030	*Ciconia nigra*			r	0	1	p		G	C	B	C	C
B	A030	*Ciconia nigra*			c	10	15	i		G	C	B	C	C
B	A080	*Circaetus gallicus*			r	3	3	p		G	C	A	C	A
B	A080	*Circaetus gallicus*			c	10	20	i		G	C	A	C	A
B	A081	*Circus aeruginosus*			c	15	25	i		G	C	B	C	C
B	A081	*Circus aeruginosus*			w	0	3	i		G	C	B	C	C
B	A082	*Circus cyaneus*			w	0	6	i		G	C	B	C	C
B	A082	*Circus cyaneus*			c	5	10	i		G	C	B	C	C
B	A083	*Circus macrourus*			c	2	2	i		G	C	B	C	C
B	A084	*Circus pygargus*			c	5	10	i		G	C	B	C	C
B	A231	*Coracias garrulus*			c	10	15	i		G	C	B	C	C
B	A231	*Coracias garrulus*			r	4	5	p		G	C	B	C	C
B	A122	*Crex crex*			r	5	5	p		G	C	B	C	C
B	A122	*Crex crex*			c	0	0		P	DD	C	B	C	C
B	A238	*Dendrocopos medius*			p	10	15	p		G	C	B	C	C
B	A429	*Dendrocopos syriacus*			p	30	40	p		G	C	A	C	C
B	A027	*Egretta alba*			w	0	8	i		G	C	A	C	C
B	A027	*Egretta alba*			c	10	25	i		G	C	A	C	C
B	A026	*Egretta garzetta*			c	40	90	i		G	C	A	C	C
B	A379	*Emberiza hortulana*			r	5	10	p		G	C	B	C	C
B	A511	*Falco cherrug*			p	1	1	p		G	B	A	C	B

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A511	*Falco cherrug*			c	1	2	i		G	B	A	C	B
B	A103	*Falco peregrinus*			c	3	5	i		G	C	B	C	C
B	A103	*Falco peregrinus*			r	1	1	p		G	C	B	C	C
B	A103	*Falco peregrinus*			w	2	3	i		G	C	B	C	C
B	A099	*Falco subbuteo*			r	0	1	i		G	C	B	C	C
B	A099	*Falco subbuteo*			c	0	0		P	DD	C	B	C	C
B	A096	*Falco tinnunculus*			p	6	6	p		G	C	A	C	C
B	A097	*Falco vespertinus*			c	15	80	i		G	C	B	C	C
B	A123	*Gallinula chloropus*			p	10	10	p		G	C	B	C	C
B	A127	*Grus grus*			c	0	5	i		G	C	A	C	C
B	A075	*Haliaeetus albicilla*			w	0	1	i		G	C	B	C	C
B	A092	*Hieraetus pennatus*			c	3	7	i		G	C	B	C	C
B	A439	*Hippolais olivetorum*			r	10	10	p		G	C	A	C	A
B	A022	*Ixobrychus minutus*			r	10	15	p		G	C	A	C	C
B	A022	*Ixobrychus minutus*			c	50	100	i		G	C	A	C	C
B	A338	*Lanius collurio*			r	100	250	p		G	C	A	C	C
B	A339	*Lanius minor*			r	40	80	p		G	C	A	C	A
B	A433	*Lanius nubicus*			r	15	25	p		G	B	A	C	B
B	A459	*Larus cachinnans*			r	2	32	i		G	C	B	C	C
B	A459	*Larus cachinnans*			w	7	7	i		G	C	B	C	C
B	A179	*Larus ridibundus*			w	33	33	i		G	C	B	C	C
B	A179	*Larus ridibundus*			c	0	0		P	DD	C	B	C	C
B	A246	*Lullula arborea*			p	5	6	p		G	C	B	C	C
B	A242	*Melanocorypha calandra*			p	40	50	p		G	C	A	C	B
B	A230	*Merops apiaster*			r	1	1	p		G	C	B	C	C
B	A230	*Merops apiaster*			c	0	0		P	DD	C	B	C	C
B	A077	*Neophron percnopterus*			r	0	2	i		G	C	B	C	C
B	A023	*Nycticorax nycticorax*			c	15	50	i		G	C	B	C	C
B	A020	*Pelecanus crispus*			c	10	50	i		G	C	B	C	B
B	A019	*Pelecanus onocrotalus*			c	0	1	i		G	C	B	C	C
B	A072	*Pernis apivorus*			c	15	30	i		G	C	B	C	C
B	A072	*Pernis apivorus*			r	1	3	p		G	C	B	C	C
B	A017	*Phalacrocorax carbo*			c	3500	3500	i		G	B	A	C	B
B	A017	*Phalacrocorax carbo*			w	0	7	i		G	B	A	C	B
B	A017	*Phalacrocorax carbo*			r	16	700	i		G	B	A	C	B
B	A393	*Phalacrocorax pygmeus*			c	50	250	i		G	C	B	C	C
B	A393	*Phalacrocorax pygmeus*			w	20	100	i		G	C	B	C	C
B	A151	*Philomachus pugnax*			c	0	0		P	DD	C	B	C	C
B	A234	*Picus canus*			p	2	3	p		G	C	A	C	C
B	A034	*Platalea leucorodia*			c	10	15	i		G	C	B	C	C
B	A032	*Plegadis falcinellus*			c	20	35	i		G	C	B	C	C
B	A119	*Porzana porzana*			r	0	0		P	DD	C	B	C	C

Species					Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A119	*Porzana porzana*			c	0	0		P	DD	C	B	C	C
B	A118	*Rallus aquaticus*			p	0	0		P	DD	C	B	C	C
B	A118	*Rallus aquaticus*			w	50	100	i		G	C	B	C	C
B	A132	*Recurvirostra avosetta*			c	0	10	i		G	C	B	C	C
B	A307	*Sylvia nisoria*			r	10	15	p		G	C	A	C	C
B	A166	*Tringa glareola*			c	0	3	i		G	C	B	C	C
B	A165	*Tringa ochropus*			w	10	25	i		G	C	A	C	C
B	A165	*Tringa ochropus*			c	30	50	i		G	C	A	C	C
B	A142	*Vanellus vanellus*			c	25	100	i		G	C	B	C	C
B	A142	*Vanellus vanellus*			r	0	5	p		G	C	B	C	C
B	A142	*Vanellus vanellus*			w	0	15	i		G	C	B	C	C

Other important species in the area based on the same source

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
B	A218	*Athena noctua*			13	13	p						X	
B	A366	*Carduelis cannabina*			10	10	p						X	
B	A363	*Carduelis chloris*			10	10	p						X	
B	A269	*Erithacus rubecula*			20	20	p						X	
B	A359	*Fringilla coelebs*			30	30	p						X	
B	A244	*Galerida cristata*			33	33	p						X	
B	A251	*Hirundo rustica*			30	30	p						X	
B	A233	*Jynx torquilla*			1	1	p						X	
B	A271	*Luscinia megarhynchos*			10	10	p						X	
B	A383	*Miliaria calandra*			275	275	p						X	
B	A278	*Oenanthe hispanica*			1	1	p						X	
B	A214	*Otus scops*			2	2	p						X	
B	A235	*Picus viridis*			1	1	p						X	
B	A445	*Sitta neumayer*			10	10	p				X			
B	A210	*Streptopelia turtur*			2	2	p						X	
B	A283	*Turdus merula*			0	0		P					X	
B	A285	*Turdus philomelos*			0	0		P					X	

As shown in Table 19 above, detailed population data for this site BG0002098 exists for the majority of species. For only two species out of all species appearing in the TDB of this Natura site, no detailed population data exist (*Porzana porzana* and *Phylomachus pugnax*).

During the reporting period for the area, the conservation status was assessed for all species from good (B) to excellent (A). For the majority of species, the area supported 0-2% of the national Bulgarian population (population criterion C). For the species *Aquila heliaca, Falco cherrug, Lanius nubicus, Phalacrocorax carbo*, the area supported 2-15% of the Bulgarian population (population criterion B), while for *Accipiter brevipes*, the area supported more than 15% of the Bulgarian population (population criterion A).

The most important species of the avifauna of the Bulgarian Special Protection Area BG0002072, as described in its Standard Data Forms (TED/SDF), are presented below:

Table 20. Standard data forms of BG0002072 (End 2022_12/03/2024) (https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=BG0002072)

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A402	*Accipiter brevipes*			r	1	2	p		G	C	B	C	C
B	A085	*Accipiter gentilis*			p	1	1	p		G	C	B	C	C
B	A086	*Accipiter nisus*			p	2	2	p		G	C	B	C	C
B	A465	*Alectoris graeca*			p	15	20	p		G	C	A	B	C
B	A255	*Anthus campestris*			r	25	30	p		G	C	A	C	B
B	A089	*Aquila pomarina*			r	1	2	p		G	C	B	C	C
B	A215	*Bubo bubo*			p	1	1	p		G	C	A	C	C
B	A087	*Buteo buteo*			c	0	0		P	DD	C	B	C	C
B	A087	*Buteo buteo*			p	3	3	p		G	C	B	C	C
B	A403	*Buteo rufinus*			p	3	4	p		G	C	B	C	B
B	A243	*Calandrella brachydactyla*			r	120	120	p		G	B	A	C	B
B	A224	*Caprimulgus europaeus*			r	18	20	p		G	C	B	C	C
B	A224	*Caprimulgus europaeus*			c	0	0		P	DD	C	B	C	C
B	A031	*Ciconia ciconia*			r	3	3	p		G	C	B	C	C
B	A080	*Circaetus gallicus*			c	0	0		P	DD	C	A	C	C
B	A080	*Circaetus gallicus*			r	2	3	p		G	C	A	C	C
B	A231	*Coracias garrulus*			r	8	8	p		G	C	B	C	C
B	A238	*Dendrocopos medius*			p	15	15	p		G	C	B	C	C
B	A429	*Dendrocopos syriacus*			p	30	40	p		G	C	A	C	C
B	A236	*Dryocopus martius*			p	1	4	p		G	C	B	C	C
B	A379	*Emberiza hortulana*			c	0	0		P	DD	C	B	C	C
B	A379	*Emberiza hortulana*			r	35	40	p		G	C	B	C	C
B	A103	*Falco peregrinus*			c	1	1	i		G	C	A	C	C
B	A103	*Falco peregrinus*			r	2	2	p		G	C	A	C	C
B	A099	*Falco subbuteo*			c	0	0		P	DD	C	B	C	C
B	A099	*Falco subbuteo*			r	1	1	p		G	C	B	C	C

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
B	A096	*Falco tinnunculus*			p	2	9	p		G	C	B	C	C
B	A442	*Ficedula semitorquata*			r	5	6	p		G	C	B	C	C
B	A092	*Hieraetus pennatus*			r	1	1	p		G	C	B	C	C
B	A439	*Hippolais olivetorum*			r	10	20	p		G	C	A	C	C
B	A338	*Lanius collurio*			r	150	600	p		G	C	A	C	B
B	A339	*Lanius minor*			r	5	6	p		G	C	A	C	C
B	A433	*Lanius nubicus*			r	3	4	p		G	C	A	C	C
B	A246	*Lullula arborea*			p	70	105	p		G	C	A	C	C
B	A242	*Melanocorypha calandra*			p	500	600	p		G	B	A	C	A
B	A230	*Merops apiaster*			r	55	55	p		G	C	B	C	C
B	A072	*Pernis apivorus*			c	0	0		P	DD	C	A	C	B
B	A072	*Pernis apivorus*			r	3	5	p		G	C	A	C	B
B	A234	*Picus canus*			p	5	6	p		G	C	A	C	C
B	A307	*Sylvia nisoria*			r	11	104	p		G	C	A	C	B

Other important species in the area based on the same source

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
B	A247	*Alauda arvensis*			160	160	p						X	
B	A218	*Athena noctua*			30	30	p						X	
B	A366	*Carduelis cannabina*			40	40	p						X	
B	A363	*Carduelis chloris*			40	40	p						X	
B	A347	*Corvus monedula*			5	5	p							X
B	A113	*Coturnix coturnix*			55	55	p						X	
B	A377	*Emberiza cirlus*			400	400	p						X	
B	A382	*Emberiza melanocephala*			400	400	p						X	
B	A269	*Erithacus rubecula*			1100	1100	p						X	
B	A359	*Fringilla coelebs*			1300	1300	p						X	
B	A244	*Galerida cristata*			80	80	p						X	
B	A251	*Hirundo rustica*			700	700	p						X	
B	A233	*Jynx torquilla*			60	60	p						X	
B	A271	*Luscinia megarhynchos*			300	300	p						X	
B	A383	*Miliaria calandra*			600	600	p						X	
B	A280	*Monticola saxatilis*			13	13	p						X	
B	A278	*Oenanthe hispanica*			30	30	p						X	
B	A214	*Otus scops*			15	15	p						X	
B	A329	*Parus caeruleus*			80	80	p						X	
B	A443	*Parus lugubris*			60	60	p						X	
B	A235	*Picus viridis*			80	80	p						X	
B	A276	*Saxicola torquata*			7	7	p						X	

Species					Population in the site				Motivation					
											Other categories			
G	CODE	Scientific name	S	NP	Size Min	Size Max	Unit	Cat. C|R|V|P	Annex IV	Annex V	A	B	C	D
B	A210	*Streptopelia turtur*			55	55	p						X	
B	A311	*Sylvia atricapilla*			600	600	p						X	
B	A304	*Sylvia cantillans*			250	250	p						X	
B	A305	*Sylvia melanocephala*			50	50	p						X	
B	A283	*Turdus merula*			800	800	p						X	
B	A285	*Turdus philomelos*			300	300	p						X	

As shown in Table 20 above, detailed population data for this site BG0002072, exists for all 33 total species that appear in the TED for this site. Of the total number of species, 27 are Annex I species of Directive 2009/147/EC.

During the reporting period for the site, the conservation status was assessed for all species from good (B) to excellent (A). For the majority of species, the site supported 0-2% of the national Bulgarian population (population criterion C). For the species *Calandrella brachydactyla* and *Melanocorypha calandra,* the site supported 2-15% of the Bulgarian population (population criterion B).

Recording of the main characteristics of all habitat types of Annex I and/or species of Annex II of Directive 92/43/EEC (in case of Special Conservation Areas, Sites of Community Importance) and/or species of avifauna of Annex I of Directive 2009/147/EC and regularly migrating species (in case of Special Protection Areas) and the main characteristics of endemic, endangered and protected species.

The production licence blocks of the wind farm under study are partially located within the protected area of the Natura 2000 network Special Conservation Area GR1260005.

During the preparation of this Special Ecological Assessment, the study team chose, as mentioned above, to examine the potential impacts of the project on the protected elements of the Natura 2000 protected area GR1260005 (the main study area, partially within which the project is located), the protected elements of the nearest protected areas of the Natura 2000 network Special Protection Areas BG0002078, GR1260010, BG0002098 and BG0002072, with emphasis on those species of avifauna (predators - scavengers, as well as other important large species) which, according to their ecology, are active over a large radius, capable of covering the distance to the

study area of the project. Furthermore, with regard to the neighbouring Bulgarian Natura 2000 Special Conservation Area BG0001028, the potential impacts of the project on Annex II species of fauna listed in Annex II of Directive 92/43/EEC, which are either species with a large area of endemism (e.g. *Canis lupus, Ursus arctos*), or are species that can travel long distances to meet their daily needs (e.g. foraging) (e.g. cephalopod species), or may be affected by the project in general due to the proximity of the site of the project to the boundaries of the Special Conservation Area.

In particular, the habitat types of Annex I of Directive 92/43/EEC, listed in the SDFs of the main study area GR1260005, were selected for further analysis, except for the habitat type 9540, which has now ceased to exist within this SPA (zero area). In addition, the fauna and flora species of Annex II of the above Directive, listed in the SDFs of the specific Special Conservation Area, were selected for further analysis. In addition, all of the large and non-predator species, as well as other large important species, of Annex I of Directive 2009/147/EC, listed in the SDFs of all the nearest Special Conservation Zones under study were selected (within which there is also the only species of designation of the Greek GR1260010 - *Clanga pomarina*). In addition, the species of chimaeras listed in Annex II of the above Directive, listed in the SDFs of the neighbouring Bulgarian Special Conservation Area BG0001028, were selected, except for the species *Myotis capaccinii* and *Rhinolophus blasii,* which show non-significant numbers (population criterion D). Finally, of the remaining fauna species listed in Annex II of the above mentioned Directive, listed in the SDFs of the adjacent Bulgarian Special Conservation Area BG0001028, the species *Lutra lutra was* selected, *Canis lupus (belonging to Annex V, see species analysis below), Rupicapra rupicapra, Ursus arctos, Vormela peregusna*, as important species with a large area of endemism, as well as three species of reptiles *Zamenis situla, Emys orbicularis* and *Testudo hermanni.*

Therefore, the total of 68 species analysed below, and from now on referred to as "species of interest", consists of: *Bombina variegata, Lutra lutra, Vormela peregusna, Dactylorhiza kalopissii, Gladiolus palustris, Elaphe quatuorlineata, Testudo graeca, Barbastella barbastellus, Miniopterus schreibersii, Myotis bechsteinii, Myotis blythii, Myotis emarginatus, Myotis myotis, Rhinolophus euryale, Rhinolophus hipposideros, Rhinolophus ferrumequinum, Canis lupus, Ursus arctos, Rupicapra rupicapra balcanica, Zamenis situla, Emys orbicularis, Testudo hermanni, Accipiter brevipes, Aegolius funereus Aquila chrysaetos, Aquila heliaca, Buteo rufinus, Bubo*

bubo, Clanga clanga, Clanga pomarina, Ciconia ciconia, Ciconia nigra, Circaetus gallicus, Circus aeruginosus, Circus cyaneus, Circus macrourus, Circus pygargus, Falco naumanni, Falco eleonorae, Falco biarmicus, Falco peregrinus, Falco vespertinus, Falco columbarius, Falco cherrug, Gyps fulvus, Haliaeetus albicilla, Hieraaetus pennatus, Aquila fasciata, Milvus migrans, Neophron percnopterus, Pernis apivorus, Nycticorax nycticorax, Ardea alba, Egretta garzetta, Microcarbo pygmaeus, Ardeola ralloides, Tetrastes bonaisa, Tetrao urogallus, Grus grus, Ixobrychus minutus, Pelecanus crispus, Pelecanus onocrotalus, Platalea leucorodia, Plegadis falcinellus, Recurvirostra avosetta, Botaurus stellaris, Glaucidium passerinum, Ardea purpurea.

The main characteristics of the 68 species of interest and the eight habitat types of Annex I of Directive 92/43/EEC are analysed below, synthesising information from reliable bibliographic sources Legakis A. and Marangou P. (eds.) 2009. *The Red Book of Endangered Animals of Greece. Hellenic Zoological Society, Athens, 528 p.*, Bakaloudis D. 2008. *Biology of Wild Fauna. Yachoudis Publications, Thessaloniki , p. 413*, *IUCN Red List of Threatened Species, www.iucnredlist.org available on 26/11/202* 4, *http://www.herpetofauna.gr/* available on 26/11/2024, www.votaniki.gr, available on 26/11/2024 etc, *Deliverable 3 List of threats to designation species of the Identification of compatible activities in relation to the designation species of the Special Protection Areas for avifauna with the Ministry of Environment and Natural Resources as the contracting authority. - Department of Environmental Planning Department of Natural Environment Management (Dimalexis 2009), Deliverable 8 Guide to ecological requirements, threats and appropriate measures for the species characterization of the Identification of compatible activities in relation to the species characterization of the Special Protection Areas of avifauna with the contracting authority the M.E.P.E.Department of Environmental Planning, Department of Natural Environment Management (Dimalexis 2009)* . The species of interest which are analysed below are referred to by their new Latin names (according to the IUCN), while as regards their common name, the one given in the Red Book of Endangered Animals of Greece was chosen (Legakis and Marangou 2009).

Habitat type code: 8210

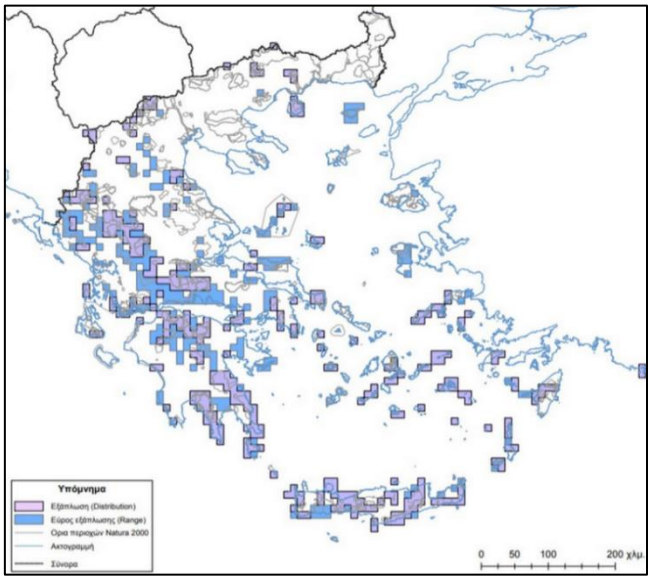
Name: Limestone rocky slopes with grassy vegetation
Status: Habitat type in Annex I to Directive 92/43/EEC

Description: Habitat type 8210 comprises grassy vegetation of limestone cliffs.

Ecological conditions: Habitat type 8210 occurs on steep cliffs with slopes of more than 65%. It extends in altitude from sea level to about 2 500 m above sea level. In areas where the continental slope ranges to the extremes, it can be coastal cliffs 10 metres high up to the tops of high mountains. These are communities composed of grass species that have the adaptations needed to grow and develop within rock crevices, even in minimal soil.

Floristic composition: the most important and characteristic species of habitat type 8210 are: *Achillea umbellata, Arenaria cretica, Asperula arcadiensis, Asperula ophiolitica, Asplenium ceterach, Athamanta macedonica, Campanula pelviformis, Campanula rupestris, Campanula pelia, Campanula topaliana, Campanula versicolor, Carum multiflorum, Centranthus ruber, Ebenus cretica, Galium graecum, Inula candida, Inula verbascifolia, Linum arboretum, Melica rectiflora, Minuartia attica, Onosma frutescens, Origanum dictamnus, Parietaria cretica, Petromarula pinnata, Potentilla speciosa, Ptilostemon chamaepeuce, Rosularia serrata, Saxifraga adscendens, Saxifraga marginata, Lactuca acanthifolia, Scrophularia heterophylla, Securigera globosa, Sedum magellense, Silene auriculata, Silene parnassica, Silene saxifraga, Staehelina fruticosa, Verbascum arcturus, Viola fragrans.*

Conservation status - Threats: Habitat type 8210 is mainly threatened by road building and the operation of quarries for the extraction of natural gravel.



Map 2: Area of distribution and range of habitat type 8210 (Source: www.votaniki.gr).

Habitat type code: 62A0

Name: Eastern sub-mediterranean dry grassy interspersed eastern sub-mediterranean dry grasslands (*Scorzoneratalia villosae*)

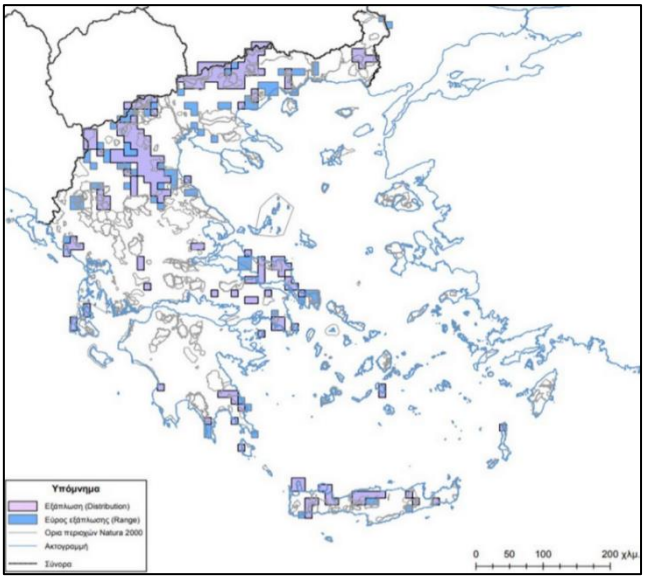
Status: Habitat type in Annex I to Directive 92/43/EEC.

Description: Habitat type 62A0 comprises sub-continental, dry to semi-dry grasslands. This habitat is composed partly of steppe or subcontinental grasslands and partly of oceanic and sub-oceanic grasslands.

Ecological conditions: Habitat type 62A0 occurs in a variety of exposures, elevations, slopes and geological substrates. Species are dominated by herbaceous perennials, mainly grasses.

Floristic composition: *Helictochloa aetolica, Hippocrepis comosa, Rostraria cristata, Rostraria cristata, Polygala anatolica, Polygala comosa, Potentilla detommasii, Potentilla recta, Ranunculus millefoliatus, Satureja pilosa, Scabiosa columbaria, Sesleria rigida, Stipa species, Teucrium montanum, Thesium alpinum, Thesium divaricatum, Thymus longicaulis, Thymus praecox, Thymus sibthorpii, Trifolium campestre, Trigonella spicata, Achillea millefolium, Allium flavum, Alyssum chalcidicum, Alyssum murale, Anacamptis pyramidalis, Anthoxanthum odoratum, Armeria rumelica, Artemisia alba, Artemisia campestris, Asperula aristata, Bornmuellera tymphaea, Bothriochloa ischaemum, Bromus cappadocicus, Carex caryophyllea, Carlina vulgaris, Chrysopogon gryllus, Dianthus cruentus, Dianthus gracilis, Eryngium amethystinum, Erysimum diffusum, Festuca valesiaca, Filipendula vulgaris, Fragaria viridis, Fumana procumbens, Galium verum, Helianthemum nummularium.*

Conservation status - Threats: Habitat type 62A0 is directly linked to grazing and its absence or overgrazing may degrade the habitat.



Map 3: Range and extent of habitat type 62A0 (Source: www.votaniki.gr).

Habitat type code: 9150

Name: Meso-European calcareous beech forests of Cephalanthero-Fagion

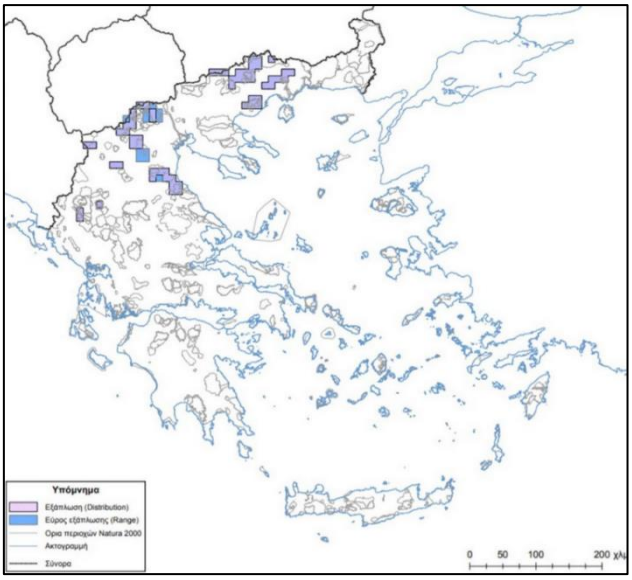
Status: Habitat type in Annex I to Directive 92/43/EEC.

Description: Habitat type 9150 includes beech forests on calcareous, often shallow soils, usually on steeply sloping slopes.

Ecological conditions: Habitat type 9150 occurs on substrate that is predominantly carbonate and may occasionally be limestone, marble, porous volcanic rock, and rarely shale. The terrain is moderately developed, on slopes with varying exposure, slopes up to 70% slope, and elevations of 850 to 1,800 meters. This habitat type is relatively rare because beech forests, in Greece, occur very rarely on limestone rocks. Their ecological value is high because of the oryx species they host.

The most important and characteristic species of the habitat type are: *Lathyrus alpestris, Lilium martagon, Melica uniflora, Mercurialis ovata, Mercurialis perennis, Monotropa hypopitys, Neottia nidus-avis, Ostrya carpinifolia, Physospermum cornubiense, Rubus hirtus, Viburnum lantana, Abies borisii-regis, Acer pseudoplatanus, Aremonia agrimonoides, Brachypodium pinnatum, Buxus sempervirens, Calamagrostis arundinacea, Campanula rapunculoides, Carex digitate, Carex flacca, Cephalanthera damasonium, Cephalanthera rubra, Epipactis greuteri, Epipactis helleborine, Epipactis microphylla, Euonymus latifolius, Euphorbia amygdaloides, Fagus sylvatica, Fragaria vesca, Fraxinus ornus, Galium rotundifolium.*

Conservation status - Threats: Habitat type 9150 has been significantly reduced to small stands, which are important for biodiversity.



Map 4: Area of distribution and range of habitat type 9150 (Source: www.votaniki.gr).

Habitat type code: 4060

Name: Alpine and boreal forests

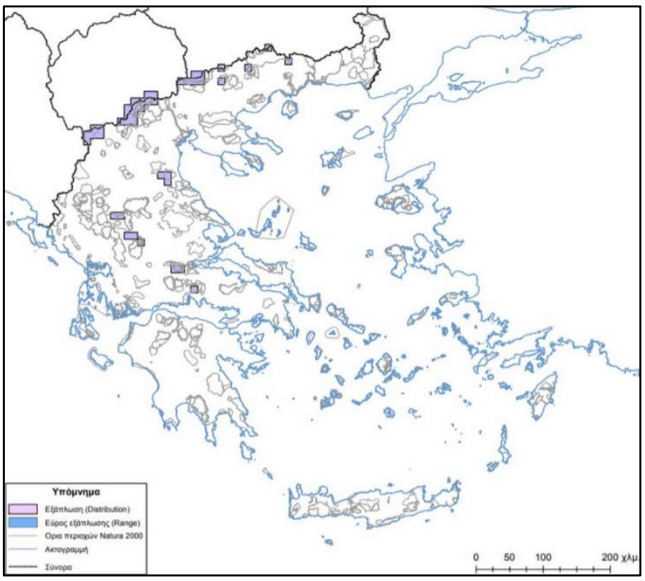
Status: Habitat type in Annex I to Directive 92/43/EEC.

Description: Habitat type 4060 comprises small, low or upland shrub formations of the alpine and subalpine zone of the Eurasian mountains dominated by species of the rhizonias.

Ecological conditions: Habitat type 4060 occurs at an altitude of 1450 - 2640 m above sea level. It occupies slopes and ridges at various exposures and on gradients of more than 30%. The habitat includes shrubland formations of the alpine and subalpine zones, dominated by *Juniperus communis subsp. nana*, which forms dense, mostly circular low shrubs. Shrub cover rarely exceeds 50 %.

The most important and characteristic species of the habitat type are *Achillea distans subsp. stricta, Agrostis castellana, Arctostaphylos uva-ursi, Armeria undulata, Astragalus sempervirens, Bruckenthalia spiculifolia, Bupleurum gerardi, Carex kitaibeliana, Carum appuanum, Cytisus decumbens, Dianthus deltoides, Draba parnassica, Dryas octopetala, Euphorbia baselices, Festuca hirtovaginata, Festuca species, Galium circae, Genista depressa, Genista subcapitata, Genista tinctoria.*

Conservation status - Threats. It is fairly stable due to the high biodiversity and species that make it up. It is threatened by overgrazing or undergrazing.



Map 5: Area of distribution and range of habitat type 4060 (Source: www.votaniki.gr).

Habitat type code: 5210

Name: Tree formations with *Juniperus spp.*

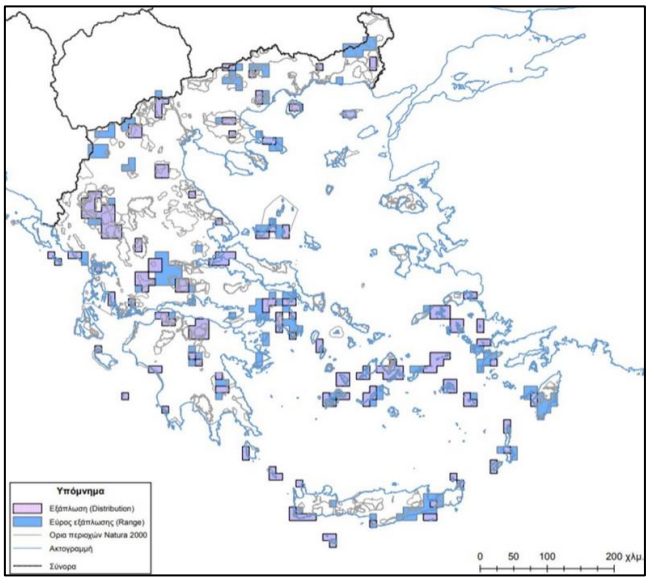
Status: Habitat type in Annex I to Directive 92/43/EEC.

Description: Habitat type 5210 comprises Mediterranean and sub-Mediterranean evergreen hardwood shrubs with tree species of *Juniperus*.

Ecological conditions: Habitat type 5210 is based on a substrate that may vary and may be limestone, shale, shale, siltstone, marble, acid granitic or basic ophiolite. Elevation ranges between 100-1,500 meters, slopes 0-60% and exposure varies. All of the juniper formations are degraded backcountry succession grades or soil-dependent ecosystems. They play an important role in protecting the soil from further erosion and degradation. They are habitats for various animals and rare plant species.

Chloride composition: Among the most characteristic plant species of habitat type 1410 are *Anthoxanthum odoratum, Asterolinon linum-stellatum, Atractylis cancellata, Berberis cretica, Clematis cirrhosa, Cynara cornigera, Juniperus foetidissima, Juniperus oxycedrus, Juniperus oxycedrus subsp. macrocarpa, Juniperus phoenicea, Linum strictum, Nepeta camphorata, Phagnalon graecum, Pistacia lentiscus, Prasium majus, Rhamnus lycioides subsp. oleoides, Rubia tenuifolia, Stipa capillata, Teucrium brevifolium, Teucrium capitatum, Thymus longicaulis, Drimia maritima, Valantia hispida, Valantia muralis.*

Conservation **status** - **Threats**. It is affected by grazing, vegetation development, the possibility of fire, poaching and even the creation of infrastructure (roads, etc.).



Map 6: Area of distribution and range of habitat type 5210 (Source: www.votaniki.gr).

Habitat type code: 9530*.

Name: Black pine subalpine forests

Status: Priority habitat type under Directive 92/43/EEC

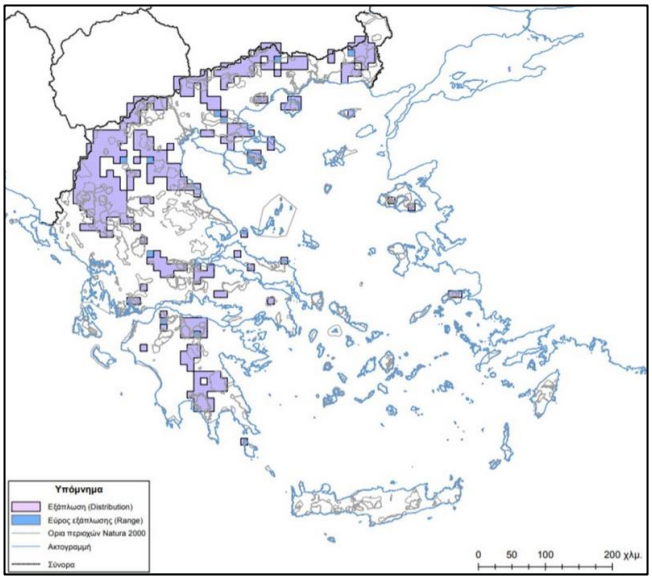
Description: The habitat type includes black pine (*Pinus nigra*) forests.

Ecological conditions: Black pine forests occur in areas where the substrate in the majority of cases is superbasic ophiolite (peridotite, gabbro, dolerite, serpentinite) or dolomite (rocks with high magnesium content), but in several cases it is limestone, gneiss, shale (rarely granite). The topography is rarely flat usually slopes with varying gradients and varying exposure, at altitudes of 450 - 1,500 metres. These forests are often of a very fragmentary nature, originating from fires. Natural regeneration is difficult due to the fungal plaque created by needles and fungal textures. After a creeping fire destroys this fungal plaque and regeneration occurs abundantly. It creates multi-timbered, productive stands even on degraded soils.

Floristic composition: in the forests of habitat type 9530, apart from black pine (Pinus nigra), other species that occur and characterise it are *Abies borisii-regis, Adenocarpus complicates, Aremonia agrimonoides, Brachypodium pinnatum, Brachypodium sylvaticum, Buxus sempervirens, Campanula stenosiphon, Daphne blagayana, Erica carnea (syn: Erica herbacea), Fragaria vesca, Galium rotundifolium, Juniperus*

communis, Juniperus oxycedrus, Orthilia secunda, Polygala nicaeensis, Pteridium aquilinum, Pyrola rotundifolia, Quercus cerris, Sanguisorba minor, Sesleria robusta, Sorbus aria, Stachys scardica, Staehelina uniflosculosa, Teucrium chamaedrys, Trifolium alpestre.

Conservation status - Threats: Black pine forests are adapted to creeping fires due to their thick bark and regenerate easily and abundantly after such fires, while they cannot withstand epiphytic fires after which they do not regenerate. The greatest risk arises from the combination of superimposed fire and grazing.



Map 7: Range and range of habitat type 9530* (Source: www.votaniki.gr).

Habitat type code: 95A0

Name: High altitude montane pine forests (*Pinus heldreichii* or *Pinus peuce*)

Status: Habitat type in Annex I to Directive 92/43/EEC

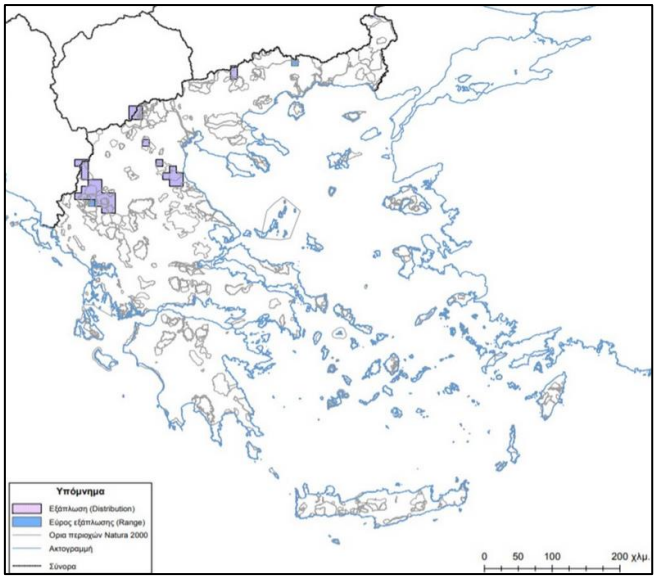
Description: Habitat type 95A0 comprises the forests of the native cold hardwood coniferous forests, in the Balkans and southern Italy, of *Pinus heldreichii* (rosebush or white pine) and *Pinus peuce* (Scots pine or Balkan pine).

Ecological conditions: Rosewood (*Pinus heldreichii*) forests grow on shallow to skeletal soils usually derived from calcareous rocks. Slopes vary but are usually steep. The altitudes at which they usually occur are between 1 500 and 1 900 m, but on Mount Olympus they reach up to 2 600 m. The stands of these forests are not very dense (usually the vegetation cover does not exceed 70 %) and the understorey is sparse with

species such as *Buxus sempervirens, Vaccinium myrtillus*, etc. Forests *of Pinus peuce* are limited to small, sparse stands in the Rhodope, Brontus and Voras at high altitudes.

Floristic composition. *Chamaurus hirsicus, Chamaurus hirsicus (syn: Chamaecytisus polytrichus), Cotoneaster nebrodensis, Cytisus decumbens, Daphne oleoides, Ferulago sylvatica, Festuca varia, Genista radiata, Gymnadenia conopsea, Hieracium murorum, Hieracium pannosum, Laserpitium siler, Ostrya carpinifolia, Pinus heldreichii, Polygala nicaeensis, Rosa pendulina, Sesleria robusta, Thalictrum minus.*

Conservation status - threats: Habitat type 95A0 does not appear to have very strong threats. It may be affected by incorrect management practices and grazing as well as changes in biotic conditions.



Map 8: Range and extent of habitat type 95A0 (Source: www.votaniki.gr).

Habitat type code: 91CA

Name: Rhodopide and Balkan Range Scots pine forests

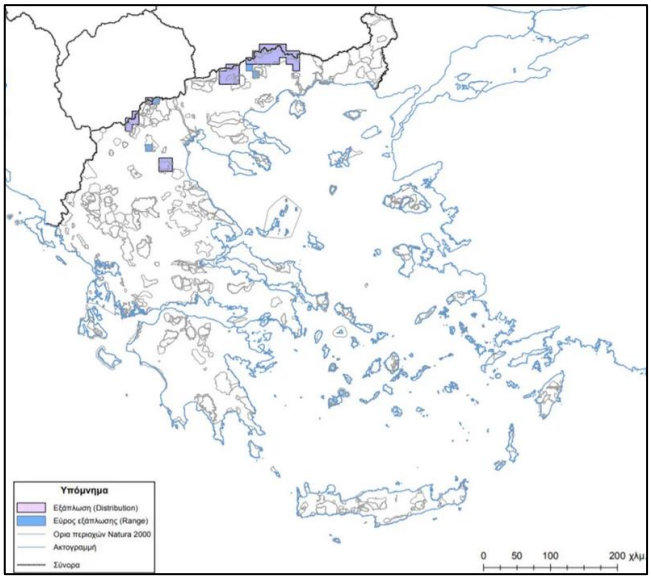
Status: Habitat type in Annex I to Directive 92/43/EEC

Description: Habitat type 91CA includes Scots pine (*Pinus sylvestris*) forests.

Ecological conditions: Habitat type 91CA occurs on dry igneous and calcareous rocks. It is usually dominated by Scots pine, but other species such as black pine (*Pinus nigra*), spruce (*Picea abies*), beech (*Fagus sylvatica*) and birch (*Betula pendula*) can also be found in its forests.

The most important and characteristic species of the habitat type are *Calamagrostis arundinacea, Corylus avellana, Avenella flexuosa, Digitalis viridiflora, Epilobium*

angustifolium, Fagus sylvatica, Galium mollugo agg., Genista carinalis, Hieracium transiens subsp. erythrocarpum, Hieracium olympicum, Hieracium sparsum, Juniperus communis, Luzula luzuloides, Orthilia secunda, Picea abies, Pinus sylvestris, Pyrola chlorantha, Quercus petraea, Rubus idaeus, Trifolium alpestre, Veronica officinalis.



Map 9: Area of distribution and range of habitat type 91CA (Source: www.votaniki.gr).

Bombina variegata (Bombina variegata)

The species is protected by Directive 92/43/EEC (Annex II and IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened (LC). It is also protected by the CITES Convention (Appendix II). According to the IUCN red list the species is not endangered, both at European and global level, although the population of the species has been declining in recent years.

It is mainly found in Central and Southern Europe and to the south-east in the Carpathian Mountains in Russia. In Greece, it is found mainly in northern Greece (Helmer at al. 1988) and its southern limits of distribution extend to Central Greece. The species has experienced local extinctions and population declines such as in southern Switzerland, northwestern and southern France and Germany. However, in areas such as the Carpathian Mountains, Poland and Slovenia, it is still common in suitable habitat.

The species occurs from 100 to 2,100 m altitude. It can be found in coniferous, deciduous and mixed forests, scrub and flooded meadows. At lower altitudes the

species lives in deciduous forests, while at higher altitudes it is more commonly found in coniferous forests and highland clearings. The species uses many types of wetlands, including lakes, marshes, rivers, pools, springs (including mineral and thermal springs), water ponds, reservoirs, and ditches. Breeding habitat is typically unshaded temporary water concentrations within or near forested areas. Breeds from May to September in water, where it lays its eggs. The female lays 120 - 170 eggs (in groups of 30) which are deposited in aquatic vegetation. These hatch in 2-3 days, and the tadpoles metamorphose after 6-10 weeks (Arnold and Ovenden 2002). The species can tolerate light water pollution and has been recorded at very high densities in areas of cleared forest in the Carpathian Mountains. This species regularly hybridises with *Bombina bombina* in many areas. It is an aquatic and social species. During the winter period it remains in tunnels in the ground near breeding sites. In case of danger, it rotates by displaying its brightly coloured abdomen to repel its enemy.

According to the threats listed in the IUCN red list, the species does not appear to be significantly threatened on a global scale. Populations of this species may be locally threatened by the loss of suitable habitat as a result of urbanization, road construction, industry (including oil extraction and transport) and the discharge of pollutants into wetlands. In addition, it is reported to be collected as bait by fishermen in some areas and is occasionally collected in large numbers both for the pet trade and for scientific use (Bülbül et al. 2018). The impact of harvesting on this species needs further research. Hybridization with *Bombina bombina* may also be considered a threat, at least in some areas. Hybridization in Transylvania has resulted in the loss of pure populations.

Lutra lutra

The species is protected by Directive 92/43/EEC (Annex II, IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is classified as endangered (EN and NT respectively). It is also protected by the CITES Convention (Appendix I).

The Eurasian otter has the widest distribution of all otter species. The distribution of the species covers parts of three continents: Europe, Asia and Africa.

The species ranges over most of Europe and in the 1960s, 1970s and 1980s experienced a historic decline and disappeared from parts of Central and Northern Europe. It is not found on most Mediterranean islands due to lack of suitable habitat,

although it is found on some islands in Greece. Otters have been found in brackish waters below sea level in the Netherlands and up to 2,400 m altitude in the Pyrenees. Outside Europe the species has been recorded up to 4,120 m altitude in Tibet (Reuther and Hilton-Taylor 2004). In the European part of Russia, significant declines have occurred in recent years and individual populations in countries such as Turkey, Italy, Georgia and Armenia continue to decline. The British population began to recover in the 1960s (Battersby 2005). The population in Portugal is stable and has not shown a significant decline historically (Cabral et al. 2005). In Norway, although the distribution range of the species is increasing on the southwest coast, the population appears to have declined again since the mid-1990s. In Greece, the otter is found throughout mainland Greece and on some islands (Mason and Macdonald 1986). In the Aegean, it occurs in Evia, Lesvos and Chios, while in the Ionian Sea it is found in Corfu. The species maintains good populations in Epirus, Eastern Macedonia and Thrace, while in the rest of Greece otter populations are declining. Island populations, especially those of Chios, Lesvos and Corfu, are small and isolated and therefore particularly threatened. In Evia the situation is rather better, but even on this island the populations are isolated and there are signs of a decline in the distribution of the species, especially in the lowlands.

The otter lives in wetland areas. It is found mainly in rivers, streams, lakes in mountainous and lowland areas, deltaic systems, estuaries and lagoons, swamps, as well as in irrigated areas (irrigation canals, rice fields) and drainage canals and ditches (Mason and Macdonald 1986, Macdonald et al. 1998). The species is highly adaptable using both saltwater and freshwater habitats and even drainage systems in urban areas. In most parts of its distribution range, the species is associated with the presence of riparian vegetation. Otters in different areas may depend on different habitat characteristics, but the important component of species habitat for breeding purposes is the presence of holes in the riverbank, including hollows between tree roots, piles of rocks, wood, or other organic and inorganic debris. It has semi-aquatic habits. There is evidence that the species sometimes breeds far from water and juveniles move to holes in the river banks once they are a few months old (Reuther and Hilton-Taylor 2004). It swims with great comfort and skill, but spends much of its time on land. It feeds mainly on fish as well as other aquatic animals (crabs, crayfish, frogs, water snakes, small mammals, birds, etc.) (Macdonald and Mason 1990). Its nesting site is always on land, but usually close to water. Otters live solitary lives, maintaining large territories, which they demarcate with their faeces and glandular secretions and which vary in extent

depending on the habitat type (Macdonald and Mason 1990). As an example, in river habitats, where their habitat is linear, the territory of an animal can extend up to 40 km of riverbed, always depending on the availability of available food (Chanin 1987). In Greece, in lowland areas and during the summer months, otters usually show a characteristic variation in habitat use. In particular, as many rivers dry up and most small wetlands dry out, otters move to less suitable habitats such as coastal areas, canals, etc. The presence of freshwater is always essential for the presence of the species in an area (Beja 1992). It has mainly nocturnal habits and, although it is an adaptable species, it avoids humans and anthropogenic disturbance (Kruuk 1996).

Threats to the species, according to the Greek Red Data Book (Legakis and Maragou 2009) are: A serious problem for the otter is the destruction and degradation of wetland habitats (Macdonald and Mason 1990, Macdonald et al. 1998). In particular, the drainage of wetlands and the destruction of riparian vegetation (e.g. burning of reeds, cutting of trees, clearing, etc.), especially in lowland areas, hydroelectric dams (large or even small ones) and river and stream alignment projects are serious threats, which have intensified in recent years and are leading to a decline in the distribution of this species in Greece. In the long term, the effects of climate change and in particular prolonged droughts may have serious impacts on otter habitats. In addition, water pollution with toxic and residual pollutants (from agricultural waste and leaching) is a potentially significant risk to otter populations (Macdonald and Mason 1994). Indirectly, non-toxic water pollution, which is associated with eutrophication phenomena in Greek wetlands and may lead to a reduction in fish and hence otter food, also has a negative impact. A similar problem is caused by intensive or even illegal fishing (Macdonald and Mason 1994). Finally, a smaller problem (although locally important) is accidental mortality in fishing gear or from passing cars on the roads. Accidental killing by hunters is usually also common.

According to the NRC (Legakis and Maragou 2009), the conservation measures required are: conduct surveys to update and possibly revise our knowledge of the distribution and population of the species, as the status of the species has not been studied at the national level since the mid-1980s. This knowledge is essential in order to identify suitable protected areas for the otter. Maintaining 'natural corridors' for animal communication by creating natural vegetation zones in wetlands is very important, especially in areas where otter populations are declining and fragmenting, such as islands and wetlands in lowland rural areas.

Threats listed on the IUCN red list are that the species' aquatic habitats are highly vulnerable to anthropogenic change. The enclosure of rivers, removal of riparian vegetation, construction of dams, pumping of water for irrigation, drainage of wetlands for agricultural use, agricultural activities and associated anthropogenic impacts on aquatic systems are detrimental to the species' populations. Also, wetland pollution is a major threat to otters. Coastal populations are particularly vulnerable to oil pollution. Pollution of rivers and lakes leads to a decrease in fish biomass, reducing food availability. In addition, important causes of mortality from various countries are drowning, deliberate killing and poaching. Nets for eels and other fish, as well as traps for marine shellfish, are very attractive to otters, and many individuals attempting to enter them become entangled and drown. Illegal hunting continues to be a problem in many parts of the species' range. In many European countries, political pressure, especially from fishermen, has resulted in the granting of permits to kill the species (Reuther and Hilton-Taylor 2004). Illegal killing for trade is increasing in Ukraine and the Danube Delta, and possibly in the eastern parts of the global range (European Mammal Assessment Laboratory 2006). In the longer term, the effects of climate change, and in particular prolonged droughts, may have serious impacts on otter habitats.

Vormela peregusna

The species is found from southeastern Europe to Russia and China. Particularly in countries such as Syria, Israel, Palestine, Romania, Bulgaria and north of Siberia. In Greece it is found mainly in the northern regions of Macedonia and Thrace.

The species is protected by Directive 92/43/EEC (Annex I and IV) and the Bern Convention (Annex II). According to the Greek Red Data Book, in Greece the species is not classified as threatened, as it is considered to be poorly known (DD), while according to IUCN at European level the species is classified as threatened (VU).

It is a rare species in most of its distribution range. It has declined significantly in Europe due to loss of steppe habitat. It usually prefers dry and open flat areas, steppes, meadows, valleys, scrub forests and cultivated areas with fruit and vegetables. It avoids mountainous areas. Breeds once a year, from March to early June. Gestation lasts 243 - 327 days (late implantation of germinal vesicle in the uterus) and gives birth to 4-8 blind pups which open their eyes after 38 - 40 days. They are weaned in 50 - 54

days and leave the nest after 61 - 68 days. They mature sexually one year after birth. The species lives about 10 years. It is a solitary and aggressive species. It is active around the area in which it nests, usually during the day and late at night. It has a highly developed sense of smell, but not of sight. It digs very deep with its claws and uses its teeth to pull out obstacles such as roots. The area of the endemic area ranges from 0.5 to 0.6 km2 (Macdonald and Barrett 1993). It feeds on small mammals, mice, rats, birds, frogs, insects, reptiles and fruits. It has also been observed feeding on small chickens and pigeons.

Threats listed on the IUCN red list are the loss of the steppe's natural habitat. Steppe habitats are declining in Europe as they are being converted to cultivated agricultural land. Secondary poisoning by rodenticides may also pose a threat, as may population declines in key prey species of the species.

Dactylorhiza kalopissii

The species is endemic to Greece and is found in several areas in the mountains of northern Greece, such as Mount Vermio and Mount Olympus, at altitudes ranging from 1,100 m to 1,600 m above sea level (Phitos et al. 1995; Delforge 1995). The species is local and abundant in the areas where it occurs. According to the IUCN red list, the species is endangered (EN), with a trend of steadily declining population (Phitos et al. 1995, Delforge 1995).

The species is protected by Directive 92/43/EEC (Annex II) and the Bern Convention (Annex II). It is also protected by the International Convention CITES (Annex II). According to the IUCN red list at European level the species is classified as endangered (EN).

It occurs only in wet grasslands near springs. It grows in neutral to slightly acidic moist marshy soils in full sunshine. The species blooms from mid-May to July. (Phitos et al. 1995, Delforge 1995).

According to the threats listed on the IUCN red list, the species' habitat has been significantly reduced recently through soil drainage, tourism development, reservoir construction and intensive grazing. Also, the collection of this orchid along with the trend of hybridization within the genus Dactylorhiza are threats to the species (Phitos et al. 1995, Delforge 1995).

Gladiolus palustris

The species is endemic to Europe and has not been classified as threatened according to the IUCN red list, due to data deficiency (DD: Data Deficient). There are population declines of the species over most of its distribution range, as evidenced by species marked as threatened in several National Red Lists. There is no information on whether the species has strong and abundant populations anywhere. More information on current population size, trend and overall rate of decline is required to place the species on the IUCN red list as threatened. The species is protected under Directive 92/43/EEC (Annex II). In neighbouring Bulgaria, there are five sites, with recent data from two of them.

The species occurs in coniferous forests (mainly pine forests) (Klotz et al. 2002) and forested wet meadows. It periodically prefers wet meadows but is drought tolerant. If the habitat is not periodically wet, populations decrease due to competition from other plants (Käsermann and Moser 1999). Grows on calcareous, moderately humic and nutrient-poor soils. The species also occurs in steppe meadows and grassy olive groves (Mereďa and Hodálová 2011). The species occurs in the following habitats listed in Annex I of Directive 92/43/EEC: 62A0, 6260, 6410, 6410, 6440, 91M0.

According to the threats listed in the IUCN red list, the species' habitat is subject to many threats such as modification of farming practices (mowing, grazing, abandonment of pastoral systems, forest planting), which often leads to vegetation change and competition for the species, water management and drainage, pollution and harvesting. Conversion of habitat for the species (grasslands) to cropland causes habitat loss. At the local level, there are threats such as aquaculture, roads and railways.

Elaphe quatuorlineata

The species is found in Mediterranean and sub-Mediterranean zones of southern Europe, mainly in Italy and the Balkans, from Croatia to Greece (not in Thrace, but on a number of Ionian and Aegean islands). It is found from sea level to 2,500 metres altitude.

The species is protected by Directive 92/43/EEC (Annex II and IV) and the Bern Convention (Annex II). According to both the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened (LC: of reduced concern).

The species is about 150 cm long, but rarely can exceed 200 cm. Adults have a yellowish brown or black colour and four black lines starting at the eye and extending to the tail. Juveniles have a different colouration and are greyish-silver with brown or black spots along the back (Arnold and Burton 1978). The species is found in vegetated hedgerows, near forest habitats, open woodland, rocky overgrown areas and traditionally cultivated land. It can also be found near water bodies and away from them. The species tends to have very large areas as spatial ranges. Females lay between 4 and 16 eggs and the production time is 4 to 5 years. It hunts mainly on the ground but often climbs trees and shrubs. The species is an adept swimmer. It feeds on small mammals such as rats and other small rodents, other small mammals, birds, lizards, amphibians and eggs.

According to the threats listed in the IUCN red list, the species is mainly threatened by habitat loss due to urbanisation, intensification of agricultural practices and development of tourism infrastructure. It is persecuted by humans in many areas of its distribution.

Testudo graeca

In southern Europe the species occurs in isolated populations in southern Spain, Mallorca (Spain), western and central Sardinia (Italy), and in the eastern Balkans where it is distributed in southeastern Serbia, most of Bulgaria, eastern Romania, northeastern Greece and European Turkey. There is an isolated population on the Black Sea coast of southern Russia. Records from Ukraine require confirmation. Genetic analysis suggests that Spanish populations are imports from North Africa in historic times (Alvarez et al. 2000). Also, all Italian populations are thought to have been imported. The abundance of this species varies greatly across its distribution range.

The species is protected by Directive 92/43/EEC (Annex II and IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece the species is not classified as threatened (LC), while according to the IUCN at European level the species is classified as threatened (NT: Near Threatened). It is also protected by the CITES Convention (Appendix II).

The species inhabits a variety of habitats from dry open scrub, grasslands and pastures, dunes, forests, heaths and open habitats. (Bayley and Highfield 1996, Buskirk et al. 2001). Areas with strongly saline substrates and sparse vegetation, as well as

accumulations of large rocks and steep slopes, tend to be avoided (Alekperov 1978, Kuzmin 2002). The species is a herbivore and feeds on a wide variety of leaves, flowers, seeds and fruits of grasses and shrubs, as well as small invertebrates such as snails and arthropods. Mature females usually lay two to four eggs (extreme one to seven) (Buskirk et al. 2001). As a result of habitat loss to agriculture and infrastructure development, populations of the species are now concentrated in marginal habitats such as human-made habitats (orchards, gardens), riverine floodplain areas, and coastal dunes.

The threats listed on the IUCN red list are habitat degradation and loss (Lambert 1995, Bayley and Highfield 1996). Harvesting of the species for the purpose of trade as pets has involved large numbers of animals and has been cited as a major factor in population decline, particularly in Morocco and Algeria (Lambert 1995, Highfield and Bayley 1996).) (In Morocco, turtle shells are used to make tourist souvenirs (Highfield and Bayley 1996). The release of captive turtles from different populations of T. graeca into the habitat represents risks of genetic pollution (Andreu 2003). Deforestation, intensive land use, use of inorganic fertilizers and pesticides, overgrazing by cattle, extensive plantations and sand mining have been factors in turtle habitat loss. Natural predators, a major cause of juvenile and adult turtle mortality (Buskirk et al. 2001), have likely been aided by anthropogenic changes in turtle habitat, allowing for higher predator densities and impacts on turtles.

Barbastella barbastellus

The species according to the Greek Red Book in Greece and the IUNC red list at European level is classified as threatened (EN and VU respectively). The species is protected by Directive 92/43/EEC (Annex II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

The species is largely restricted to central and southern Europe, although its distribution range extends as far as North Africa. It occurs at 1,800 m altitude in the Alps, 1,900 m in the Caucasus and 2,260 m in the Pyrenees.

Winter flocks are usually small, individuals tend to be solitary, but flocks of up to 500 and rarely up to 1,000 individuals have been observed in France and Poland and over 7,000 individuals in Slovakia (Schober 2004). It is considered a near-extinct species in the Netherlands since 1984. It was last recorded in Norway in 1949 and is

probably completely extinct today. Population declines are widely reported and it is considered threatened in many countries. Populations in Germany have increased in the last five years, especially after a reduction in insecticide use. Relatively common in forested areas in the western part of the Caucasus and with no reported population decline.

In Greece it is one of the rarest bat species. It has been reported at five sites in Central Greece (Fthiotida and Fokida prefectures) (Volleth 1987; Helversen and Weid 1990), and has also been found at Smolika, Kato Nefrokopi and Kaimaktsalan. Its populations appear to be isolated, a hypothesis reinforced by the fact that it is associated with mature forests and is difficult to colonise new areas. Its distribution in our country is probably wider, but at the global level it has been found to be fragmented.

The species occurs in habitats rich in food availability, mature forest areas and agricultural lands. In summer it nests in cavities of old trees and less frequently in buildings. In winter it takes refuge initially in trees and later in caves, mines or underground bunkers. It feeds on moths, which it forages for in mature woodland and forest and tree plantation boundaries.

Threats to the species according to the IUCN include habitat degradation and destruction, particularly the loss of old mature forests with old trees that the species uses for nesting (Hutson et al. 2008b). Reforested areas are not suitable for the species. Also, loss of underground habitat and sites in old buildings are a threat to the species. Loss of suitable foraging habitat, such as riparian vegetation of rivers and streams, is another threat to the species. The direct and indirect effects of pesticides, which kill insect species such as the moth (the species' main prey), are also a significant threat (Russo et al. 2020). Finally, caving and cave tourism may have negative impacts, as individuals of the species have been captured in caves in our country (Helversen and Weid 1990).

Miniopterus schreibersii

The winged bat is a relatively small species of chiroptera with a wingspan of 30 to 34 cm and a weight of 10 - 14 g (Wilson and Mittermeier 2019). It has short ears and a very small round trawl. The wings are narrow and long. The dorsal fur is greyish-brown, while that of the abdomen is now light brown. Recent phylogenetic studies using DNA sequencing have 'restricted' *Miniopterus schreibersii* to Europe, North Africa and parts of the Near East. Miniopterus populations, consisting of medium-sized

individuals, from sub-Saharan Africa, East Asia and Australia, which until recently were included in *M. schreibersii*, are now recognised as distinct species, which are not closely related to *M. schreibersii.* The species is monotypic.

According to the Greek Red Book in Greece and the IUNC red list at global level, the species is classified as threatened (NT and VU respectively). The species is protected by Directive 92/43/EEC (Annexes II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions. The global population of the species, according to the IUCN red list, is estimated to have declined by at least 30% in the last 16.5 years over its widest distribution range (three generations, with one generation equal to 5.5 years; Pacifici et al. 2013). It is extinct in Germany (Germany 2018), Ukraine (Ukraine 2018) and Austria. In Switzerland, the population of the species has been steadily declining since the 1960s. Individuals of the species were sometimes recorded during migration in caves along the French border, but no colonies were discovered (Bohnenstengel et al. 2014). The population in Serbia is estimated at 150,000 individuals (Pejić et al. 2018). A baseline survey of the main colonies in Turkey identified a total of 18,251 bats of the species (Çoraman Çelik 2012).

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 Sea, the North and South Aegean Sea 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.

The species roosts almost exclusively in underground locations. Summer breeding colonies may include 500 - 10,000 individuals, with the most numerous concentration of 70,000 individuals being in a French cave (EUROBATS 2019). It usually enters winter hibernation in groups in spacious caves (groups of up to 40,000 individuals have been observed in three caves in Serbia (Paunović 2004), Romania (Bücs et al. 2018), and European Turkey (Paksuz, Özkan 2012)). The species feeds mainly in deciduous forests and mature orchards (including olive groves), in gardens, in hedgerows between pastures, in riverine forests and in urban areas. In the

Mediterranean region the species can use grasslands as habitat, but generally avoids cultivated land and areas with long vegetation. However, in Portugal they use arable land (olive and cereal), avoiding areas with denser tree cover, preferring areas close to roosts. In France, feeding areas are usually located within 30 km of the main roosting site, while in Portugal 82% of females feed within 10 km of the colony. The winged bat mates in September and early October and fertilization occurs immediately (rather than in spring as in most bats), but implantation of the zygote occurs after hibernation. She gives birth to a young in July or June. 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. Lepidoptera dominate the species' diet in all seasons, making up 76-95% of the species' diet. The species is migratory, changing its roosting location many times during the year, with long-distance movements occurring occasionally (the longest recorded distance is 833 km; Hutterer et al. 2005). The maximum known age is 22 years (Gazaryan 2004).

The Conservation Status of the species, 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 in Conservation Status as Unknown (Unk) (EEA 2019). The total population size was estimated to be approximately 23,000 - 50,000 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 Greek bats, nearly 47,000 individuals have been counted in 68 refuges (Georgiakakis and Papamichael 2020), but the actual number is undoubtedly higher. The largest known colony of bats in Greece, at the Cave of Lakes (Kastria, Achaia), has over 18,000 individuals of this species.

The threats listed in the IUCN red list are the disturbance of the species' colonies, both during winter and summer. Inappropriate protection of cave entrances (e.g. with inappropriately designed grills) can lead to abandonment or declining numbers. Caving and caving tourism, casual visits to caves and vandalism of caves have resulted in the decline or even extinction of the species' colonies. Pesticides also represent a potentially high risk, as according to the species' diet, it relies on preying on many species of parasites. In 2002, mass mortality events were reported for populations in France (40% mortality up to 60% in one year (Roué and Némoz 2002), Spain (mortality occurred in Spain during the same period, including 1,000 deaths out of

6,000 individuals in one colony), Italy and Portugal. In 2013 a mass mortality event occurred in a bat colony of the species, causing the death of about 500 individuals in northeastern Hungary (Bükk Mountains). Mortality events in Spain and Hungary were associated with viral mortality (Kemenesi et al. 2018). Another event with about 200 dead individuals was reported in 2018 from Georgia (EUROBATS 2018). Mortality following impacts on wind farm turbines is also a threat (has been recorded in Spain, Portugal and France), but can occur anywhere within the species' distribution range (Rodrigues et al. 2015).

Myotis bechsteinii

The species according to the Greek Red Book in Greece and the IUNC red list at European level is classified as threatened (NT and VU respectively). The species is protected by Directive 92/43/EEC (Annexes II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

Rare species occurring at low densities and with specific habitat requirements. Its population is fragmented and does not readily colonise new areas. There is very little information on population trends of the species, but it is suspected that the species is declining as a result of the loss and degradation of certain types of woodland, exacerbated by other threats such as human disturbance.

The species is found in Central and Southern Europe and temperate Southwest Asia (Caucasus and Asia Minor). It has been recorded from sea level to 1,500 m altitude in central Spain (Benzal and de Paz 1991).

It is considered, as mentioned above, a rare species throughout its distribution range, although in optimal habitat it can be found regularly and is a typical member of Central European bat colonies. In southern Europe and the Caucasus it is rare. There are also a few records from Turkey, where it has been found in groups of up to six individuals at six sites. Breeding colonies are small, numbering up to 10-30 individuals.

This species has specific habitat requirements and is highly dependent on mature natural forests. In the Southwest Asian region it occurs in broadleaf and sometimes mixed forests. In Europe, it tends to prefer mature deciduous beech and oak forests with a high proportion of old trees. Occasionally found in artificial habitats such as pastures, plantations (especially orchards) and agricultural gardens. In summer the species is found roosting in tree holes or occasionally in buildings, and may also use artificial boxes for birds or bats (Schlapp 1999). In winter it hibernates in underground

habitats and in tree holes. It feeds on flying and non-flying insects in woodlands. The species is sedentary (Hutterer et al. 2005).

Threats listed on the IUCN red list include inappropriate management and development of forest habitats, intensive agriculture (e.g., pesticide use on agricultural land adjacent to forested areas occupied by the species), and human disturbance of roosting sites of the species. The loss of old trees with cavities is a particular problem. In Germany, infrastructure development (and associated habitat fragmentation) and forestry are the main threats (Schulenberg 2005).

Myotis blythii

This species is a medium-sized bat, with fairly large ears. It is morphologically similar but slightly smaller than *Myotis myotis.* Its snout and ears are also shorter and narrower, but distinguishing it from the related *M. myotis* is extremely difficult. The wingspan ranges from 30 to 40 cm and the weight from 19 to 29.5 g (Wilson adn Mittermeier 2019). The fur on the back is brown with a greyish tinge and the abdomen is distinctly off-white. Often the fur between the ears has a light-coloured patch.

According to the Greek Red Data Book, the species is not classified as threatened (LC) in Greece, while according to the IUNC red list at European level it is classified as endangered (VU). The species is protected by Directive 92/43/EEC (Annexes II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

It is distributed in south-central and southern Europe (including Sicily, Cyprus, Crete and other smaller islands in the Mediterranean), in south-western Asia from Asia Minor to the Caucasus region, Palestine and North Jordan to Kashmir, the Altai Mountains, Nepal, northern India and northern and central China It is concentrated in colonies of up to 500 individuals. There have been large population declines since the 1950s in several areas, including Central Europe, Israel and Central Asia, and there is evidence of continuing declines in some areas of its range, although in other areas populations appear stable. It remains a generally abundant species. In Turkey it occurs in large colonies and is the second most common bat species. In Iran there is evidence of population decline, although it remains one of the most visible species. The Spanish population is estimated to be less than 20,000 individuals and is concentrated in the southern part of the country (Palomo and Gisbert 2002). It is declining, at a rate of about one-third of its population over the last 10 years in important large colonies in Andalusia (Franco and Rodrigues de los Santos 2001). It is one of the rarest species in

Portugal, where the population of 2,000 individuals is steadily declining (Rodrigues et al. 2003). It is uncommon in northern Austria but appears stable in its population levels (Spitzenberger 2002). In France, the population of over 20,000 individuals has experienced a decline that began in the 1960s but is now stable. In Romania, a known colony has declined by 95% as a result of disturbance due to cave tourism.

In Greece, it has been found in a large number of locations throughout the mainland, Evia, Peloponnese, Crete and 14 other islands in the northern and southern Aegean and Ionian seas. The most known sites 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 2,000 m altitude (1,700 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 the winter it is found only in mountain caves (above 1,000 m), where it overwinters. Its winter shelters in the rest of Greece are largely unknown. In the northern part of its range it forms maternity colonies in attics. Mother colonies are usually found in underground habitats, such as caves and mines, and sometimes in the attics of buildings (especially in Central Europe). Mother colonies can be hundreds or even 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 shelters, singly or in small aggregations close to the mother 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. The species enters hibernation underground at a relatively constant temperature of 6 - $12^{(o)\ C.}$ The micromyotis is considered an epidemic 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 (Hutterer et al. 2005) in a straight line, suggesting 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 feeding grounds is 4-7 km, with longer distances for some feeding 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, the species may also hunt other species, which suggests that its hunting strategy is quite flexible. Given the species' wide geographic distribution, its diet is also quite broad and, in addition to orthopterans and coleopterans, includes Lepidopteran larvas, mandarins (especially in the Mediterranean), dipterans of the family Tipulidae, hymenopterans and spiders, indicating that the species is opportunistic. The micromyotid can 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.

The Conservation Status of the species, 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 in Conservation Status as Unknown (Unk) (EEA 2019). The total population size was estimated to be approximately 10,000 - 50,000 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 Greek Bats Database, nearly 14,900 individuals have been counted in 50 refuges (Georgiakakis and Papamichael 2020), but the actual number is likely higher.

Threats listed on the IUCN red list include changes in land management, particularly agricultural pollution, the disappearance of habitats that support livestock (steppes, grasslands, natural pastures), and other agricultural activities that may affect populations of the species. Disturbance to cave and building roosts is also a threat to the species.

Myotis emarginatus

The pyromyotis is a relatively small bat, weighing 5.5-15.5 g (Wilson and Mitttermeier 2019) and with a wingspan of between 22 and 25 cm. Its ears have a

characteristic notch, forming a nearly right angle at their outer edge, and its fin has scattered tuberculate growths.

According to the Greek Red Data Book, the species is classified as threatened (NT) in Greece, while according to the IUNC red list at European level it is listed as a species of reduced concern (LC). The species is protected by the Directive 92/43/EEC (Annex II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions. The species is found in Southern Europe, but also in the southern regions of Western and Central Europe. It is also found in non-arid areas of south-west Asia and Asia Minor. It occurs in its distribution range from sea level to 1 800 m altitude. The highest altitude records have been made in the Alps (812 and 1505 m) (Spitzenberger 2002). Locally the species may be rare or common. The species experienced a significant population decline from the 1960s to the 1990s, but more recently the population numbers in many areas have increased and the species has spread to new areas.

In Greece it is a common species, having 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 range, including Greece, the species forms colonies mainly in caves and mines throughout the year, less frequently in buildings and rock shelters. It occurs, as mentioned above, from sea level to 1800 m altitude, but in Greece so far
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 Central 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. The diet of the species, unique in Europe, as it includes mainly spiders, with a secondary diet of diptera, lepidoptera and neurotrophins, and a smaller proportion of coleoptera and hymenoptera. Flies of the genus Musca, constitute the major proportion of the residues in the faeces of

individuals feeding in stalls. Pyrrhomycetes capture most of their prey by 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 shrublands and grasslands, as well as around livestock facilities, where it finds abundant flies around the droppings of livestock (Zahn et al. 2010, Dekker et al. 2013). It is dependent on the presence of uneven-aged forests, forest grasslands and traditional orchards. In the Mediterranean region it has been reported to use olive groves as hunting habitat.

Mother colonies consist of dense aggregations of mainly adult females and juveniles, sometimes or in mixture with other species (genera Rhinolophus, Myotis, and Miniopterus), which gives 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. Pyrrhula is considered an epidemic species, as the longest recorded seasonal movement distance is only 105 km (Schunger et al. 2004 in Hutterer et al. 2005). Since few wintering sites are known, the species is likely to move 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 shelters. The feeding grounds are 50-70 ha in size, within which there are up to 6 central feeding grounds, which it visits every night. In summer the species uses roosting sites in underground habitats (in Central Europe it uses building attics).

The Conservation Status of *M. emarginatus*, 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 5,000 - 10,000 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 Handicapped in Greece, nearly 4,400 individuals have been counted in 27 refuges (Georgiakakis and Papamichael 2020), but the actual number is likely higher.

Threats listed on the IUCN red list are loss, alteration or disturbance of the species' habitat. Agricultural activities, which may affect populations of the species (e.g. pesticide use), as the species is primarily associated with agricultural habitats. Also, disturbance to roosting sites (such as buildings and caves) is a threat.

Myotis myotis myotis

This species occurs in western, central and southern Europe (with isolated records in southern England and southern Sweden) and in Asia Minor.

The species is common throughout its range of distribution with population numbers varying at different levels. The species is protected by Directive 92/43/EEC (Annexes II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as endangered (NT), while according to IUCN at European level the species is not classified as threatened and is listed as a species of reduced concern (LC), with its population considered stable.

During the 1980s and 1990s in Central Europe, there were increases in the species' populations, following significant declines in previous decades. It forms large colonies (up to tens of thousands of individuals) in caves in Central Europe. In Austria, the population was estimated at 76,000 individuals in 1999 and continues to increase (Spitzenberger 2002). In France, 37,000 individuals were recorded in the summer of 1995 (Roué and Groupe Chiroptères 1997), with population trend data not available. A small population disappeared in Britain in 1990.

In Greece, trannomyotida 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.

The species is one of the largest bats in Greece with a weight of 20-27 g. and a wingspan of 35-45 cm. Its fur is brown or reddish brown on the back and distinctly whitish on the belly. The trannomyotis occurs in a variety of habitats from deciduous forests (mainly open forests and forest margins) to semi-open and open grasslands and

pastures, farmland, 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 bunkers and rock crevices. Occasionally it forms small colonies in trees. The species forms, in underground shelters, large maternal colonies of 50 to 1,000 females or more. Mother colonies usually form in late March and last until August. They usually consist of adult females and their young, as well as a few adult males. These males are not the most successful from a reproductive standpoint because 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), a fact that adds great management value to its refugia. It gives birth in May to June (April in some Mediterranean countries) to a young that becomes independent after 5 - 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. It usually feeds on large (> 1 cm) species of terrestrial arthropods, mainly beetles of the family Carabidae, and other arthropods such as liverworts, 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. It is an occasional migrant. The longest recorded movement is 436 km (Simon et al. 2004).

The Conservation Status of the species, 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 1000 - 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 Chiroptons of Greece, nearly 2700 individuals have been counted in 17 refuges (Georgiakakis and Papamichael 2020), but the actual number is probably higher.

Threats listed on the IUCN red list are agricultural activities (e.g. pesticide use, intensification of agriculture leading to the uprooting of shrubs and hedgerows and small forests, road development) as it is a typical species of agricultural - rural landscape mosaics. Loss or disturbance to roost sites in underground habitats and buildings may also be a threat. However, they are not considered to be serious threats to the species at this time.

Rhinolophus euryale

This species is a medium-sized bat, with a wingspan of up to 32 cm and a weight of 7.5 to 17.5 g (Wilson and Mittermeier 2019). The dorsal fur is brownish gray or brownish red and usually differs slightly from the grayish (sometimes whitish) abdominal fur. The eyes are slightly hidden behind the horseshoe, and the upper projection of the saddle is acute and slightly curved downwards.

According to the Greek Red Book in Greece and the IUNC red list at European level, the species is classified as threatened (NT and VU respectively). The species is protected by Directive 92/43/EEC (Annex II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

Rhinolophus Euryale is a species of western Palaearctic, occurring in southern Europe, north-western Africa (Morocco to Tunisia) and the Near East. It is widely distributed throughout its range and is found at altitudes up to 1,000 m. It is considered a rare species with summer colonies numbering 50-500 individuals. Winter flocks usually number up to 2,000 individuals. It occurs in large vulnerable colonies and is considered threatened in many areas. Large population declines have been reported in some European countries, including Spain (Palomo and Gisbert 2002) and Slovakia (Ibáñez 1999). In France, the population declined by about 70% between 1940 and 1980, although thereafter the trend appears to have stabilised (Brosset et al. 1988). The species is probably one of the two rarest of the genus in Italy and anecdotal evidence suggests that some colonies have declined in recent decades. From 1960 to 2000 the species disappeared from a number of sites in Romania, but the trend over the last five years seems to be stable. The species has a very small and declining population in Portugal (Rodrigues et al. 2003, Cabral et al. 2005). There is little information on

population trends outside Europe, although it is suspected that population declines have continued in non-European sites. For example, in Iran the species is no longer found in caves that 30 years ago had 20,000 individuals of different species. It is thought to be declining in North Africa (GMA Africa Laboratory 2004).

In Greece, the mesrinolophos has been found in almost all of the mainland and on 12 islands (including the Peloponnese and Euboea), but is absent from the Cyclades and Crete. Its distribution in our country is probably wider. Most 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, Western Macedonia, 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 1,000, 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 species of Rhinolophus, but also with species of the genera Myotis and Miniopterus, which adds great management value to its refugia.

The feeding areas of the species are found in Mediterranean and sub-Mediterranean shrublands and woodlands, mainly broadleaf forests, riparian forests and tree plantations (e.g. olive groves). In Italy, the preferred foraging habitat is broadleaf woodland and riparian vegetation. Coniferous forests are avoided (Russo et al. 2002), as well as open areas. It prefers karstic areas of low to moderate altitude (usually below 1000 m) with caves, which it uses as refuges. The known distances between its refuges and feeding sites range from 1,5 to 24 km. Summer roosts are located in natural and artificial underground areas. In winter it enters hibernation in underground spaces (usually large caves with a stable microclimate). It is an epidemic species and distances between summer and winter refugia are usually less than 50 km (the longest recorded distance travelled by an individual is 134 km) (Heymer 1964 in Hutterer et al. 2005). The mesopredator hunts for food at the forest edge or above trees, but its highly flexible 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.

The Conservation Status of the species, 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 in Conservation Status as Unknown (Unk) (EEA 2019). The total population size was estimated at an approximate size of 2,275 - 5,000 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 of the Greek Chiroptor Database, nearly 4,400 individuals have been counted in 30 refuges (Georgiakakis and Papamichael 2020), but the actual number is undoubtedly higher.

Threats listed on the IUCN red list are loss of foraging habitat for the species and disturbance and loss of subterranean habitat. Fragmentation and loss of the species' habitats, such as vegetated hedgerows and riparian vegetation, is a significant threat because such areas are used for the species' movements. The species' heavy reliance on caves for roosting sites makes it particularly sensitive to cave disturbance, such as that caused by cave tourism. The use of strong pesticides is also believed to have contributed to the dramatic population declines of the species that occurred previously in France (Brosset et al. 1988).

Rhinolophus ferrumequinum

The Tranorhinolophus is a medium-sized bat and the largest representative of the genus Rhinolophus in Greece and Europe. The wingspan ranges from 33 to 40 cm and the weight from 18 to 24 grams. The dorsal fur of adults is brown or brown-grey, often with reddish edges. The abdomen is white - grey to white - yellow in colour. Juveniles are mostly grayish and acquire their adult coloration after about two years (Dietz et al. 2009).

The species according to both the Greek Red Book in Greece and the IUNC red list at European level is not classified as threatened and is listed as a species of reduced concern (LC). The species is protected by Directive 92/43/EEC (Annex II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

The species has a wide range of distribution in the Palaearctic, which includes northwest Africa, southern and central Europe, from Portugal to Greece and north to southern England, France, Germany, Austria, Czech Republic, Slovakia, Bulgaria, Bulgaria, Turkey, Cyprus, Israel, Jordan, Iraq and Iran. Areas of Ukraine, Crimea and the Caucasus, in Turkmenistan, Uzbekistan, southern Kazakhstan, Afghanistan, Pakistan, northern India, Nepal, China (Wilson and Reeder 2005), Korea and Japan (Csorba et al. 2003). Usually occurs below 800 m elevation, but can be found up to 3,000 m in the Caucasus, depending on availability and humidity at the kurnias sites. In Europe its population trend is decreasing.

The Tranorhinolophus is a species with a wide distribution in Greece, both on the mainland and on the islands (it has been found on 22 islands, including Crete, Peloponnese and Evia. It is possible that the absence of records from some islands or inland areas is due to the absence of data and not to the non-existence of the species in these areas. It has been found in many places in Crete (116), but also in the north of the island. Aegean (61, mainly on Lesvos) and Eastern Macedonia and Thrace (48). Aegean and Western Macedonia. On the other hand, the highest abundance has been recorded in Crete, Western Greece and Eastern Macedonia and Thrace, indicating that there is no geographical pattern in its abundance, other than small islands supporting small populations.

The two most widespread Rhinolophus species in Europe, *R. Ferrumequinum* and *R. Hipposideros*, are of particular conservation interest and are the subject of considerable research and monitoring. *R. Ferrumequinum* has experienced significant declines in its distribution range in northwestern Europe over the last 100 years (e.g. UK, Germany, Austria) and has disappeared in some countries (e.g. Belgium, Netherlands). However, there are signs of stabilisation or even recovery in some north-western European countries (Hutson et al. 2001). For example, in the UK the species declined massively in the past, but is now stable at a low population level (around 5,000 individuals) (Ransome and Hutson 2000). However, in Austria declines continue, with a 70% population decline in the last 10 years, from 100 to 30 breeding individuals (Spitzenberger 2002). Elsewhere in Europe, trends are variable and generally less well known, for example in Malta the species is extinct, in Portugal and Spain the trend is not known (although some colonies have disappeared in Spain) (Palomo and Gisbert 2002; Cabral et al. 2005), in Croatia the population is considered stable, and in Romania the population has been slowly increasing since 1989 due to reduced pesticide use and

a return to traditional agriculture. In Switzerland, the species is very rare (three kurnias sites with about 200 individuals), but the population trend seems stable. It is a rare species in most parts of its distribution range, although at least in parts of Southwest Asia and the Caucasus it is abundant and widespread (it is the most frequently reported species in Turkey). Summer colonies of about 30-200 individuals (in some cases up to 400 individuals) and winter colonies of up to 500 individuals are not uncommon.

The Tranorhinolophus prefers relatively warm areas, while in the Mediterranean it is found in areas with altitudes up to 1,500 m, rarely higher. It is a species typically associated with forest habitats, but landscapes characterised by mosaicism with a variety of habitats such as forests, scrub, grasslands, pastures, crops and shrub/tree rows are important for its presence in an area. It is also often found in wetlands with rich tree cover, but also in residential areas. During the colder months of the year it takes refuge in caves and mines, where it goes dormant. In Greece and other Mediterranean countries, R. *Ferrumequinum* forms breeding colonies mainly in underground shelters (caves and mines) and less so in buildings. In more northern countries it breeds almost exclusively in buildings. When the species occupies buildings, it requires certain features of the building itself, as well as proximity to good feeding areas and underground spaces to enter hibernation (Hutson et al. 2001). Breeds in cold underground areas (usually large caves). In the Mediterranean, the tranquillophile often uses the same shelters as other Rhinolophus species, as well as species of the genera Myotis and Miniopterus, which adds great management value to its shelters. Its feeding sites are usually an average of 5 km from its refuges, and it may visit up to five different sites each night. It is an epidemic species as it does not make long movements on a seasonal basis (a few tens of kilometres) (the longest distance was recorded at 180 km (De Paz et al. 1986)). Mating usually occurs in late summer or autumn, but sometimes in winter or spring. Males select their "love shelters", which are visited by females to choose a mate. Females reach reproductive maturity between their second (Balkans) and fifth year (UK). Only one chick is born each year, which begins to fly at three or four weeks and becomes independent 1-2 weeks later. The maximum recorded age is 30.5 years. Flies relatively slowly and usually close to the ground or vegetation, but also at a height of a few metres (4-6 m). A significant part of its hunting is done from perches (tree branches or vertical rocks): as it hangs, it scans the surroundings with the ultrasonic waves it emits and attacks approaching insects. It consumes the captured insects either in the air or on some perches, usually in places it visits frequently to eat.

It hunts even in winter, when the weather is mild. Its diet consists mainly of Coleoptera (scarabs and copepod beetles) and Lepidoptera (moths), while seasonally it also feeds on Diptera, Hymenoptera, as well as other smaller flying insects and spiders.

The Conservation Status of the species, 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 5,000 - 10,000 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 Greek Bats, nearly 2,300 individuals have been counted in 40 refuges (Georgiakakis and Papamichael 2020), but the actual number is undoubtedly higher.

Threats listed on the IUCN red list include fragmentation and isolation of habitats used by the species, change in the management regime of deciduous forests and agricultural areas, loss of food resources (insects) due to pesticide use, and disturbance and loss of underground habitats. In north-western Europe, habitat change is likely to be one of the main causes of the species' population decline. The conversion of woodland to large-scale agriculture is particularly damaging to the species. While declines in other areas, particularly in Eastern Europe, may not be as severe at present. However, the loss of traditional agricultural land cultivation practices as they move towards western-style economies may have significant impacts in the near future. Pesticide use has been a recognised threat to the species' food resources (insects), particularly when these have been directed against the larvae, which are the species' favourite food. Populations in caves and other underground habitats have been subject to increased disturbance (e.g. from tourist visits) by changes in the use of such sites. In buildings, colonies may be affected by human interventions such as renovation or the application of insecticides used to restore timber (Hutson et al. 2001). Predation by domestic cats (Ancillotto et al. 2019) and light pollution (Straka et al. 2020) also pose a significant threat to the species. Although populations are currently increasing in several areas of Europe, the fate of this species remains largely dependent on effective conservation measures to protect and properly manage feeding sites.

Rhinolophus hipposideros

The hippopotamus is the smallest representative of the genus Rhinolophus in Europe, with a wingspan of up to 25 cm and a weight ranging from 4 to 9 g. The dorsal fur of adults is brownish-grey or brownish-yellow, while the abdomen is white-grey. Juveniles are generally greyish in colour. The wing membrane and ears are brown. The wings are very broad, small and rounded, with which the whole is wrapped when it falls into daytime torpor or during the hibernation period.

The species according to both the Greek Red Book in Greece and the IUNC red list at European level is not classified as threatened (LC). The species is protected by Directive 92/43/EEC (Annex II and IV) and the Bern (Annex II) and Bonn (Annex II) Conventions. The species has a wide distribution range in the Western and Central Palaearctic. It occurs from sea level to 2,000 m altitude.

The global distribution of *Rhinolophus hipposideros* extends mainly to Central and Southern Europe (but is absent from the Netherlands and Scandinavia),NW Africa, West and Central Asia up to the Himalayas, and there are isolated records in East Africa. The species is rare in the northern part of its distribution range. In Europe it forms summer colonies of 10-50 individuals. In winter, up to 500 individuals are concentrated at roosting sites. Since the 1950s, the northern boundary of the species' distribution range has moved southwards. In the lower countries, northern Belgium and Germany, with the exception of a few colonies in the state of Bavaria, the species has disappeared (Fairon et al. 1982, Schofield 1999). The species has also disappeared from much of Poland, where 87% of the wintering population was lost between 1950 and 1990 (Urbanczyk 1994, Ohlendorf 1997). In Switzerland and Austria the distribution of the species was fragmented, as colonies remained only at altitudes above 400 m (Stutz and Haffner 1984, Spitzenberger 2002). In Spain some colonies disappeared due to the restoration of buildings, but there are no data on population trends. Populations in southern Europe are thought to be stable. Overall, Europe has seen a significant decline in the species' population over the last 50 years, with this decline continuing, but at a slower rate. In Turkey it is a frequently reported species and the population is stable.

The microrhinolophos is one of the most common bats in Greece, having been recorded throughout the mainland and on 18 islands of the Ionian and Aegean Seas and Crete. The regions with the fewest known locations are Attica (7) and Thessaly (12),

perhaps due to its small size (Attica) and/or limited research effort there. In contrast, in Crete it has been found in 117 sites. The largest (up to 200 individuals) known colonies are in the Prespes region (Papadatou et al. 2011) and in Rhodope. Very important colonies are also known in Gramos, Crete (where many colonies have also been identified), Kefalonia and Central Macedonia. As in many other species, colonies on smaller islands have smaller sizes. The highest abundance has been recorded in Western Macedonia (mainly around Prespes), Eastern Macedonia and Crete. These quantitative parameters (numbers of sites, numbers and sizes of colonies, etc.) have not been corrected for the extent of each region and reflect not only the suitability of habitats but also the intensity of the research effort.

It is found in areas with habitat mosaics, mainly in forests, tree plantations, small meadows, freshwater sites and rich riparian vegetation, even in residential areas (usually small villages). It forms maternity colonies usually at altitudes up to 1,200 m, while during the summer months it is found up to 2,000 m. In Greece it has been recorded up to 1,700 m in summer, while in winter it has been observed dormant up to 1,260 m, but may be found at higher altitudes. In autumn and winter it goes dormant in underground areas (caves, mines, etc.), but when the weather is favourable it comes out to feed. In summer it forms breeding colonies in abandoned or old buildings or parts of buildings with little human presence (usually houses, chapels, warehouses, etc.), and less so in underground shelters. It also uses a wide range of night crows. Its preference for buildings on the one hand provides it with an abundance of shelters even in areas that do not have enough caves or mines, but on the other hand makes it vulnerable to building management (renovation, demolition, etc.). It often forms colonies with other individuals of the genus Rhinolophus (mainly *Rhinolophus ferrumequinum*), but also with species of the genera Myotis and Plecotus. Mother colonies usually number 10 to 150 individuals, sometimes more. Its diet consists mainly of Diptera (family Tipulidae but also mosquitoes - genus Culicidae), Hymenoptera, Neuroptera and small moths. It feeds almost exclusively in flight. It hunts in a wide range of habitats including areas of tall herbaceous vegetation, areas of vegetation hedgerows, woodland habitats, ditches and riparian woodland. It has a very flexible flight and usually hunts close to vegetation (bushes or under trees). Feeding sites are located up to a few kilometres from its shelters. Its feeding grounds are located in close proximity to its shelters (often in the range of a few hundred metres), and it may visit up to seven different feeding sites during the night. These usually include trees and habitat mosaics close to its shelters,

such as agroforestry, small crops, orchards, deciduous and riparian forests, with the presence of freshwater concentrations being important for the species. For movement, individuals of the species typically use linear landscape features such as shrub/dendril systems, canals, forest edges, etc.

Mating takes place in autumn or winter within their shelters. Females give birth to a single young (usually starting in their second year of age), but not every year. The young are trained in flight by their mothers at three weeks of age and become independent 2-3 weeks later. The maximum recorded age is 21 years and 3 months (Simmons and Conway 2003). The species is epidemic, with summer and winter roosts spaced 5-10 km apart (the longest recorded travel distance is 153 km. Heymer 1964 in Hutterer et al. 2005).

The Conservation Status of the species, based on the 4th National Report under Article 17 of Directive 92/43/EEC for the period 2013-2018, was assessed as Favourable (FV) and the trend of the Conservation Status as Unknown (XX) (EEA 2019). The total population size was estimated to be approximately 3,600 - 5,000 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 Handicapped in Greece, nearly 2,500 individuals have been counted in 73 refuges (Georgiakakis and Papamichael 2020), but the actual number is clearly higher.

Threats listed in the IUCN red list are disturbance and loss of underground habitats, changes in the management regime of agricultural areas (loss of scattered trees and plant barriers due to intensification of agriculture) and fragmentation and isolation of the species' habitats. Further threats include, climate change, wind energy (wind turbines), decline in game populations of the species, light pollution. Despite a recent reverse population trend recorded over part of its distribution range (increasing population trend), it is still highly dependent on conservation measures.

Canis lupus

The largest of the 41 species of the family Canidae. Body length of the species ranges from 1-1,3 m in males and from 0,87-1,17 m in females. The weight of males ranges from 30-80 kg (average 55 kg) and females from 23-55 kg (average 45 kg). Its

colour varies from light grey to black, depending on the area and the environment in which it lives.

The species is protected by Directive 92/43/EC (Annexes II, IV and V) (Annex II: Greek populations only south of the 39thparallel; Annex IV: except Greek populations north of the 39thparallel; Annex V: Greek populations north of the 39thparallel) and the Bern Convention (Annex II). According to the Greek Red Data Book, in Greece the species is classified as VU, while according to the IUCN at European level it is listed as a species of reduced concern (LC). It is also protected by the CITES Convention (Appendices I and II).

It is distributed in the northern hemisphere from the Arctic to the 20th (20th) parallel, i.e. central Mexico, North Africa and South Asia. Due to human disturbance and changes in environmental conditions, habitat destruction and degradation, and killing by social groups (e.g. cattle ranchers), it is now found in small populations in Europe, Asia and North America. It is nowadays widespread in Asia, North America and North America. Isolated populations are found in Portugal, Spain, Italy and Scandinavia. Historically the species was found in most of Europe. In the mid-20thcentury, the range of the species' distribution decreased significantly to remnants in the northwestern Iberian Peninsula, central Italy, areas of the Baltic, the Carpathian Mountains and the mountainous regions of the Balkans. In the last 50 years, the distribution range of the species has greatly expanded with its presence recorded in all continental European countries, with the exception of Luxembourg. The European wolf subpopulation is currently a large metapopulation with several distinct subpopulations (Chapron et al. 2014). The Balkan subpopulation covers a vast area from Slovenia in the north to central Greece in the south and includes the entire Dinaric Mountains range through Croatia, Bosnia-Herzegovina, western Serbia, Montenegro, Macedonia, Albania and western and southern parts of Bulgaria.

Due to the diversity of climate, topography, vegetation, human settlement patterns, and historical evolution of the species, wolf populations in different parts of its original range vary dramatically in density Wolf densities typically range from about one individual per 12 sq. km. to less than one per 120 sq. km. (Mech and Boitani 2003). The total European wolf population can be viewed as a large metapopulation with many distinct subgroups, although dispersal could theoretically link almost all subgroups. After the 1960s and 1970s, the European wolf population generally increased in number and widened its distribution range. However, some European populations are still small

and not all have more than 1,000 individuals. The total number of wolves in the EU-28 is likely to be in the range of 13,000 - 14,000. Some of the subpopulations are contiguous with wolf populations living in non-EU countries. The number of wolves in geographical Europe (excluding Russia) is likely to be over 17,000. As for the Balkan population, this ranges from 3,750 to 4,000 individuals. There is a continuity of the Balkan underpopulation and suitable habitat for the species throughout the region. Although the Balkan subpopulation is estimated to number nearly 4,000 individuals, local densities may vary widely and the overall demographic trend is unknown. In Croatia and Slovenia, the underpopulation has recovered significantly after improved management in the 1990s. In Serbia and Bosnia and Herzegovina (Trbojević 2016) it is likely that underpopulation has declined in recent years. In the east, the Balkan subpopulation comes into contact with the Carpathian subpopulation, which extends as far as northern Bulgaria and eastern Serbia (Iliopoulos 1999; Kusak et al. 2005; Štrbenac et al. 2005; Jeremic et al. 2014, 2016; Trbojević 2016). Regarding Greece, the latest population estimates made in the country for the species (concerning counts made in 2014, and updated with additional data in 2016, in the framework of the implementation of the horizontal monitoring programme for species of interest included in Directive 92/43/EC, using data from the application of different primary data collection methodologies according to Iliopoulos 2018), put the population at 1020 individuals (189 packs), without counting the number of lone wolves p This number appears to have increased compared to previous years (population counts in 1998-1999) by 31 % to 40 %, while its range increased by 6,000 square kilometres (Iliopoulos 2018). The species moves within very large territories (average territory area in Greece 338 square kilometres), and in a wide range of habitats, preferring mainly forested areas with developed livestock and high density of pens.

According to the Greek Red Data Book 2009, there are estimated to be about 600 wolf individuals in Greece (minimum population size of 600 individuals in the spring season). The area of the species' distribution exceeds 40,000 sq. km (Iliopoulos 1999a, 1999b). With the exclusion of the wolf from the list of huntable species in the early 1990s and the ban on the use of poison baits in the 1980s, the wolf population started to gradually recover in areas of its distribution in Greece. Their high reproductive potential and the particular ability of wolves to colonize new areas through dispersal (Boitani 2000, 2003), resulted in their rapid re-emergence in areas where the species had disappeared or declined dramatically in recent decades (Hatzirvassanis

1991), particularly in Central Greece and eastern Epirus (Iliopoulos 2000, 2003, 2005b). At the same time, a decrease in the number of wolves is observed in some areas of the species' distribution (North Pindos), probably due to the reduction of free grazing herds, which still constitute the main food of the species in Greece (Iliopoulos 2005a, 2008).

Wolves live in different habitat types and their wide range of distribution indicates the species' adaptability to the most extreme (both in terms of natural and anthropogenic factors) conditions. The wolf's habitat has been described in simple terms as 'wherever there is no human disturbance and wherever food is available'. Where wolves depend on wild ungulate prey, their habitat is that of their prey. Therefore, the habitat quality of the species should be interpreted in terms of human disturbance, density of prey and size of the area. In general, large forest areas are particularly suitable for the species in Europe, although it is not exclusively a forest species. In general, it occupies a wide variety of habitats, from the arctic tundra to the northern limits of forests, grasslands and extensive forests in mountainous areas. It prefers mountainous areas with relatively high forest cover and a good deal of livestock. The wolf's habitat is essentially that of its food (Boitani 2000, 2003). Although it has developed particular adaptations for carnivory, it is an omnivorous species and feeds opportunistically on whatever is available in its habitat. When forming herds it preys on medium and large mammals (moose, deer, elk, deer, wild boar and cattle), while when alone it feeds on small mammals (beavers, rabbits, etc.), as well as birds, invertebrates and carcasses. Wolves in Greece feed mainly on free grazing livestock, carcasses of animals from stables and other smaller mammals (Papageorgiou et al. 1994, Iliopoulos 1999d, Migli et al. 2005, Iliopoulos et al. 2009). In a few areas with a sufficient density of wild ungulates (wild boar, roe deer), it has been observed that they occasionally feed on these species as well (Migli et al. 2005). It is found in lowland, semi-mountainous and mountainous zones and where food availability is high and continuous on an annual basis (Iliopoulos 2000). The diet composition of the species throughout its geographic range depends on the relative abundance of potential prey, as well as on accessibility and availability. During periods of food scarcity it also feeds on garbage remains. During periods of food shortage, it attacks livestock, causing damage to livestock. As a predator, it is very important in controlling and regulating its prey populations, preventing ecological damage from overgrazing, phloem feeding, etc.

It is a monogamous species. It breeds once a year and only the dominant pair in the pack, from January to March. The estrus in the female lasts 5-10 days, when she mates. Gestation lasts 60-63 days. She gives birth to 5-14 cubs (usually 5-7), blind, which open their eyes after 10-15 days. At 20-25 days of age the young can stand on their feet and walk, and are weaned at about 8 weeks of age. The species lives for about 13 years.

It is a nocturnal species, but is sometimes active during the day. It lives in family groups consisting of 5 - 9 individuals. The leader of the group is the dominant male, followed by the first female. During the winter, more family groups join together to form packs. Older individuals live alone or form small same-sex groups. When moving, it travels long distances (up to 200 km per day), usually in winter and during the night, while in summer it remains in a more restricted area. It can reach speeds of 55-70 km/h. The endemic area of a herd occupies an area of 130 to 13,000 km2 and is marked to prevent invasion by other individuals of the species. In Croatia, the average size of the endemic area is 150.5 km2 , and a herd covers 50% of its activities in an area of 3.3 - 26.3 km2 (Kusak et al. 2005). The average size of the endemic area is smaller in spring and summer (34-47 km2) than in autumn and winter (45-86 km2) (Findo and Chovancova 2004). The population density ranges from 50-60 km2 per person, while in Italy it reaches 80 km2 per person (Macdonald and Barrett 1993).

The threats listed in the Greek Red Data Book (Legakis and Maragou 2009) are the following: Anthropogenic mortality, reduction in food availability throughout the species' distribution range due to the decline in extensive livestock production combined with relatively low densities of wild ungulates (Sfugaris and Giannakopoulos 1999) and habitat fragmentation due to the construction of major roads and other transport infrastructure.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are as follows: Increasing the availability of the natural prey of the wolf (wild ungulates) both in number of species and in numbers (densities) (Iliopoulos et al. 2009), measures to reduce its geographical isolation due to road construction (Iliopoulos 2005a, 2008, Iliopoulos et al. 2006), conservation and intensification of traditional methods of guarding the herds (Iliopoulos 1999c, Iliopoulos et al. 2009).

The threats listed on the IUCN red list are mainly human disturbance which is the biggest limiting factor in Europe today, due to fear, misunderstanding and the fact that the species attacks livestock, causing damage to livestock, have caused an

uncomfortable relationship between the species and humans in many areas, leading to direct conflicts and retaliation and preventive persecution. In some countries, poorly regulated wolf hunting poses a threat, while in others wolf killing permits are issued regardless of biological understanding. Poaching is widespread and probably represents the most important mortality factor for wolves in many parts of Europe. Wolf depredation on domestic livestock has been a problem for centuries, and although the number of sheep or cattle taken as a percentage is very low, the species' attack on domestic livestock and livestock remains the primary reason for wolf persecution. Wolves have also become a symbol of wider issues of social change facing rural life, so that the politics of managing the species has become highly controversial and intertwined with many other issues. It also appears that agencies and institutions in many countries are ill-equipped to deal with the biological and socio-political challenges of wolf management. Human land use is the most significant threat to wolf habitat. Wolves can live close to people, but they need safe areas. This is not always taken into account in land use planning in wolf areas and small, fragmented subpopulations in western Europe can result in animals moving into unsuitable habitats. Although wolves show a good ability to cross linear infrastructure such as motorways and railways, these structures can be associated with wolf mortality and there is a need to ensure wildlife permeability in all infrastructure projects. Wolf-dog hybridization has been increasingly reported in most European countries, but seems to be a major issue only in Italy and other Mediterranean countries due to poor dog management practices. Legislation and public attitudes towards dog management and control policies prevent the implementation of a coordinated effort to manage the occurrence and spread of hybridization (Ciucci 2012).

The specific threats to the European Balkan subpopulation according to the same source are: Poorly regulated legal hunting and illegal killing (often using poisoned bait) kill unknown numbers of wolves across the wider distribution of the Balkan subpopulation. Other pressures commonly reported include habitat fragmentation due to construction of fenced highways and lack of wild game. In many countries, there is very limited knowledge about the ecology or status of the wolf (Huber et al. 2002; Iliopoulos 2005; Trbojević 2016).

Ursus arctos

The species is a priority species under Directive 92/43/EEC (Annex II). It is a species whose conservation requires the designation of Special Conservation Zones and indeed as a priority species.

The species is protected by Directive 92/43/EEC (Annex II, priority species and Annex IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece the species is classified as a threatened species (EN), while according to the IUCN at European level it is listed as a species of reduced concern (LC) (IUCN red list), and is also protected by the International Convention CITES (Annex I and II).

Brown bears in parts of north-eastern Europe (Baltic Sea) are linked to the large population in northern Eurasia (about 100,000) which is spread throughout Russia. The other populations of the species in Europe are smaller and isolated. These populations except for two (Central Apennine - Abruzzi and Cantabrian) are distributed in two or more countries. Management at the population level across national borders is generally accepted. However, the implementation of this idea is far from satisfactory, especially in countries that do not implement their own national plans. Agreements between countries include various degrees of coordinated management (France with Spain, Greece with Bulgaria, Greece with Bulgaria, Slovenia with Croatia, Sweden with Norway), exchange of information (Sweden and Norway, Croatia, Slovenia Italy and Austria) or more commonly, working groups have been established between scientists. However, in no case is there a formal population-level management plan as described in Linnell et al. 2008.

Bears in Bulgaria are under a protection status that allows for the removal of problem individuals. The Greek portion is strictly protected, as are the few specimens in Serbia.

Regarding the subpopulation of the species in the forest areas stretching from the Dinaric Mountains in Slovenia in the north to the Pindos mountain range in Greece in the south, it is estimated at about 3,940 individuals and is divided among nine countries (Slovenia 564, Croatia 937, Bosnia and Herzegovina 1,000, Montenegro 378, FYROM 375, Albania 190, Serbia 120 and Greece 450-500). The forest areas in these countries are not contiguous than in the Carpathian region, dividing to some extent the functional habitat into more or less isolated sub-regions. The northern part of the distribution of this population is close to the Alpine population. However, there is no

continuous distribution of female bears within the Alps. Historical links with the Carpathian population through Serbia and with the Eastern Balkans through the FYROM have been fragmented. In Slovenia, human-bear conflicts make it challenging for the population to spread into the Alps. With Croatia's accession to the EU, the status of bears changed from "game species" to "fully protected". There is a general lack of information from Bosnia and Herzegovina, Montenegro, Albania, and Macedonia. There is no monitoring and no management plan in these countries. There appears to be limited or no connectivity between segments of this population in Montenegro, Albania, and FYROM, dividing the population into potential subpopulations, some of which continue to decline (Huber 2018).

This subpopulation, which as mentioned above extends from Slovenia in the north to Greece in the south, appears to be genetically very close to the bears remaining in the Alps. The overall subpopulation has been stable in recent years. However, trends vary in different regions. In Slovenia there has been steady growth and remains stable in Croatia. After a notable decline in Bosnia and Herzegovina in the 1990s due to the war, the underpopulation segment there may be recovering. In the Pindus region the trend of the subpopulation is characterised as increasing (450-500). The estimate of the population size of 3 940 is based on weak evidence. About half (1 800) of these individuals are mature. The data on population trend is also based on little quantitative data and it is likely that the trend is stable rather than increasing. In countries where brown bear hunting is permitted, there may be a tendency to overestimate to justify higher quotas. There is, as mentioned above, no consistent distribution of female bears in the Alps, but there is a consistent presence of male bears.

As for the Balkan subpopulation, located in southwestern Bulgaria and northeastern Greece, it includes populations of the species found in the Rila and Pirin mountains of Bulgaria and in the western Rhodope Mountains on both sides of the national border. Of the total population of about 520 bears, about 42 are found in Greece. The link between bears in Greece and Bulgaria is likely to consist of dispersal of males from Bulgaria, as well as family groups that disperse seasonally from Greece to Bulgaria. The Greek part of the Eastern Balkan subpopulation is close to the Pindos subpopulation and only recently the first evidence of a possible link between these two populations has been demonstrated. In the Eastern Balkans the main challenge is to maintain the links between the segments of this population. Bulgaria has developed a new bear management plan and conflicts seem to have decreased. In Greece, habitat

fragmentation, mainly due to highways, remains a conservation problem (Huber, D. 2018).

The range of the brown bear in Greece, according to the Greek Red Book (Legakis and Maragou 2009), covers a total area of 13,500 km and, as mentioned above, consists of two main geographically isolated population cores, the first covering the wider Rhodope Mountains and the second the wider Pindos Mountains, which is the southernmost edge of the species' range in Europe (Mertzanis 1990, 1991, 1994; Mertzanis et al. 1994, Mertzanis and Bousbouras 1996). Internally, these population nuclei show further trends of disjuncture, due to degradation of forest areas that act 388 as linking zones, forming 4 smaller sub-populations, while recolonization of new areas by the species (Olympus, Pieria, Antihasia, southern Pindos) has formed at least two meta-populations (in the mountain arc of Vora and southern Pindos) (Iliopoulos 2005b, Merztanis et al. 2005). The minimum total population is estimated at 190-260 individuals and, despite annual losses (due to poaching) of 5.6%, it appears to be stable, with upward trends on a local scale.

At the Balkan level (except Romania), 8.2% of the brown bear population is found in Greece. At the European level, 0.9% of the brown bear population is found in Greece (Legakis and Maragou 2009).

The brown bear is one of the largest terrestrial carnivores. Its length is 1 - 2.8 m. It weighs between 80 and 600 kg, depending on the area in which it lives, and the male is 8 - 10 % larger than the female.

Pure and mixed deciduous and coniferous forests in the upland and semi-mountainous zones are the brown bear's main habitat (mainly mixed forests of *Pinus nigra* and *Quercus sp.).* The agro-forestry formations of the semi-mountainous zone, with their high mosaic (gaps) and rocky outcrops, also play an important role in terms of food availability as suitable wintering areas. The use of the sub-alpine zone mainly involves movements to neighbouring areas with suitable habitat or wintering areas. The diet of bears consists of ~85% plant-based foods and ~15% animal-based foods (Mertzanis 1991, 1992; Mertzanis and Bousmpouras 1996; Kritsepi and Mertzanis 1998). The reproductive interval is estimated at 2 years and each litter ranges from 1-3 cubs and rarely four cubs. The spatial range of males averages ~250 km2 , with a maximum of 500 km2 , while the spatial range of females with young averages 25 km2 (Mertzanis 2009). Overlapping spatial territories of males and females are common, while females with young systematically avoid large males (Mertzanis and Vogiatzis

1997; Mertzanis et al. 2005). Foraging and movement activity is predominantly nocturnal. Marking tree trunks (mainly coniferous trees) and utility and telephone poles at focal points of the territory is a dominant trait of males during the breeding season (May-July) (Karamanlidis et al. 2004a, Karamanlidis et al. 2004b). Recent studies (Giannakopoulos et al. 2007) have shown sensitivity of bears to anthropogenic noise above 47 dB.

The species is polygamous and during the estrus period (10 - 30 days) the female may mate successively with several males. It breeds every 2 to 4 years and mates from May to July. The fertilised egg, which is implanted in the uterine wall, develops after a delay of about 5-7 months, usually in November, when the female enters hibernation. Overall, pregnancy lasts 210-255 days, but the actual development of the embryo takes 6-8 weeks. The female gives birth in mid-winter (January - February), 1-3 blind to naked pups, which weigh 340 - 680 g, and in 3 months their weight reaches 15 kg. Breastfeeding lasts for 18-30 months. They become independent after three years and mature sexually at the age of 4-6 years.

Threats according to the Greek Red Data Book are poaching, the use of poisoned baits (Antoniou et al. 1998) and habitat destruction/degradation by large infrastructure projects (motorways e.g. Egnatia Odos) and forest fires.

According to the NRC. (Legakis and Maragou 2009) the conservation measures required are: a) intensification of information to producers to reduce incentives for deliberate eradication, b) strict environmental control of infrastructure projects affecting the habitat (Mertzanis 2005), c) immediate change in the specifications of forest management plans: Abolition of clear-cutting logging and adoption of the "multi-purpose forest" model, compatible with maintaining the quality and extent of bear habitat (Mertzanis 2001, 2002, 2003); d) stricter surveillance/preservation of allocation areas, to combat poaching and forest fires; e) immediate activation of the 4th programming period (2007-2013) of agri-environmental measures, to provide relief to producers by subsidising preventive measures against the damage caused by bears to production (Bousbouras et al. 2006) g) immediate updating and activation by the competent state agencies of the General Action Plan for the Protection and Management of Bear Populations and Habitats in Greece; h) creation of special "bear emergency teams" with appropriately trained personnel from the forestry and other services (e.g. rural police).

The threats listed in the IUCN red list are mortality from human disturbance as the species has a low reproductive rate. The species requires large habitats and is vulnerable to any land use change. In Eastern Europe, land use developments tend to follow western examples with more intensive use of productive areas. The bear's ideal habitat has disappeared in Europe through logging and deforestation. The planting of non-native conifer species has seriously altered local ecosystems in some places. Habitat fragmentation, particularly as a result of road building, is a major problem for a species that requires such large areas. Mortality caused by high-speed road and rail networks within the species' habitats is a major threat in some areas, including Greece and Croatia. Poaching remains a threat to many, but not all populations, and occurs regardless of population size. Poaching has probably worsened in the 1990s in countries such as Albania, Bulgaria, Bosnia and Herzegovina, Serbia, Montenegro, Bosnia and Herzegovina and FYROM as a result of their declining economic and social situation, but appears to be less so in the last decade. Poaching in Russia is a particular problem. Five very small, isolated bear populations in southern and western Europe (located in France, Spain and Italy) are highly threatened due to their small populations. They could easily become extinct as a result of random fluctuations.

Rupicapra rupicapra balcanica

The wildebeest is native to the mountainous parts of central and southern Europe and Asia Minor, where it occurs as seven subspecies: balcanica, carpatica, cartusiana, rupicapra, tatrica, asiatica and caucasica (Shackleton 1997; Pedrotti and Lovari 1999). It has been introduced into Argentina and New Zealand. The subspecies balcanica inhabits most of the mountainous areas of Albania, as well as the four main mountain ranges of Bulgaria. The total population of the subspecies *Rupicapra rupicapra balcanica* is a few thousand individuals. Numbers are believed to be decreasing in all subpopulations (Shackleton 1997). In Greece it constitutes 30 populations, which occur in the Pindus mountain range, the mountains of Central Greece, Mount Olympus, Rhodope and some mountains of the north-western border. Its total population size at national level is between 1 330 and 1 765 individuals.

The subspecies *Rupicapra rupicapra balcanica* is protected by Directive 92/43/EC (Annex II and IV) and the Bern Convention (Annex III). According to the IUCN at European level the species is not classified as threatened and is classified as

Least Concern (LC), while according to the Greek Red Data Book in Greece it is classified as Near Threatened (NT).

It lives in mountain pastures in the alpine and subalpine zone, using a variety of habitats other than alpine pastures, such as open rocky areas, mixed broadleaf forests and coniferous forests (Pedrotti and Lovari 1999). In winter it prefers forested steep areas where there is no snow (Nowak 1999).

It is a polygynous species. Males remain solitary except during the breeding season. It breeds once a year. It mates from late October to December. After a gestation period of about 170 days, it usually gives birth in May-June to a young weighing 2-3 kg, although twins are sometimes observed. Breastfeeding lasts for about 2-3 months. If the female is killed, other females in the flock take over the care of the young. Sexual maturity occurs at 2.5 years in females and 3.5 to 4 years in males. She lives 14-22 years (Huffman 1999).

It is a diurnal species. Some females with their young form small family groups (social species), while the male is solitary. In case of danger, it makes a sharp sound. It can jump 2 m in height and 6 m in length and run at a speed of 50 km/h.

The grouse is considered to be an "intermediate" consumer in mountain ecosystems, able to adapt its dietary habits to concentrated or fibrous food resources, depending on circumstances (Hofmann 1989). Thus, the grouse diet includes either herbaceous vegetation or woody plant parts, depending on their availability at different times of the year (Garcia-Gonzalez and Cuatras 1996; Ramanzin 2001). Wild geese feed on plants on the ground surface or parts of plants that can reach, e.g. up to 130 cm above the ground surface. In the winter period, taking advantage of snow cover, they may also access parts of plants at a higher level. They generally feed on herbaceous plants, mainly grasses and legumes, although in winter they are 'forced' to modify their diet by feeding on parts of woody species (Couturier 1938; Catusee et al. 1996; Schnidrig-Petrig and Salm 1998). Thus, during the winter, grouse consume grasses and shrubs while they are available. As long as the snowpack on the ground is not frozen and is of low height, grouse have access to this type of food by digging with their forelegs. In this way, they feed more or less on possums, as well as on other plant species such as *Vaccinium spp., Juniperus spp., Arctostaphylus spp., Thymus spp.* from which they consume a few centimetres of their branches (Catusee et al. 1996, Schnidrig-Petrig and Salm 1998). As the snow gets longer, grouse are no longer able to perceive what lies beneath the snow cover and so simply move to specific areas that are not

covered by snow. Only when the snow is so heavy that the grouse cannot find and consume grass, are they "forced" to feed on whatever parts of trees and shrubs are available. They then consume new shoots, twigs, leaves, or even the bark of deciduous and coniferous trees, as well as lichens and moss that are on tree trunks or have been blown down by the wind (Couturier 1938; Catusee et al. 1996; Schnidrig-Petrig and Salm 1998). In spring, grouse gradually feed on new shoots as they emerge from the ground. Typically, these are leaves from plant species that maintain underground reserves, such as *asphodeline* (*Asphodeline spp.*), iris (Iris *spp.*), *gentian* (*Gentiana spp.*), daffodils (*Narcisus spp.*), but also lucerne (*Luzula sp.*) and avens (*Avena sp.*), which grouse soon leave to switch to fresh grass. The young shoots and tender leaves of various shrubs, such as sorbia (*Sorbus aucuparia, Sorbus torminalis*), various species of the Fabaceae family (*Laburnum spp., Cytisus spp., Calicotome spp.*), leptocarpus (*Corylus avellana*), blueberries (*Vaccinium spp.*), etc, supplement the diet of the grouse in early spring (Catusse et al. 1996, Schnidrig-Petrig and Salm 1998). Grasses are the main food source for grouse on an annual basis and in high proportions compared to other plant classes, ranging from 30% to as much as 75%. (Hegg 1961; Schröder 1977; Baumann 2004; Trutman 2009). The diet of the grouse is very rich and includes about 300 species of herbaceous plants (Tosi and Perco 1982). Some typical grasses found to be consumed by grouse include *Sesleria caerulea,* several species of *Festuca spp., Anthoxanthum odoratum, Dactylis glomerata, Phleum alpinum, Poa alpine*, etc. (Garcia-Gonzalez and Cuartas 1996, Baumann 2004, Trutman 2009).

It is hunted for its meat, fur and skin, and increases tourism through hunting in many European countries (Gortazar 2000). In Greece, hunting is prohibited.

Threats listed on the IUCN red list are poaching and excessive hunting in parts of its distribution range, especially when it occurs outside protected areas and private hunting reserves (Shackleton 1997, Jurdíková 2000). Many of the less numerous subspecies (*e.g., R. r. balcanica, R. r. cartusiana, and R. r. tatrica*) are threatened by the deliberate introduction of subspecies from other geographic areas (*especially R. r. rupicapra*), leading to hybridization and genetic quagmire (Shackleton 1997). Human disturbance, particularly as a result of increased tourism and recreational activities in mountainous areas, may also be a problem (Shackleton 1997; Jurdíková 2000). Competition with domestic livestock and introduced species is a threat to the more vulnerable subspecies, although it is not considered a significant problem for *R. r. rupicapra*. The subspecies *R. rupicapra rupicapra*, however, suffers periodic outbreaks

of mange, causing a decline in the local population (Shackleton 1997). In 2006 a new disease was recorded for the first time in this subspecies. In general, habitat loss is not a significant threat to the species, as much of its range is within protected areas. However, habitat loss may be a problem in some areas (e.g. for subspecies *balcanica* in Albania) (Shackleton 1997). Because its population is indeed very small, subspecies *cartusiana* is prone to extinction (Shackleton 1997).

Zamenis situla

This species is found in southern Italy (only in the Apulia Apulia region of Puglia, adjacent to the Basilicata region and Sicily) and Malta, and its distribution range also extends from southern Croatia (including the Adriatic islands), to southern Bosnia and Herzegovina, southern Montenegro, Albania (coastal zone), the Mediterranean and the sub-Mediterranean parts of Skopje, southern Bulgaria and most of mainland Greece (including some Ionian and Aegean islands). It is also found in Turkey and the Crimean peninsula in Ukraine. It has also been recorded in Cyprus, but this record requires verification. This species is found from sea level up to 1,600 m altitude. It is generally common. In Italy it is usually rare, but locally it may be a common species. In Turkey, it is generally a common species.

The species is protected by Directive 92/43/EC (Annex II and IV) and the Bern Convention (Annex II). According to IUCN at European level the species is not classified as a threatened species (LC).

Non-venomous snake up to 120 cm long (usually shorter). It may be striated or spotted. Diurnal snake that avoids high temperatures. It is often found in scrubland and long vegetation, on field boundaries, in marshes, on the edges of brooks, in vineyards, in olive groves. It moves cautiously between stones and vegetation and often climbs bushes and rocks. It is often seen in settlements and human environments (farm gardens and buildings in rural villages). It feeds mainly on rodents but may also feed on lizards and small birds. It mates in late spring and females lay only 2-8 eggs year after year. It will probably bite if caught. Harmless snake.

The name Spitofid is said to have originated in the Cyclades, when in some areas people deliberately brought it into their storage areas to control mice. In many areas it is mistakenly believed to be a poisonous snake and is killed and threatened by illegal collection.

According to the IUCN red list the threats listed are the pet trade, which is a significant threat in some areas. It is threatened in some areas of its distribution range (e.g. Albania) by habitat loss due to agricultural intensification.

Emys orbicularis

The species has a wide, but in recent years fragmented distribution in Europe (especially in the Mediterranean region). It is found in north-western Africa, southern Europe and western Asia.

Populations towards the northern ends of the species' distribution range tend to be very small, while populations in the Mediterranean and Caucasus regions tend to be more abundant. The French population (Servan 1995), the Spanish and at least the western Turkish population is thought to have been in decline (Atatur 1995).

The species is protected by Directive 92/43/EEC (Annex II and IV) and the Bern Convention (Annex II). According to the Greek Red List in Greece and the IUCN at European level the species is classified as threatened (NT). It is also protected by the International CITES Convention (Annex III). The population of the species according to the IUCN red list is in significant decline.

In Greece, the species is distributed in mainland Greece, the Peloponnese and several large islands (Evia, Samos, Kos, Mytilene and the Ionian Islands). It is not found above 1,000 m altitude (Dimitropoulos and Ioannidis 2002).

The species has diverse habitat use in its wide range of distribution. It lives mainly in stagnant waters or low-flowing rivers, in artificial lakes with rich vegetation, as well as in marshes, canals and ponds. It is a carnivorous species and feeds on invertebrates, small fish, amphibians and carcasses, hunting in water and on land. The female lays 4-10 eggs in holes in loose soil on the banks of lakes and rivers (Capula 1990). These hatch after 2-3 months. It is mainly active in the morning hours (Taylor 1998). It remains for long periods of the day on rocks or out of water, where it basks, and when in distress it immediately dives into the water

Threats listed on the IUCN red list are the loss of habitat for the species (urbanization, road construction, wetland drainage), the effects of which have been considered critical to the decline of the species' populations (Atatur 1995, Servan 1995). The species is also very sensitive to water pollution, which has been considered a major factor in the species' extinction from areas (Atatur 1995, Servan 1995, Mascort 1996). The species has been considered to be at particularly high risk from competition for

food, spawning sites from the non-native species *Trachemys scripta* (Kramer 1995, Servan 1995). Harvesting for food and pet trade has been a historical influence and continues at some sites, but is not a significant threat to the species overall. Over-exploitation of water sources reduces available habitat for the species and increases salinization.

Testudo hermanni

The species is protected by Directive 92/43/EEC (Annex I and IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is classified as VU. It is also protected by the CITES International Convention (Annex II).

The species occurs mainly in southeastern Mediterranean Europe, from coastal northeastern Spain to southeastern France, Mallorca and Menorca (Spain), Corsica (France), Sardinia and Sicily, coastal areas of Italy, coastal areas of Croatia, Montenegro and central and southern Serbia. It also occurs in the hinterland of south-western Romania, much of Bulgaria, in the FYROM and almost all of Albania. In Greece it occurs almost throughout the mainland, as well as on the Ionian Islands, but is rare in the extremely dry thermo-Mediterranean zone of the southern and eastern Peloponnese (where it is replaced by *Testudo marginata*) and is absent from mountainous areas (in Macedonia it is absent from altitudes above 1,400 m), from the Aegean islands. Despite its wide distribution, the species is currently in serious trouble, with almost all of its populations showing strong and continuing trends of decline.

Population densities can reach up to 60 individuals per hectare in exceptional cases, with 1-5 individuals per hectare being a more common density (Stubbs 1989b).

The species inhabits a wide range of typical Mediterranean ecosystems, with the exception of areas with very low (semi-arid areas) or very high (dense pine forests) vegetation cover. It prefers open evergreen forest with Mediterranean oaks, but when this habitat is not available it also occurs in longleaf vegetation, garrigue, sand dune scrub, coastal meadows, and agricultural areas. It is also found in wetlands, grasslands and agricultural land (Wright et al. 1988, Capper 1998). During the breeding season the male becomes particularly aggressive. Females lay 3-5 eggs. Both leaves mature at 9 to 12 years of age, but males mature younger (Stubbs 1989b). It is primarily a herbivorous species. Its diet consists of mostly plants, but it also feeds on small invertebrates, carcasses and feces of other animals. It is active in the early morning and late afternoon

and remains in shade under shrubs and in dense undergrowth during the warmer hours of the day (Wright et al. 1988). It enters hibernation from October to March (Stubbs and Swingland 1985). It moves within a radius of up to 500 m and rarely leaves the boundaries of the endemic area, which is approximately 0.8 ha (Stubbs and Swingland 1985).

According to the Greek Red Data Book (Legakis and Maragou) the species is currently facing a multitude of problems (Hailey and Willemsen 2003) which include:

- Crop intensification, use of herbicides and insecticides (Willemsen and Hailey 2001), and use of heavy farm machinery (Hailey 2000).
- Land consolidation and general residential (or tourist) development outside traditional settlement nuclei.
- Opening of new roads, fragmentation of natural populations, increased vehicle traffic (Hailey and Goutner 1991).
- Fires (Hailey 2000).

In addition, the Mediterranean turtle was, and to a lesser extent still is, a target for collection as a pet. Current legislation and captive breeding have now generally restricted the international trade in the species, but it continues on a smaller, smuggled scale. Collecting also continues to a more limited extent by Greek individuals, who transport individual animals from the countryside to urban areas. The species is also consumed by some ethnic minorities, a practice that may seriously affect local populations, although the extent of this is not precisely known.

According to the NRC (Legakis and Maragou 2009), the conservation measures required are as follows: Protection of existing populations. Rational use of insecticides, and use of mild or traditional farming methods. Control excessive tourist development and building outside traditional settlement cores, and control illegal land encroachment. As Greece is home to the largest population of Mediterranean turtles in the world, protection measures in Greece are particularly important for the overall survival of the species.

The threats listed on the IUCN red list are habitat loss due to expansion and intensification of agriculture. Also, urbanization and development of tourism infrastructure, fires, and collection for trade of domestic animals are threats to the species. In addition, genetic hybridization and the potential effects of microbes and disease of released turtles (Stubbs 1989b, Willemsen 1995), road mortality from accidents on roads by passing vehicles, and the use of pesticides in agriculture have a

negative impact on the species' populations. Finally, in Serbia the shell is used in traditional medicine.

Buteo rufinus

The species is endemic in Greece, with local migratory populations (mainly in northern Greece). The European population of the species is estimated at 13,800 - 22,900 pairs (27,600 - 45,800 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 1,100 - 2,100 pairs (2,300 - 4,200 mature individuals) and is increasing. The Greek population is estimated to number 200-300 pairs, corresponding to 1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book, in Greece the species is classified as Vulnerable (VU), while according to the IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by BirdLife International (BirdLife International 2017), while it is also protected by the CITES International Convention (Appendix II).

The species mainly lives in open dry scrubby areas with topsoil, sparse long vegetation, grasslands, extensive crops, near suitable nesting sites in cliffs, gorges and mountains up to 1,600 m altitude. The species builds its nests mainly on cliffs but sometimes uses trees in rural areas (Hagemeijer and Blair 1997) and power poles (Tucker and Heath 1994). Nests can be reused and the species may also use old nests of other birds. It usually lays 2-4 eggs (Billerman et. al. 2020). Foraging habitat includes steppe, semi-arid areas with fringing vegetation. It feeds preferentially on small mammals, but its diet is supplemented with lizards, snakes, small birds, and large insects (Tucker and Heath 1994). In Greece, the eagle gecko is an epidemic and partially migratory species. It has a wide distribution, but is found locally mainly in the eastern part of Greece (Thrace, An. Macedonia, Thessaly, etc.) and is scarcer in western Greece and the Peloponnese. It also nests on many Aegean islands, even small ones, but its (possible) nesting in Crete has not yet been proven. A part of the population especially the birds nesting in Northern Greece, migrate from our country. Those birds that migrate from northern Europe move to North Africa and southern Asia leaving their breeding grounds in August and September and returning in March and April

(Billerman et al. 2020). They are generally observed singly, in pairs or in small family groups, but during migration when they can they form larger flocks (Ferguson-Lees and Christie 2001).

According to the recorded threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Intensification of perennial crops (vineyards, orchards, olive groves, etc.)
- Residential development (urban or extra-urban, legal or arbitrary)
- Tourism - recreational infrastructure (ski resorts, golf courses, golf courses, golf courses, campsites)
- Transmission lines (electricity, telephone), oil and gas pipelines
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Noxious recreational activities
- Abandonment of traditional agricultural practices and land use including abandonment of extensive farming and livestock farming
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

The threats listed on the IUCN red list are the destruction of its habitats through agricultural intensification resulting in a reduction of the prey that is part of its prey. The species is also very vulnerable to the effects of potential wind energy development (Strix 2012). Finally, death by collision with power lines is another threat to the species.

The proposed conservation actions, according to the IUCN, are as follows:

- Environmental impact assessment for new wind farm developments
- Power interconnection lines to be more visible for new wind farm developments
- Ensure the conservation of the species' habitat, as well as the species' prey populations.

Aquila chrysaetos

Until the 1960s, the golden eagle had a wide distribution in almost all the mountains of mainland Greece and on several islands. Its current distribution is limited to some mountainous and semi-mountainous areas of Thrace and Macedonia, the Pindos mountain range up to the Sterea, and nowadays only a few places in the

Peloponnese and Evia. On the islands it is found in Crete and possibly in the Cyclades (Syros) (Handrinos and Akriotis 1997). Its population in the 1980s was in the range of 150-200 pairs. (Handrinos 1987a) with a decreasing trend, since in 1990 it was estimated at 140-180 pairs (Tucker and Heath 1994), while today it is estimated at 100-150 pairs. (BirdLife International 2004), of which 60 individuals or 16- 22 pairs. exist in Crete (Xirouchakis 2001). The Cretan population is reported to belong to the subspecies A. c. homeyeri, although its exact taxonomic classification needs investigation (Handrinos 1987a).

According to the IUCN red list, the European population of the species is estimated to number 9,600 - 12,800 pairs (19,200 - 25,600 mature individuals), while in the EU28, the population is estimated at 5,200 - 6,300 pairs (10,400 - 12,500 mature individuals). The Greek population is estimated at 100-160 pairs (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as endangered (EN), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). Also, it is not classified as a species of European interest in terms of protection by BirdLife International, while it is also protected by the CITES International Convention (Appendix II).

The proportion of the species' population found in Greece corresponds to about 1% of the European population.

The species is found in mountainous areas with rocky outcrops, where it nests (Handrinos and Akriotis 1997). It prefers open areas with low vegetation and avoids forests, although it may also live in wooded areas, using gaps for foraging (Adamakopoulos et al. 1995). It is mainly found in mountainous and semi-mountainous areas, while in summer it is often observed in the alpine zone (Xirouchakis 2001). It mainly nests on rocks (800-2,000 m) (Handrinos 1987a), but also, e.g. in the forest of Dadia, on trees (Hallmann 1989). Its diet consists mainly of birds and small and medium-sized mammals, reptiles and carrion, especially in winter (Vaglianos 1981; Handrinos 1987a; Hallmann 1989; Handrinos and Akriotis 1997). In mainland Greece, especially in Macedonia and Thrace, golden eagles very often feed on turtles, which they throw from high up on rocks to break their shells (Handrinos and Akriotis 1997), while in Crete newborn lambs are sometimes part of their diet (Xirouchakis 2001). It

lays 1-2 eggs in early March, which it incubates for 45-47 days. The chicks fledge after about two months. The territory of a pair occupies about 80-100 km2 (Hallmann 1980, Xirouchakis 2001). In Crete, the reproductive success of the species was estimated at 0.51 chicks/territory/year, with a frequency of one successful attempt every other year (Xirouchakis 2001).

The main threats to the species are poaching (especially in Crete, where for this reason immature individuals are observed in one third of pairs), illegal use of poisoned baits and degradation of its feeding habitats (mainly the abandonment of mountain crops), and, at local level, the overharvesting of certain key food species, such as partridges, rabbits, etc. Extensive reforestation and natural afforestation of abandoned land also cause problems for the species.

A protected species, with the majority of the breeding population in Greece occurring in Natura 2000 sites (designated as Special Protection Areas).

Conservation measures required: Strict control of illegal use of poisoned baits and poaching, systematic census of the Greek population, management and protection of feeding areas (e.g. restoration of terraces and agri-environmental measures for the revival of mountain crops), artificial feeding (feeders), reduction of predation pressure on prey species, identification of the most productive territories and their more effective protection, public information and awareness raising.

According to the recorded threats in the list of threats to the species of designation (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Invasive livestock farming and livestock stables
- Tourism - recreational infrastructure (ski slopes, golf courses, courses, camps)
- Mining activities - quarries - mines
- Renewable energy: Wind farms
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control 'harmful' mammals
- Poisonous insecticides used to use poisonous mammals to kill pests
- Nuisance activities (hunting, logging, fishing, gathering plants and firewood)
- Noxious recreational activities, changes in the frequency and intensity of forest fires (increase or decrease)
- Construction of dams and flood protection measures, irrigation networks

- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming
- Reforestation
- Changes in the extent and distribution of habitats due to climate change.

Threats listed on the IUCN red list are wind energy, whose production facilities pose a direct threat of mortality to the species (Watson 2010). Also, poisoning, poaching and trapping have led to population declines in Spain (Katzner et al. 2012a). In the past the species was affected by the use of strong pesticides, although this is not a significant problem today. There are records of mortality as a result of electrocution when colliding with power lines, but there are no data to suggest a significant demographic effect. In addition, reforestation, long-term changes in food availability, including declining livestock numbers, and climate change may threaten the species in the future (Watson 2010).

The recommended conservation actions according to the IUCN are:

- Enforce protection of the species in many countries from illegal poaching and egg collection.
- Implement educational programs that demonstrate the benefits and feasibility of maintaining healthy populations of the species
- General land use policies in remote mountain areas should not compromise basic feeding and nesting requirements
- Need to protect extensive areas of forest peatlands in north-eastern Europe
- Need for more information on numbers and stability of unmonitored populations (Tucker and Heath 1994).

Circaetus gallicus

The species has a particularly wide distribution in Europe, Africa and Asia. In Europe the breeding population is estimated at 9,900 - 16,000 pairs (19,800 - 31,900 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 6,800 - 10,400 pairs (13,700 - 20,700 mature individuals). The Greek population is estimated to number 350-600 pairs, corresponding to 4 % of the European population (BirdLife International 2021). The population of the species is estimated to have been increasing in recent years (IUCN red list).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as threatened (NT), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). Also, it is not classified as a species of European interest in terms of protection by BirdLife International, while it is also protected by the CITES International Convention (Appendix II).

The species is mainly distributed in mainland Greece and some islands, although it does not breed on these islands. The distribution of the species extends to the southern Peloponnese, while the bulk of its population is in central and northern Greece (Handrinos and Akriotis 1997).

Individuals breeding in the Palaearctic are migratory, while the Southeast Asian population is resident. Most migratory individuals overwinter in northern Africa (Ferguson-Lees and Christie 2001), while individuals overwintering in eastern Africa move to India and surrounding countries, with small populations overwintering in southern Europe (Hagemeijer and Blair 1997) They migrate south between August and November and north between February and May (Ferguson-Lees and Christie 2001). During migration, snake eagles are observed in individuals or pairs, but sometimes form groups of up to 12 individuals that gyrate 20 to 100 m above the ground (Snow and Perrins 1998; Ferguson-Lees and Christie 2001).

The habitats they use are found in warm, temperate and tropical environments, and they have been observed at altitudes above 1,200 m but prefer areas with partial cover. They feed exclusively on reptiles and mainly on snakes. The nest is most often constructed relatively low in the tree. The species usually lays one egg.

The species has experienced significant population declines in Northern Europe due to habitat loss. It still appears to be poached in Malta, and seems to face problems from the installation and operation of wind farms. It is listed as a species of limited interest, on the IUCN red list, due to its large geographical distribution, and is listed as near threatened in the Red Book of Threatened Vertebrates of Greece.

According to the threats recorded in the Threat List of Species of Interest (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Expansion - intensification of annual crops
- Construction of roads of all categories, including railways
- Persecution by specific users as harmful

- Inappropriate forest management
- Noxious recreational activities
- Other nuisance activities (military exercises, scientific research, vandalism)
- Deforestation and logging
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming
- Pollution from agrochemicals discharged into water bodies, waterlogging of receptors.

The threats listed on the IUCN red list are: o Changes in agriculture and land use, which have reduced the amount of suitable hunting habitat. In addition, snake populations have declined due to increased monoculture cultivation, destruction of plant barriers, pesticide use, abandonment of traditional forms of farming and subsequent deforestation. Habitat fragmentation has resulted from forest fires and road construction. The species is also at risk from poaching, nest destruction and impacts on power lines (Tucker and Heath 1994). Finally, the species is highly vulnerable to the effects of potential wind energy development (Strix 2012).

The proposed conservation actions, according to the IUCN, are as follows:

- Large-scale habitat conservation measures for the species, including the conservation of low-scale crops, conservation of plant barriers and reduction of pesticide use
- Appropriate management of forest areas, including the preservation of old trees, prevention of fires and limiting the construction of forest roads
- Educational campaigns, targeted at hunting organisations, to reduce poaching
- Power lines should be marked or undergrounded to reduce conflicts in areas of importance to the species
- Maintain and improve monitoring of the species (Tucker and Heath 1994).

Hieraaetus pennatus

In Greece, the hawk eagle is a summer visitor and transient migrant, with a fairly wide distribution. It nests mainly in northern Thrace, N. Macedonia, North. Epirus and central Greece, where it is rather rare (Handrinos and Akriotis 1997).

The European population is estimated at 23,300-30,300 pairs (46,600-60,500 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 20,300-23,900 pairs (40,600-47,800 mature individuals). The breeding population in Greece is estimated at 70-120 pairs, corresponding to <1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece, the species is classified as endangered (EN), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017), while it is also protected by the CITES International Convention (Appendix II).

The species is much more widespread during migration, especially in autumn, when several individuals are observed in Attica, the southern Peloponnese, Crete, etc. Recently few individuals have been observed wintering in southern Greece (in southern Peloponnese and Crete) (Chandrinos 1992, Handrinos and Akriotis 1997, EOE data).

The species is mainly migratory, and northern birds leave their breeding grounds in September and return in March and April (Orta and Boesman 2013). Birds tend to be found singly or in pairs, and even during migration rarely form groups of more than five, and stay away from other predators (Ferguson-Lees and Christie 2001). The birds rise about 200-300 m above the ground when hunting (Brown et al. 1982). It is an open woodland species, preferring parts of open woodland, and has been recorded at altitudes up to 2,000 m. It nests in mid- and low-altitude forests (coniferous, deciduous or mixed), alternating with scrub, grassland, glades and open areas where it finds its prey. It feeds on a variety of small and medium-sized birds, reptiles and mammals (Adamakopoulos et al. 1995). Nests are built in trees and are constructed of sticks and branches lined with fresh leaves. They are often reused every year. Normally two eggs are laid (Orta and Boesman 2013). Species with a dimorphism in the colour of the adult plumage (whitish or brownish phase), it is estimated that about 60% of the Greek population belongs to the whitish phase (Handrinos and Akriotis 1997). It is, in general, a species that has not been sufficiently studied in our country.

It is mainly threatened by the encroachment and degradation of lowland and semi-mountainous forests (poor implementation of forestry practices, road construction, etc.) where it nests, the reduction of its prey due to the ongoing

intensification of agriculture (clearance, destruction of plant barriers, pesticides, etc.) and perhaps poaching during migration. A protected species, probably most of its population is found in Natura 2000 sites (designated as Special Protection Areas). More effective forest management and protection of the species in the areas where it nests is required, together with the adoption and implementation of agri-environmental measures in its feeding areas. A systematic census of the breeding population in Greece, a study of its biology/ecology and an investigation of the threats it faces are also needed.

According to the threats recorded in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Expansion - intensification of annual crops, residential development (urban or extra-urban, legal or arbitrary)
- Commercial - industrial development (ports, airports, industrial zones)
- Renewable energy (wind farms)
- Transmission lines (electricity, telephone), oil and gas pipelines
- Inappropriate forest management
- Deforestation
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Construction of dams and flood protection interventions (irrigation networks).

The threats listed on the IUCN red list are habitat degradation, direct persecution, human disturbance of habitats (Ferguson-Lees and Christie 2001) and deforestation. Habitat loss is also due to urbanization and wildfires. Pesticide accumulation can affect the reproductive success of the species (Tucker and Heath 1994). It is also very vulnerable to the effects of potential wind energy development (Strix 2012).

The recommended conservation actions according to the IUCN are:

- Conservation and protection of extensive areas of alternating open habitat and mature forest
- Any afforestation or deforestation should take place outside the breeding season
- Education programmes and legislation aimed at reducing illegal persecution and destruction of nesting and egg collection sites

- Modification of the design of power transmission lines to avoid collisions and electrocution
- Research the distribution, numbers, habitat, population dynamics and diet of the species, and the impact of pesticides on reproductive success (Tucker and Heath 1994).

Accipiter brevipes

The European population of this species is estimated at 3,800 - 7,700 pairs (7,700 - 15,300 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 1,700 - 3,400 pairs (3,400 - 6,800 mature individuals). The population of the species at European level is considered stable. The Greek population of the species is estimated at 1,000 - 2,000 pairs and constitutes 23 % of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species has not been assessed and therefore does not have a threatened status (NE), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 2 species of European interest in terms of protection by Birdlife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

The species is mainly found in Northern Greece (Macedonia and Thrace) although breeding of the species has also been recorded in Central Greece, Peloponnese and some islands (Kefalonia, Lesvos, Samos) (Handrinos and Akriotis 1997).

The species breeds mainly in fragmented deciduous forests along river and stream catchments, but may also use broad-leaved forests at the foothills and slopes of mountains, usually below 1,000 m altitude, but has been recorded up to 2,000 m (Hagemeijer and Blair 1997). It arrives at its breeding sites in April or early May and eggs are laid in May or early June. Breeds in the Balkans, the Caucasus, southern Russia and central Asia. It nests on tree branches, preferring deciduous trees. The nest is a tiny stick platform (30 cm wide, 15 cm deep), lined with twigs and sometimes leaves, and is usually placed 5-10 m from the ground. Occasionally it uses the old nests of other birds. It lays 3-5 eggs. It feeds mainly on lizards, newborn birds and large insects such

as dragonflies and grasshoppers (Tucker and Heath 1994). The species is a migrant, probably overwintering in sub-Saharan Africa (Ferguson-Lees and Christie 2001; Orta and Marks 2014). Birds leave their breeding grounds in September. During migration it often flies at night and travels in flocks that become particularly large at certain bottlenecks (Orta and Marks 2014).

According to the recorded threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Expansion - intensification of annual crops
- Extensive expansion and intensification of agricultural activities
- Infrastructure for tourism and recreation (ski resorts, golf courses, golf courses, golf courses, camps)
- Inappropriate forest management
- Nuisance activities (hunting, logging, fishing, plant and firewood collection)
- Noxious recreational activities
- Deforestation and logging
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Construction of dams and flood protection measures, irrigation networks
- Wetland drainage and other land reclamation works
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Changes in the extent and distribution of habitats due to climate change.

Threats listed on the IUCN red list are the impacts of potential wind energy development, as the species is highly vulnerable to these (Strix 2012). The species is also considered undesirable to falconers in Georgia and relatively large populations are killed after being captured in an attempt to catch other more desirable falcon species (Orta and Marks 2014).

The recommended conservation actions, according to the IUCN, are as follows:

- Identify and protect areas of importance to the species, particularly from wind farm construction
- Awareness campaign to reduce poaching

- Carry out studies on the ecology of the species and monitor populations to inform conservation measures.

Neophron percnopterus

Until the early post-war years, the Egyptian vulture was a common and widespread species in all lowland and semi-mountainous areas of the country. In the last 30-40 years, however, the species has shown a clear and continuing population decline. The first estimate (in the 1980s) put the breeding population in Greece at 200-250 pairs, with the highest concentration in Meteora (Handrinos and Akriotis 1997). In 1994-2003 it was estimated that there were still 100-140 pairs, while in 2009 the total population did not exceed 30-50 pairs, half of which were found in Evros.

However, these pairs have dramatically decreased even more in recent years, and now (2018) they amount to five in all of Greece (Saravia et al. 2019).

The European population of the species is estimated at 3,000 - 4,500 pairs (6,100 - 9,000 mature individuals), while in the EU28 the population is estimated at 1,700 - 1,900 pairs (3,400 - 3,800 mature individuals). The Greek population is estimated to number approximately 5 - 12 pairs (BirdLife International 2021), which corresponds to <1% of the European population.

In general, there are particular difficulties in locating territories and monitoring the Egyptian vulture population due to the now low densities and the behaviour of the species. During migration, especially in autumn, individual Egyptian vultures move southwards over the Peloponnese, Crete, etc. (Handrinos and Akriotis 1997).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions. According to the Greek Red Data Book in Greece and the IUCN at European level, the species is classified as threatened (CR and VU respectively) (BirdLife International 2021). It is also classified as a SPEC 1 species of European interest in terms of protection by Birdlife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

Egyptian vultures nest solitarily at densities determined by local conditions of food availability and suitable nesting sites (rocks). In such ideal situations the species forms loose colonies, as it did previously in Meteora. Social vultures in feeding areas feed largely on carrion and any other residue of organic origin, even mammalian

excrement, while their diet is supplemented with small vertebrates (mainly turtles). It arrives at the breeding grounds around the end of March and starts incubating its eggs (1-2, very rarely 3) around the end of April. The chicks hatch in June but remain in the nest until early September. There are no reliable data on the reproductive success of the species in Greece, but it is estimated to be very low. Around mid-September the bulk of the population departs for central Africa via the Bosphorus.

The most important threat to the species is secondary poisoning caused by the illegal use of poisoned baits, mainly by livestock farmers. Furthermore, land use changes and especially the reduction of extensive livestock farming, combined with recent strict veterinary hygiene regulations, directly reduce food availability, as the Egyptian vulture was locally dependent on scattered livestock farms and, more recently, to a large extent on open dumpsites, especially where there was regular dumping of dead animals and slaughterhouse waste. Finally, incidents of poaching and disturbance at breeding sites (e.g. climbing, rock lighting) have a very negative impact on the already critically small breeding population in our country. Any other negative factors for the species remain unknown, both during migration and in Africa, where it winters, and data from other countries demonstrate dangerously high accumulation of chemicals in chicks.

A protected species, almost the entire breeding population in Greece is found in Natura 2000 sites (Special Protection Areas). The population in Evros is supported by the feeding station in the National Park of Dadia.

The immediate priority is to strictly control the illegal use of poisoned baits and to systematically provide supplementary feeding (feeders) where the species used to use open dumps in the past, as well as near any isolated territories. Any MPA of projects located near or within the species' territories (e.g. road widening, siting of wind and hydroelectric projects, installation of high-voltage pylons) should necessarily take care to ensure the complete protection of the Egyptian vulture's nesting and feeding area. Furthermore, it is imperative to carry out a complete survey to identify all the territories, as well as a thorough investigation of its specific biology (diet, reproduction, limiting factors) and the investigation of any as yet unknown threats (e.g. antibiotics, chemicals in the food chain, etc.). Finally, it is essential to raise public awareness, especially among farmers, hunters and ranchers.

According to the recorded threats in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Intensive and stabled livestock farming
- Extensive and intensive livestock farming and intensive livestock grazing
- Extractive activities: quarrying - mining
- Renewable energy: Wind farms
- Construction of all categories of roads and railway lines
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control "pest" mammals
- Stalking by specific users as harmful
- Nuisance recreational activities
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Construction of dams and flood protection interventions, irrigation networks
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming
- Changes in the extent and distribution of habitats due to climate change.

The threats listed in the IUCN red list are: lead poisoning (from firearms), direct poisoning, electrocution (from collisions with power lines), collisions with wind turbines, reduced food availability and habitat change affecting European populations (Donázar et al. 2002; Kurtev et al. 2008; Zuberogoitia et al. 2008; Carrete et al. 2009; Dzhamirzoev and Bukreev 2009; Sara et al. 2009). Illegal poisoning of carnivorous mammals appears to be the main threat at breeding sites in Spain (Hernandez and Margalida 2009) and in the Balkans. Within the European Union, regulations introduced in 2002 to control the disposal of animal carcasses have significantly reduced food availability. However, recently adopted regulations will allow the operation of feeding stations (feeders). Poisoning is a threat to the species, often through the use of poison baits targeting terrestrial predators (Carrete et al. 2007; Carrete et al. 2009; Cortés-Avizanda et al. 2009) and through the consumption of poisoned animals. Recent analyses from several countries such as Spain (Lemus et al. 2008) and Bulgaria (Angelov 2009) have identified high levels of species contamination leading to increased mortality. Antibiotic residues present in the carcasses of intensively farmed animals may increase the susceptibility of chicks to disease (Lemus et al. 2008, Kurtev et al. 2008). Mortality following impacts on power lines was found to be particularly

common in the Canary Islands (Donazar et al. 2002, Donazar et al. 2007a) and potentially dangerous in other regions of Spain (Donazar et al. 2007b, 2010b). Competition for suitable nest sites with *Gyps fulvus* may reduce breeding success in the short term (Kurtev et al. 2008).

The recommended conservation actions according to the IUCN are as follows:

- Intensive cooperation with local stakeholders to ensure poison-bait and poaching-free zones in locations with high densities of the species throughout the breeding and migration season
- Extensive research into the causes of the decline of the species' populations throughout its range
- Marking of electric pylons in areas where high mortality is recorded
- Coordinate monitoring of population trends of the species throughout its range
- Establishment of supplementary feeding sites where needed especially in locations where immature individuals congregate
- Reduce poisoning risks by enforcing a strict ban on poison baits to control 'noxious' mammals.
- Effective impact assessments of wind farms before they are built
- Reduction of disturbance at nesting sites
- Confiscation of live birds held illegally, and attempts to breed them in captivity and future reintroduction programs.

Gyps fulvus

According to the most recent data and literature review resulting from Xirouhakis (2019) and the deliverable of the LIFE16 IPE/GR/000002 project [*Action Plan for three scavenging bird species (vultures): Vulture (Gypaetus barbatus), Vulture (Gyps fulvus), Black Vulture (Aegypius monachus)*] "*the total number of vulture individuals before the 1980s was estimated at 600-970 individuals with 300- 470 in mainland Greece and 300-400 in Crete (Tewes 1994). However, the first and most detailed report on the population of the species on a national scale was made in the 1980s and estimated the population at 450 pairs (Handrinos 1985). The species had already disappeared from all major Ionian and Aegean islands except Naxos, while it was extinct in Thrace (30 pairs), Macedonia (30 pairs), Epirus (>70 pairs), Thessaly*

(80 pairs): Ossa (15), central Pindos (35) and Olympos (20-30), the island of Oxia in the mouth of the Acheloos river in the Ionian Sea (8-10 pairs), Peloponnese (10 pairs), Central Greece (100 pairs) and Crete (500 individuals). The above data are the most valid historical reference for the status of the species and are assessed as the most reliable for comparisons, for calculating population trends and as favourable reference values and future conservation targets for the species on a national scale. In the period 1990-2000 the population reached 120-130 pairs (Hallmann 1996) and recovered in the 2000-2010 decade to 170-200 pairs, of which 25-30 pairs (90-110 individuals) were found in mainland Greece, while the remaining 150-160 pairs (370-450 individuals) were found on the islands (Bourdakis 2003; Xirouchakis and Mylonas 2005; Bourdakis et al. 2006). This increase was mainly due to the population in Crete at 140-160 breeding pairs (340-420 individuals), which were distributed in 24-28 colonies. In the current decade the species has remained in Thrace (four colonies hosting a total of 10-12 pairs), Etoloakarnania (three colonies with 10-15 pairs), Cyclades (Naxos, Herakleia, one colony with 9-10 pairs). On the contrary, the species in Crete hosts 78 colonies of 250-340 pairs (900-1000 individuals), i.e. it has almost doubled (and is the largest island population in the world). The reproductive success of the species in Crete in the 2000s was 75% (range = 69-82%) and productivity ranged from 0.46 to 0.59 chicks/breeding pair/year, meaning that about 70-90 young were entering the population annually (Xirouchakis 2003). The total population is estimated at 280-380 pairs, while the decline in mainland Greece is estimated at 85%. The continental population of the species is an integral part of the Balkan population since in the last 30 years tagged individuals from Croatia, Serbia and Bulgaria have been frequently recorded in northern (Thrace) and western Greece (mainly in western Pindos up to Agrafa) and the Cyclades, and recently up to the Peloponnese (Stoychev et al. 2005; Jerrentrup and Efthimiou 2006; Xirouchakis and Tsiakiris 2009). These individuals frequently visit Greece to feed and breed. Also, individuals from Evros have been recorded in Bulgaria, North Macedonia, while juvenile tagged individuals from Italy, France, Serbia, Bulgaria and Israel have been observed respectively in the feeding area of the protected area of Dadia mainly in the autumn months (60-100 individuals, Skartsi et al. 2010), i.e. the period of the natal dispersal of the species".

The European population is estimated at 32,400-34,400 pairs (69,600-89,400 mature individuals), while in the EU28, according to the IUCN red list, it is estimated at 33,700-41,900 pairs (67,400-83,800 mature individuals). The Greek population is

estimated to number 380 - 800 pairs (BirdLife International 2021). Based on the above data, Greece hosts 1% of the European population.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as a threatened species (VU/CR), while according to the IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). Also, it is not classified as a species of European interest in terms of protection by Birdlife International, while it is also protected by the CITES International Convention (Appendix II).

The vulture is a cow vulture species, typical of open areas, found in semi-mountainous and mountainous areas, exploiting livestock activities (Handrinos and Akriotis 1997, Bourdakis et al. 2004, Xirouchakis and Andreou 2009). It feeds exclusively on large or medium-sized ungulate carcasses, from which it selects the soft body parts, with a particular preference for viscera (Tucker and Heath 1994, Xirouchakis 2005). The spread of its colonies always coincides with the presence of limestone substrates (Xirouchakis and Mylonas 2005b), where many pairs nest together in steep cliffs, gorges and steep cliffs almost above the sea (Vagliano 1981, Handrinos and Akriotis 1997, Xirouchakis and Mylonas 2004). In Crete, where the population has been studied more extensively, the altitude of the colonies ranges from 120-1,100 m, with a predominantly south-western orientation (Xirouchakis and Mylonas 2004). The breeding season lasts from mid-January to mid-March, with the majority of nesting occurring in late February. It lays one egg, which incubates for 57 days, with the chick hatching in 120-140 days (Xirouchakis 2003). The reproductive success of the species ranges from 69-82%, while its productivity is 0.52 chicks per breeding pair per year. On average, 70-90 young are fledged annually on the island (Xirouchakis and Tsiakiris 2008).

Secondary bait poisoning is the most serious threat to the species, both in mainland Greece and on the islands. Poaching and the siting of wind farms near colonies or areas of intense foraging are additional sources of mortality. Land-use changes, animal settlements and the closure of illegal dumpsites are shrinking and degrading foraging habitat.

A protected species, all its colonies occur in Natura 2000 (Special Protection Areas). Its population is systematically monitored only in Crete, while some colonies in Macedonia and Thrace are systematically supported by artificial feeding (feeders).

In Crete there are two fenced feeding stations, which are occasionally maintained by farmers in the surrounding areas.

Strict control of the illegal use of poisoned baits and systematic operation of feeders is needed to maintain the remaining colonies. A study of the impact of the operation of existing wind farms is also required, and specifications for the siting of planned wind farms need to be drawn up. In all cases, management actions for the species should include colony monitoring and public information and awareness programmes to reduce poaching.

According to the recorded threats in the Threat List of Species of Concern (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Intensive and stabled livestock farming
- Residential development, urban or unplanned, legal or arbitrary
- Commercial-industrial development (ports, airports, industrial zones)
- Extractive activities: quarrying and mining
- Renewable energy: Wind farms
- Construction of all types of roads and railways
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control "pest" mammals
- Stalking by specific users as harmful
- Nuisance recreational activities
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Construction of dams and flood protection interventions, irrigation networks
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming
- Pollution from agrochemicals discharged into water bodies, waterlogging of receptors
- Changes in the extent and distribution of habitats due to climate change.

Threats listed on the IUCN red list poisoning from poison baits intended for 'noxious' predators (e.g. fox, wolf and bear are considered (Snow and Perrins 1998, Ferguson-Lees and Christie 2001). In some areas, the reduction in food availability resulting from changes in livestock management practices has had a severe impact (Ferguson-Lees and Christie 2001). The species is very vulnerable to the effects of potential wind energy development (Strix 2012).

The recommended conservation actions, according to the IUCN, are as follows:

- Maintain and promote non-intensive livestock management systems (extensive livestock farming) to ensure food supply for the species
- Establishment and maintenance of feeding stations, particularly in areas where food is scarce
- Avoiding large and extensive wooded areas and therefore maintaining large areas of open habitat required by the species for foraging (Tucker and Heath 1994)
- Prohibit abandonment of poisoned carcasses and encourage abandonment of dead animals.

Microcarbo pygmaeus

In Europe the species breeds mainly in Romania, with significant numbers also in Russia, Montenegro, Greece, Montenegro, Greece, Turkey, Ukraine and Italy.

The European breeding population of the species is estimated at 42 300 - 55 500 pairs (84 600 - 111 000 mature individuals), while the wintering European population is estimated at 53 300 - 134 000 individuals. In the EU28 the breeding population is estimated at 16 100 - 18 300 pairs (32 300 - 36 600 mature individuals), and the wintering population is estimated at 16 400 - 38 500 individuals. The Greek population of the species is estimated at 3,000-3,100 pairs, which is 6% of the European population (BirdLife International 2021).

The main colonies are in Prespes and Lake Kerkini. During the winter period very large numbers are observed on the Evros River. It is worth mentioning that Greece is one of the most important wintering areas of the species worldwide.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017).
The species' habitat consists of reedbeds within open water, on the coast where there is extensive grazing and wet meadows, and during winter, in coastal wetlands, along rivers, and sometimes in inland lakes in the interior (Johnsgard 1993; Crivelli et al. 2000, Billerman et al. 2020). The nest is built near or above the water in trees, shrubs,

reeds, or islands of vegetation. The species breeds between April and July in large mixed-species colonies, leaving breeding grounds towards the end of August and returning between March and April (Billerman et al. 2020). The breeding season is April to May. It has one oviposition per year and the female lays 4-6 eggs. Throughout the year it usually feeds singly or in small groups (Nelson et al. 2005) and its diet consists mainly of fish up to 15 cm long (Billerman et al. 2020). It also more rarely feeds on small mammals, crustaceans, leeches and large insects. The species is sedentary throughout much of its range with some populations migrating short distances (Billerman et al. 2020)

According to the recorded threats in the species listing (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Extensive aquaculture
- Intensive aquaculture
- Intensive aquaculture
- Accidental entanglement in fishing gear
- Disturbing activities (hunting, logging, fishing, harvesting of plants and firewood)
- Noxious recreational activities
- Wetland drainage and other land reclamation works
- Pollution from urban waste water
- Pollution from industrial or military activities
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed in the IUCN red list are the degradation of wetlands through drainage for agricultural needs (Billerman et al. 2020). It also suffers from persecution at aquaculture facilities (Eken and Magnin 1999; Kazantzidis and Nazirides 1999; Crivelli et al. 2000). In Southeast Europe, conservation measures have ameliorated the major threats (Crivelli et al. 2000), although there is still concern about habitat destruction and persecution in wintering areas (Billerman et al. 2020). It is also sensitive to marine pollution, such as biocides and pesticides drifting from runoff and leaching from agricultural land.

The recommended conservation actions, according to the IUCN, are as follows:

- Improved wetland management

- Increased regulations and controls on water pumping and pollution in coastal wetland ecosystems.
- Identification and designation of protected areas.

Clanga clanga

Distribution, population data and trends: The spotted eagle is an uncommon and local winter visitor in Greece. It inhabits the large wetlands of northern and central Greece, with larger populations in the Evros Delta (and neighbouring hills), Amvrakikos, Kerkini and Nestos Delta, while it is very rarely observed in more southerly areas. The annual wintering population averages 70-80 individuals, 80% of which are young and immature birds. The maximum population of the species in Greece (47 individuals) was recorded in the Evros Delta in 2008 (Chandrinos 1992; Handrinos and Akriotis 1997). One individual that had been ringed in Greece was found in Latvia (Akriotis and Chandrinos 2004).

The European population of the species is estimated to number 960 - 1,300 pairs (1,900 - 2,500 mature individuals), while in the EU28 the population is estimated at 18 - 31 pairs (36 - 70 mature individuals) (BirdLife International 2021).

Percentage of the population of the species found in Greece: Approximately 50% of the species' wintering population in the Balkans (excluding Turkey) (Ferguson-Lees and Christie 2001).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions. According to the Greek Red Data Book in Greece and IUCN at European level, the species is classified as threatened (EN and VU respectively) (BirdLife International 2021). It is also classified as a SPEC 1 species of European interest in terms of protection by Birdlife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

Ecology: Found almost exclusively in large wetlands with riparian woodlands, stands of large trees etc. or adjacent to wooded hills, where it roosts, often with other eagle species, away from human settlements (Tucker and Heath 1994). It nests 5-25 m above the ground and the nest is reused in successive years, although many pairs have two or three nests used interchangeably. It feeds mainly on waterfowl, often injured by predators, and more rarely on other vertebrates, large insects and carrion (Alivizatos et

al. 2004; Alivizatos et al. 2006). It is a migratory species, with birds leaving their breeding grounds in October and November and returning in February and March.

Threats: The main threats to the species are wetland degradation, deforestation of large tree stands and clearance of lowland/riverine forests. Locally the species is also threatened by disturbance, poaching, poisoning by lead shot and perhaps poisoned baits.

Conservation measures in place: Protected species, the entire wintering population in Greece is found in Natura 2000 (Special Protection Areas).

Conservation measures required: Better protection of roosting sites is needed, especially in the Evros Delta, where most of the wintering population is concentrated, and protection of feeding areas. Control of the illegal use of poisoned baits and poaching is also needed, together with a ban on the use of lead shovels in wetlands.

According to the threats recorded in the Threats to Species of Interest (Dimaleksis 2009) (species of interest) the reported threats to the species are:

- Expansion - intensification of annual crops
- Hunting-predation-trapping-collection of eggs or chicks-destruction of nests
- molting by buckshot
- Drainage of wetlands and other land reclamation works
- erosion control works, cleaning of stream beds, embankments and embankments of lakeshores and gullies
- Urban waste water pollution
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and wastes.

Threats listed in the IUCN red list are evidence of hybridization between this species and *Clanga pomarina* (Bergmanis et al. 1997, Lohmus and Vali 2001, Dombrovski 2002, Vali et al. 2010). In some European countries, mixed pairs may constitute 50% of the species' pairs (Maciorowski and Mizera 2010) or even more (Vali 2011). It is not particularly clear whether this represents a new phenomenon or a conservation concern, but *C. pomarina* is much more numerous than *C. clanga* in the overlap zone and the distribution range of *C. pomarina* appears to be spreading eastward, further into the distribution range of *Clanga clanga.* Other key threats, include habitat destruction and disturbance, as well as poaching and electrocution. Suitable habitat mosaics have been lost as a result of deforestation and wetland drainage. In Eastern Europe, intensification of agricultural practices and abandonment

of traditional lowland floodplain management have reduced habitat quality. The species is particularly sensitive to permanent human presence in their territory. Finally, deliberate and accidental poisoning over much of its range is a significant threat to the species.

The proposed conservation actions, according to the IUCN, are as follows:

- Research on the species' range, and establish long-term monitoring programmes to improve our understanding of population trends
- Improve understanding of the species' breeding habitat requirements
- Protection of breeding areas, particularly from wetland drainage
- Conservation of traditional wet grasslands
- Forestry regulation to minimise disturbance and protect potential nesting trees
- Further investigate the threat of hybridisation of the species with *C. pomarine*
- Prevent poaching, poisoning and impacts on power lines
- More general awareness.

Aquila heliaca

Distribution, population data and trends: Common in Greece and widely distributed species in the pre-war years and until the 1960s, the population of *Aquila heliaca* suffered a dramatic decline and today it is probably no longer breeding in Greece: The last known pairs survived in the southern part of southern Evros until the mid-1980s, although perhaps 1 pair. still nests (Handrinos and Akriotis 1997; BirdLife International 2004). Today *Aquila heliaca* is a rare and local winter visitor, with an average of 6-10 individuals per year, mainly in the large wetlands of northern Greece (Evros Delta, L. Kerkini, Kalamas Delta, etc.). A few individuals, mainly juveniles, migrate south in autumn along the Ionian coast (Messolonghi, western Peloponnese, etc.) (Chandrinos 1992; Handrinos and Akriotis 1997). There are 10 recoveries in Greece of ringed individuals in Hungary (5), Slovakia (4) and Bulgaria (Akriotis and Handrinos 2004).

The European population of the species is estimated at 1,900 - 3,000 pairs (3,900 - 6,000 mature individuals), while in the EU28 the population is estimated at 270 - 390 pairs (540 - 770 mature individuals) (BirdLife International 2021).

Percentage of the species' population found in Greece: <1% of the European (wintering) population.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions.According to the Greek Red Data Book in Greece the species is classified as threatened (CR), while according to IUCN at European level the species is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 1 species of European interest in terms of protection by Birdlife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix I).

Ecology: The only species of the genus *Aquila* that lives in lowland/semiplain habitats. In Europe it has been pushed to higher altitudes due to persecution and habitat loss. In Central and Eastern Europe, it breeds in forests up to 1 000 m altitude. It nests in trees in lowland and riparian forests and forages in open steppe areas and crops, while in winter it frequents large wetlands. From late February to early May adults return to breeding areas. During the breeding season it feeds on small to medium-sized mammals, reptiles and birds, while in winter it feeds mainly on waterfowl, often also on carrion (Adamakopoulos et al. 1995). Rabbit ticks were once its main prey.

Threats: The main threats to the species are degradation of lowland and riparian forests and (to a lesser extent) wetlands, prey depletion, poaching and poisoned baits. Although it used to breed close to settlements, it is a very sensitive species during the breeding season.

Conservation measures in place: Protected species, almost the entire wintering population is found in Natura 2000 (Special Protection Areas).
In the area of the Dadia SPA it benefits from the vulture feeder.

Conservation measures required: Conservation of the species in Greece should focus on both wintering areas and breeding pairs that are likely to be found. In neighbouring countries (Bulgaria, FYROM) there are several pairs of the species and *Aquila heliaca* could recolonise Greece. The possibility of breeding the species in captivity should also be investigated as a long-term goal, with the aim of reintroducing it to Greece. Strict control of the illegal use of poisoned baits and poaching is also needed, as well as public information.

According to the recorded threats in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Renewable energy: Wind farms
- Expansion - intensification of annual crops

- Construction of all types of roads and railways
- Increase of all types of roads and railways, all types of transport lines (electricity, telephone), oil and gas pipelines
- Hunting - poaching - trapping - collecting eggs or chicks - destroying nests
- Illegal use of poisoned baits to control harmful mammals
- Stalking by specific users as harmful
- Improper forest management
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Noxious recreational activities
- Deforestation and logging
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Construction of dams and flood protection measures, irrigation networks
- Changes in the extent and distribution of habitats due to climate change.

Threats mentioned in the IUCN red list are intensive forest exploitation threatening breeding areas in mountainous areas and lack of large trees in lowland areas. Other threats, include loss and alteration of feeding habitats, shortages of small and medium game species (particularly the hare), human disturbance of breeding sites, poaching and illegal trade, poisoning and electrocution following collisions with power lines. Finally, along the species' migratory routes, the main threats are poaching, poisoning and depletion of prey.

The proposed conservation actions, according to the IUCN, are as follows:

- Conduct surveys to identify breeding and wintering sites and migration corridors
- Implementation of forestry policies beneficial to the species, such as maintaining large trees in open ground, and protecting old growth forest on slopes
- Preventing mortality from nest destruction and collection, electrocution on medium voltage power lines, and general persecution in wintering areas and migration corridors
- Preservation of foraging habitats (maintenance of traditional land use)
- Increase in prey numbers of the species through management of foraging habitats
- Raising public awareness and involving stakeholders in conservation activities.

Pelecanus crispus

In Europe, the species breeds mainly in Greece, with significant numbers also in Russia, Turkey, Romania and Bulgaria.

The European population of the species is estimated to number 3,700-4,700 pairs (7,500-9,400 adults), with the European wintering population estimated at 3,200-11,400 individuals, while in EU28 the population is estimated at 2,200-2,800 pairs (4,400-5,600 adults), with the EU28 wintering population estimated at 2,400-3,700 individuals. In Europe both the breeding and wintering population is estimated to be increasing. The Greek population is estimated to number 1,900 - 2,200 pairs, corresponding to 50% of the European population, while the wintering Greek population is estimated at 1,700 - 2,800 individuals, corresponding to 40% of the European wintering population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions. According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to IUCN at European level the species is not classified as Threatened (LC) (BirdLife International 2021). It is also classified as a SPEC 1 species of European interest for protection by Birdlife International (BirdLife International 2017), and is also protected under the CITES International Convention (Appendix I).

A very rare species which is only widespread in SE. It is very rare and very rare only in Northern Europe. It is found up to 850 m altitude. The species occurs mainly in inland freshwater wetlands but also in coastal lagoons, river deltas and estuaries. (Peja et al. 1996, Crivelli et al. 1997, Mix and Bräunlich 2000, Billerman et al. 2020). Breeding begins in late March and April. It has one spawning season per year. It is sometimes found alone but usually in dense colonies of up to 250 pairs (Cramp et al. 1977, Billerman et al. 2020). The species migrates between late July and September, although it sometimes remains in breeding colonies until November (Nelson 2005). Immature individuals may remain in breeding colonies year-round. Birds return to breeding sites in late January to April, depending on the region (Nelson 2005). The species nests in small islands of vegetation in freshwater lakes to avoid predatory mammals or in dense aquatic coastal vegetation such as reedbeds (Crivelli 1994; Peja et al. 1996, Pyrovetsi 1997, Billerman et al. 2020), and occasionally the species builds nests on open ground (Hatzilacou 1993, Nelson 2005). Artificial islands can also be

used for nesting. The nests consist of reeds and vegetation. The species feeds entirely on fish (Tucker and Heath 1994).

In Greece The Silver pelican is a fairly common but local species in Greece. Until the beginning of the 20th century it was found in most areas, even in southern Greece, while today it is mainly found in Thrace, Macedonia, Epirus, Central Greece and the Peloponnese (Handrinos and Akriotis 1997). The total breeding population in Greece has increased significantly in recent years and currently stands at 1,150-1,300 pairs (Greek Red Data Book - Legakis and Marangou 2009). Colonies are distributed in 3 locations: 1,000-1,100 pairs in the Little Prespa River, 100-146 pairs in the Amvrakikos Gulf and 45-55 pairs in the Kerkini River, where it has recently started nesting on artificial breeding islands. After the breeding season and throughout the winter, the species is dispersed almost all over mainland Greece, as well as on several islands, while ringed individuals in Greece have been found in Turkey (Akriotis and Chandrinos 2004).

According to the Greek Red Data Book (Legakis and Marangou 2009), the threats to the species are disturbance to nesting sites, but this threat has decreased compared to the past. This globally threatened species has increased its population in Greece in recent years. In general, it no longer faces threats mainly due to awareness, especially among fishermen, who no longer pursue it.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are as follows: Better guarding of the colonies, especially the one in Amvrakikos Gulf, to ensure that they are protected from disturbance.

According to the recorded threats in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Intensive aquaculture
- Intensive aquaculture activities: Wind farms
- Pursuit by specific users as harmful
- Activities causing disturbance (hunting, logging, fishing, harvesting, plant and firewood collection)
- Erosion control works, cleaning of stream beds, embankments of the seashore and stream beds
- Increase in the population of indigenous problematic competing species
- Pollution from urban wastewater

- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

The threats listed on the IUCN red list are wetland drainage, poaching and persecution by fishers (Crivelli 1994, Crivelli et al. 1997, Mix and Bräunlich 2000). Other threats include wetland pollution, disturbance by tourists and fishermen, collision with overhead power lines and overexploitation of fish stocks (Crivelli et al. 1999, Hatzilacou 1993, Mix and Bräunlich 2000). Finally, during periods of low water levels, the loss of eggs by wild boars (Bulgarian colony - Billerman et al. 2020) is also a threat.

The proposed conservation actions, according to the IUCN, are as follows:

- Monitoring of breeding, wintering numbers and ecological changes of important areas for the species.
- Sustainable wetland management.
- Undergrounding or marking of power lines.
- Legal protection of the species
- Carrying out public awareness campaigns
- Prevent poaching and overfishing.

Pelecanus onocrotalus

In Europe, the breeding stronghold of the species is Romania, with small numbers also occurring in Greece, Russia and Ukraine.

The European population of the species is estimated at 9,300 - 20,400 pairs (18,700 - 40,700 mature individuals), while in the EU28 the population is estimated at 8,600 - 19,000 pairs (17,200 - 37,900 mature individuals). The species population trend at European level is estimated to be increasing. The Greek population is estimated to number 610 - 940 pairs, corresponding to 6% of the European population (Birdlife International 2021). According to the same source, 88% of the European breeding population is estimated to occur in Romania.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions. According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to IUCN at European level the species is not classified as Threatened (LC). It is also classified as a SPEC 3 species of European conservation concern by Birdlife International.

The roseate pelican is an uncommon summer visitor and a transit migrant in Greece. It was recorded for the first time nesting in Greece in the mid-1960s, on the L.

Mikri Prespa, which has since then remained the only breeding site of the species in Greece (Handrinos and Akriotis 1997). In recent years (2001-2007) the population has been estimated at 250-350 pairs (Greek Red Data Book - Legakis and Maragou 2009), with increasing trends. Few Roseate Pelicans winter in Greece, but hundreds of individuals are observed mainly in the wetlands of Thrace and Macedonia during migration. Often, and especially in autumn, juveniles are observed on the Aegean islands. The wintering areas of the Greek population are not known but are most likely located in the large Shand marshes in southern Sudan. There is a rediscovery in Greece (Amvrakikos Gulf) of an individual that had been ringed in Romania (Akriotis and Chandrinos 2004).

The habitat of the species includes fresh or brackish water bodies with rich fish fauna. It is found in lakes, river deltas, lagoons and marshes with abundant aquatic vegetation (mainly extensive reedbeds for nesting and breeding). In Europe the species is migratory (Billerman et al. 2020). The species feeds exclusively on fish. These are stored in the lower jaw pouch upon capture and then, when the bird is on land, are shed and re-eaten. Daily requirements reach 900-1,200 g (Cramp and Simmons 1977). It is a social species and lives in colonies. It ranges in East Africa and south of the Sahara and breeds in southern Europe. It arrives in Greece in April-May and departs for wintering sites around mid-October (the exception is the population of Little Prespa, which is permanent). Foraging is done during the morning hours. For this purpose it can travel long distances of up to 60 or 100 km. It is a monogamous species. It nests in places with dense aquatic vegetation on the banks and usually on islands of lakes. It forms small colonies on islands and reed beds. It usually lays 2 eggs (1-3). Incubation is carried out by both sexes and lasts 29-30 days. In Greece, it nests in small groups and in close contact or among groups of silverback pelicans nesting on the same islands A variable proportion of the breeding population in L. Mikri Prespa population regularly travels to feed also in the lakes Kastoria, Chimaditida, Zazari, Vegoritida and Kerkini, in the Axios-Ludia-Aliakmon Delta and other smaller wetlands in northern Greece, but also in the FYROM. During migration, roseate pelicans are also found in marine areas.

Threats reported in the Greek Red Data Book (Legakis and Marangou 2009) are the low breeding success of the species and declining numbers of breeding pairs due to disturbance by fishermen and visitors, a phenomenon that has nowadays become extinct. The long distance between feeding and nesting sites does not appear to cause a significant reduction in breeding success. Disturbance at feeding sites is present but

does not appear to be serious, mainly due to awareness, especially among fishermen, who no longer pursue pelicans. There is no evidence of a worrying reduction in the abundance and availability of food (fish) or of contamination with poisonous substances. However, the existence of only one colony in Greece makes the species vulnerable.

According to the HCV, the conservation measures required are as follows: Continued monitoring of the breeding population and ensuring high numbers of silver pelicans (the two species nest together and are linked through the phenomenon of social reinforcement). It is also important to ensure safe nesting and feeding sites, such as by maintaining shallow waters free of vegetation and with sufficient fish, through management programmes. Also, investigate the possibility of establishing a second breeding colony and continue to study the species' movements in Greece.

According to the recorded threats in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Extensive aquaculture
- Intensive aquaculture
- Renewable energy: Wind farms
- Renewable energy sources
- Disturbing activities (hunting, logging, fishing, harvesting plants and firewood)
- Wetland drainage and other land reclamation projects
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Increase in the population of indigenous problematic competing species
- Pollution from urban waste water
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are habitat destruction of the species through drainage, encapsulation of rivers and streams for agricultural purposes (irrigation) and agricultural and industrial development (Crivelli et al. 1991, Johnsgard 1993, Nelson 2005, Billerman et al. 2020). Climate variations that have a strong influence on water levels in wetlands, such as flooding leading to the destruction of nesting sites (Billerman et al. 2020) or declining water levels leading to fish kills due to increased

water salinity (Crivelli 1994), also pose significant threats to the species. Also, poaching is another threat to the species (Johnsgard 1993, Billerman et al. 2020), as it is persecuted in fish farms due to the reduction in fish stocks it causes (Crivelli et al. 1991, Kostadinova et al. 2007). There are records of mortality as a result of collision with power lines during migration and it has often been found drowned in fishing nets (Crivelli et al. 1991). Disturbance (Billerman et al. 2020), (e.g. from tourism) threatens breeding colonies (Crivelli et al. 1991) and pesticides, heavy metal contamination and disease could have devastating effects on large colonies in the future (Crivelli et al. 1991, Billerman et al. 2020).

The recommended conservation actions, according to the IUCN, are as follows:

- Monitor and review management practices in key aquatic habitats of the species.
- Protection of the species' feeding and breeding habitats.
- Monitoring of persecution and enforcement of education programs.
- Monitoring heavy metal and pesticide levels and improved management of water bodies to reduce pollutant loads.

Ardeola ralloides

In Europe, the species breeds mainly in Russia, Romania, Turkey, Spain and Ukraine. The European population of the species is estimated at 18 300 - 33 500 pairs (36 600 - 67 000 adults), while in the EU28 the population is estimated at 6 500 - 11 000 pairs (13 100 - 22 000 adults). The Greek population of the species is estimated at 560 - 570 pairs, corresponding to 3 % of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to the IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European conservation concern by Birdlife International (BirdLife International 2017).

In Greece, the species is a locally common summer visitor and a common migrant transient with a wide distribution in the country. The breeding distribution of the species is spread over nine colonies the largest of which are in Kerkini, Axios Delta

and Amvrakikos Gulf (Kazantzidis 2005), while other smaller colonies are found in Petron and Mikri Prespa lakes, the mouth of the river Gallikos and Kalamas Delta (Yfantis and Kazantzidis 2004). A much more widespread and common species during migration, it is found in the larger wetlands of Greece and occasionally, in small groups, in coastal wetlands both on the mainland and islands. Two individuals that were ringed in Voulagria and Romania were found in Fthiotida and Aitoloakarnania respectively, while a cryptocichlid ringed in the Axios Delta was found in Ghana (Akriotis and Chandrinos 20004).

In the Palaearctic, the species has a dispersed distribution and is migratory (Billerman et al. 2020). The species occurs from sea level to 2,000 m elevation. The species breeds from April to July in Eurasia in colonies (also found in mixed-species colonies), which can be up to 2,000 pairs in size. The species roosts in large groups (often of mixed species) (Brown et al. 1982) in protected forests and reedbeds (these roosting sites attract herons that feed up to 80 km away).) (Kushlan and Hancock 2005). The species inhabits permanent or temporary wetlands (Brown et al. 1982), showing a preference for freshwater with abundant marsh vegetation (Billerman et al. 2020), reedbeds, nearby trees and shrubs (Kushlan and Hancock 2005). Habitats for this species include swamp plains, river valleys, river deltas, lakes, canals, ditches, and rice paddies (Billerman et al. 2020). It generally avoids dry habitats and those with very high rainfall (Kushlan and Hancock 2005) and typically breeds in lowlands although it has bred in mountain lakes up to 2,000 m in elevation. It spawns once a year. The nest is a well-constructed platform usually placed less than two metres (occasionally up to 20 metres) high near or above water in reedbeds (Billerman et al. 2020) or in dense trees or shrubs (e.g.e.g. willow (*Salix spp.)* or poplar (*Populus spp.)* (Hafner and Didner 1997; Kushlan and Hancock 2005), preferring nesting sites within five kilometres of feeding areas (Kushlan and Hancock 2005). Lays 4 - 6 eggs. At 30 - 35 days of age, chicks begin to fly and become independent soon after leaving the nest. After spawning, Palaearctic populations migrate south from August to November (Kushlan and Hancock 2005; Billerman et al. 2020), returning to breeding colonies between February and May.

The species feeds solitarily or in small groups of 2-5 individuals during the breeding season although large flocks may form in winter and during migration (Kushlan and Hancock 2005). It feeds mainly on aquatic insects (larvae and perfect),

small fish (up to 10 cm), amphibians (frogs and tadpoles) and grasshoppers, beetles, butterflies, molluscs and spiders, and may occasionally feed on very small birds.

According to the recorded threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Transmission lines (power, telephone), oil and gas pipelines
- accidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Noxious recreational activities
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are loss and degradation of natural and artificial freshwater habitats and deforestation of wet forests (Hafner and Didner 1997).

The recommended conservation actions according to the IUCN are:

- Sustainable management of reedbeds and freshwater habitats, including reduction of water pollution and overexploitation of fish.

Clanga pomarina

The screech-owl is a fairly widespread, locally rather common summer visitor and transient migrant in Greece. A much more common species and with a wider distribution in pre-war years, it now nests in Thrace, Macedonia, Thessaly and Epirus (until recently it also nested in Central Greece) (Handrinos and Akriotis 1997). The breeding population in Greece is estimated at 67-90 pairs (the majority of which in Evros), with a decreasing trend (Chandrinos 1992, Handrinos and Akriotis 1997, BirdLife International 2004, EOE data, Papandropoulos prospectively).

More widespread during autumn migration, when several isolated, mainly young individuals are observed in the south-western Peloponnese, Crete, etc. Four Ringed Screamers ringed in Slovakia (2), Germany and Poland were found in Heraklion, Crete, Zakynthos, Aegina and Korinthia (Akriotis and Chandrinos 2004).

The European population of the species is estimated to number 10,800 - 15,200 pairs (34,200 - 46,200 mature individuals). The Greek population of the species is

estimated to number 70 - 90 pairs, corresponding to <1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as endangered (EN), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by BirdLife International (BirdLife International 2017), while it is also protected by the CITES International Convention (Appendix II).

It is an eagle with a fairly specialised habitat, living in lowland and semi-deciduous forests (nesting in trees), but always in the vicinity of freshwater wetlands (rivers, streams, marshes, wet meadows, etc.), where it finds its prey. It feeds on a wide variety of reptiles, amphibians, small mammals, birds, large insects and rarely carrion (Vlachos 1989, Zogaris et al. 2003). Birds are generally observed singly or in pairs, but will congregate around abundant food sources and migrate in flocks (Snow and Perrins 1998, Ferguson-Lees and Christie 2001, Porter and Aspinall 2010). Birds leave their breeding grounds between August and November and return in March and April (Snow and Perrins 1998, Ferguson-Lees and Christie 2001, Meyburg et al. 2014).

The most serious threat to the species comes from the ongoing degradation and destruction of the freshwater wetlands where it feeds, due to intensification of agriculture (afforestation, clearing of hedgerows and lowland forests, etc.). Locally, it is threatened by human encroachment on nesting habitats, mainly by the operation of quarries, road construction, etc. and perhaps by poaching and pesticides.

A protected species, the majority of its breeding population in Greece is found in Natura 2000 areas (Special Protection Areas)

Specific management plans and effective protection of the areas where the species breeds are required, but especially of its feeding habitats. Systematic monitoring of its populations is also needed.

According to the threats recorded in the list of threats to the species designation (Dimalexis 2009) (species of interest - *the only species designation of GR1260010*), the reported threats to the species are:

- Transmission lines (power, telephone), pipelines, oil, gas
- Inappropriate forest management
- Noisy recreational activities

- Other nuisance activities (military exercises, scientific research, vandalism)
- Deforestation and logging
- Wetland drainage and other land reclamation works
- Erosion control works, cleaning of stream beds, embankments of lakeshores and stream beds
- Destruction of riparian ecosystems
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are habitat loss (particularly wet forest and grassland drainage and ongoing deforestation) and hunting (Ferguson-Lees and Christie 2001). The latter is particularly prevalent during the migration period, with potentially thousands of birds killed annually in southern Europe (Tucker and Heath 1994). It is also highly vulnerable to the effects of potential wind energy development (Strix 2012).

The recommended conservation actions, according to the IUCN, are as follows:

- Conduct surveys with a focus on monitoring population numbers during migration, identifying important migration sites, investigating required habitat (both nesting and foraging) and conservation measures for the species.
- Protect areas located within migration corridors and prevent disturbance near nesting sites (Barov and Derhé 2010).
- Require large-scale conservation measures to protect breeding and foraging habitat (Tucker and Heath 1994).

Ciconia ciconia

The European population of the species is estimated at 251,000 - 282,000 pairs (502,000 - 563,000 mature individuals), while in the EU28 the population is estimated at 156,000 - 168,000 (313,000 - 335,000 mature individuals). The Greek population is estimated at about 2,000 pairs, which corresponds to <2% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece, the species is classified as Vulnerable (VU), while according to the IUCN at European level it is listed as a Species of Reduced Concern (LC) (BirdLife

International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017).

It reproduces from February to April. Nests in loose colonies of up to 30 pairs (Hancock et al. 1992, Elliott et al. 2020) or solitary. The main departure from European breeding grounds occurs in August (Hancock et al. 1992) with species travelling in large flocks (Brown et al. 1982, Hancock et al. 1992), arriving in Africa in early October (Brown et al. 1982). The species inhabits open areas (agricultural crops, mainly rice, cotton and clover near populated areas), shallow marshes, lake shores (Hancock et al. 1992, Elliott et al. 2020), lagoons, floodplains, rice paddies and arable land (Snow and Perrins 1998), especially where scattered trees are present (Elliott et al. 2020). It generally avoids areas of persistently cold, wet weather or large areas of tall, dense vegetation such as reedbeds or woodlands (Hancock et al. 1992, Elliott et al. 2020). During winter the species shows a preference for drier habitats (Hancock et al. 1992) such as grasslands, steppes, and cultivated fields (Elliott et al. 2020). Often species concentrates near ponds (Hancock et al. 1992), streams, ditches (Elliott et al. 2020), or rivers (Hancock et al. 1992). The species is carnivorous and has a varied and opportunistic diet. It feeds on small mammals e.g. mice, juvenile rats (Hancock et al. 1992), large insects (e.g. beetles, grasshoppers, crickets), adult and juvenile amphibians, snakes, lizards, earthworms, fish (Elliott et al. 2020), eggs and chicks from birds and molluscs (Hancock et al. 1992). The nest is made of sticks (Elliott et al. 2020) and is usually placed up to 30 m above the ground (Brown et al. 1982) in trees or on the roofs of buildings, as well as on pillars, and two members of the pair participate in its construction. The species nests solitarily or in loose colonies, often using traditional nest sites (there are records of individual nests being used every year for 100 years) (Hancock et al. 1992, Elliott et al. 2020). Nest sites are usually located close to foraging areas, but may be up to 2-3 km away (Snow and Perrins 1998).

According to the threats recorded in the list of threats to the species of conservation concern (Dimalexis 2009), the reported threats to the species are:

- Crop expansion
- Extension of livestock grazing in wet grasslands
- Water pollution in wetland areas
- Illegal use of poisoned baits to control "pest" mammals
- Accidental killing by hunting or poaching
- Construction of dams and flood protection interventions (irrigation works)

- Drainage of wetlands and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters (waterlogging of receiving waters).

Threats listed on the IUCN red list are habitat alteration, including drainage of wet grasslands (Elliott et al. 2020) (from dams, embankments, pumping stations and canal systems) (Goriup and Schulz 1990), development, industrialization and intensification of agriculture (Hancock et al. 1992) (e.g. ploughing of rough pasture for sowing crops) (Goriup and Schulz 1990). It is also threatened by a lack of nesting sites in some areas (Elliott et al. 2020), as, for example, the roofs of new farm buildings do not support nests and nest substrates on pylons are often destroyed during maintenance work (Goriup and Schulz 1990). The species may also suffer from the overuse of pesticides (Hockey et al. 2005) in agriculture, and through the consumption of poisoned baits intended to kill large carnivores (Elliott et al. 2020). Another serious threat is collision and electrocution on overhead power lines, especially during migration to Europe (Hancock et al. 1992).

The recommended conservation actions, according to the IUCN, are as follows:

- A report by the International Council for the Conservation of Birds (ICBP) suggests that habitat management for the species should include periodic flooding of grasslands, creation of native grassland mosaics, and maintenance or creation of ditches and ponds (Goriup and Schulz 1990). Also, according to the above report, proposed management strategies in relation to power poles, such as undergrounding or marking overhead cables, are very important to reduce electrocution and impact threats (Goriup and Schulz 1990). Also, avoiding disturbance to nests during maintenance of power poles is important
- Because of the species' habit of defecating on its legs to regulate body temperature in warm climates, it is not recommended that tracking rings be placed on the legs (dry uric acid accumulates in the legs and hardens around the leg tracking rings, tightening them and leading to injury) (Goriup and Schulz 1990). Therefore, other methods of tracking movements, such as satellite telemetry or flap tags are recommended (Goriup and Schulz 1990)
- Monitoring of breeding, migration, wintering numbers and ecological changes in key breeding habitat locations
- Sustainable management of river valleys and wet grasslands

- The abandonment of grasslands, afforestation of farmland and drainage of wet grasslands and inland wetlands in key breeding areas should be stopped.

Ciconia nigra

The black-backed stork is a rare and local visitor and a transit migrant in Greece. Although probably never a common species even in the past, it is currently breeding in northern Greece, mainly in Thrace (especially in southern Evros), Macedonia, Epirus, locally in Thessaly, and Lesvos (6-8 pairs). The total population in Greece is estimated at 70-100 pairs. (of which about 50 pairs breed in Evros), with stable trends.

The European population of the species is estimated at 10,100-16,200 pairs (20,200-32,400 mature individuals), while in the EU28, according to the IUCN red list, it is estimated at 6,600-10,400 pairs (13,300-20,700 mature individuals). The Greek population is estimated to number 110-170 pairs, corresponding to 1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as endangered (EN), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by BirdLife International (BirdLife International 2017), while it is also protected by the CITES International Convention (Appendix II).

During migration it has a wider distribution but remains rare. There are no counts from the migration period, although the presence of small or medium-sized flocks is not uncommon in BA. Greece. The maximum count in Greece was about 400 individuals in the Evros Delta (15-9-2006), while in autumn small flocks or individual birds head south over the Peloponnese (maximum count of a flock of 11 individuals over L. Two individuals ringed in Croatia and the Czech Republic were found in Messolonghi and Heraklion, Crete, respectively (Akriotis and Chandrinos 2004).

A relatively shy and much less anthropophilic species than the White Stork (*Ciconia ciconia*). It nests solitarily, far from settlements, usually in trees and less often on rocks, in hilly, semi-mountainous areas, with coniferous, deciduous or mixed forests, valleys, clearings, small crops, etc, but always in the vicinity of freshwater wetlands (streams, marshes, wet meadows, etc.), where it finds its prey. The species is found from sea level to 2 000 m altitude. It generally avoids large bodies of water and dense

forests. Outside the breeding season it frequents wetlands, coastal or inland, often in association with white storks, herons, etc. It feeds mainly on small fish, reptiles and amphibians (especially frogs), small mammals and, more rarely, small birds. It is a monogamous species. It has one oviposition per year and the female lays 3-5 eggs. It is a species that has not been well studied in Greece (Handrinos and Akriotis 1997). The species is migratory. During migration it travels either singly or in small groups of up to 100 individuals (Snow and Perrins 1998). The species can use nests of other birds and usually reuses the same nest for consecutive years (Billerman et al. 2020).

It is mainly threatened by misapplication of forest management practices (reforestation, clear-cutting, opening of forest roads, etc.), but particularly by degradation and destruction of wetland habitats where it feeds (browsing, marsh drainage, stream alignments, etc.), reduction of prey due to pollution, disturbance, collision with power lines, etc. Protected species, most of the breeding population in Greece is found in Natura 2000 areas (Special Protection Areas). Management and protection of both nesting areas and foraging habitats is required (adoption and implementation of agri-environmental measures, conservation of wetland areas, etc.), systematic census of the breeding population in Greece and study of the biology and ecology of the species, as well as its migratory movements in Greece.

According to the threats recorded in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Expansion of crops in wetlands
- Extension of livestock grazing in wet grasslands
- Mining activities quarries - mines
- Construction of roads of all categories, including railways
- Transmission lines (electricity, telephone), oil and gas pipelines
- Illegal use of poisoned baits to control 'noxious' mammals
- Accidental killing by hunting or poaching
- Improper forest management
- Nuisance activities (hunting, logging, fishing, plant and firewood collection)
- Construction of dams and flood protection measures, irrigation networks
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are the degradation of their habitat (Hancock et al. 1992, Lohmus and Sellis 2003, Diagana et al. 2006). The area of suitable habitat available for breeding is being reduced through deforestation (Elliot et al. 2014), particularly the destruction of large traditional nesting trees (Hancock et al. 1992). Rapid development of industry and agriculture, dam construction (Balian et al. 2002), drainage of lakes for irrigation and hydropower generation, desertification and pollution caused by the concentration of pesticides and other chemicals are major threats to the species. The species is also occasionally killed by collisions with power lines and poaching in southern Europe (especially during migration) has caused a decline in the population.

The proposed conservation actions, according to the IUCN, are as follows:

- Retention of large mature trees during forest management is important to provide nesting sites (Lohmus and Sellis 2003)
- Conservation measures aimed at increasing the reproductive success and population density of the species should cover large areas of mainly deciduous forest, should focus on river quality management within 20 km of nesting sites, should aim to protect and manage foraging habitats and improve food availability by creating shallow artificial water bodies along rivers or in grasslands (Jiguet and Villarubias 2004)
- Monitoring of breeding, migration, wintering numbers and ecological changes in the species' key habitats
- Undergrounding or marking of power cables.
- Prevent poaching and overfishing of fish.

Circus aeruginosus

The species in Northern Europe is migratory. Southern populations are partially migratory or simply move to neighbouring areas. Several individuals are resident in Greece, while in Western Europe it is also generally epidemic (Ferguson-Lees and Christie 2001, Orta et al. 2020).

The European population of the species is estimated at 151,000 - 243,000 breeding females (303,000 - 485,000 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 53,200 - 88,000 breeding females

(106,000 - 176,000 mature individuals). The Greek population is estimated to number 50 - 100 pairs, less than 1 % of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017), while it is also protected by the CITES International Convention (Appendix II).

The species nests in the large wetlands of Macedonia and Thrace and the Amvrakikos Gulf in Western Greece. Common during migration is observed throughout the mainland but also on many Aegean islands and Crete (Handinos and Akriotis 1997). Migratory birds leave their breeding grounds in September and October, wintering from southern France south to sub-Saharan Africa (Orta et al. 2020). They begin their return journey in February and March, arriving in March and April (Snow and Perrins 1998; Ferguson-Lees and Christie 2001; Orta et al. 2020). Migration is generally on a broad front, although there is some concentration at a few sites (Brown et al. 1982). Hundreds of birds are occasionally found at roosting sites, sometimes with other cicadas such as *Circus pygargus*, but they are usually solitary and are usually found in groups only temporarily in particularly rich feeding areas (Snow and Perrins 1998, Ferguson-Lees and Christie 2001, Orta et al. 2020). Birds fly about 10-30 m above the ground (Brown et al. 1982).

The species inhabits extensive areas of dense vegetation in fresh or brackish water, mostly in lowland areas (Orta et al. 2020), up to 400 m in elevation (Hagemeijer and Blair 1997). Its diet consists mainly of small birds, but it supplements its diet with mammals such as rabbits and rats, as well as amphibians and fish.

The species nests on the ground, preferring extensive reedbeds (Cramp and Simmons 1980; Ferguson-Lee and Christie 2001). The nest is a pile of reeds built in dense vegetation. It usually lays three to six eggs (Orta et al. 2020).

According to the listed threats in the Threats to Species of Concern (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Illegal use of poisoned baits to control "pest" mammals
- Molybdenum from buckshot
- Changes in the frequency and intensity of forest fires (increase or decrease)

- Wetland drainage and other land reclamation works
- Erosion control works, stream bed cleaning, embankments of lakeside and stream beds and the filling of soils, streams and creeks
- Filling of soils, streams and coasts.

Threats listed on the IUCN red list include: drainage and drainage of wetlands, poaching, overuse of pesticides in and around wetlands (Ferguson-Lees and Christie 2001, Orta et al. 2020). The species is also very vulnerable to the impacts of potential wind energy development (Strix 2012).

The proposed conservation actions, according to the IUCN, are as follows:

- Conservation of the species' wetland habitats, with legal protection, and restoration of already degraded wetlands
- Avoiding disturbance around nesting areas during agricultural operations until the chicks are fledged.

Circus cyaneus

The species breeds from Ireland to European Russia (Orta et al. 2014), while it does not breed in the Balkans, Italy, Switzerland and Austria (Hagemeijer and Blair 1997). In Greece, the winter wren does not nest and is only found as a winter visitor. A significant number of individuals pass through Greece during migration, following a route from the Aegean Sea, the southern Peloponnese, the Ionian Sea and leaving towards southern Italy. From there they continue their journey to the countries where they will give birth.

The European population is estimated at 56,300 - 86,600 breeding females (112,000 - 174,000 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 10,500 - 15,200 pairs (21,100 - 30,300 mature individuals) (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species has not been assessed as being under threatened status (NE), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021).It is also classified as a SPEC 3 species of European interest for protection by BirdLife International (BirdLife International 2017), and is protected by the CITES Convention (Appendix II).

The species is observed throughout the mainland as well as the islands (Handrinos and Akriotis 1997).

The habitat of the species is marshes with low vegetation, grasslands and generally open areas. It is also found in fringing ecosystems, even at high altitude, in large open, wet areas including peat bogs, riparian woodlands, marshy meadows, brackish marshes, dry uplands including upland meadows and areas adjacent to coniferous forests. In Greece, wintering gulls are observed in a variety of habitats during migration (e.g. high mountains, rocky gorges) and during winter they descend to flat, open areas such as farmland and meadows, preferably near wetlands (Handrinos and Akriotis 1997). A finicky wetland predator, 43-51 cm long, with a long tail and slightly curved wings. The male winter warbler has beautiful, pale grey plumage with black 'noses' on the wings. The male's coloration and gentle flight give this predator the appearance of a seagull from a distance. He holds his wings above the horizontal in an open V and glides on the air currents, low and light. The female and juveniles are dark brown on top with many yellowish streaks on the underside and a distinctive white spot at the base of the tail. Spawning begins in mid-April and continues until early July but varies according to the latitude of the species' distribution. It nests on the ground, in dense grass or shrubs, crops or marsh vegetation. Its diet consists mainly of small mammals such as mice and squirrels, and it also preys on small mammals in open habitats, particularly in the *Passeridae* family. Birds are often the main prey in the breeding season. It also feeds on reptiles and insects (Cramp and Simmons 1980; Ferguson-Lee and Christie 2001; Leckie et al. 2008; Arroyo et al. 2009).

According to the recorded threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Wetland drainage and other land reclamation projects
- erosion control works, cleaning of stream beds, embankments and embankments of lakeshores and stream valleys
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive farming and livestock farming
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed in the IUCN red list are: habitat destruction and shrinkage due to intensive agriculture, drainage of swamps and marshes and deforestation. The species is also threatened by poaching in Central and Eastern Europe (Tucker and Heath 1994).

The recommended conservation actions, according to the IUCN, are as follows:

- Conservation of large open areas such as steppes, wet grasslands and low grazing intensity grasslands
- Afforestation of riparian and upland shrublands should be prohibited in areas where these habitats are threatened
- A ban on poaching.

Circus pygargus

The species is fully migratory and is found, over its wide range of distribution, only as a summer breeding visitor, wintering and migratory.

The European population of the species is estimated at 69,700 - 110,000 breeding females (139,000 - 219,000 adults), while in the EU28, according to the IUCN red list, the population is estimated at 14,300 - 20,200 breeding females (28,600 - 40,400 adults). The Greek population of the species is estimated to have 5-10 pairs, less than 1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as a threatened species (CR), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of their protection by Birdlife International (BirdLife International 2017), while it is also protected by the CITES International Convention (Appendix II).

European populations of the species winter in sub-Saharan Africa (Ferguson-Lees and Christie 2001, Orta et al. 2020). It leaves its breeding grounds in August and September and returns in March and April (Snow and Perrins 1998, Orta et al. 2020). In Greece, the species is found in western Macedonia in the Florina area and perhaps in the northern part of Evros in Thrace, but is more common during migration (Chandrinos 1992, Handrinos and Akriotis 1997) The Willow Grouse tends to hunt alone, although it has been observed to form groups (often over 50 individuals) with *Circus macrourus* and *Circus aeruginosus* at high prey concentrations (Ferguson-Lees and Christie 2001). The species prefers open habitats usually in lowland areas. It nests on tall ground vegetation in mainly cereal fields, but there is evidence that it may also

nest in alpine meadows. It lays 3-5 eggs. Diet consists mainly of mammals and small birds, reptiles and large insects.

According to the threats recorded in the list of threats to the species of conservation concern (Dimalexis 2009), the reported threats to the species are:

- Expansion - intensification of annual crops
- Increased expansion of agricultural expansion and expansion of agricultural activities; - Illegal use of poisoned baits to control 'noxious' mammals
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive farming and livestock production
- Pollution from agrochemicals run-off into receiving waters, waterlogging of receptors.

Threats listed on the IUCN red list include conversion of habitat to agricultural land, as the use of harvesters to harvest crops often causes failure to reproduce (Orta et al. 2020, Ferguson-Lees and Christie 2001). Intensification and changes in agricultural practices could potentially deplete food reserves for the species. (Ferguson-Lees and Christie 2001, Orta et al. 2020). Also, in the past, the use of strong pesticides appeared to cause declines in European populations (Ferguson-Lees and Christie 2001). The species is also very vulnerable to the effects of potential wind energy development (Strix 2012).

The proposed conservation actions, according to the IUCN, are as follows:

- Maintain tall vegetation during the breeding season, as mortality rates of chicks are high when agricultural operations are occurring
- Key management actions include moving nests to safe places during agricultural harvesting, and no agricultural work should take place around nesting sites
- Research on migration corridors and the locations of stopover and wintering areas of the species would result in better development of conservation measures (Trierweiler 2010).

Circus macrourus

The European population of the species is estimated to number 1,000 - 2,200 breeding females (2,000 - 4,300 mature individuals), while in the EU28 the population

of the species is estimated at 10 - 50 breeding females (20 - 100 mature individuals) (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece there are insufficient data to assess its threatened status (DD), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021) It is also classified as a SPEC 1 species of European interest for protection by Birdlife International (BirdLife International 2017), and is protected by the CITES International Convention (Appendix II).

The species is a transient visitor from Greece and is observed throughout mainland Greece as well as on the islands (Handrinos and Akriotis 1997).

The species breeds in uncultivated grasslands and avoids very dry open areas, choosing wetter areas for breeding with sparse shrubs and scattered trees (Tucher and Heath 1994). It nests at altitudes above 1,000 m in its breeding areas (Hagemeijer and Blair 1997). The species is migratory, with most birds wintering in sub-Saharan Africa or Southeast Asia. The species leaves breeding grounds between August and November and returns to them in March-April, nesting in small colonies. The nest consists of grass and is placed on the ground protected by tall vegetation. It lays 3-6 eggs (usually 4 or 5). The diet consists mainly of small birds and rodents but also lizards, which it captures in flight and on the ground (Tucker and Heath 1994). Although the species is most often found singly, females and juveniles form groups of 10-15 individuals during migration (Snow and Perrins 1998; Ferguson-Lees and Christie 2001).

According to the recorded threats in the List of Threats to Species of Concern (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Illegal use of poisoned baits to control "pest" mammals
- Drainage of wetlands and other land reclamation projects
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive farming and livestock farming
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed in the IUCN red list are mainly, degradation and destruction of steppe grasslands through conversion to cropland, burning of vegetation (by farmers or

storms), intensive grazing of wet grasslands, and clearing of shrubs and vegetation barriers (Galushin et al. 2003).

The recommended conservation actions, according to the IUCN, are as follows:

- Conservation of wetlands
- Supporting moderate grazing and maintaining grasslands
- Develop survey methodology (including Geographic Information Systems-GIS) and conduct surveys, particularly in breeding areas and in the northern and southern areas of the species' range. Search for new nesting areas. Carry out research on the size of the foraging area of the species and their role in the movement of populations
- Introduce and enforce legislation to promote the recovery of the agricultural economy in breeding areas
- Encourage full legal protection and education in countries that are migratory corridors for the species.

Milvus migrans

The European population is estimated at 186,000 - 254,000 pairs (372,000 - 507,000 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 51,300 - 63,500 pairs (102,000 - 127,000 mature individuals). The Greek population is estimated at 20 - 40 pairs, corresponding to <1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece, the species is classified as threatened (CR), while according to IUCN at European level the species is listed as of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European interest in terms of protection by BirdLife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

Although the species has never been a common species in Greece, it used to have a wide distribution and a larger population. In the last 3-4 decades, its population has declined significantly in Greece. It nests in only a few sites in Thrace, Macedonia, Western Thessaly and probably in Epirus. In the large wetlands of northern and western Greece it is also observed as a winter visitor, as well as in Crete where several

individuals winter mainly in the plain of Messara and the Asterousia Mountains in the prefecture of Heraklion (Handrinos and Akriotis 1997). Three ringed individuals in Germany were found in Laconia, Kythera and Pyrgos Ilia (Akriotis and Chandrinos 2004).

The species occurs in a wide range of habitats such as dry and open areas, fragmented forest areas, lakes and rivers adjacent to forests with sparse tree cover. It is found at altitudes of up to 1 000 metres. In Europe, unlike elsewhere, it generally avoids breeding in urban areas (Hagemeijer and Blair 1997). The species is migratory with a wide geographical distribution. It arrives at breeding sites between February and May (Ferguson-Lees and Christie 2001). Eggs are laid between March and June. It ranges from sub-Saharan Africa to southern Africa (Orta et al. 2020). It nests in trees forming small colonies (2 to 30 pairs) and on rocks (Sergio and Boto 1999). It builds its nest in forks of trees, mainly pine or oak. It uses the same nest for several years or several times builds a new nest close to the old one in the same tree. It feeds on insects, birds, lizards, snakes, rodents, amphibians, dead fish and sometimes animal carcasses (Sergio and Boto 1999). Also, human waste has become a food source in many areas. It seeks its food by flying close to the ground surface.

According to the listed threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Intensive and intensive livestock farming
- Illegal use of poisoned baits to control 'pest' mammals
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming
- Pollution from agrochemicals discharged into water bodies, waterlogging of receptors.

The threats listed on the IUCN red list are poisoning, poaching and water pollution from pesticides and other chemicals (Orta et. al. 2020). Poisoning and water pollution continue to cause declines in populations of the species in Europe. Although it has adapted to the presence of humans and inhabits habitats close to urban areas, particularly in terms of feeding, urban modernization has been accepted as reducing available foraging habitat (Ferguson-Lees and Christie 2001). Finally, the species is highly vulnerable to the impacts of potential wind energy development (Strix 2012).

The proposed conservation actions, according to the IUCN, are as follows:

- Develop and implement stronger legislation against poisoning, poaching and pollution
- Appropriate assessments of the impacts of wind energy development.

Pernis apivorus

The European population of the species is estimated at 120,000 - 175,000 pairs (241,000 - 350,000 mature individuals), while in the EU28 the population is estimated at 44,000 - 71,100 pairs (95,600 - 151,000 mature pairs). The Greek population is estimated to number 1,000 - 2,000 pairs (BirdLife International 2021), corresponding to 1% of the European population.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017), and it is also protected by the CITES International Convention (Appendix II).

The species has a wide distribution in Greece although the main population is found in northern Greece (Macedonia, Thrace). It is also quite common during migration where large groups of 20-50 individuals are often observed on the eastern Aegean islands and Crete (Handrinos and Akriotis 1997, Agostini et al. 2007).

The species is migratory and winters in tropical Africa. It leaves breeding grounds in August and September and returns between April and June (Orta et al. 2020). The birds are mostly solitary except during migration, when they flock and congregate in large numbers at preferred transit points (Ferguson-Lees and Christie 2001, Orta et al. 2020). It is found in forests, preferably deciduous, but also in mixed forests in temperate and northern zones up to 1,500 m elevation. It also uses a variety of habitats with forested and open areas, including soils and cultivated land. It feeds primarily on wasps and secondarily on rodents, small birds and eggs. Nests are built on branches, preferably in deciduous trees. It usually lays two eggs (Orta et al. 2020).

According to the recorded threats in the list of threats to the species designation (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Inappropriate forest management
- Unmanaged forest management

- Other nuisance activities (military exercises, scientific research, vandalism)
- Deforestation and logging
- Changes in the frequency and intensity of forest fires (increase or decrease),
- Abandonment of traditional agricultural practices and land use (including abandonment of extensive agriculture and livestock farming)
- Pollution from agrochemicals discharged into water bodies (water logging).

Threats listed on the IUCN red list include: poaching during migration, particularly in Italy, Malta and Lebanon (Ferguson-Lees and Christie 2001; Orta et al. 2020). The population decline in Northern Europe is due to deforestation and inappropriate forest management. Human habitat disturbance is also a threat to the species. Pesticide use has not had a significant impact in Europe (due to its ecological requirements - the species lives in woodlands and feeds mainly on wasps). It is also very vulnerable to the effects of potential wind energy development (Strix 2012).

The recommended conservation actions, according to the IUCN, are as follows:

- Prevention of poaching
- Promotion of low-intensity agriculture and forestry
- Minimise disturbance during the breeding season.

Haliaeetus albicilla

The European population of this species is estimated to number 10 400 - 14 600 pairs (20 900 - 29 200 mature individuals), while the wintering population is estimated at 10 900 - 17 600 individuals. In the EU28 the population is estimated at 4,800 - 6,300 pairs (9,600 - 12,600 mature individuals). The Greek population of the species is estimated to number 8 - 10 pairs, corresponding to <1 % of the European population (BirdLife International 2021).

Norway and Russia hold more than 55% of the European population. The species in Greece is epidemic and is found in almost all the large wetlands of northern Greece (Evros Delta, Lakes Vistonida and Mitrikou, Nestos Delta, Lake Kerkini and Koronia, Aliakmonas Delta) (Handrinos and Akriotis 1997).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions. According to the Greek Red Data Book in Greece the species is classified as a threatened species (CR), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife

International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017), while it is also protected by the CITES International Convention (Appendix I).

The sea eagle used to have a wide distribution and nested in many areas of mainland Greece, and perhaps also on some islands: Until the early 1960s there were e.g. 10-12 pairs. only in the Evros Delta (Handrinos and Akriotis 1997). Today the species nests only in a few large wetlands in Thrace, as well as in Eastern and Central Macedonia. In the large wetlands of northern Greece, especially in the Evros Delta, a population of sea eagles of mainly juvenile and immature birds regularly overwinters, with an average of 8-10 individuals per year. A very rare species in southern Greece and on the islands, with few records so far (Lesvos, Crete, etc.), perhaps from individuals moving along the coasts of Asia Minor (Chandrinos 1992; Handrinos and Akriotis 1997; Helander and Stjernberg 2002).

In Greece, the species occurs in large wetlands (river deltas, lagoons, lakes) and nests in large trees, riparian and other lowland forests. It feeds mainly on fish and waterfowl, often injured by hunters, but also on mammals, carrion, etc. However, our knowledge of the biology and ecology of the species, especially during the breeding season, is still scarce. It is mainly threatened by the degradation of wetlands and lowland forests, as well as poaching, poisoned baits, lead poisoning from buckshot and perhaps heavy metal poisoning, etc. It is a species particularly sensitive to disturbances during the nesting period, a period during which it may also face problems of food shortage, which explains the low reproductive success of the species in Greece. A protected species, almost the entire breeding and wintering population in Greece is found in Natura 2000 sites (Special Protection Areas). Locally, as in the Dadia National Park, it also benefits from the vulture feeder. Strict protection is needed for all pairs and nesting sites, as well as wintering and feeding areas of the species, particularly with regard to poaching and the use of lead shovels in wetlands. There is also a need to investigate the threats facing the species, such as the impact of heavy metals, and to study its reproductive biology and ecology. The provision of supplementary feeding (feeders), at least for some pairs, during the summer period should also be investigated.

According to the recorded threats in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Expansion - intensification of annual crops

- Extensive expansion and intensification of agricultural activities
- Commercial - industrial development (ports, airports, industrial zones)
- Tourism - recreational infrastructure (ski resorts, golf courses, campsites)
- Construction of all types of roads and railways
- Hunting - poaching - trapping - collection of eggs or chicks - destruction of nests
- Illegal use of poisoned baits to control 'noxious' mammals
- Accidental killing by hunting or poaching
- Improper forest management
- Lead poisoning by buckshot
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Noxious recreational activities
- Other nuisance activities (military exercises, scientific research, vandalism)
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Wetland drainage and other land reclamation works
- erosion control works, cleaning of stream beds, embankments and embankments of lakeshores and gullies
- Abandonment of traditional agricultural practices and land use, including extensive agriculture and livestock farming
- Pollution from industrial or military activities
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Solid waste and waste.

Threats listed on the IUCN red list include wetland loss and degradation, human disturbance and persecution, environmental pollution, conflict with wind turbines (Krone and Scharnweber 2003), and indiscriminate use of poison baits and pesticides. Also, modern forest management methods reduce the availability of suitable habitat (Orta et al. 2013).

The recommended conservation actions, according to the IUCN, are as follows:

- Preventing the loss of nesting and foraging habitat due to inappropriate forest management
- Protection of nesting sites from human disturbance/destruction and egg collection

- Taking measures against poaching and the use of poisoned baits to combat 'harmful' predators
- Providing food at feeding stations (feeders) in some areas will aid juvenile survival and increase reproductive success rates (Tucker and Heath 1994).

Bubo bubo

The species is epidemic with the European population estimated at 18,500 - 29,800 pairs (37,100 - 59,500 pairs), while in the EU28, according to the IUCN red list, the population is estimated at 13,000 - 18,200 pairs (26,000 - 36,400 adults). According to the same source, the species is considered to be of reduced concern (LC). The Greek population is estimated at 300 - 700 pairs and constitutes 2% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened and is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European interest in terms of protection by Birdlife International (BirdLife International 2017) and is also protected by the CITES International Convention (Appendix II).

The species is distributed throughout mainland Greece but with a sparse distribution from Thrace to the Peloponnese, and on the islands it is found nesting on Lesvos (Pieper 1981; Handrinos and Akriotis 1997).

The species occurs mainly in rocky areas with cliffs and ravines, caves, parts of woodlands, scattered trees and groves. It also uses river valleys with gorges, woodlands, and fields with suitable rocky areas or cliffs and abandoned quarries for feeding. The species prefers sheltered rocks or crevices on steep slopes, in the ground, or in cave entrances for nesting. Occasionally uses old tree nests of other species for nesting and rarely nests in tree cavities. It feeds mainly on mammals from small rodents to rabbits and heron-sized birds, but its diet includes frogs, reptiles, fish and larger insects.

According to the recorded threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Tourism - recreational infrastructures (ski resorts, golf courses, golf courses, camps)

- Mining activities: quarries - mines
- Transmission lines (electricity, telephone), oil and gas pipelines
- Hunting - poaching - trapping - collecting eggs or chicks - destroying nests
- Illegal use of poisoned baits to control 'noxious' mammals
- Improper forest management
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Construction of dams and flood protection measures, irrigation networks
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive farming and livestock farming
- Extension - intensification of annual crops
- Residential development, urban or extra-urban, legal or arbitrary.

Threats listed on the IUCN red list are human activity and disturbance. It is an extremely sensitive species and the slightest disturbance can cause nest abandonment. Recreational activities such as skiing and mountaineering lead people to unknown nesting sites of the species (Tucker and Heath 1994). It also suffers from poisoning and impacts on overhead cables (power, telephone).

The recommended conservation actions, according to the IUCN, are as follows:

- Protecting nesting sites from development and extensive logging (Holt et al. 2013)
- Increase public awareness of the species' sensitivity to human disturbance (e.g., birdwatchers, photographers) (Tucker and Heath 1994)
- Enhancing the protection of the species.

Aegolius funereus

The European population of the species is estimated at 94 600 - 236 000 pairs (189 000 - 471 000 mature individuals), while in the EU28 the population is estimated at 20 900 - 128 000 pairs (41 900 - 255 000 mature individuals). The Greek population is estimated to number 10-100 pairs, which is less than 1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece there are insufficient data to assess the threatened status (DD), while according to the IUCN at

European level the species is not classified as threatened (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International, while it is also protected by the CITES International Convention (Appendix II).

It is mainly distributed in the Alps of Central Europe, the Dinaric Alps, Scandinavia, and northern Russia. In Greece, it is found in small populations in the Rhodope Mountains, on Mount Olympus and Pindos.

It is a forest-dwelling species. It breeds mainly in coniferous forests of spruce and fir, or mixed with conifer, and even pure pine forests (Hagemeijer and Blair 1997), usually up to 1,800 m altitude. It nests in tree holes or uses oak tree nests. Rarely uses artificial wooden boxes. Breeding may begin in February in a good year (Mikkola 1983) and continue until July (Holt et al. 1999), but most eggs are laid in April. It lays 3 - 7 eggs. Feeds primarily on small mammals, rodents and shrews, and secondarily on small birds and large insects (Snow and Perrins 1998). It has also been recorded feeding on bats and frogs (Mikkola 1983). The species is generally endemic, but disperses in years when prey is scarce (Holt et al. 1999).

Threats listed on the IUCN red list are forestry which has resulted in the elimination of nest cavities and reduced prey populations (Holt et al. 1999). The species once frequently used old black woodpecker (*Dryocopus martius*) holes, but the decline of the species has resulted in fewer nesting opportunities (Mikkola 1983). Hoopoes (*Strix aluco*) and skunks (*Martes spp.*) are serious predators of this species, and in some years the latter can destroy a high birth rate and kill many females in the nest. It is also vulnerable to pesticides (König et al. 2008).

The recommended conservation actions according to the IUCN are as follows:

- Careful forest management (selective logging) that allows the species to maintain suitable habitat
- Provision of artificial nesting boxes, which has proven to be an effective practice should be continued
- Predation of nests by skunks can be avoided by using appropriate techniques at artificial nesting sites (König et al. 2008).

Falco naumanni

The species is migratory and in Europe breeds mainly in Spain, Italy and Greece. Small populations of the species are also found in Russia, Azerbaijan, Turkey and Portugal.

The European population of the species is estimated at 32,900 - 42,600 pairs (65,900 - 85,200 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 29,000 - 32,500 pairs (58,000 - 65,000 mature individuals). The Greek population is estimated to number about 7,100 pairs, corresponding to 19 % of the European population (BirdLife International 2021). The population trend, both at European and EU28 level, is decreasing.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions. According to the Greek Red Data Book in Greece the species is classified as VU, while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European interest in terms of protection by Birdlife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

The species is mainly found in Central and Western Greece (Epirus, Thessaly, Sterea Greece), usually in settlements near large lowland areas (Handrinos and Akriotis 1997). Much more common species and with a wider distribution in the past, until the early 1960s, while afterwards it suffered a dramatic decline and shrinking of its distribution (Handrinos and Akriotis 1997). In Greece there are at least 140 colonies, with the most important population occurring in the Thessalian plain (Legakis and Marangou 2009). There is one rediscovery of the species in Greece (one individual) that was ringed in Austria (Akriotis and Chandrinos 2004).

The species is usually found in colonies, often close to human settlements, on steppes, natural and managed grasslands, open bushland (toasty grasslands), low hills with little vegetation and non-intensive crops. The birds leave their breeding grounds in September and return between February and April (Orta and Kirwan 2020). They migrate in flocks of various sizes, usually tens to low hundreds, often with other hawks such as *F. tinnunculus*, *F. vespertinus* and F. *amurensis* (Ferguson-Lees and Christie 2001). They cross water bodies by flying high enough to be barely detectable, while

over land they fly low (about 20-30 m), especially during the northward migration (Brown et al. 1982; Ferguson-Lees and Christie 2001).

Breeds colonially (usually 15-25 pairs) and nesting occurs mainly in May, nesting mainly in human structures such as large old buildings, walls and ruins, in settlements and rubble in rural areas, in cracks or under roofs, but also uses natural sites, for example rock hollows, quarries and occasionally old nests. It also uses artificial crates for nesting and occasionally nests on the ground (Vlachos et al. 2004b). The foraging habitat of the species consists of open areas with low vegetation and bare ground, as well as grasslands and hunts almost exclusively in rural areas with dry insect crops. Its diet consists almost exclusively of insects that it captures in the air and on the ground, and it rarely feeds on lizards and small rodents (Vlachos et al. 2003). The species winters in sub-Saharan Africa.

According to the Greek Red Data Book (Legakis and Maragou 2009), the threats to the species are the possible loss of habitat on wintering grounds in Africa and during the migration period. In Greece, the main problems facing the species are the intensification of agriculture, which restricts foraging areas (grasslands, areas under fallow, uncultivated zone between fields), the restriction of non-irrigated crops, such as cereals, due to the development of irrigated crops, resulting in the restriction of orthopterans and other insects and invertebrates, which are the main food source of the species, and the reduction of grassland near settlements by converting it into crops or afforesting it. Furthermore, intensive use of pesticides also leads to a reduction in food availability and possibly causes poisoning problems for the birds themselves (Sfougaris et al. 2004). The reduction of available nesting sites in settlements is a limiting factor for the species. This reduction is due to the destruction of old buildings (houses, shelters, warehouses, dovecotes, etc.) or their repair with new materials. Finally, in some areas there is harassment and persecution by people, but usually the circus birds are accepted in the settlements.

According to the recorded threats in the list of threats to the species of designation (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Expansion - intensification of annual crops
- Extensive expansion and intensification of agricultural activities
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming

- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are habitat degradation and loss, mainly as a result of intensification of agriculture but also deforestation and urbanization. Pesticide use can cause direct mortality, but also indirect mortality through the reduction of its prey. Renovation of old buildings has resulted in the loss of nesting sites (Davygora 1998).

The recommended conservation actions, according to the IUCN, are as follows:

- Monitoring of the species and encouraging research on limiting factors, and appropriate habitat management
- Promote appropriate agricultural policies (extensive farming), control of pesticide use, construction of artificial nesting sites
- Protection of colonies.

Aquila fasciata

The species is epidemic, with the European population estimated at 1,000 - 1,300 pairs (2,100 - 2,500 mature individuals), while in the EU28 the population is estimated at 1,000 - 1,200 pairs (2,100 - 2,400 mature individuals). In Greece, the population is estimated to number 100 - 140 pairs, which corresponds to about 10 % of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European interest in terms of protection by BirdLife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

In Greece, the species is mainly found in western and southern Greece, as well as in the Peloponnese, with a high density of pairs in Mani. On the islands it spreads throughout the Aegean Sea and Crete, the Cyclades and the Dodecanese (Handrinos and Akriotis 1997, Bourdakis and Xirouchakis 2009).

The species is epidemic in Greece. The distribution of the species in Greece coincides, in general, with the distribution of mainly the island partridge and the wild

rabbit, which are its main prey on the islands (Handrinos and Akriotis 1997). Some pairs in mainland Greece are relatively isolated, but populations in some areas (mainly on the Aegean islands) are particularly dense.

Typically a Mediterranean eagle species. The species is found in open rocky habitats (such as rocky coasts and rain islands) with sparse macro vegetation and toadstools, in pine forests and evergreen forests alternating with habitats with small dry low-intensity crops from sea level to 1.500 m elevation (Tucker and Heath 1994; Hagemeijer and Blair 1997). Mature individuals typically occupy areas near large aquatic ecosystems (Ferguson-Lees and Christie 2001). In the Mediterranean region, spawning occurs mainly from February to mid-March. (Orta et al. 2016). The nest is reused for successive years (Ferguson-Lees and Christie 2001). The diet consists mainly of small to medium-sized birds, but will also hunt mammals, some reptiles and insects (Ferguson-Lees and Christie 2001).

According to the listed threats in the species of interest (species of interest) listed in the species of interest threat list (Dimalexis 2009), the reported threats to the species are:

- Residential development, urban or unplanned, legal or arbitrary
- Tourism - recreational infrastructure (ski resorts, golf courses, golf courses, golf courses, camps)
- Mining activities: quarries - mines
- Renewable energy: Wind farms
- Construction of all types of roads and railways
- Transmission lines (electricity, telephone), oil and gas pipelines
- Pursuit by specific users as harmful
- Disturbing activities (hunting, logging, fishing, gathering of plants and firewood)
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Construction of dams and flood protection measures, irrigation networks
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming
- Changes in the extent and distribution of habitats due to climate change.

Threats listed on the IUCN red list are pesticide use, which affected the species in the mid-20thcentury and since then populations have not recovered. Since the 1950s, the species' populations have declined throughout its range. Juveniles also suffer from

collisions with power lines (Rollan et al. 2010). Finally, declining prey availability, increased human disturbance and poaching in breeding areas along with agricultural intensification are considered key factors in the species' population decline (Ferguson-Lees and Christie 2001, Orta et al. 2016).

The proposed conservation actions, according to the IUCN, are:

- Require the implementation of access restrictions and legal protection of habitats in nesting areas to avoid disturbance and destruction of these habitats
- Undergrounding and/or marking of power pole interconnection cables.
- Maintenance of extensive livestock and agriculture, including the maintenance of vegetation fences at crop boundaries
- Undertake educational campaigns with the active participation of hunting organisations and clubs, and continue and promote research and monitoring, especially in the eastern Mediterranean countries and Portugal (Tucker and Heath 1994).

Falco peregrinus

The European population of this species is estimated to number 14 900 - 28 800 pairs (32 200 - 62 100 mature individuals), while in the EU28 the population is estimated at 16 100 - 31 100 (32 200 - 62 200 mature individuals). The Greek population is estimated at 300 - 500 pairs, corresponding to 2% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened (LC) (BirdLife International 2021). It is also not listed in a category of species of European interest for protection by BirdLife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix I).

The species has a wide distribution and spreads throughout Greece although its population density depends on the presence of suitable nesting habitat (Handrinos and Akriotis 1997).

In Central and Northern Europe the species is migratory and winters in Africa. In Greece the species is resident. It lives solitary and most of the time rests on rocks or trees. It lives in open areas with woody vegetation or high rocks and rarely in sparse

forests. It also nests on steep rocky shores, in buildings, in trees and rarely uses the nests of other birds. The endemic area ranges from 51 km2 in northern Europe to 160 km2 in southern Europe. Migratory birds leave their breeding grounds between August and November and return between March and May (Snow and Perrins 1998). Most birds travel individually or in pairs. It is found in a wide variety of habitats such as the Mediterranean islands, the Aegean islands, the Adriatic, and the islands of Spain. In Greece it is found in Crete, as well as on other islands and rocky coasts of the mainland. Birds of small and medium size constitute the species' diet (mainly pigeons). It usually eats part of its prey and leaves the rest. It always catches its prey in the air, usually by flying in circles above it at high altitude and swooping down on it vertically at speeds of up to 240-410 km/h. Nesting occurs from February to March in temperate zones and eggs are usually laid in a crevice in a rock, without creating a nest (White et al. 2013). It is a monogamous species.

According to the recorded threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Expansion - intensification of annual crops
- Intensification of perennial crops (vineyards, orchards, olive groves, etc.)
- Residential development, urban or extra-urban, legal or arbitrary
- Recreational tourism infrastructure (ski resorts, golf courses, golf courses, golf courses, campsites)
- Extractive activities: quarries-mining
- Pursuit by specific users as harmful
- Disturbing activities (hunting, logging, fishing, gathering of plants and firewood
- Abandonment of traditional agricultural practices and land use, including abandonment of extensive agriculture and livestock farming
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Changes in the extent and distribution of habitats due to climate change.

The threats listed in the IUCN red list are: Persecution across the range was the greatest threat in the 19th and early 20th centuries (Snow and Perrins 1998). Severe population declines in the 1960s-1970s were due to eggshell breakage and adult and embryo mortality from hydrocarbon contamination associated with pesticides at that time (Ferguson-Lees and Christie 2001; White et al. 2013). The species is used

extensively by falconers who raise them for hunting, although the population-level implications of this threat are uncertain (White et al. 2013).

The proposed conservation actions, according to the IUCN, are as follows:

- Ban the use of highly toxic pesticides and discourage the use of new potentially harmful chemicals
- Protect and monitor nesting sites, and prevent exposure of the species to toxic contaminants through their diet (Tucker and Heath 1994).

Falco eleonorae

The European population of the species is estimated at 14,200 - 14,500 pairs (28,400 - 28,900 mature individuals), while in the EU28 the population is estimated at 14,100 - 14,400 pairs (28,300 - 28,800 mature individuals). The Greek population of the species is estimated at 12,300 pairs, corresponding to 86% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by BirdLife International and is protected by the CITES International Convention (Appendix II).

In Europe, this species breeds mainly in Greece (86% of the European population), but also in Spain (6% of the European population) and Italy (5% of the European population).

The species is distributed in the Aegean Sea with six major concentrations in the northern Aegean, Sporades, eastern Cyclades, Antikythera, southwestern Dodecanese and the satellite islands of eastern Crete (Handrinos and Akriotis 1997).

The species is fully migratory, leaving its Mediterranean breeding grounds in October and November. It ranges in the Magadaskari, East Africa and the Mascarene Islands, returning to its breeding grounds in late April and May. It lives on rocky islands, steep coasts and rocky slopes, where it breeds in colonies of 5 to 20 pairs or up to 200 pairs. The species is known to fly at altitudes of up to 1,000 m during the breeding season (Snow and Perrins 1998). The species tends to move in small and loose flocks and in migration travels with other species that fly at high altitudes, including

Falco subbuteo (Snow and Perrins 1998; Ferguson-Lees and Christie 2001). It feeds mainly on small birds and insects which it captures in the air. By summer its diet consists mainly of large insects which it catches in the air, and during the breeding season, it changes its diet drastically and feeds almost exclusively on small migratory ostrich species heading to Africa. This foraging strategy, combined with the species' very late reproduction, ensures a protein-rich diet for the chicks, whose development coincides with the autumn migration. The species nests in crevices and cavities in rocks or holes, but also on the ground. It is a monogamous species. It lays 2-3 eggs (range 1-7) in summer (July-August). The hatching of the chicks coincides with the autumn migration of birds. Both sexes feed them, but mainly the male.

According to the threats recorded in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Intensification of perennial crops (vineyards, orchards, olive groves, etc.)
- Infrastructures for tourism and recreation (ski resorts, golf courses, golf courses, golf courses, camps)
- Hunting - poaching - trapping - collecting eggs or chicks - destroying nests
- Disturbing activities (hunting, logging, fishing, gathering, plant and firewood collection)
- Introduction of invasive species
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Changes in the extent and distribution of habitats due to climate change.

Threats listed on the IUCN red list have historically been persecution by humans. Also, human disturbances associated with tourism development have been shown to negatively affect reproductive success. Predation by rats is also significant on some islands that are breeding sites. Finally, the species is vulnerable to the effects of potential wind energy development (Strix 2012).

The proposed conservation actions, according to the IUCN, are as follows:

- Implement effective actions to protect coastal areas and conduct Environmental Impact Assessments (EIAs) that address developments and activities in these areas. National and international policies on coastal tourism should discourage the development of new large-scale resorts and favour sustainable tourism that is more environmentally friendly

- Protection of colonies
- Investigate the ecological requirements and threats to wintering areas and protect them
- Increase public awareness of the species (Barov and Derhe 2010).

Falco columbarius

The species is migratory with the European population estimated at 20,000 - 41,700 pairs (40,100 - 83,400 mature individuals), while in the EU28 the population is estimated at 6,700 - 14,400 pairs (13,400 - 28,700 mature individuals) (BirdLife International 2021). In Europe, the species breeds mainly in Russia (with the species' population accounting for 48% of the European population), while it also has a significant presence in Finland, Sweden, Norway, Iceland and the UK. The population trend in Europe, according to the IUCN red list, is estimated to have been declining in recent years, with this decline being much greater in the EU28.

In Greece the species is a winter visitor and is found mainly in Northern Greece during the wintering period and during the migration period (Handrinos and Akriotis 1997).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species has not been assessed and therefore does not have a threatened status (NE), while according to IUCN at European level the species is classified as Vulnerable (VU) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by BirdLife International, and is also protected by the CITES International Convention (Appendix II).

The species is found in a wide variety of habitats, from sea level to forest floor in some areas, in scrubby steppes, northern tundra, swamps and open grasslands. It generally prefers open areas with scattered trees or scrubby vegetation. During the migration period, it is often found along coastlines. The species breeds from March to June and mainly uses old nests of other species (especially rookery nests), but also uses tree hollows, overhangs on rocky cliffs. It usually lays three to six eggs. The species' diet consists mainly of small birds, bats and insects, as well as small rodents.

According to the recorded threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Expansion - intensification of annual crops
- Extensive expansion and intensification of agricultural activities
- Drainage of wetlands and other land reclamation projects
- Erosion control works, cleaning of the bed of streams, embankments of the seashore and stream beds.

Threats listed on the IUCN red list are the loss and destruction of suitable habitat for the species due to overgrazing and inappropriate management. Also, increased tourism activity in the species' breeding habitats has resulted in disturbance to nesting sites. In addition, predation by *Vulpes vulpes* is another threat to the species. Finally, in the past (1960s and 1970s), the use of chlorinated hydrocarbons caused a decrease in the species' reproductive success, but with the banning of these pesticides, their impact decreased, as evidenced by the subsequent breeding density and distribution of the species, as well as the numbers of migration and overwintering populations.

The recommended conservation actions, according to the IUCN, are as follows:

- Restoration and protection of the species' habitats
- Minimise the use of pesticides (Hagemeijer and Blair 1997).

Falco vespertinus

The species breeds in Eastern Europe, with the main part of its distribution range extending from Belarus and southwards to Hungary, northern Serbia and Montenegro, Romania, Moldova and eastern Bulgaria, and eastwards to Ukraine and north-western and southern Russia. The species winters in southern Africa (Palatitz et al. 2009; Billerman et al. 2020).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex I and II) Conventions. According to the Greek Red Data Book in Greece there are insufficient data for its assessment (DD), while according to IUCN at European level the species is classified as Vulnerable (VU) (BirdLife International 2021). It is also classified as a SPEC 1 species of European interest in terms of protection by Birdlife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

The breeding European population of the species is estimated to number 57,000 - 84,000 pairs (115,000 - 170,000 mature individuals), while in the EU28 it is estimated at 2,500 - 4,000 pairs (5,000 - 8,000 mature individuals) (BirdLife International 2021).

The species inhabits open areas with sparse tree vegetation at the forest borders, agricultural land, pastures and meadows with scattered trees and hedgerows. It is found from sea level to 300 metres above sea level. It nests in colonies in old crow nests and sometimes between active havarron nests. It prefers to build its nest in the upper part of the tree canopy, but sometimes nests in cliffs or tree holes, in hedgerows or isolated bushes (Ferguson-Lees and Christie 2001, Billerman et al. 2020). The breeding season runs from mid-April to August (Billerman et al. 2020). It lays 4-5 eggs. The laying rate is one egg per two days. Incubation lasts 22-23 days and is carried out by both sexes. Chicks leave the nest at 27-30 days of age. It feeds mainly on insects that it captures in the air (especially orthopterans, but also beetles, dragonflies, butterflies and cicadas). During breeding, chicks may feed on small birds, rodents, lizards and frogs (in Hungary, mice and toads are an important part of the species' diet). As mentioned above, the species is migratory, leaving their breeding grounds in August and September, and returning to them between February and May. During migration they form mixed flocks, often over 100 individuals, with other hawks such as *F. naumanni*, and tend to stay at very high altitudes for most of the journey (Ferguson-Lees and Christie 2001).

According to the listed threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Expansion - intensification of annual crops
- Hunting - poaching - trapping - collecting eggs or chicks - nest destruction
- abandonment of traditional agricultural practices and land use, including abandonment of extensive farming and livestock production
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list include destruction of suitable nesting sites through deforestation for agricultural expansion or timber trade (Ferguson-Lees et al. 2001) and widespread use of pesticides that affect the species' food resources (Ferguson-Lees et al. 2001). In central Europe, agricultural intensification is causing habitat loss for the species and the reduction of extensive pasture management, particularly grazing, is affecting the species' food supply (Palatitz et al. 2009). From 1980 to 1999, intensive poisoning of *Corvus frugilegus* in Hungary forced the species to change its habits of selecting nesting sites, resulting in large colonies of the species in that country becoming almost extinct, with only 38% of the breeding population now

breeding colonially (Palatitz et al. 2009). Poaching and poisoning, as well as electrocution of power lines, have also been reported as a threat in some countries. In October 2007, 52 roosting birds were found shot in Fassouri, Cyprus, with 46 already dead and 6 injured (Palatitz et al. 2009).

The proposed conservation actions, according to the IUCN, are as follows:

- Continue to conduct regular surveys to monitor population trends of the species,
- Conduct further research on the effects of changes in agriculture and land management in general.
- Further research on the impact of the species on the management of the species and the use of land in Central Europe, including the development of further studies on the impact of the species on the management of land use and agriculture.
- Provision of artificial colonies for the species
- Preventing hunting in sensitive areas through law enforcement campaigns and prosecution of trespassing cases, as well as raising public awareness through programmes.

Falco biarmicus

The European population of the species is estimated at 420 - 820 pairs (840 - 1 700 adults), while the EU28 population is estimated at 140 - 170 pairs (280 - 330 adults). In Greece the population is estimated to number 40 - 60 pairs, which corresponds to about 8% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece and the IUCN at European level, the species is classified as endangered (EN) (BirdLife International 2021). It is also classified as a SPEC 3 species of European interest in terms of protection by BirdLife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

According to the Greek Red Data Book (Legakis and Marangou 2009), the Golden Hornbill is a rare and locally endemic species in Greece. More common and with a wide distribution in the past, it nested in many areas, even on islands. Its current

distribution is now fragmented. It nests mainly in mainland Greece and on a few islands, e.g. Lesvos, Kos, etc. (Handrinos and Akriotis 1997).

The golden egret is a species that is native to open areas and requires large rocky, steppe and fern areas and dry grasslands for hunting, and in winter has been found in crops and wetlands (Tucker and Heath 1994). It hunts in areas of sparse vegetation interspersed with rocky outcrops and avoids wooded areas. The species nests in crags and cliffs and uses old nests of other raptors or herons. It usually lays 3-4 eggs (Kemp 1994) between February and May. It feeds mainly on small to medium-sized birds which it captures in the air as well as small mammals, reptiles and large insects (Tucker and Heath 1994). The species is usually recorded singly or in pairs, but has been observed congregating in groups of up to 20 individuals in feeding areas (feeders) (Ferguson-Lees and Christie 2001, Kemp and Marks 2020). The species is epidemic and migration is only recorded outside Europe (Kemp 1994, Kemp and Marks 2020).

The threats listed in the Greek Red Data Book (Legakis and Maragou 2009) are: The species is vulnerable due to its very sparse population and fragmented distribution. The threats it faces are not sufficiently known, but it is likely to be threatened by egg collectors, poaching and locally by a reduction in its prey due to overexploitation.

According to the NRC (Legakis and Maragou 2009), the conservation measures required are as follows: More effective protection of the species is needed, especially in the breeding areas and especially in its nests. Also, systematic census and monitoring of the population, identification of the threats it faces and study of its biology/ecology are needed.

According to the recorded threats in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Expansion - intensification of annual crops,
- Residential development (urban or extra-urban, legal or arbitrary), tourism - recreational infrastructure (ski resorts, golf courses, golf courses, camps),
- Mining activities (quarries - mines)
- Pursuit by specific users as harmful
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Construction of dams and flood protection measures, irrigation networks

- Pollution from agrochemicals discharged into water bodies, waterlogging of receptors
- Changes in the extent and distribution of habitats due to climate change.

Threats listed on the IUCN red list are poisoning, poaching and trapping for hawks (Kemp 1994). These threats have subsided, although persecution and egg and chick collection for the species are still probably the most serious threats to the species. In Italy it is still threatened by poaching (Snow and Perrins 1998; Ferguson-Lees and Christie 2001). The species is also vulnerable to the effects of potential wind energy development (Strix 2012). Habitat loss through urbanization, modification of agricultural practices, road construction, open pit mining, expansion of agriculture into steppes and grasslands, and reforestation has caused a decline in hunting and game areas for the species. It also suffers from human disturbance, pesticides, collisions with power lines, and competition with *Falco peregrinus* (Gustin et al. 2000, Ferguson-Lees and Christie 2001, Strix 2012, De Rosa 2019, Keller et al. 2020, Snow and Perrins 1998, Kemp and Marks 2020, Corso 2018). Perhaps the main threat facing the golden egret, as noted above, is the theft of chicks and eggs from its nests. As this problem is very acute internationally, strict secrecy should be maintained regarding the nesting sites of the golden egret in the region. Otherwise, making them public is very likely to lead to the theft of chicks or eggs, since the guarding of their nests is non-existent in Greece.

The proposed conservation actions, according to the IUCN, are as follows:

- Protection of the species' habitats, which should be ensured through the promotion of appropriate agricultural and forestry policies, including reduction of pesticides, protection of natural grasslands, etc.
- Requirement for legal protection of important breeding sites
- Promote conservation programmes to combat the theft of eggs and chicks, as well as poaching
- Reduction of human disturbance at breeding sites (e.g. quarries, climbing)
- Develop national action plans for the species, including research studies, especially in areas where data on the breeding season and population size and trend of the species are unknown (Gustin et al. 2000).

Falco cherrug

This species is a rare winter visitor and transient migrant in Greece, with the breeding European population estimated at 430 - 630 pairs (860 - 1300 mature individuals), while in the EU28 the population is estimated at 210 - 310 pairs (430 - 620 mature individuals) (BirdLife International 2021). In Greece, the wintering population is estimated to be 2 individuals, corresponding to <1% of the European wintering population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions. According to the Greek Red Data Book in Greece and the IUCN at European level, the species is classified as threatened (CR and EN respectively). It is also classified as a SPEC 1 species of European interest for protection by Birdlife International, and is also protected by the CITES International Convention (Appendix II).

In Europe, the species breeds mainly in south-eastern Europe, which has a very small proportion of the global breeding population. Reports of possible breeding in 1-2 areas of northern Greece have not yet been confirmed. Most records of the species come from Macedonia and Thrace, while it is rarer in the southern regions and islands. During migration its distribution is wider, but it is also rare (Handrinos and Akriotis 1997). Its population trends are not known (Handrinos and Akriotis 1997). One individual ringed in Hungary was found in Poros Troizinia (Akriotis and Chandrinos 2004).

The species is usually found in open valleys and coastal lowlands with grasslands and crops, but especially in large wetlands (Evros Delta, L. Kerkini, Messolonghi, etc.), where it has been observed hunting waterfowl and wading birds. It also feeds on mammals, mainly diurnal rodents. The species hunts close to the ground in open areas, combining rapid acceleration with high agility, thus specializing in medium-sized terrestrial rodents. In the Ebro Delta, it has been observed to hunt rabbits (*Spermophilus citellus*). In some areas, especially near wetlands, its main prey is birds. It uses cliff ledges for nesting and sometimes occupies the old nests of other birds. The species occurs singly or in pairs (Ferguson -lees and Cristie 2001). The species is epidemic, partially migratory or fully migratory, and is highly dependent on food supplies at breeding sites during the winter season (Baumgart 1991; Snow and Perrins 1998). Mature individuals are primarily migratory, with central and eastern European

birds migrating from the Balkans to Turkmenistan, Egypt and northwestern India (Hagemeijer and Blair 1997). Migratory birds generally leave their breeding grounds in September and October, returning between February and May (del Hoyo et al. 1994).

Threats mentioned in the Greek Red Data Book (Legakis and Marangou 2009) are possibly poaching, capture for commercial purposes and wetland degradation.

According to the N.C.B. (Legakis and Marangou 2009), the conservation measures required are as follows: Confirmation of the information on the species' possible wintering in Greece, better recording of the wintering population and investigation of the threats to the species.

The threats to the species according to the IUCN are the loss and degradation of steppe and dry grasslands due to intensification of agriculture, establishment of plantations and reduction of extensive livestock farming, causing a decline in key prey species. Harvesting for hawk breeding is a serious problem, which has caused local extinctions (Baumgart 1991). Poaching and pesticide use are also minor threats to the species (Baumgart 1991; Riddle and Remple 1994; Barton 2000; Eastham et al. 2000; Eastham et al. 2000; Fox 2002; Haines 2002; ERWDA 2003). Hybridization with escaped or released falcons could affect the genetic integrity of wild populations (Nittinger et al. 2007).

The recommended conservation actions according to the IUCN are:

- Maintain or implement population and habitat management programmes for the species throughout its distribution range
- Implementation of CITES regulations
- Monitoring of markets to quantify the trade in falcons
- Tagging and ringing of individuals of the species to better monitor the species and determine the impact of trade
- Increase public awareness of the conservation of falcons
- Continue to census and monitor the species throughout its range
- Maintain livestock grazing systems that ensure the long-term conservation and survival of key prey species
- Greater protection (with emphasis on degradation and pollution) of key breeding habitat (Baumgart 1991; Bailey et al. 2001; Fox 2002).

Ardea purpurea

In Europe the species breeds mainly in Ukraine, Russia, Romania, Romania, Spain, France and Italy.

The European population of the species is estimated at 28 800 - 48 700 pairs (57 700 - 97 300 mature individuals), while in the EU28 the population is estimated at 11 700 - 19 100 pairs (23 500 - 38 100 mature individuals). The Greek population is estimated at 45 pairs, corresponding to < 1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annexes I and II) Conventions. According to the Greek Red Data Book in Greece the species is classified as endangered vulnerable (EN), while according to IUCN at European level the species is not classified as threatened (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European conservation concern by BirdLife International (BirdLife International 2017).

The purple tit is a rare and local summer visitor, as well as the most common and widespread migrant transient in Greece. A more widespread and common species in the past, it now has a fragmented and local distribution, mainly in northern and less so in central Greece. In the last thirty years the breeding population of the Purple Finch in Greece has been reduced to 10% of what was recorded in the 1970s (600-650 pairs), but the species has not stopped nesting in many wetlands in southern Greece (Kazantzidis 2005; Handrinos and Akriotis 1997). Its population in Greece was estimated (2003) at 40-60 pairs in 7 wetlands (in the deltas of the rivers Axios, Evros and Sperchios and in the lakes Kerkini, Prespa and Chimaditida, as well as in the Amvrakikos Gulf) (Yfantis and Kazantzidis 2003, Kazantzidis 2005), with a tendency to further decline. The most important nesting site of the species in Greece is the Axios Delta, with 16-20 pairs (Yfantis and Kazantzidis 2003). Species most widespread during migration periods and during the breeding season, it is observed (usually as individuals) in many wetlands throughout Greece, including several islands (Handrinos and Akriotis 1997). There have been three recoveries in Greece of ringed individuals in the Netherlands, Austria and Hungary, while an individual ringed in L. Kerkini was found in Korytsa, Albania (Akriotis and Chandrinos 2004).

Populations breeding in the Western Palearctic are migratory (Billerman et al. 2020) and travel on a wide front between breeding and wintering areas (Kushlan and Hancock 2005). The species occurs in colonies (Billerman et al. 2020, Kushlan and Hancock 2005), and although these are usually small in size and rarely exceed 50 pairs

(Turner 2000), colonies of up to 1,000 pairs have been recorded in some areas (Hancock and Kushlan 1984, Billerman et al. 2020). It often nests with other heron species, such as the great crested *grebe Ardea cinerea.* In migratory populations, fall migration occurs from August to October (Hancock and Kushlan 1984), with return occurring in spring and beginning in March (Hancock and Kushlan 1984). The species occurs in wetlands from sea level to 1.800 m (Billerman et al. 2020), showing a preference for dense, flooded freshwater reed beds (*Phragmites spp.*). It also uses, lake banks, river margins (Billerman et al. 2020), ditches, canals, brackish water lagoons (Kushlan and Hancock 2005). The diet consists of fish 5 to 15 cm long (occasionally up to 55 cm), amphibians (salamanders and frogs), insects (e.g., beetles , dragonflies, spiders, and grasshoppers) and mollusks, as well as small birds and mammals, snakes, and lizards (Billerman et al. 2020; Hancock and Kushlan 1984). The nest is a platform of reeds placed on or near water up to three meters high in flooded reedbeds or up to 25 meters high of adjacent trees in wetland ecosystems. The species lays 3-5 eggs in April-May, which incubate for 25-26 days. The chicks reach full plumage at 45 - 50 days of age, when they leave the nest (Kazantzidis 2005).

According to the Greek Red Data Book (Legakis and Marangou 2009), the threats to the species are water pollution and the destruction and degradation of wetlands, especially freshwaters such as lakes and marshes, are among the main threats to the species in Greece. The reasons for the decline in the population of the Purple Finch in Greece are not sufficiently known, but may be due to alterations in the wetlands of sub-Saharan Africa, where the species winters (Yfantis and Kazantzidis 2003, Kazantzidis 2005). Also, the practice of burning reeds in late spring in many areas of northern Greece may limit the species' nesting potential.

According to the recorded threats in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest) the reported threats to species are:

- Crop expansion in wetlands
- Livestock grazing in wet grasslands
- Extension of agricultural land to wetland watercourses
- Accidental killing by hunting or poaching.
- Noisy recreational activities
- Wetland drainage and other land reclamation works

- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters

Threats listed on the IUCN red list are the loss of reeds through agricultural encroachment, water management practices (e.g., drainage), and reed harvesting (Hushlan and Hancock 2005; Hockey et al. 2005).

The recommended conservation actions, according to the IUCN, are as follows:

- Sustainable management of freshwater habitats and creation of protected areas around colonies
- Conservation of large uncultivated reed beds (Barbraud et al. 2002).

Botaurus stellaris

In Europe, the species breeds in most countries, but mainly in Russia and Ukraine. The botaurus is mainly a winter visitor and a transient migrant in Greece, with a few pairs breeding only in the Amvrakikos. During wintering and especially during periods of heavy winter, large numbers of bulls are found mainly in wetlands of northern and western Greece (Handrinos and Akriotis 1997, Newbery 1997). During spring migration the species is also found in several wetlands or temporarily flooded areas in mainland Greece and on several islands (Handrinos and Akriotis 1997, Bonetti and Papakonstantinou 2000, Zogaris 2000, Zogaris et al. However, there are no sufficient counts of the wintering or migrating population. One individual ringed in Germany was found in central Macedonia (ESDS database). The species has suffered a significant decline in Greece, but it is difficult to document all areas where it used to breed. Historically, there is clear evidence that it nested e.g. in the wetlands of Thermaikos, the Evros Delta, the Strofilias area, the L. Ioannina, and possibly the L. Karla, etc. In the 1980s, the breeding population in Greece was estimated at 2 pairs (Crivelli et al. 1988), while in 2009, it was estimated at 5-15 pairs (Zogaris 2000, Zogaris et al. 2003, BirdLife International 2004) in only two areas, in the northern Amvrakikos Gulf (Zogaris 2000).

The European breeding population is estimated at 73,700-103,000 males displaying spatial behaviour (147,000-206,000 mature individuals), while in the EU28, the population is estimated at 12,700-18,600 males displaying spatial behaviour (25,400-27,100 mature individuals). The Greek breeding population is estimated at 5-15 pairs (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II) and the Bonn Convention (Annex II). According to the Greek Red List in Greece the species is classified as threatened (EN), while according to the IUCN red list at European level the species is not classified as threatened, and is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 2 species of European conservation concern by BirdLife International (BirdLife International 2017).

Populations breeding on the European Atlantic and Mediterranean coasts are largely epidemic due to relatively mild winters (Newbery et al. 1996), although they may make local dispersal movements associated with rainfall (Hancock and Kushlan 1984). However, continental populations are primarily migratory (Newbery et al. 1996, Kushan and Hancock 2005) with notable dispersal of immature post-breeding adults (Kushan and Hancock 2005).

Highly specialized species, living in reedbeds and freshwater marshes. Particularly during the breeding season, it is directly dependent on the presence of relatively extensive reedbeds, and feeds on the edges of dense emergent vegetation, wet meadows or the edge of ditches, small lakes and lowland rivers. It feeds mainly on fish, amphibians, reptiles, aquatic insects and, less frequently, small mammals and birds. It nests in dense reed beds, where it builds a nest as a small platform at water level. It is active early in the morning and late in the afternoon, while the rest of the day it rests in reeds, where it is difficult to see. Species is usually polygamous, females are exclusively engaged in caring for chicks, while males defend the territory (White et al. 2006). The characteristic 'mooing' sound used to mark and maintain territory is heard (in the Amvrakikos) from February to the last week of June. It builds its nest on a platform of dead reeds and bogs. It lays 5-6 eggs (3-7). The laying rate is one egg every 2-3 days. Incubation is carried out by the female and lasts 25-26 days. Egg hatching is asynchronous. The chicks leave the nest at 50-55 days of age. They reach sexual maturity at the age of one year.

According to the Greek Red Data Book (Legakis and Marangou 2009), the threats facing the species are human interventions in wetlands (habitat destruction, conversion or drainage of freshwater wetlands, water resource intensification projects, etc.), which lead to the rapid shrinkage of freshwater habitats in spring. Since birds usually build their nests in flooded reedbeds, these must be kept flooded with water throughout the breeding season to prevent eggs or chicks from being endangered by

predators and disturbance. This is the case, for example, in the Rodia marsh, Amvrakikos, where significant changes have taken place due to the waterlogging of the large reeds, resulting in their thinning and a reduction in the number of breeding pairs there (Zogaris et al. 2003). Hydrological changes may also negatively affect food availability. In winter and during migration the species is often poached.

According to the NRC, the conservation measures required are as follows: Monitoring and promotion of specific water management plans in specific wetlands can restore or assist in the recovery of the breeding population. Specific management measures are required in the specific areas in the Amvrakikos. Strict control of poaching is also needed, and public awareness of wetland management, particularly of reedbeds, is considered important.

According to the threats recorded in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Crop expansion in wetlands
- Transmission lines (electricity, telephone), oil and gas pipelines
- Oil, gas, gas pipeline, power lines, oil and gas pipelines
- Disturbing activities (hunting, logging, fishing, gathering plants and firewood)
- Construction of dams and flood protection measures, irrigation networks
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters
- Changes in the extent and distribution of habitats due to climate change.

Threats listed on the IUCN red list are habitat degradation/destruction through loss/destruction of Phragmites reeds (Kushlan and Hancock 2005) from drainage, direct destruction (Billerman et al. 2020), sea level rise and saltwater intrusion (Newbery et al. 1996), and pollution (either eutrophication that alters fish populations within the reeds or pesticides that may reduce the survival of the species) (Marion et al. 2000). Human disturbance during the nesting season is also a threat (Newbery et al. 1996, Marion et al. 2000, Kushan and Hancock 2005) e.g., disturbance from cane cutting (Kushan and Hancock 2005), noisy recreation and water sports (Newbery et al. 1996, Marion et al. 2000, Kushan and Hancock 2005), motorized vehicles and hunting (Kushan and Hancock 2005). Hunting and egg and chick collection still occur in some

areas of the species' range (Billerman et al. 2020). Finally, the species can experience high mortality in very severe winters (especially in epidemic populations) (Marion et al. 2000).

Ardea alba

In Europe, the species breeds largely in Russia, with significant breeding populations also present in Belarus, Ukraine and Hungary.

The species is rare and locally epidemic, but widespread and locally common in winter in Greece. It was found nesting for the first time in Greece in the late 1960s, in L. Mikri Prespa and since then it has occasionally nested in various wetlands in northern Greece, such as Porto Lagos and the Axios Delta (Yfantis and Kazantzidis 2004, Kazantzidis 2005, Handrinos and Akriotis 1997). In 2003 the breeding population was estimated at 31-42 pairs, distributed in three colonies in the lakes of Prespa (2) and Kerkini, indicating a slight decrease in the distribution of the species. Much more widespread and locally common, the Silverback overwinters in the large wetlands of Macedonia, Thrace and western Greece, with an estimated population of 1,000-2,000 individuals (Naziridis et al. 1992; Handrinos and Akriotis 1997), , while few individuals have been recorded during migration to southern Greece, Crete, etc. The Silver-winged Teals wintering in Greece come mainly from central and eastern European countries and especially from Ukraine, as at least evidenced by the 16 ringed individuals recovered in Greece to date (Akriotis and Chandrinos 2004).

The European population of the species is estimated at 39,900 - 65,700 pairs (79,800 - 132,000 mature individuals), while in the EU28 the population is estimated at 7,900 - 11,400 pairs (15,900 - 22,800 mature individuals). The Greek population is estimated to number 120 - 130 pairs, corresponding to <1% of the European population (BirdLife International 2021). The population trend of the species, both at European and EU28 level, is estimated to be increasing.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece, the species is classified as Vulnerable (VU), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by BirdLife International.

Palaearctic populations of the species are migratory (Flint et al. 1984, Martínez-Vilalta et al. 2020). The species nests in loose colonies in dense and extensive reedbeds, mainly in freshwater wetlands and river deltas. Occasionally, particularly where there are no extensive reedbeds, it nests with other heron species in mixed colonies in trees (Lake Kerkini). In winter it occurs in coastal wetlands, usually singly or in small flocks (Martínez-Vilalta et al. 2020). The species usually breeds in colonies of tens, hundreds or even thousands of pairs (Kushlan and Hancock 2005; Martínez-Vilalta et al. 2020), sometimes, as mentioned above, with other heron species. The species is most active at dawn and dusk (although in coastal environments its feeding habits are determined by tides) (Kushlan and Hancock 2005). It roosts at night in trees (Brown et al. 1982) adjacent to lakes or rivers or in mangroves, often with other species (Langrand 1990). The species inhabits all types of inland and coastal wetlands (Martínez-Vilalta et al. 2020) although it is mostly found along the coast in winter (Snow and Perrins 1998). It inhabits river and lake shores, marshes, floodplains, wet meadows, rice fields, reservoirs, salt marshes, mudflats, coastal marshes, lagoons and estuaries (Marchant and Higgins 1990; Kushlan and Hancock 2005; Hockey et al. 2005; Martínez-Vilalta et al. 2020). In aquatic habitats its diet consists of fish, amphibians, snakes, aquatic insects and crustaceans, while in drier habitats it feeds more frequently on insects, lizards, small birds and mammals (Martínez-Vilalta et al. 2020). It often forages in irrigation canals, fields, etc. The nest is constructed from branches and vegetation (Kushlan and Hancock 2005; Brown et al. 1982) above water at a height of 1-15 m, in reeds, shrubs, trees and other plants near water or in locations protected by terrestrial predators (Kushlan and Hancock 2005; Martínez-Vilalta et al. 2020). As noted above, the species usually nests colonially in clusters, where nests may be less than a meter apart or in contact, although they are usually placed more spread out in reedbed habitat (Kushlan and Hancock 2005). It may also reuse nests from previous years (Kushlan and Hancock 2005).

Threats listed in the Greek Red Data Book (Legakis and Marangou 2009) are water pollution and the destruction/degradation of wetlands, particularly freshwater habitats such as lakes and marshes. Incidents of poaching are also reported in winter, although the number of individuals killed is limited.

According to the NRC (Legakis and Maragou 2009), the conservation measures required are: protection of wetlands from pollution and degradation;

promotion of measures to limit the use of pesticides and fertilizers on farmland peripheral to wetlands; and management of reedbeds to take into account the species' needs and ecological requirements for nesting.

According to the threats recorded in the list of threats to the species (Dimalexis 2009), the reported threats to the species are:

- Expansion of crops into wetlands
- Extension of livestock grazing in wet grasslands
- Extension of livestock farming to wetlands in wetlands
- Persecution by specific users as harmful
- Accidental killing by hunting or poaching
- Nuisance activities (hunting, logging, fishing, plant and firewood collection)
- Noxious recreational activities
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

The threats listed in the IUCN red list are the loss and degradation of wetlands (Marchant and Higgins 1990, Martínez-Vilalta et al. 2020), through drainage (over-pumping of water for agricultural use), overgrazing, clearing of river and lake valleys and beds, burning of reeds, increased salinity of water and invasion by invasive alien plants (Marchant and Higgins 1990). Also, in the past, the species has suffered intense persecution for the plume trade (Martínez-Vilalta et al. 2020).

The proposed conservation actions, according to the IUCN, are as follows:

- Conservation of breeding habitat, which includes protection of colonies, control of disturbance and management of riparian vegetation
- Conservation of feeding habitats, which includes water management (pollution, salinity, water level).

Egretta garzetta

In Europe, the species breeds mainly in the European part of Russia, but also in France, Spain and Italy. Significant breeding populations are also found in Ukraine and Romania.

The European population is estimated at 60 800 - 94 900 pairs (121 000 - 190 000 mature individuals), while the wintering European population is estimated at 33

700 - 47 700 individuals. In the EU28 the breeding population is estimated at 39,100 - 48,000 pairs (78,300 - 95,900 mature individuals), and the wintering population is estimated at 32,300 - 42,700 individuals. The Greek population is estimated to number 2,500 - 2,600 pairs, with the population of the species estimated at approximately 4% of the European population (BirdLife International 2021). According to the IUCN red list, the species' population trend in Europe has been declining at a rate of 9% and in the EU28 at a rate of 11% over the last 15 years.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level the species is not classified as threatened (LC) (BirdLife International 2021). It is also not listed as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017).

At the European level, the species has an exceptionally wide range and although the population trend appears to be declining, the decline is not considered to be rapid enough, therefore the species is assessed as being of reduced concern (LC) according to the IUCN red list.

The species occurs in Greece in 17 colonies in mixed colonies with other herons mainly in the Amvrakikos Gulf, the Axios Delta and Kerkini (Kazantzidis 2005).

Populations of the species that breed in the Palearctic are migratory (Hancock and Kushlan 1984). Breeding timing of the species varies geographically (Billerman et al. 2020), although European populations breed from spring to mid-summer (March to July). The species lives in colonies, sometimes thousands of pairs, in marshes and swamps, shallow lakes and river deltas (Kazantzidis 2000), irrigation canals, salt marshes and rice fields (which are particularly important habitat in areas with limited remaining wetlands), flooded meadows, fresh brackish or saline wetlands (Billerman et al. 2020) and shows a preference for shallow water (10 - 15 cm depth).) in open areas where water and dissolved oxygen levels fluctuate daily and where fish congregate in pools or at the water surface (Kushlan and Hancock 2005). It is also found in dry fields and pastures, and some populations are almost entirely coastal, nesting on rocky or sandy shores, mudflats, and tidal creeks (Billerman et al. 2020). The diet is highly opportunistic (Kushlan and Hancock 2005), consisting primarily of small fish less than 20 g in weight and less than 10 cm in length (Billerman et al. 2020), aquatic and terrestrial insects (e.g. beetles, dragonfly larvae and crickets) (Kushlan and Hancock 2005) and crustaceans, as well as amphibians, molluscs and snails (Billerman et al.

2020, Kushlan and Hancock 2005), spiders, worms, reptiles and small birds (Billerman et al. 2020). The species may nest on the ground in protected areas (Kushlan and Hancock 2005) or on rocks up to 20 m high, in reeds, shrubs or trees (Billerman et al. 2020). It usually nests in single or mixed-species colonies (Kushlan and Hancock 2005). It can travel 7-13 km to forage from breeding colonies during the breeding season (Billerman et al. 2020).

According to the listed threats in the species listing (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Whitefish
- Expansion of crops into wetlands
- Extension of livestock grazing in wet grasslands
- Extension of agricultural land to wetlands
- Accidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Noxious recreational activities
- Drainage, wetlands and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed in the IUCN red list are degradation and loss of wetlands through their drainage and their conversion to crops. Changes in management practices and contamination from agricultural and industrial activities (Kushlan and Hancock 2005) are also a significant threat. The species is also susceptible to avian influenza (Ellis et al. 2004; Melville and Shortridge 2006).

The proposed conservation actions, according to the IUCN, are as follows:

- Protection of nesting sites and breeding habitat to maintain the suitable habitat characteristics of these habitats for the species (Fasola and Alieri 1992)
- Establish a network of new nesting sites within 4 to 10 km of available foraging habitat in areas without suitable nesting sites (Fasola and Alieri 1992)
- Sustainable management of freshwater wetlands and creation of protected perimeter zones around colonies.

Tetrastes bonasia

In Europe, this species breeds mainly in Russia, with significant breeding populations also in Finland and Belarus.

The European population of this species is estimated to number 2,000,000 - 3,480,000 pairs (4,010,000 - 6,960,000 mature individuals), while in the EU28 the breeding population is estimated at 558,000 - 949,000 pairs (1,110,000 - 1,900,000 mature individuals). The Greek population of the species is estimated at 200-300 pairs, which is less than 2% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I and II) and the Bern Convention (Annex III).According to the Greek Red Data Book in Greece there are insufficient data for its assessment (DD), while according to the IUCN at European level the species is not classified as threatened and is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of conservation by Birdlife International (BirdLife International 2017).

The bulk of the species' population lives in Rhodope and Lailia , but a few individuals are also found in some mountain forests of NW Macedonia. (Prespes, Gramos, etc.) (Handrinos and Akriotis, 1997).

The species occurs in mixed coniferous forests, both in plains and mountains. It appears to avoid clear coniferous stands (de Juana and Kirwan 2013). It generally prefers large, dense forests with rich, diverse shrub vegetation (about 2 m high) and occasional clearings (Madge and McGowan 2002). Nesting occurs in April and May in central Europe and May to June in Scandinavia. It lays 7-10 eggs. The nest is a shallow scrape lined with plant material and is well concealed beneath duff or under the roots of fallen trees (Madge and McGowan 2002). The species feeds on a variety of plant foods, and its diet changes seasonally, particularly shrub fruits (blueberries, etc.), tender shoots, leaves, nuts and acorns in autumn, fruits and berries in summer, newly planted vegetation in spring, etc, both on the ground and on trees. (Cramp 1980, Handrinos and Akriotis 1997). Chicks feed almost exclusively on arthropods for the first ten days before becoming more vegetarian. The species is epidemic (de Juana and Kirwan 2013).

According to the recorded threats in the list of threats to the species designation (Dimalexis 2009) (species of interest) the reported threats to species are:

- Construction of roads of all categories, as well as railway lines
- Hunting - poaching - trapping - collecting eggs or chicks - nest destruction
- inappropriate forest management
- Disturbing activities (hunting, logging, fishing, gathering of plants and firewood
- Deforestation and logging.

The threats listed in the IUCN red list are intensive hunting and poaching. It is most heavily hunted in European Russia and Siberia, where perhaps as many as two million birds were hunted annually in the early 1990s (de Juana and Kirwan 2013). Furthermore, the species has very specific requirements for its habitat structure (Madge and McGowan 2002) and is therefore very sensitive to changes in these, particularly to modern forestry trends (Schäublin and Bollmann 2011; de Juana and Kirwan 2013). However, small-scale timber harvesting could have a positive impact on the natural regeneration of areas subject to natural phenomena such as, avalanches, insect damage, fires and erosion. The species has a huge distribution range, so protected areas play a very limited role in its conservation, although conservation measures can be locally important in maintaining subpopulations, e.g. in Greece, Hungary and Belgium (de Juana and Kirwan 2013).

The recommended conservation actions, according to the IUCN, are:

- Integration of forestry practices in habitat conservation
- Monitoring populations to ensure that numbers are stable and exploitation is sustainable
- Require better law enforcement in countries where threatened and illegal hunting is common (e.g. Bulgaria and Greece) (Storch 2007).

Ixobrychus minutus

In Europe, the species breeds mainly in Romania, Russia and Ukraine, with small numbers also in Spain, Serbia, Hungary, Bulgaria and Belarus.

The European population of the species is estimated at 85 900 - 151 000 pairs (171 000 - 301 000 mature individuals), while in the EU28 the population is estimated at 20 700 - 36 500 pairs (41 400 - 73 000 mature individuals). The population trend, according to the IUCN red list, is stable at European level, while at EU28 level, it is

unknown. The Greek population is estimated to number 600-700 pairs, corresponding to <1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece and the IUCN at European level, it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European interest in terms of protection by BirdLife International (BirdLife International 2017).

A common breeding species in Thrace, Macedonia and Epirus and locally common in the Peloponnese, it also nests on Lesvos, Lemnos, Samos, Kos and Corfu (Handrinos and Akriotis 1997).

Palaearctic populations of the species are fully migratory, traveling south between August and October and returning north from March to April (Billerman et al. 2020; Kushlan and Hancock 2005). In the western Palaearctic, the species breeds primarily between May and July. It breeds singly or occasionally in small loose groups in favorable areas (Billerman et al. 2020). The species is most common in fresh water marshes with *Typha spp.* beds, reeds (*Phragmites spp.*) (Hockey et al. 2005) or other dense aquatic vegetation, preferably trees (Billerman et al. 2020) such as willow (*Salix spp.*). or alder (*Alnus spp.*) (Kushlan and Hancock 2005, Billerman et al. 2020). It is also found on the margins of lakes, (Billerman et al. 2020), wooded and marshy stream and river banks (Kushlan and Hancock 2005), peatlands (Billerman et al. 2020), bogs, wet meadows, rice fields (Billerman et al. 2020), and occasionally on the margins of lagoons (Kushlan and Hancock 2005). Its diet varies by site and season, but it is essentially insectivorous and feeds on aquatic adult and larval insects such as crickets, grasshoppers, caterpillars (Billerman et al. 2020) and beetles (Kushlan and Hancock 2005). Other food items include spiders, mollusks, crustaceans (Billerman et al. 2020) (e.g., shrimp and crayfish), fish, frogs, tadpoles, small reptiles, and birds. The nest is constructed of reeds and twigs (Billerman et al. 2020) and is usually placed near floating islands of dense vegetation (Kushlan and Hancock 2005) (such as *Typha spp.* or reeds (*Phragmites spp.*) (Hockey et al. 2005) near or up to 60 cm above the water surface (Snow and Perrins 1998). Alternatively, nests can be placed in low shrubs or trees (e.g., alder or willow) up to two meters above the water (Kushlan and Hancock 2005; Billerman et al. 2020). Preferred nesting sites are typically 5-15 m off shore in water 20-30 cm deep (Snow and Perrins 1998).

According to the listed threats in the species characterization threat list (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Expansion intensification of annual crops
- Increase in agricultural intensification of plantation development
- accidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering of plants and firewood)
- Noxious recreational activities
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are degradation and destruction of the species' habitat due to pollution. In Belgium, the species has suffered from pollution and drainage of wetlands and in the Netherlands building construction has disturbed nesting habitat. The decline in European populations is due to mortality during migration and wintering. Droughts in Africa have led to desertification and loss of wetland areas, which is expanding passage through the Sahara (Tucker and Heath 1994). Recreational activities such as fishing and swimming are also a threat, as is the intensive commercial use of water bodies (e.g. reed cutting, fish farming). Also, river incrustation and eutrophication are additional threats (Bauer et al. 2006). The species may also be affected by fires (San-Miguel-Ayanz et al. 2009).

The recommended conservation actions, according to the IUCN, are as follows (although conservation measures in European breeding areas are unlikely to reverse population declines):

- Conservation of reed canaries on the margins of rivers and ditches
- Sustainable management of river valleys and reed beds, including reduction of water pollution and overexploitation of fish
- Minimising disturbance to breeding sites due to tourism.

Platalea leucorodia

In Europe the species breeds mainly in the Netherlands and Russia, with significant numbers also in Spain, Germany, Romania, Romania, Hungary and Portugal.

The European population of the species is estimated at 11 900 - 18 200 pairs (23 800 - 36 300 adults), with the European wintering population estimated at 6 200 - 9 300 individuals, while in the EU28 the population is estimated at 8 400 - 12 000 pairs (16 800 - 23 900 adults), with the EU28 wintering population estimated at 5 900 - 8 600 individuals. In Europe both the breeding and wintering population is estimated to be increasing. The Greek population is estimated to number 300 - 700 pairs, corresponding to 3 % of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to IUCN at European level the species is listed as Least Concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by Birdlife International (BirdLife International 2017), while it is protected by the CITES International Convention (Appendix II).

Palaearctic breeding populations are fully migratory (Billerman et al. 2020), but only travel short distances during the migratory season (Snow and Perrins 1998).

In Greece, according to the Greek Red Data Book (Legakis and Maragou 2009), the Chuliar Flycatcher is a rare and local epidemic species. Existing data indicate that the former distribution of the species in Greece was not very different from the present one (Handrinos and Akriotis 1997). During the 1970s the breeding population of Houliaromyta in Greece was estimated at 200-240 pairs (in 5 colonies) and after about a decade it had decreased to 113-172 pairs, in the same colonies (Handrinos and Akriotis 1997). In recent years the breeding population in some colonies (e.g. Axios Delta) has been greatly reduced and the species has stopped nesting in lakes Ismarida and Prespa. According to the most recent census (2003), the species breeds in 4 colonies, in Kerkini Lake, the Axios Delta, the French River and the Amvrakikos Gulf (Rodia swamp), with a total population of 223 pairs, which remains stable, with fluctuations from year to year (Yfantis and Kazantzidis 2004). The largest proportion of the breeding population in Greece is found in the Kerkini Lake, in the Gulf of Amvrakikos and in the Gulf of Amvrakikos (Rodia swamp), with a total population of 223 pairs, which remains stable, with fluctuations from year to year (Yfantis and Kazantzidis 2004). Kerkini (125 pairs) and Amvrakikos Gulf (70 pairs), while 23 pairs nest in the Axios Delta (Yfantis and Kazantzidis 2004). Occasionally, during migration

periods, small groups of chuliarworms occur in coastal wetlands throughout Greece, although these movements have not been well studied. The species overwinters mainly in the large wetlands of western and northern Greece, in small numbers (284-355 individuals) and with increasing trends. There are 6 recaptures in Greece of ringed individuals in Hungary and Austria, while 17 recaptures of ringed birds, mainly in Kerkini Island, come from Turkey, Israel, Tunisia, Egypt, Romania and Italy (Akriotis and Chandrinos 2004).

The species inhabits freshwater wetlands, river deltas, as well as lagoons and marshes and swamps (Hancock et al. 1992, Snow and Perrins 1998). It nests in riparian or riparian forests with tamarisk, willow, alder and dense reed beds, forming mixed colonies with other species of herons, cormorants and heronries. It migrates in flocks of up to 100 individuals (Hancock et al. 1992, Snow and Perrins 1998). The species shows a preference for extensive shallow (Billerman et al. 2020) (less than 30 cm deep) wetlands with substrates of silt, clay or fine sand, generally avoiding waters with rocky substrates and dense vegetation (Hancock et al. 1992). The nest is constructed of twigs and vegetation, on the ground or alternatively on dense emergent vegetation (e.g., thatch) (Billerman et al. 2020), in shrubs or deciduous trees (e.g., willows, poplars) up to 5 m from the ground (Billerman et al. 2020). The species nests in colonies within which adjacent nests are usually one to two m apart or in contact (Hancock et al. 1992). Breeding colonies are located within 10-15 km of feeding sites, often much less (although the species has been observed feeding up to 35-40 km from nesting sites) (Hancock et al. 1992). The species is most active in the morning and evening (although in coastal areas it forages at low tide regardless of time of day) (Hancock et al. 1992).

It feeds on mollusks, crustaceans, worms, leeches, frogs, tadpoles, and small fish (up to 10-15 cm long) (Billerman et al. 2020; Hancock et al. 1992), which it catches by filtering the bottom sediment of the shallow areas it uses as feeding areas. It also feeds on insects (such as beetles, dragonflies, grasshoppers and flies). It is a monogamous species, having one oviposition per year. It lays 3 to 4 eggs in April-May.

The threats mentioned in the Greek Red Book (Legakis and Marangou 2009) are water pollution and the destruction or degradation of wetlands. Increasing numbers of cormorants in some areas (Kerkini Lake, Axios Delta) may pose a threat to the species, as the two species compete for nesting sites. In areas with limited availability of such sites, such as Kerkini L., this may cause problems for the species.

According to the NRC (Legakis and Maragou 2009), the conservation measures required are as follows: Protect the species' breeding and feeding wetlands from pollution and degradation. Promote measures to limit the use of agricultural products and fertilizers on cultivated land around the wetlands. Investigate competition between the species and the cormorant in terms of nesting sites.

According to the recorded threats in the list of threats to the species designation (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Expansion intensification of annual crops
- Increased expansion of agricultural expansion
- Accidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are habitat degradation and destruction through drainage and water pollution (Billerman et al. 2020, Hancock et al. 1992). The species is particularly affected by the disappearance of reed canaries due to agricultural and hydroelectric development (Hancock et al. 1992). Overfishing and disturbance have caused population declines in the country (Hancock et al. 1992) and human exploitation through the collection of eggs from nesting sites for food has threatened the species in the past (Hancock et al. 1992, Billerman et al. 2020). Poaching and collisions with power lines are the main causes of mortality during migration (Triplet et al. 2008). The species is susceptible to avian influenza, so may be threatened by future outbreaks of the virus (Melville and Shortridge 2006).

The proposed conservation actions, according to the IUCN, are as follows:

- Monitor breeding, migration, wintering population and ecological changes in key locations of the species
- Management of wetlands and creation of protection zones around colonies of the species.

Nycticorax nycticorax

In Europe, the species breeds mainly in Ukraine, the European part of Russia and Italy, with significant numbers also in Romania, Turkey, Spain, Serbia and France.

The European population is estimated at 57,300 - 84,400 pairs (114,000 - 169,000 adults), while the EU28 population is estimated at 25,900 - 36,100 pairs (51,900 - 72,100 adults). In Greece, the population of the species is estimated to number 1,300 - 1,400 pairs, corresponding to 2% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as threatened (NT), while according to the IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European conservation concern by Birdlife International (BirdLife International 2017).

In Greece there are 11 colonies of the species with the largest ones in the Axios Delta and Lake Kerkini (Kazantzidis 2005).

The northern populations of the species are migratory. The southward migration begins from September to October, returning to breeding grounds from March to May (Kushlan and Hancock 2005). The species inhabits the margins of shallow lakes, rivers and streams, marshes, and uses reservoirs, canals, aquaculture (Billerman et al. 2020), and rice paddies for foraging (Kushlan and Hancock 2005). It nests in fresh, brackish, or saltwater with aquatic vegetation and trees that it uses for nesting (Billerman et al. 2020). During migration, the species may also frequent dry grasslands, marine shorelines (Billerman et al. 2020), and estuaries (Hockey et al. 2005). Its diet consists of fish, amphibians, frogs, tadpoles, snakes, lizards, and insects (beetle larvae, grasshoppers, etc.) (Billerman et al. 2020). It also feeds on spiders, mollusks, leeches, small rodents, and bats; it is primarily active at night and roosts colonially on trees during the day. It nests in trees, but rarely on platforms of reeds or reeds within reedbeds (Birch 2002) and the nest is constructed of twigs and vegetation (Kushlan and Hancock 2005), placed 2-50 m above water or on dry ground near water (Snow and Perrins 1998) in trees, shrubs, reedbeds, on rock outcrops in protected sites (Kushlan and Hancock 2005, Billerman et al. 2020). The species usually nests in small numbers in single-species or mixed colonies, although sometimes groups can reach several thousand pairs

(Snow and Perrins 1998). It is a species common at altitudes up to 2,000 m. It is a monogamous species. It breeds in mixed colonies, with other species of herons, herons and loons. It lays 3-5 eggs.

According to the recorded threats in the Threats to Species of Interest List (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Transmission lines (electricity, telephone), oil and gas pipelines
- Hunting - poaching - trapping - collecting eggs or chicks - nest destruction
- accidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, gathering of plants and firewood)
- Noxious recreational activities
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are wetland drainage and destruction (Billerman et al. 2020, Kushlan and Hancock 2005) and winter drought in winter in wintering areas. It is also highly sensitive to pesticides (Kwon et al. 2004, Kushlan and Hancock 2005, Billerman et al. 2020) and cases of genetic damage from oil contamination have been reported (Custer 2000). The species is susceptible to avian influenza, so may be threatened by future outbreaks (Melville and Shortridge 2006). It is persecuted in fish farms due to the reduction in fish stocks it causes (Kushlan and Hancock 2005).

The recommended conservation actions according to the IUCN are as follows:

- Protect and maintain nesting sites and spawning habitat (Fasola and Alieri 1992)
- Establish a network of new nesting sites within 4 - 10 km of suitable foraging habitat in areas without suitable nesting sites (Fasola and Alieri 1992)
- Sustainable management of river valleys and reedbeds.
- Reduction of water pollution and overfishing
- Minimise disturbance from tourism/recreation at breeding sites.

Plegadis falcinellus

In Europe the species breeds mainly in Russia and Spain, with notable numbers in Romania, France and Ukraine.

The European population of the species is estimated at 30,100 - 59,700 pairs (60,200 - 120,000 adults), while in the EU28 the population is estimated at 11,200 - 32,000 pairs (22,400 - 63,900 adults). The Greek population of the species is estimated to number 220-300 pairs, corresponding to <1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions.According to the Greek Red Data Book in Greece the species is classified as threatened (CR), while according to IUCN at European level the species is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of conservation by Birdlife International (BirdLife International 2017).

According to the Greek Red Book (Legakis and Maragou 2009), the steelhead in Greece is a rare and local summer visitor with a wider distribution during migration. It was found nesting for the first time in Greece in 1960, and by 1973 there were 6 colonies in Greece with a total population of 1,100-1,500 pairs (Handrinos and Akriotis 1997). Since then the species has suffered a dramatic decline, and its population seems to have reached its lowest point in the 1990s, when it even stopped nesting in some areas (e.g. Axios Delta). The population of the steelhead started to increase from the early 2000s, when it appeared in colonies from which it had disappeared in the 1990s, but also in some new colonies (French estuary) (Handrinos and Akriotis 1997). According to the most recent record (2003), it was found to breed in 5 colonies, in the Amvrakikos Gulf (Rodia swamp), the Kalamas estuary, the Axios Delta, the Gallikos estuary and the L. Kerkini, with a total population of 95-115 pairs (Yfantis and Kazantzidis 2004). Most of the breeding population in Greece is found in the Rodia swamp of Amvrakikos Gulf (50-60 pairs), while 22 pairs were counted in 2003 on an island in the Kalamas Delta, where it nests in rookeries together with White-fronted Goats (*Egretta garzetta*). In the colony of Gallikos in 2007, 13 pairs nested, while in L. Kerkini up to five pairs nested (2003) (Yfantis and Kazantzidis 2004). It has a wider distribution during migration periods, especially in spring, a period when groups of 50-100 individuals are found in coastal wetlands, mainly in mainland Greece and on the

islands. In the last 4-5 years, however, there has been a clear decline in the migratory population, with smaller and smaller groups being recorded. Three individuals ringed in Ukraine (2) and Hungary were found in Axios, Vistonida River and Mallia of Heraklion (Akriotis and Chandrinos 2004).

The northern populations of the species' distribution range are fully migratory (Billerman et al. 2020). Also, the northern and southern populations of the species' distribution range breed in spring, while breeding in other areas of the species' distribution range coincides with the rainy season (Billerman et. al. 2020). It forms mixed colonies with other heron species, cormorants and chickadees, either in small groups (Brown et al. 1992), or in large aggregations of thousands of pairs, and during the wintering season the species forages in small flocks (Hancock et al. 1992, Billerman et al. 2020) of up to and 30 individuals (Brown et al. 1992). It often roosts (roosts) at night in large groups (sometimes thousands of individuals) with other species, occasionally in trees far from feeding sites (wetlands) (Brown et al. 1992). Steelhead live primarily in freshwater wetlands, floodplains, wet meadows (Marchant and Higgins 1990, Billerman et al. 2020), marshes (Billerman et al. 2020) and swamps, reservoirs, rice fields. The species feeds in very shallow water and nests in riparian or riparian forests with tamarisk, willow and alder, in fresh or brackish wetlands with tall emergent vegetation (e.g. reedbeds) (Marchant and Higgins 1990; Billerman et al. 2020). The species occurs less frequently in coastal locations such as estuaries, salt marshes, and coastal lagoons (Billerman et al. 2020). Nesting sites are often trees that may also be far from water (Brown et al. 1982, Billerman et al. 2020). The nest is constructed of twigs and vegetation and is usually placed one meter above water (occasionally up to seven meters) in tall emergent vegetation (e.g., thatch), low trees, and shrubs. It feeds mainly on insects (beetles, dragonflies, grasshoppers, crickets, flies), worms, leeches, snails, snails, mussels, crabs and crayfish and occasionally fish, frogs, lizards, small snakes, foraging in shallow freshwater marshes and wet meadows, and in rice paddies when these are available. The species' diet varies depending on what is available seasonally (Hancock et al. 1992).

The threats listed in the Greek Red Data Book (Legakis and Marangou 2009) are water pollution and the destruction and degradation of wetlands (especially wet meadows and shallow freshwater wetlands). The increase in the number of cormorants in some areas (Kerkini Lake, Axios Delta) is likely to pose an additional threat to the

species, given that the two species use similar nesting habitat. Incidents of poaching during migration have also been recorded, but these are tending to disappear.

According to the NRC (Legakis and Maragou 2009), the conservation measures required are as follows: Protection of wetlands, especially those where steelhead breed from pollution and degradation, and protection of feeding areas (wet meadows, shallow freshwater wetlands, etc.). Promote measures to limit the use of pesticides and fertilisers on farmland around wetlands. Investigate competition of the species with the cormorant in terms of nesting sites.

According to the recorded threats in the Threats to Species of Concern List (Dimalexis 2009) (species of interest) the reported threats to the species are:

- Expanding crops in wetlands
- Livestock grazing in wet grasslands
- Accidental killing by hunting or poaching
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Construction of dams and flood protection measures, irrigation networks
- Wetland drainage and other land reclamation works
- Pollution from agrochemicals discharged into receiving waters, waterlogging of receiving waters.

Threats listed on the IUCN red list are wetland degradation and loss (Snow and Perrins 1998, Billerman et al. 2020), through water drainage (Marchant and Higgins 1990, Hancock et al. 199) for agricultural use and hydropower generation (Balian et al. 1992), grazing, burning of riparian vegetation, increased salinity of water and introduction of non-native plants (Marchant and Higgins 1990). The species is also locally threatened by hunting (Snow and Perrins 1998; Billerman et al. 2020), disturbance, and pesticides used in agriculture peripheral to wetlands and runoff through surface runoff within the wetlands. Finally, the species is susceptible to avian influenza, so may be threatened by future outbreaks of the virus (Melville and Shortridge 2006).

The proposed conservation actions, according to the IUCN, are as follows:

- Sustainable management of river valleys and wetlands
- Deforestation of farmland, drainage of wetlands and inland wetlands in important breeding sites should be stopped.

Recurvirostra avosetta

This species breeds throughout Europe, with significant populations occurring in Spain, Ukraine, the Netherlands, Germany, France, Germany and Russia.

The European population of the species is estimated at 40 700 - 77 700 pairs (81 200 - 155 000 mature individuals), with the European wintering population estimated at 72 100 - 113 000 individuals, while in the EU28 the population is estimated at 30 800 - 61 900 pairs (61 600 - 124 000 mature individuals), with the EU28 wintering population estimated at 68 000 - 93 400 individuals. In Europe, according to the IUCN red list, the breeding population trend is estimated to be decreasing, while the European wintering population is estimated to be increasing. The Greek population is estimated to number 400-600 pairs, corresponding to 1% of the European population, while the wintering Greek population is estimated at 2,000-6,000 individuals, corresponding to 4% of the European wintering population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to IUCN at European level the species is listed as Least Concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of conservation by Birdlife International (BirdLife International 2017).

In Greece, the avocet is locally quite common, but breeds and winters in a few relatively few Greek wetlands. It is found in the main coastal wetlands of western and northern Greece and in a few islands of the northern Aegean (Handrinos and Akriotis 1997). In the 1990s the breeding population of the avocet was 500-700 pairs (Handrinos and Akriotis 1997), but today it is estimated at 300-500 pairs, with negative trends (Greek Red Book-Legakis and Maragou 2009). The main breeding areas are the Evros Delta (< 50 pairs), the Axios-Loudia-Aliakmon Delta (20-30 pairs), the Messolonghi Lagoon (23-40 pairs). The largest current colony is located in the wetlands of Halkidiki (Agios Mamas and the marshes of N. Fokea) where about 100 pairs have been breeding since 2007. Colonies of the species have also been recorded in wetlands of Lemnos and Lesvos. The species is more numerous in winter, occurring in all large coastal wetlands and in some inland wetlands (L. Kerkini, L. Koroneia, etc.). It is estimated that 2,000-5,000 individuals winter in Greece, a number that seems to have remained stable over the last decade. The areas where more than 1,000 avocets often winter are the Spperchio

Delta, the Messolonghi Lagoon, the Axios-Loudia-Aliakmon Delta, Ptelea and the other lagoons of Rodopi, L. Kerkini, etc. (Handrinos and Akriotis 1997). There are 11 recoveries in Greece of individuals ringed in Ukraine, Austria and Bulgaria, all from Macedonia and Thrace (Akriotis and Chandrinos 2004).

Northern populations of the species migrate south between August and October and return to breeding areas between March and May (Pierce and Boesman 2013). The species is present year-round in areas of western Europe (Hayman et al. 1986; Pierce and Boesman 2013).

The species nests in coastal wetlands, especially in lagoons and river deltas, while it is often found in man-made or artificial wetlands (salt ponds). The species breeds in flat open areas in shallow salt or brackish wetlands (Johnsgard et al. 1981; Hayman et al. 1986; Urban et al. 1986; Snow and Perrins 1998). Outside of the breeding season, the species occurs in coastal and inland salt ponds and mudflats, lagoons, salt marshes, estuaries (Pierce and Boesman 2013), sandy beaches, and floodplains (Urban et al. 1986). It rarely occurs in inland freshwater lakes and rivers (Urban et al. 1986), but forages on agricultural lands peripheral to wetlands (Pierce and Boesman 2013). The most important features of breeding habitat appear to be water levels that gradually decrease during the summer exposing additional feeding areas and high salt concentrations that prevent the growth of excessive emergent and coastal vegetation (Johnsgard et al. 1981). It also occurs primarily in coastal wetlands and less frequently in inland wetlands. It forms loose colonies, mainly on islands, in areas with little or no vegetation. It usually nests with other wading species, such as reed buntings (*Himantopus himantopus*) and terns. The nest may be placed in a variety of locations, including bare sand (Johnsgard et al. 1981), dried mud, short grass (Urban et al. 1986), dead vegetation, and on mounds of debris (Johnsgard et al. 1981). Adjacent nests are usually one meter apart (Hayman et al. 1986) or occasionally up to 20-30 cm (Urban et al. 1986). Lays an average of 3.64 -3, 76 eggs during April and May. The diet consists of crustaceans, aquatic insects (e.g., small beetles, midges, and brine flies), mollusks and polychaetes, and small fish as well as plant material (e.g., seeds and roots).

The threats listed in the Greek Red Book (Legakis and Marangou 2009) are the degradation or destruction of wetlands by various anthropogenic activities, causing natural habitat limitation and water pollution. The decline in the breeding population is also likely to be due to predation of eggs and chicks by corals, Mediterranean silversides and mammals. In addition, disturbance caused by farm animals (mainly cattle) grazing

close to the breeding areas of aborigines or the destruction of nests that they sometimes cause is also the cause of the reduction in the number of breeding pairs in some areas. Disturbance to colonies caused by human activities in some areas is an additional threat in some areas. Also, erosion of the islands in the areas where the avocet nests is a problem faced by some colonies, mainly in northern Greece.

According to the NRC (Legakis and Maragou 2009), the conservation measures required are as follows: Protection of wetlands from pollution and degradation, with emphasis on wetlands where the species breeds. Protection from human disturbance (recreation and projects) in breeding areas. Protection of islands from erosion. Promote measures to reduce the use of pesticides and fertilisers on crops around wetlands. Construction of artificial islands in areas where the species breeds or has bred in the recent past. Control of grazing during the breeding season near colonies of the species.

According to the recorded threats in the Threats to Species of Interest (Dimaleksis 2009) (species of interest) the reported threats to the species are:

- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Wetland drainage and other land reclamation projects
- Pollution from agrochemicals discharged into water bodies, waterlogging of receptors.

Threats listed in the IUCN red list are wetland pollution from pesticides and insecticides run-off into aquatic receptors. Also, important wintering areas are threatened by reforestation, pollution, human disturbance and reduced river flows (Kelin and Qiang 2006). The species is susceptible to avian influenza, so may be threatened by future outbreaks of the virus (Melville and Shortridge 2006).

The proposed conservation actions, according to the IUCN, are as follows:

- Construction of artificial nesting sites in coastal locations, such as beaches, covered with sparse vegetation, as they increase the reproductive success of the species (Burgess and Hirons 1992)
- The species responds positively (e.g. breeding numbers increase) to grazing by cattle on coastal grasslands, possibly as a result of reduced
- vegetation allowing improved predator detection (Olsen and Schmidt 2004)
- Wetland pollution, infrastructure development and human disturbance of key breeding sites must be stopped.

Grus grus

In Europe, the species breeds mainly in Finland, Sweden, the European part of Russia and Poland, with notable numbers in Germany, Estonia, Lithuania and Latvia.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Data Book in Greece the species is not classified as threatened, as there are insufficient data (DD: Data deficient), while according to IUCN at European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by BirdLife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

The European breeding population of the species is estimated at 154,000-212,000 pairs (309,000-423,000 mature individuals), with the European wintering population estimated at 317,000-380,000 individuals, while in the EU28 the population is estimated at 124,000-169,000 pairs (248,000-338,000 mature individuals), with the EU28 wintering population estimated at 312,000-352,000 individuals. In Europe both the breeding and wintering population is estimated to be increasing. The Greek wintering population is estimated to number between 5 and 30 pairs, corresponding to less than 1% of the European wintering population (BirdLife International 2021).

During the breeding season the species uses a wide variety of shallow wetlands, including high altitude wetlands, peat bogs, usually with ponding water, swampy forest clearings, reedbeds and rice fields. The species requires inaccessible ground nesting sites near seasonally flooded riparian forests. Habitats of the species during the non-breeding season (wintering and migration period) include floodplains, marshy grasslands, shallow sheltered bays, rice paddies (Cramp and Simmons 1980), grasslands and savannah-like areas (such as open oak woodlands on the Iberian Peninsula) (Meine and Archibald 1996). The species returns to its breeding grounds in March (Vegvari 2002), where breeding begins in late April or early May, occasionally up to three weeks earlier in the southern parts of its range (Snow and Perrins 1998). The nest is a mound of wetland vegetation (which may be reused from year to year), generally placed in or near water in inaccessible undisturbed marsh, heath, bog (Cramp and Simmons 1980; Urban et al. 1986). or meadow (Malik and Prange 1995). Two eggs are usually laid (Archibald et al. 2013). The species is omnivorous both during the

breeding season and during non-breeding periods (Cramp and Simmons 1980). The species is fully migratory, although isolated breeding populations east and south of the Black Sea may be permanent residents or make only local movements (Snow and Perrins 1998).

Threats listed on the IUCN red list are primarily from habitat loss and degradation through dam construction, urbanization and agricultural expansion (including changes in land use, intensification, expanded irrigation systems and conversion of traditional oak pastures) (Meine) and Archibald 1996). In highly developed breeding areas, the species is threatened by disturbance of nesting sites through tourism, which reduces its reproductive success by increasing the frequency of successful nest predation by rooks, wild boars and foxes (Meine and Archibald 1996). Egg collection is also a threat to the breeding population in Turkey (Meine and Archibald 1996). During its migratory routes and in its wintering areas, the species is particularly threatened by habitat fragmentation and the loss of many smaller traditional foraging areas, leading to increasing concentrations of large flocks in smaller areas and thus increased competition (Cramp and Simmons 1980; Alonso et al. 1994; Meine and Archibald 1996). Pesticide poisoning may also affect cranes along migration routes and in some wintering areas, especially where they are primarily dependent on cereal crops (Meine and Archibald 1996). Collisions with utility lines (telephone and power) are common in highly developed areas along migration routes and in wintering areas (collisions are the main cause of adult mortality in wintering areas in Spain) (Meine and Archibald 1996). Hunting is a major threat to this species during migration (Meine and Archibald 1996, Nawaz et al. 2006).

Glaucidium passerinum

In Europe, the species breeds mainly in Russia, with significant numbers in Sweden, Romania, Norway, Belarus, Belarus, Latvia, Austria, Germany, Finland and Austria.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece, the species has not been assessed and therefore does not have a threatened status (NE), while according to IUCN at the European level it is listed as a species of reduced concern (LC) (BirdLife International 2021). It is also not classified as a species of European

interest for protection by BirdLife International (BirdLife International 2017), and is also protected by the CITES International Convention (Appendix II).

The European population of the species is estimated at 82,900 - 157,000 pairs (165,000 - 313,000 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 31,000 - 69,700 pairs (62,000 - 139,400 mature individuals). The Greek population of the species is estimated to number 5-10 pairs, which corresponds to less than 1% of the European population (BirdLife International 2021).

The species is mainly found in coniferous and mixed forests. It occurs mainly in the taiga zone and in upland forests. It is monogamous and breeds from April to July. It nests in tree holes, either natural or holes dug by woodpeckers, and also makes use of artificial nesting boxes. It usually lays four to seven eggs. It feeds on small mammals, particularly rats, and also bats and small birds (Holt et al. 1999). The species is mainly epidemic, although some dispersal occurs during winter and bad weather, and low prey numbers may cause movements (Hagemeijer and Blair 1997).

Threats listed on the IUCN red list are weather conditions, as breeding numbers can be significantly affected by these, and the availability of food resources (mainly rodents) can also affect the species' breeding rate. Despite large-scale deforestation in Finland, there is no evidence of population decline there, but in western Germany extinction in many areas has been linked to forest destruction and subsequent changes in the ecosystem, such as an increase in the population of the hoopoe (*Strix aluco*) at higher altitudes (Holt et al. 1999).

The recommended conservation actions, according to the IUCN, are as follows:

- Require more research to better inform conservation measures (König et al. 2008)
- Conservation of forest habitats, including the preservation of old trees and the provision of artificial nesting boxes.

Tetrao urogallus

In Europe, the species breeds mainly in the European part of Russia, Sweden and Finland, with significant numbers also occurring in and Norway. In Greece, the species is found only in three areas of Macedonia (Rodopi, Lailia forest of Serres and Mount Athos) (Handrinos and Akriotis 1997).

The European population of the species is estimated to number 798,000 - 1,710,000 males exhibiting spatial behaviour (1,590,000 - 3,420,000 mature individuals), while in the EU28 the population is estimated at 468,000 - 1,170,000 males exhibiting spatial behaviour (937,000 - 2,330,000 mature individuals). In Europe the breeding population is estimated to be declining. The Greek population is estimated to number 150-180 pairs, which is less than 1% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I, II and III) and the Bern Convention (Annex III). According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to IUCN at European level the species is listed as Least Concern (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of conservation by Birdlife International (BirdLife International 2017).

The species is epidemic, with local movements occurring during winter, mainly for food availability (de Juana and Kirwan 2012).

In Greece, according to the Greek Red Data Book (Legakis and Maragou 2009), the species is rare and very locally epidemic. The bulk of the Greek population is found in the forests of Western Rhodope, while a few pairs are also found in the forest of Lailia, Serres (Poirasidis 1989) and in Athos (Hšlzinger and Rszler 1990), where the presence of the species is questionable (Handrinos and Akriotis 1997). Finally, there is unconfirmed information on the presence of the species in the Gramos (Handrinos and Akriotis 1997). The size of the Greek population is not precisely known: the first estimate was 330-380 individuals (Poirasidis 1989), while later it was estimated at 225-313 pairs (BirdLife International 2004). Greece is the southernmost limit of the geographic distribution of the Wild Bear in the Western Palearctic, and the Greek population is isolated from the rest of the Balkans.

In Greece, especially in the Western Rhodopes, the wild bear is found in dense, mature mixed forests of mainly Scots pine (*Pinus sylvestris*) and black pine *(P. nigra*), spruce (*Picea abies*), beech (*Fagus sylvatica*) and fir (*Abies alba*), with dense understorey and small clearings (Papaioannou 1968, Poirazidis 1989, Handrinos and Akriotis 1997). In Athos it is found at an altitude of 1,140-1,340 m. There are insufficient data on its ecology/biology. In winter it feeds almost exclusively on pine needles, in spring to late summer on various other plant species and from summer to early winter on insects. The blueberry (*Vaccinium myrtillus*) is a very important food

source, especially for the young, in the first months of their lives. They give birth from mid-April to mid-June, but usually in May. It lays six to nine eggs (Madge and McGowan 2002). The nest is a shallow cavity lined with plant material or feathers, and is often found well sheltered at the base of a tree (Harrison and Castell 2002).

Threats listed in the Greek Red Book (Legakis and Maragou 2009) are the misapplication of forest exploitation practices (opening of a large network of forest roads, with controlled logging, disturbance, etc.) and illegal hunting. In the future, climate change is likely to play an important role in the reduction of the Greek forest (Klaus et al. 1999; Hagemaijer and Blair 1997).

According to the recorded threats in the list of threats to the species of conservation concern (Dimalexis 2009) (species of interest), the reported threats to the species are:

- Construction of roads of all categories, as well as railway lines
- Hunting - poaching - trapping - collecting eggs or chicks - nest destruction
- Inappropriate forest management
- Disturbing activities (hunting, logging, fishing, plant and firewood collection)
- Deforestation and logging.

Threats listed in the IUCN red list are the destruction or alteration of the forest habitat. It is still hunted (even during the breeding season) except in SW and CE.

The recommended conservation actions, according to the IUCN, are as follows:

- Prohibition of human disturbance, especially in areas with small or threatened populations.
- Reduce mortality through the removal, relocation and marking of power lines, wires and fencing for deer and sheep.
- Require local enforcement of legislation in areas threatened by poaching.

Flora of the area

General

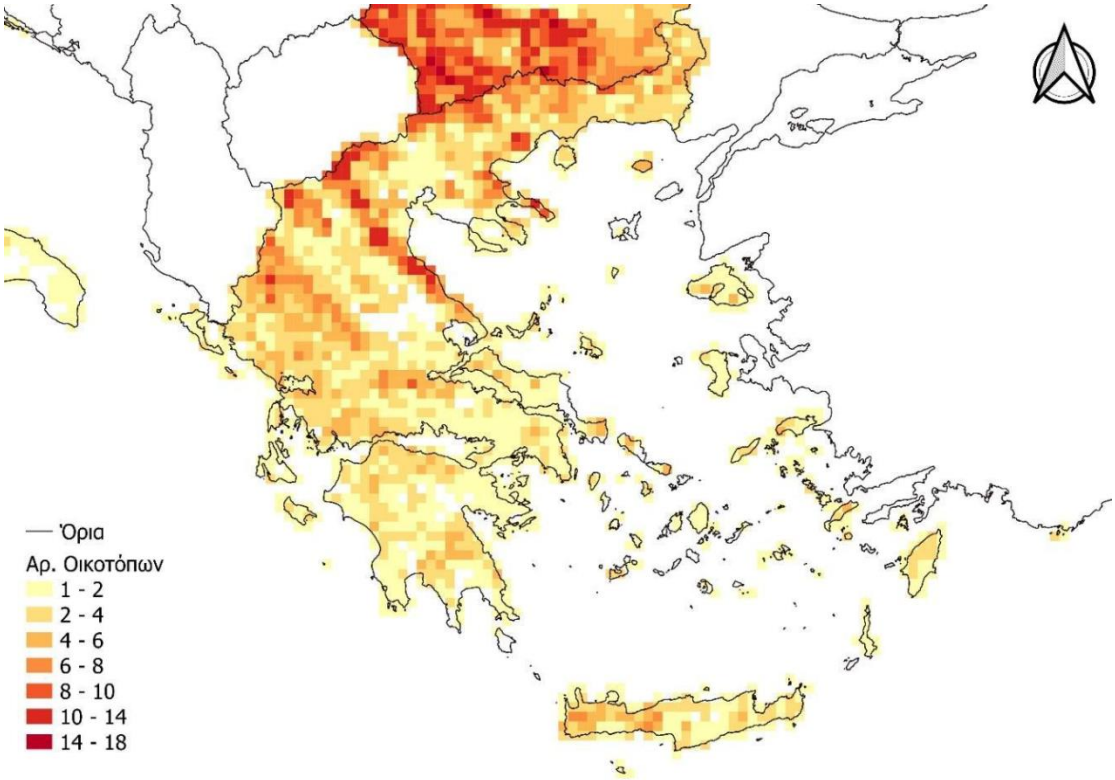
Greece's geographical position at the crossroads of three continents, its orographic configuration, the diversity of soil types and the climate have contributed decisively to the creation of a mosaic of ecosystems. Greece hosts a high diversity of forest vegetation types, due to ecological conditions and historical factors. Indicative of this high diversity is demonstrated by the fact that 28 forest habitat types are present and recorded in Greece according to Directive 92/43/EEC, which is the third largest number of habitat types among the Member States of the European Union. (data from the last report according to Article 17 of Directive 92/43/EEC for the period 2013-2018).

The highest number of forest habitat types is found in areas located mainly in the north-central and north-eastern part of the country. The diversity of forest vegetation in Greece can initially be attributed to its geographical location, as species diversity increases from north to south (Gillman et al. 2015, Willig and Presley 2013, in Tsiripidis I. and Bazos I. 2023). The biological diversity of Greece is also remarkable according to Bilz et al. (2011), as it hosts the highest number of taxa per unit area in Europe (Tsiripidis I. and Bazos I. 2023).

Another reason to which the high diversity of forest vegetation in Greece can be attributed is its topographic and geomorphological diversity. According to the E.A.D.O. report (2023), mountainous areas, with their complex and intense relief, are globally high diversity areas. In particular, the high geomorphological diversity present in mountain ranges results in a corresponding ecological diversity and therefore a high ecotope diversity (Spehn and Körner 2005, in Tsiripidis I. and Bazos I. 2023). Also, in mountainous regions, particularly in the northern hemisphere and mid-latitudes (20o-40o north of the equator), organism diversity is typically maximized at mid-elevations (Guo et al. 2013, in Tsiripidis I. and Bazos I. 2023), which accommodate the typical deciduous forest growth zone at these latitudes. The high diversity of mountainous areas may be partly due to the typically lower degree of disturbance in mountainous areas compared to lowland areas (Spehn and Körner 2005).

Map 10 shows that higher local diversity of forest habitat types occurs mainly in the north-central and north-eastern part of the country, in particular in the mountain

ranges along the northern border (Gramos, Varnountas, Voras, Belles, Orvilos, Rodopi), on specific mountains in north-eastern Greece (Paggaio and Athos), and on the mountains running from north to south-east across the north-central part of the country (Vermio, Pieria, Olympus, Kato Olympus, Ossa).



Map 10. Number of forest habitat types per 10x10 km cell of the European ETRS (LAEA 5210) in Greece (data taken from the website of the European Environment Agency for the period 2013-2018).

Finally, another reason for the high diversity of forest vegetation in Greece, especially in the northern part of the country, is the fact that the wider region (southern Balkans) functioned as a shelter for several tree species during the Pleistocene (e.g. Košir et al. 2008; Médail and Diadema 2009; Tzedakis 2004; Tzedakis et al. 2002, in Tsiripidis I. and Bazos I. 2023). Areas that have functioned as refugia are usually characterized by high species diversity, and such relationships have been found for angiophyte diversity in forest vegetation types (e.g. Jiménez-Alfaro et al. 2018, in Tsiripidis I. and Bazos I. 2023), but also for tree species diversity in Europe.

Greece is one of the most important biodiversity hotspots worldwide in terms of the number of endemic plants, with the percentage of these plant taxa exceeding 22%

(Convention on Biological Diversity 2016). To date, more than 7,000 terrestrial plant taxa have been recorded in Greece (Dimopoulos et al. 2013, 2016, Flora of Greece web.

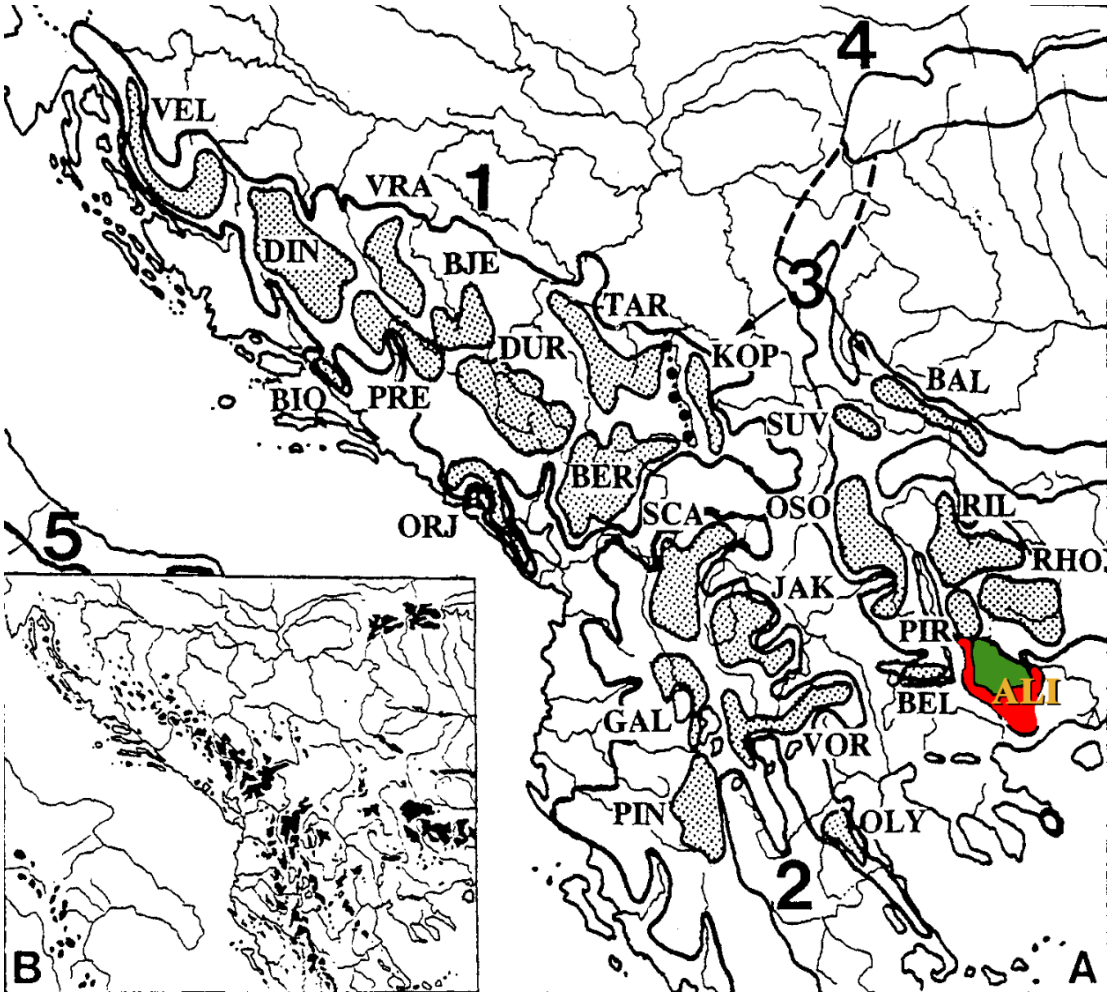
Based on the available data up to March 2022 (Flora of Greece web: Vascular Plants of Greece: An Annotated Checklist, March 2022), the flora of the Vascular Plants of Greece includes a total of 6,820 taxa: 5,900 and 2,000 subspecies, belonging to 1,087 genera and 184 families.

THE PHYTOGEOGRAPHICAL REGION OF NORTHEASTERN GREECE (NE)

The area of Orvilos, according to endemism and vegetation, in accordance with the phytogeographical division of South-Eastern Greece. Europe by Horvat et al. (1974), it is located within the eastern part of the Eastern Moesia province (area west of the Black Sea, north of the Balkan Mountains and Skardos, south of the Danube River and east of the Drinus River) of the Balkan subregion of the Central European region (Map 11).

Map 11. The phytogeographical division of SEE. Europe from Horvat et al. (1974).

Stevanović (1996), dividing the flora occurring in the main mountain ranges of the Central Balkans into spatial categories, includes Orvil, together with Mount Baldy, in the Balkan-Rodope mountain system, which is a subgroup - designated ALI (Map 12). Although the other mountains of the Balkan-Rhodope system belong more or less to the alpine or transitional alpine type, the ALI group is differentiated and classified in the oromediterranean floristic region.

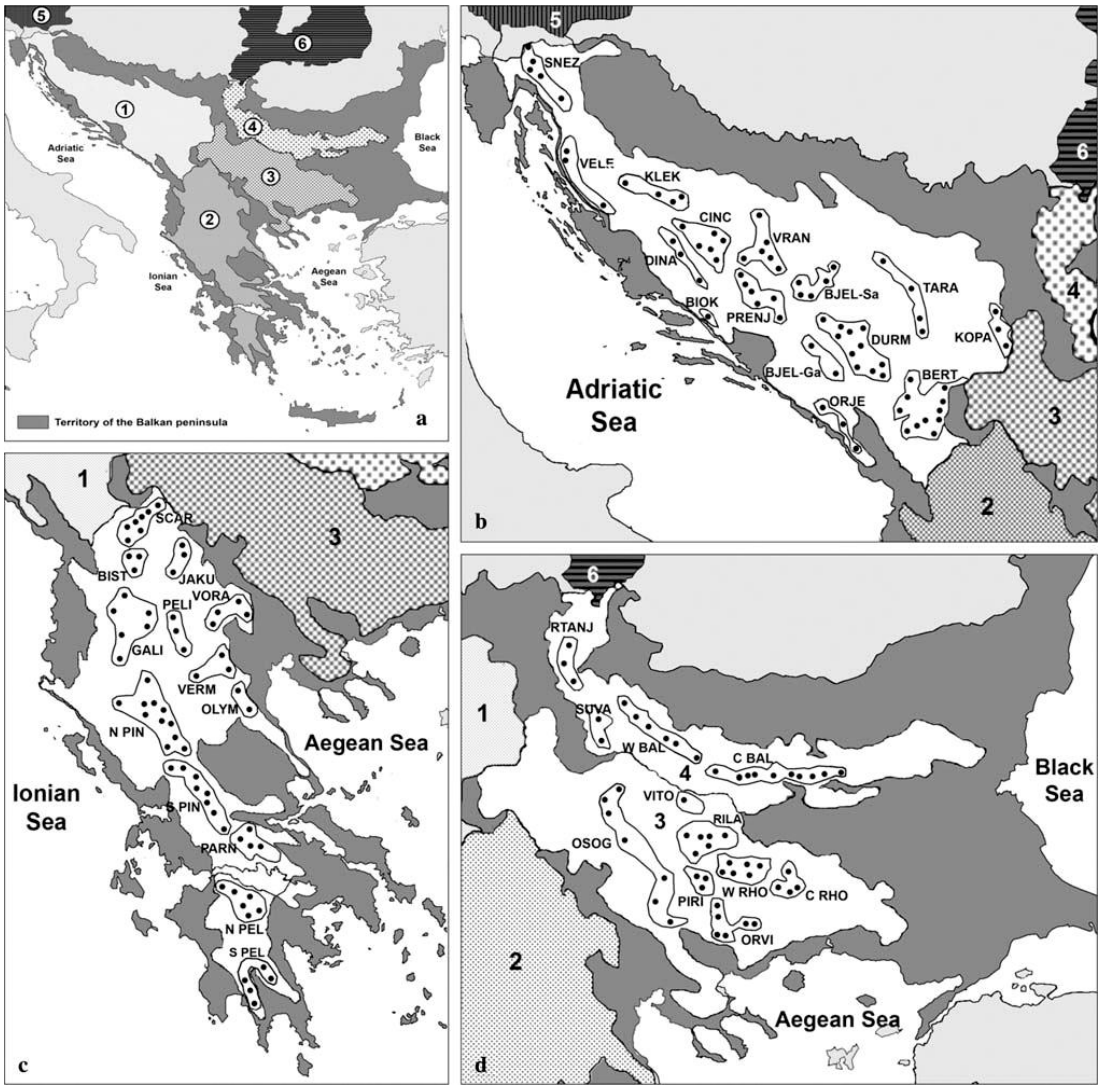


Map 12. The geographical position of 25 mountain groups in the main mountain systems of the West and West Africa. Central Balkan Peninsula. 2. 1. Scardo-Pindian Mountains. 3. Balkan Mountains-Rodope. Carpathians (4) and Apennines (5). The contour lines surrounding the shaded mountain ranges indicate an altitude of c. 1000-1200 m.

According to Stevanovic et.al. (2009) mountain systems in the Balkans can be divided into four main groups (Map 13). Orvilos is placed in the Rhodope-Rila mountain system (group numbered 3), which includes mountains of Bulgaria, SE Serbia, the eastern part of North Macedonia and Greece.

Oberdofer (1990), who proposed the division of Europe into phytogeographic regions based on the distinction of characteristic floristic groups (floristic elements), places Orvil in the region characterized by the Balkan geocluster.

Based on the division of the Greek territory into 13 floristic regions by Strid and Tan (1997), Orvilos is placed in the phytogeographic region of Northeastern Greece (NE Greece).



Map 13. a. Appearance of the four main mountain systems in the Balkans: (1) Dinaric Alps, (2) Scandinavian-Pindian including the Hellenides, (3) Rhodope-Rila, (4) Balkan. The Alps (5) and Carpathians (6) are also indicated. b. Dinaric Alps, dots represent the highest mountain peaks from which data on Arctic-Alpine species distribution were studied. c. Scandic-Pindian mountain system. d. Rhodope-Rila mountain systems (3) and the Balkan Mountains (4) from Vladimir Stevanovic et al. (2009)

The phytogeographic region of Northeastern Greece (NE) shows a strong floral affinity with Bulgaria and Anatolia (Turkey). The floral region, according to "Vascular

Plants of Greece: an annotated checklist" is the richest in **number of forest taxa** (444 taxa), but also the richest floral region in **Greek endemic forest taxa** (24 taxa).

The phytogeographic region of Northeastern Greece (NE) is considered an area of particular diversity as 3,557 taxa are recorded, which makes it the richest area in number of taxa. The number of endemic taxa (131) is also significant, as well as the number of taxa of restricted distribution in the Balkan Peninsula (425 taxa). It should be noted, following the annotated checklist 'Vascular Plants of Greece: an annotated checklist', that the number of endemic taxa, exclusively of the phytogeographic region of north-eastern Greece (NE), compared to the corresponding numbers of the other floral regions of Greece, is significant.

A large number of endemic plants were created by complex processes that took many millions of years. They are narrowly endemic, occurring in very limited areas and usually consisting of small populations. They are therefore particularly sensitive to possible environmental disturbances. The (60) of the Greek endemics are narrow-types and occur exclusively in the region of Northeastern Greece (NE) (Table 21).

These plants are found in crevices, lithic slopes, stony slopes and stony shrublands of the limestone slopes of Mount Athos (such as: *Aethionema orbiculatum, Anthemis sibthorpii, Aubrieta erubescens, Centaurea chalcidicaea, Centaurea huljakii, Centaurea peucedanifolia, Helichrysum sibthorpii, Onosma paradoxa, Satureja athoa, Silene orphanidis, Viola athois, Linum olympicum subsp. athoum, Isatis tinctoria subsp. athoa), on the Pangaio mountain (such as Campanula pangea, Centaurea pangaea, Verbascum pangaeum),* on serpentinite rocky slopes in Evros (*Paronychia manfrediana*) or in the Organi Rodopi (*Onosma kittanae*). A limited number of narrow-native endemics occur in other locations in the region (NE). Such narrow-native endemics are found exclusively in Falakro (*Hieracium caesium subsp. volakanum, Crocus orphei*), in areas of Serres and Volvi (*Colchicum chimonanthum*), in Kavala (*Verbascum halacsyanum, Minuartia athoa subsp. neoiraklitsa*), etc.

Table 21. Greek endemic taxa occurring exclusively in the region of northeastern Greece (NE).

AA	SPECIES	Annex II species (Directive 92/43/EEC)	Annex IV species (Directive 92/43/EEC)	Species of Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Endemic Rare (R)
1	*Acinos alpinus* subsp. *nomismophyllus*						**+**
2	*Aethionema orbiculatum*					**+**	**+**
3	*Allium melanogyne*						**+**
4	*Anthemis sibthorpii*						**+**
5	*Arenaria filicaulis* subsp. *teddii*				***** DD**		**+**
6	*Armeria sancta*					**+**	**+**
7	*Astragalus thracicus* subsp. *monachorum*						**+**
8	*Aubrieta erubescens*						**+**
9	*Calamintha menthifolia* subsp. *hirta*						**+**
10	*Campanula albanica* subsp. *sancta*				***** LC**		**+**
11	*Campanula pangea*				****** VU**		**+**
12	*Centaurea chalcidicaea*						**+**
13	*Centaurea greuteri*						**+**
14	*Centaurea huljakii*						**+**
15	*Centaurea pangaea*						**+**
16	*Centaurea peucedanifolia*	**+**			****** VU**		**+**
17	*Colchicum chimonanthum*				****** VU**	**+**	**+**
18	*Crepis athoa*				****** VU**	**+**	**+**
19	*Crocus biflorus* subsp. *stridii*				***** VU**		**+**
20	*Crocus orphei*						**+**
21	*Dianthus pinifolius* subsp. *tenuicaulis*						**+**
22	*Dianthus strymonis*						**+**
23	*Helichrysum sibthorpii*		**+**		***** VU** ****** EN**	**+**	**+**
24	*Hieracium bohatschianum* subsp. *onosmoidiforme*						**+**
25	*Hieracium caesium* subsp. *volakanum*						**+**
26	*Hieracium heldreichii* subsp. *charrelianum*						**+**
27	*Hieracium jankae* subsp. *patentiramum*						**+**
28	*Hieracium jankae* subsp. *tschairlicum*						**+**
29	*Hieracium megalothecum*						**+**
30	*Hieracium murorum* subsp. *malacodiaphanum*						**+**

AA	SPECIES	Annex II species (Directive 92/43/EEC)	Annex IV species (Directive 92/43/EEC)	Species of Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Endemic Rare (R)
31	*Hieracium murorum* subsp. *phegophilum*						+
32	*Hieracium pseudolympicum*						+
33	*Hieracium rechingerorum*						+
34	*Hieracium sparsum* subsp. *acropolianthelum*						+
35	*Hieracium sparsum* subsp. *cholomonense*						+
36	*Hieracium transiens* subsp. *leilae*						+
37	*Hieracium transiens* subsp. *levimaculatum*						+
38	*Hieracium triadanum* subsp. *epinephum*						+
39	*Hieracium triadanum* subsp. *leucopannosum*						+
40	*Hieracium turbinellum* subsp. *pseudobracteolatum*						+
41	*Isatis tinctoria* subsp. *athoa*				** VU	+	+
42	*Linum olympicum* subsp. *athoum*						+
43	*Minuartia athoa* subsp. *athoa*						+
44	*Minuartia athoa* subsp. *neoiraklitsa*						+
45	*Onosma kittanae*				*** EN		+
46	*Onosma paradoxa*						+
47	*Paronychia manfrediana*						+
48	*Salvia teddii*					+	+
49	*Satureja athoa*					+	+
50	*Silene orbelica*						+
51	*Silene orphanidis*	+			*VU ** EN	+	+
52	*Taraxacum extimum*						+
53	*Taraxacum rigidifolium*						+
54	*Taraxacum salonikiense*						+
55	*Taraxacum xanthiense*						+
56	*Thymus plasonii*				**EN	+	+
57	*Verbascum halacsyanum*						+
58	*Verbascum pangaeum*						+
59	*Viola athois*		+		** NT	+	+
60	*Viola ganiatsasii*						+

* *The red data book of rare and threatened plants of Greece.*

** 2009. *The red data book of rare and threatened plants of Greece.*
*** Natural Environment and Climate Change Agency (NECCA) (2024) The Greek Red List of Threatened Species.Athens, Greece. available at redlist.necca.gov.gr, accessed 17/08/2024

Memorandum to Tables 21, 22 and 23

One species is considered:
Critically Endangered (CR) when it meets any of the five IUCN Red List criteria for this category and is therefore considered to be at extremely high risk of extinction in the wild.
Endangered (EN) when it meets any of the five IUCN Red List criteria for this category and is therefore considered to be at very high risk of extinction.
Vulnerable (VU) when it meets any of the five IUCN Red List criteria for this category and is therefore considered to be at high risk of extinction.
Near Threatened (NT) when it has been assessed according to the IUCN Red List criteria, and does not meet any of the criteria for being considered threatened. However, it is not far from meeting or likely to meet them in the near future.
Least Concern (LC) when it has been assessed according to the IUCN Red List criteria, and does not meet any of the criteria to be considered threatened or near threatened.
Data Deficient (DD) when there are insufficient data concerning its distribution and/or population status to make an assessment of the risk of extinction. This species could range from Extinct to Low Risk.

In the Northeastern Greece (NE) region, in addition to the above mentioned narrow endemics, 72 Greek endemic taxa are found, i.e. taxa that occur only in some of the floral regions of Greece and in no other country (Table 22).

Table 22. Greek endemic taxa occurring also in the phytogeographic region of northeastern Greece (NE).

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species of Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Endemic Rare (R)
1	*Abies cephalonica*						+
2	*Alkanna graeca*						
3	*Alcanna pelia*						+
4	*Allium erythraeum*					+	+
5	*Allium favosum*					+	+
6	*Allium integerrimum*					+	+
7	*Allium macedonicum*					+	+
8	*Asperula aristata* subsp. *thessala*						+
9	*Bolanthus thymifolius*						+
10	*Campanula lavrensis*					+	+
11	*Carum appuanum* subsp. *palmatum*				***LC	+	+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species of Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Endemic Rare (R)
12	*Centaurea grisebachii* subsp. *confusa*						+
13	*Centaurea grisebachii* subsp. *occidentalis*						+
14	*Centaurea johnseniana*						+
15	*Centaurea lactiflora*	+				+	+
16	*Conium divaricatum*						
17	*Dactylorhiza kalopissii* subsp. *macedonica*						+
18	*Dianthus corymbosus*						+
19	*Dianthus gracilis* subsp. *xanthianus*					+	+
20	*Elytrigia obtusiflora* subsp. *graeca*						?+
21	*Euphorbia deflexa*						
22	*Festuca grandiaristata*						+
23	*Festuca rubra* subsp. *thessalica*						+
24	*Galium breviramosum*						+
25	*Galium capitatum*					+	+
26	*Galium exaltatum*						+
27	*Goniolimon heldreichii*					+	+
28	*Hieracium graecum*						+
29	*Hieracium jankae* subsp. *macranthelophorum*						+
30	*Hieracium pyrgosense*						+
31	*Hieracium sericophyllum* subsp. *eriocomum*						+
32	*Hieracium sericophyllum* subsp. *pilosius*						+
33	*Hieracium triadanum*						+
34	*Hieracium turbinellum*						+
35	*Hypericum athoum*					+	+
36	*Johrenia distans*						+
37	*Laserpitium siler* subsp. *laeve*						+
38	*Leptoplax emarginata*						+
39	*Malcolmia graeca* subsp. *bicolor*						+
40	*Melica cretica* subsp. *greuteri*						
41	*Nepeta argolica*						+
42	*Nepeta argolica* subsp. *malacotrichos*						+
43	*Ornithogalum atticum*						+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species of Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Endemic Rare (R)
44	*Orobanche baumanniorum*						+
45	*Paeonia mascula* subsp. *hellenica*						+
46	*Paronychia albanica* subsp. *graeca*						
47	*Paronychia cephalotes* subsp. *thracica*						+
48	*Pterocephalus perennis* subsp. *perennis*						
49	*Ranunculus thasius*						+
50	*Salvia eichleriana*					+	+
51	*Scilla subnivalis*						
52	*Scutellaria albida* subsp. *vacillans*				***LC		+
53	*Silene grisebachii*						+
54	*Silene multicaulis* subsp. *sporadum*						+
55	*Silene niederi*					+	+
56	*Taraxacum copidophylloides*						+
57	*Taraxacum dialeptum*						+
58	*Taraxacum egnatiae*						+
59	*Taraxacum graecum*						
60	*Taraxacum phitosii*						+
61	*Taraxacum protervum*						+
62	*Teucrium divaricatum* subsp. *athoum*						+
63	*Teucrium flavum* subsp. *hellenicum*						
64	*Thymus dolopicus*						+
65	*Tragopogon longifolius*						+
66	*Trifolium dolopium*					+	+
67	*Verbascum cylindrocarpum*						+
68	*Verbascum dimoniei*						+
69	*Verbascum dingleri*						+
70	*Veronica chamaedrys* subsp. *chamaedryoides*						+
71	*Viola phitosiana*						+

* 1995. *The red data book of rare and threatened plants of Greece.*

** 2009. *The red data book of rare and threatened plants of Greece.*

*** Natural Environment and Climate Change Agency (NECCA) (2024) The Greek Red List of Threatened Species.Athens, Greece. available at redlist.necca.gov.gr, accessed 17/08/2024

The presence of 396 taxa, endemic to the Balkan Peninsula, plays an important role in the high diversity of plant species in northeastern Greece. Table 23 presents the 79 rare endemic taxa of the Balkan Peninsula that occur for the Greek area exclusively in the phytogeographic region of northeastern Greece (NE), while Table 24 contains Balkan taxa that also occur in other phytogeographic regions of Greece.

Table 23. Rare endemic taxa of the Balkan Peninsula occurring in Greece **exclusively in the** Northeastern Greece (NE) **region.**

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
1	*Alkanna primuliflora*				***DD		+
2	*Alkanna stribrnyi* subsp. *stribrnyi*				***DD		+
3	*Allium melanantherum*					+	+
4	*Alyssoides utriculata* subsp. *bulgarica*						+
5	*Anthemis macedonica* subsp. *thracica*				***LC		+
6	*Anthemis orbelica*				**VU ***VU		+
7	*Asperula suberosa*					+	+
8	*Campanula orphanidea*				***LC	+	+
9	*Cardamine amara* subsp. *balcanica*						+
10	*Carex kitaibeliana* subsp. *capillata*						+
11	*Centaurea immanuelis-loewii*	+			***NT		+
12	*Centaurea macedonica*						+
13	*Centaurea marmorea*				***VU		+
14	*centaurea parilica*						+
15	*Centaurea rutifolia*						+
16	*Centaurea stoebe* subsp. *serbica*						+
17	*Cerastium decalvans* subsp. *orbelicum*						+
18	*Cerastium rectum* subsp. *rectum*						+
19	*Chondrilla urumoffii*						+
20	*Colchicum doerfleri*				***LC	+	+
21	*Convolvulus boissieri* subsp. *suendermannii*						+
22	*Crocus biflorus* subsp. *alexandri*				***LC		+
23	*Cytisus agnipilus*						+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
24	*Dianthus gracilis* subsp. *drenowskianus*						+
25	*Dianthus gracilis* subsp. *friwaldskyanus*						+
26	*Dianthus noeanus*						+
27	*Dianthus petraeus* subsp. *orbelicus*						+
28	*Dianthus simulans*						+
29	*Dianthus tenuiflorus*						+
30	*Erysimum bulgaricum*						+
31	*Erysimum welchevii*						+
32	*Festuca oviniformis*						+
33	*Festuca penzesii*						+
34	*Festuca pirinica*						+
35	*Festuca thracica*						+
36	*Festuca valida* subsp. *leilaensis*						+
37	*Fritillaria drenovskii*		+			+	+
38	*Galium macedonicum*						+
39	*Galium mirum*						+
40	*Geum rhodopeum*						+
41	*Haberlea rhodopensis*				**VU		+
42	*Hieracium bohatschianum*						+
43	*Hieracium kritschimanum*						+
44	*Hieracium mattfeldianum* subsp. *poliophorum*						+
45	*Hieracium murorum* subsp. *obesiglandulum*						+
46	*Hieracium olympicum* subsp. *argyrotrichum*						+
47	*Hieracium pirinicola*						+
48	*Hieracium sparsum* subsp. *paniculatissimum*						+
49	*Lilium rhodopeum*				* VU **VU	+	+
50	*Lomelosia rhodopensis*						+
51	*Luzula multiflora* subsp. *snogerupii*				***LC		+
52	*Minuartia doerfleri*				***VU		+
53	*Moehringia pendula*						+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
54	*Nonea atra*						+
55	*Ornithogalum pluttulum*					+	+
56	*Paeonia saueri*				***CR		+
57	*Potentilla apennina* subsp. *stojanovii*				***VU		+
58	*Salix xanthicola*				*R (rare)		+
59	*Saxifraga ferdinandi-coburgi*				***LC	+	+
60	*Saxifraga stribrnyi*				***LC		+
61	*Sempervivum leucanthum*						+
62	*Soldanella chrysosticta* subsp. *chrysosticta*						+
63	*Soldanella rhodopaea*				**NT		+
64	*Taraxacum aznavourii*						+
65	*Taraxacum janchenii*						+
66	*Thymus degenii*				***DD		+
67	*Tragopogon hayekii*						+
68	*Verbascum adrianopolitanum*					+	+
69							
70	*Verbascum humile* subsp. *humile*						+
71	*Verbascum nobile*						+
72	*Verbascum pseudonobile*						+
73	*Verbascum roripifolium*						+
74	*Verbascum spathulisepalum*						+
75	*Viola grisebachiana*				***VU		+
76	*Viola orbelica*				***NT		+
77	*Viola perinensis*				***VU		+
78	*Viola serresiana*				***LC		+
79	*Viola stoyanovii*				***NT	+	+

* *The red data book of rare and threatened plants of Greece.*

** 2009. *The red data book of rare & threatened plants of Greece.*

*** Natural Environment and Climate Change Agency (NECCA) (2024) The Greek Red List of Threatened Species, Athens, Greece, available at redlist.necca.gov.gr, accessed 17/08/2024.

Table 24. Endemic taxa of the Balkan Peninsula occurring **also in the** Northeastern Greece (NE) **region.**

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
1	*Abies borisii-regis*						
2	*Acer heldreichii*					+	
3	*Acer heldreichii* subsp. *heldreichii*					+	
4	*Acer hyrcanum* subsp. *hyrcanum*						
5	*Acer hyrcanum* subsp. *intermedium*						
6	*Achillea ageratifolia* subsp. *ageratifolia*						
7	*Achillea chrysocoma*				***LC		+
8	*Alchemilla heterotricha*				***EN		+
9	*Achillea holosericea*						
10	*Alchemilla lanuginosa*				***LC		+
11	*Alcona pindicola*				***LC		+
12	*Achillea pseudopectinata*						
13	*Alchemilla bulgarica*				***VU		
14	*Alchemilla serbica*				***VU		
15	*Alyssum chalcidicum*						+
16	*Alyssum corymbosoides*						+
17	*Alyssum sibiricum*						
18	*Anthemis arvensis* subsp. *cyllenea*				***LC		+
19	*Anthemis macedonica*				***LC		
20	*Anthemis macedonica* subsp. *macedonica*				***LC		+
21	*Anthemis pindicola*				***LC	+	+
22	*Anthemis tinctoria* subsp. *parnassica*						
23	*Anthyllis aurea*				***LC		
24	*Anthyllis vulneraria* subsp. *bulgarica*				***LC		
25	*Anthyllis vulneraria* subsp. *pulchella*				***LC		
26	*Anthyllis vulneraria* subsp. *scardica*				***LC		+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
27	*Arabis bryoides*						+
28	*Arabis procurrens*				**NT		
29	*Arenaria cretica*				***LC		
30	*Aristolochia elongata*				***LC		+
31	*Armeria rumelica*						
32	*Arum nigrum*						
33	*Asperula aristata* subsp. *condensata*						
34	*Asperula aristata* subsp. *nestia*						+
35	*Aster alpinus* subsp. *cylleneus*						+
36	*Astragalus angustifolius* subsp. *balcanicus*				***LC		+
37	*Astragalus gladiatus*				***LC		
38	*Astragalus spruneri*						
39	*Astragalus suberosus subsp. haarbachii*				***LC		
40	*Astragalus thracicus*						
41	*Asyneuma pichleri*						
42	*Atocion lerchenfeldianum*						+
43	*Aurinia corymbosa*						
44	*Ballota nigra* subsp. *sericea*				***LC		+
45	*Barbarea longirostris*						+
46	*Bellevalia hyacinthoides*				***LC	+	
47	*Berteroa orbiculata*				***LC		+
48	*Bromus cappadocicus* subsp. *lacmonicus*						+
49	*Buglossoides glandulosa*						
50	*Bupleurum aequiradiatum*						
51	*Bupleurum apiculatum*				***LC		
52	*Campanula albanica* subsp. *albanica*				***LC		
53	*Campanula moesiaca*				***LC		

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
54	*Campanula patula* subsp. *epigaea*				***LC		+
55	*Campanula sparsa* subsp. *sparsa*				***LC		
56	*Campanula sparsa* subsp. *sphaerothrix*				***LC		
57	*Campanula spatulata* subsp. *spatulata*				***LC		
58	*Campanula spatulata* subsp. *spruneriana*				***LC		
59	*Campanula scutellata*				***LC		+
60	*Campanula trachelium* subsp. *athoa*				***LC		
61	*Campanula wanneri*				***CR		
62	*Cardamine acris* subsp. *acris*						
63	*Carduus candicans* subsp. *candicans*						
64	*Carduus kerneri* subsp. *scardicus*						+
65	*Carex castroviejoi*						+
66	*Carum appuanum* subsp. *bulgaricum*				***LC		+
67	*Centaurea affinis* subsp. *affinis*						
68	*Centaurea affinis* subsp. *pallidior*						
69	*Centaurea bovina*						+
70	*Centaurea cuneifolia* subsp. *pallida*						
71	*Centaurea cylindrocephala*						+
72	*Centaurea deustiformis*						+
73	*Centaurea graeca*						+
74	*Centaurea grisebachii* subsp. *grisebachii*						
75	*Centaurea napulifera* subsp. *napulifera*						
76	*Centaurea napulifera* subsp. *tuberosa*						
77	*Centaurea pindicola*						+
78	*Centaurea thracica*						
79	*Centaurea tymphaea* subsp. *brevispina*					+	+
80	*Centaurea tymphaea* subsp. *tymphaea*						

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
81	*Centaurea zuccariniana*						+
82	*Centranthus ruber* subsp. *sibthorpii*						
83	*Cephalaria ambrosioides*						
84	*Cephalaria flava* subsp. *flava*						+
85	*Cerastium decalvans* subsp. *decalvans*						
86	*Cerastium rectum* subsp. *petricola*						
87	*Cerinthe minor* subsp. *cleiostoma*						
88	*Chamaecytisus austriacus* subsp. *tommasinii*						
89	*Cirsium appendiculatum*						
90	*Cirsium candelabrum*				***LC		
91	*Cirsium ligulare* subsp. *albanum*						
92	*Cleome aurea*						+
93	*Clinopodium dalmaticum*				***DD		
94	*Colchicum haynaldii*				***LC	+	
95	*Consolida phrygia* subsp. *thessalonica*						
96	*Convolvulus boissieri* subsp. *parnassicus*						
97	*Corydalis blanda*						
98	*Corydalis solida* subsp. *incisa*						
99	*Cotoneaster parnassicus*				*R (rare)		+
100	*Crataegus heldreichii*						
101	*Crepis viscidula*						
102	*Crepis viscidula* subsp. *geracioides*						+
103	*Crepis viscidula* subsp. *viscidula*						
104	*Crocus nivalis*				***LC		
105	*Crocus veluchensis*				***LC		
106	*Crucianella graeca*				***LC		

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
107	*Cynoglossum pustulatum* subsp. *parvifolium*						+
108	*Dactylorhiza cordigera* subsp. *cordigera*						
109	*Dactylorhiza kalopissii*						
110	*Danthoniastrum compactum*						
111	*Delphinium balcanicum*						+
112	*Dianthus gracilis* subsp. *gracilis*						+
113	*Dianthus petraeus*						
114	*Dianthus pinifolius* subsp. *lilacinus*						+
115	*Dianthus pinifolius* subsp. *pinifolius*						
116	*Dianthus pinifolius* subsp. *serbicus*						
117	*Dianthus stenopetalus*						
118	*Dichoropetalum minutifolium*				***VU		
119	*Digitalis laevigata* subsp. *graeca*					+	+
120	*Digitalis laevigata* subsp. *laevigata*						
121	*Digitalis viridiflora*						
122	*Drymocallis regis-borisii*						+
123	*Echinops bannaticus*						
124	*Epilobium tournefortii*						
125	*Erodium absinthoides* subsp. *guicciardii*						+
126	*Erysimum calycinum*						+
127	*Erysimum comatum*						+
128	*Erysimum drenowskii*						+
129	*Erysimum pseudocuspidatum*						
130	*Euphorbia amygdaloides* subsp. *heldreichii*				***LC		+
131	*Ferulago sylvatica* subsp. *confusa*						
132	*Festuca hirtovaginata*						+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
133	*Festuca koritnicensis*						
134	*Festuca macedonica*						+
135	*Festucopsis sancta*				***LC		+
136	*Fritillaria gussichiae*			+		+	+
137	*Fritillaria thessala*					+	+
138	*Galium aegeum*						+
139	*Galium anisophyllon* subsp. *plebeium*						+
140	*Galium hellenicum*						+
141	*Galium intricatum*						+
142	*Galium pseudaristatum*						
143	*Galium rigidifolium*						+
144	*Gastrocotyle macedonica*						+
145	*Genista depressa*						
146	*Genista subcapitata*						+
147	*Gentianella bulgarica*						
148	*Goniolimon dalmaticum*						
149	*Gymnadenia frivaldii*				*VU ***NT		
150	*Gypsophila pallasii*				***DD		
151	*Haplophyllum balcanicum*						+
152	*Haplophyllum coronatum*						+
153	*Helleborus odorus* subsp. *cyclophyllus*						
154	*Herniaria nigrimontium*						+
155	*Hesperis dinarica*						
156	*Hieracium bosniacum* subsp. *dolopicum*						+
157	*Hieracium bracteolatum*						+
158	*Hieracium bracteolatum* subsp. *bracteolatum*						+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
159	*Hieracium chalcidicum subsp. chalcidicum*						+
160	*Hieracium chalcidicum* subsp. *divaricatum*						
161	*Hieracium gaudryi*						+
162	*Hieracium heldreichii* subsp. *heldreichii*						+
163	*Hieracium pannosum* subsp. *friwaldii*						
164	*Hieracium pannosum* subsp. *parnasidis*						+
165	*Hieracium pannosum* subsp. *taygeteum*						
166	*Hieracium racemosum* subsp. *crinitiforme*						
167	*Hieracium racemosum* subsp. *eriopus*						+
168	*Hieracium sartorianum*						
169	*Hieracium sartorianum* subsp. *sartorianum*						
170	*Hieracium scardicum*						+
171	*Hieracium sparsum* subsp. *macedonicum*						+
172	*Hieracium sparsum* subsp. *schultzianum*						+
173	*Hieracium thapsiformoides*						+
174	*Hyacinthella leucophaea* subsp. *atchleyi*					+	
175	*Hypecoum pseudograndiflorum*						
176	*Hypericum maculatum* subsp. *immaculatum*						
177	*Hypericum rochelii*						+
178	*Hypericum rumeliacum* subsp. *rumeliacum*						
179	*Hypericum thasium*						+
180	*Hypericum vesiculosum*						+
181	*Iris reichenbachii*					+	
182	*Knautia ambigua*				***LC		
183	*Knautia drymeia* subsp. *nympharum*				***LC		
184	*Knautia macedonica*				***LC		+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
185	*Knautia magnifica*				***LC	+	+
186	*Knautia midzorensis*				***LC		
187	*Lactuca aurea*						
188	*Lamium bifidum* subsp. *balcanicum*				***LC		
189	*Lathraea rhodopea*				*R (rare) **VU ***LC		+
190	*Lathyrus alpestris*						
191	*Lathyrus aureus*						
192	*Lilium albanicum*					+	
193	*Lilium chalcedonicum*					+	+
194	*Linaria genistifolia* subsp. *sofiana*				***LC		
195	*Linaria peloponnesiaca*				***LC		
196	*Linum capitatum* subsp. *capitatum*				***LC		
197	*Linum elegans*						
198	*Linum flavum* subsp. *albanicum*						
199	*Linum hirsutum* subsp. *spathulatum*				***LC		+
200	*Linum hologynum*				***LC		
201	*Linum thracicum*				***LC		
202	*Malabaila involucrata*						
203	*Malcolmia graeca*						+
204	*Malcolmia orsiniana* subsp. *angulifolia*				***NT		+
205	*Melampyrum heracleoticum*						+
206	*Minuartia attica* subsp. *attica*						
207	*Minuartia glomerata* subsp. *glomerata*				***LC		
208	*Minuartia glomerata* subsp. *macedonica*				***LC		+
209	*Minuartia glomerata* subsp. *velutina*				***LC		+
210	*Minuartia stojanovii*						+

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
211	*Myosotis alpestris* subsp. *suaveolens*						
212	*Noccaea lutescens*						+
213	*Noccaea tymphaea*						+
214	*Oenanthe montis-khortiati*						
215	*Onobrychis alba* subsp. *calcarea*				***NT		
216	*Onobrychis montana* subsp. *scardica*				***NT		
217	*Onobrychis pindicola*						+
218	*Ononis adenotricha*						
219	*Ophrys helenae*						+
220	*Ornithogalum fimbriatum*					+	
221	*Ornithogalum fimbriatum* subsp. *fimbriatum*					+	
222	*Paronychia albanica*						
223	*Paronychia macedonica* subsp. *macedonica*						
224	*Paronychia rechingeri*					+	+
225	*Pedicularis brachyodonta* subsp. *grisebachii*						+
226	*Pedicularis brachyodonta* subsp. *moesiaca*						+
227	*Pedicularis orthantha*				***VU		+
228	*Petrorhagia illyrica* subsp. *illyrica*						
229	*Petrorhagia thessala*						+
230	*Pinus peuce*					+	+
231	*Plantago media* subsp. *pindica*				***LC		+
232	*Poa jubata*						
233	*Poa macedonica*						+
234	*Polygala supina* subsp. *rhodopaea*				***LC		+
235	*Polygonum longipes*						
236	*Potentilla haynaldiana*						

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
237	*Pterocephalus perennis*						
238	*Ptilostemon afer* subsp. *afer*				***LC		
239	*Pulsatilla halleri* subsp. *rhodopaea*						+
240	*Pyrus elaeagrifolia* subsp. *bulgarica*				***LC		
241	*Ranunculus incomparabilis*						+
242	*Ranunculus psilostachys*						
243	*Rhinanthus pindicus*						+
244	*Rhinanthus sintenisii*						+
245	*Rhamnus saxatilis* subsp. *prunifolia*						
246	*Saxifraga rotundifolia* subsp. *chrysospleniifolia*				***LC		
247	*Scabiosa balcanica*						+
248	*Scabiosa tenuis*						+
249	*Scabiosa triniifolia*						
250	*Scandix australis* subsp. *balcanica*						
251	*Scrophularia aestivalis*				***LC		+
252	*Scrophularia laciniata*						
253	*Sedum alpestre* subsp. *erythraeum*						+
254	*Sedum stefco*				**VU		+
255	*Sedum tuberiferum*						+
256	*Sempervivum heuffelii*					+	
257	*Senecio macedonicus*						
258	*Senecio thapsoides* subsp. *thapsoides*						+
259	*Sesleria achtarovii*						+
260	*Sesleria robusta*						
261	*Sesleria robusta* subsp. *robusta*						
262	*Sesleria tenerrima*						

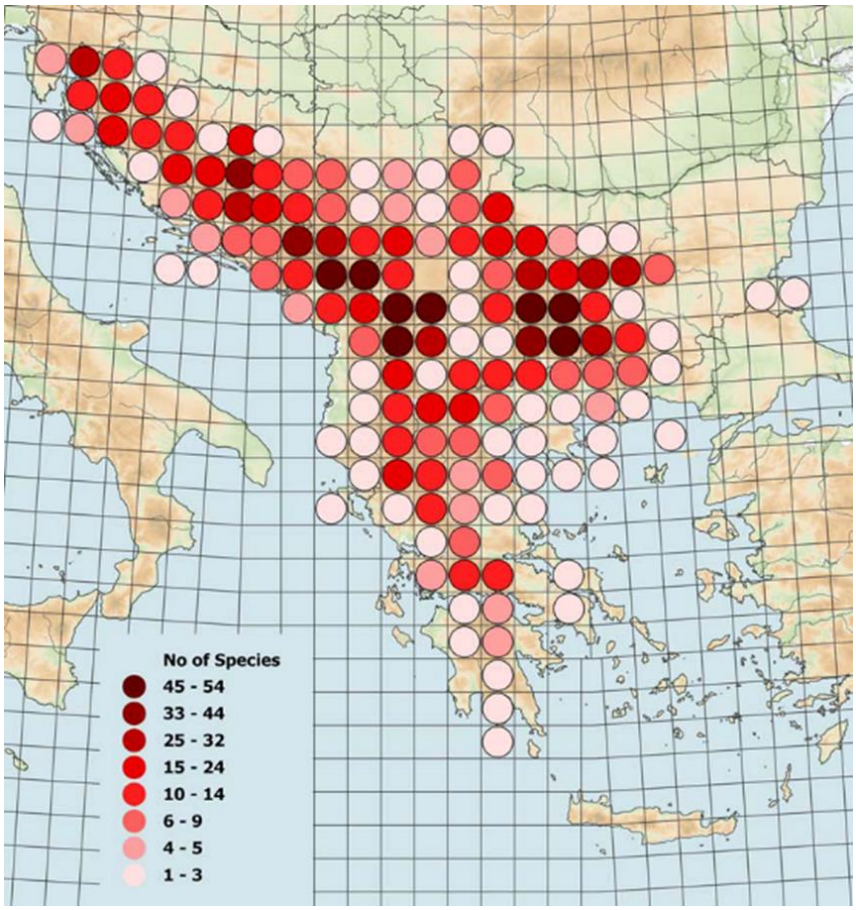
A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
263	*Sideritis purpurea*						
264	*Sideritis scardica*				***NT		+
265	*Silene exaltata*						
266	*Silene fabarioides*						
267	*Silene flavescens*						
268	*Silene flavescens* subsp. *flavescens*						
269	*Silene flavescens* subsp. *thessalonica*						+
270	*Silene frivaldszkyana*						
271	*Silene graeca*				***LC		+
272	*Silene heuffelii*						
273	*Silene radicosa*						
274	*Silene roemeri* subsp. *roemeri*						+
275	*Silene sendtneri*						
276	*Silene sendtneri* subsp. *balcanica*						+
277	*Silene scorpilii*						+
278	*Silene waldsteinii*						
279	*Sorbus borbasii*				***LC		
280	*Sorbus umbellata* subsp. *baldaccii*				***LC		
281	*Sorbus umbellata* subsp. *umbellata*				***LC		
282	*Stachys leucoglossa*				***LC		+
283	*Stachys plumosa (as **Stachys pangaea**)*				*VU **VU ***LC	+	
284	*Stachys plumosa* subsp. *freynii*				***LC		+
285	*Stachys plumosa* subsp. *plumosa*				***LC		
286	*Stipa balcanica*						+
287	*Taraxacum dorchocarpum*						+
288	*Taraxacum gracilens*						

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Species listed in Annex IV (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81	Rare (R) Balkan endemic
289	*Taraxacum insolitum*						+
290	*Taraxacum pindicola*						
291	*Thymus boissieri*				***LC		
292	*Thymus leucotrichus* subsp. *neiceffii*				***LC		+
293	*Thymus stojanovii*				***LC		+
294	*Thymus teucrioides*				***LC		+
295	*Tragopogon balcanicus*						
296	*Trifolium dalmaticum*				***LC		
297	*Trifolium medium* subsp. *balcanicum*				***LC		
298	*Trifolium pignantii*						
299	*Trifolium trichopterum*				***LC		
300	*Verbascum banaticum*						
301	*Verbascum dieckianum*						+
302	*Verbascum eriophorum*						+
303	*Verbascum glabratum*						
304	*Verbascum glabratum* subsp. *glabratum*						
305	*Verbascum glandulosum*						+
306	*Verbascum leucophyllum*						+
307	*Verbascum nigrum* subsp. *abietinum*						
308	*Verbascum rupestre*						+
309	*Verbascum undulatum*						
310	*Viola aetolica*				***LC		+
311	*Viola delphinantha*	+				+	+
312	*Viola macedonica*						
313	*Viola orphanidis* subsp. *orphanidis*				***LC		
314	*Viola seeana*				***LC		
315	*Viscaria atropurpurea*						

* *The red data book of rare and threatened plants of Greece.*
** 2009. *Red data book of rare & threatened plants of Greece.*
*** Natural Environment and Climate Change Agency (NECCA) (2024) The Greek Red List of Threatened Species, Athens, Greece, available at redlist.necca.gov.gr, accessed 17/08/2024.

Although a greater proportion of the woody taxa of the area are European and Mediterranean, reflecting the transition from Mediterranean to Meso-European flora, the strong influence of the Ice Age was particularly important, and is reflected in the current composition of the mountain flora of the area. V. Stevanovic et al. (2009) report that Turrill (1929) lists 96 arctic-alpine species in the Balkan Peninsula, while another 46 arctic-alpine species found in the Alps have not been recorded in the peninsula. As the list was incomplete, it is difficult to know the degree of accuracy. Some Arctic-Alpine species were also discovered in the Balkan Peninsula in the last 80 years and were included in Turrill's list of Arctic-Alpine species as unknown in the Balkan Peninsula.

Today 77 Arctic-Alpine taxa are known in the Balkan Peninsula, representing 56.2% of the total Arctic-Alpine flora in Europe. The number of such species in mountains south of the border mountain ranges between SE Albania, the Republic of Macedonia, Northern Greece and Southwestern Bulgaria is small. Of the 77 arctic-alpine species recorded in the Balkan Peninsula, 34 species (44.15%) occur in all 3 mountain systems (Dinaric Mountains, Skardo-Pindian Mountains, Balkan Mountains-Rodope). The number of arctic-alpine species in the Balkans is closely related to altitude, geographical position, the main direction of distribution of mountain systems and geological composition. The higher mountains of the Western and Central Balkans contain the highest number of Arctic-Alpine species, with the number of species decreasing in the mountain systems from north to south (Map 14). In the Rhodope-Rila mountain system 54 Arctic-Alpine taxa (71%) are recorded, mainly in Vitosa, Rila, and Pirin, and to a lesser extent in Western Rhodope and Osogovska Planina. From Mount Vitosa, Rila, and Pirin to the Western Rhodope and Osogovska Planina, 2-4 times fewer Arctic-Alpine species are recorded. Table 25 shows the arctic-alpine and northern taxa occurring in the NE region.



Map 14. Distribution and number of arctic-alpine species in the Balkans (50x50 Km2) from Vladimir Stevanovic et. al. (2009)

Table 25. Alpine taxa occurring in the NE region.

A.A.	SPECIES	*AA*: Arctic-Alpine	Bo: North	Annex II species (Directive 92/43/EEC)	National Red List species (RDB)	List of plant species of Decree 67/81
1	*Alnus incana* subsp. *incana*		**+**		****NT**	
2	*Asplenium ruta-muraria* subsp. *ruta-muraria*		**+**			
3	*Asplenium septentrionale*		**+**			
4	*Asplenium viride*		**+**			
5	*Aster alpinus*	**+**				
6	*Caltha palustris*		**+**			
7	*Carex rostrata*		**+**			

A.A.	SPECIES	*AA*: Arctic-Alpine	Bo: North	Annex II species (Directive 92/43/EEC)	National Red List species (RDB)	List of plant species of Decree 67/81
8	*Catabrosa aquatica*		+			
9	*Cerastium cerastoides*	+				
10	*Coeloglossum viride*		+			
11	*Corallorhiza trifida*		+	+	***LC	
12	*Drosera rotundifolia*		+		**EN	
13	*Dryas octopetala*	+			**VU	
14	*Epilobium anagallidifolium*	+				
15	*Epilobium palustre*		+			
16	*Eriophorum angustifolium*		+			
17	*Euphrasia salisburgensis*	+			***LC	
18	*Geum rivale*		+			
19	*Glechoma hederacea*		+		***LC	
20	*Goodyera repens*		+		***LC	
21	*Gymnadenia rhellicani*	+			**VU ***EN	
22	*Hypopitys monotropa* subsp. *hypophegea*		+			
23	*Hypopitys monotropa* subsp. *monotropa*		+			
24	*Juncus articulatus*		+			
25	*Juncus filiformis*		+			
26	*Koeleria macrantha*		+			
27	*Koeleria macrantha* subsp. *macrantha*		+			
28	*Leucorchis (Pseudorchis) albida*	+				
29	*Leymus arenarius*		+			
30	*Luzula multiflora*		+		***LC	
31	*Luzula spicata*	+			***LC	
32	*Luzula sudetica*	+			***LC	
33	*Moneses uniflora*		+			
34	*Neottia cordata*		+		**VU ***VU	
35	*Oxalis acetosella*		+			
36	*Paris quadrifolia*		+		***LC	
37	*Phegopteris connectilis*		+			
38	*Phleum alpinum*	+			***LC	
39	*Poa glauca* subsp. *glauca*	+				

A.A.	SPECIES	AA: Arctic-Alpine	Bo: North	Annex II species (Directive 92/43/EEC)	National Red List species (RDB)	List of plant species of Decree 67/81
40	*Polystichum lonchitis*	+			***LC	
41	*Potamogeton gramineus*		+			
42	*Pyrola chlorantha*		+		***LC	
43	*Pyrola media*		+		***LC	
44	*Pyrola minor*		+		***LC	
45	*Pyrola rotundifolia*		+		***VU	
46	*Rubus idaeus*		+		***LC	
47	*Sagina saginoides*	+			***DD	
48	*Sanguisorba officinalis*		+			
49	*Saxifraga adscendens* subsp. *adscendens*	+			***LC	
50	*Saxifraga paniculata*	+			***LC	
51	*Sedum annuum*	+				
52	*Thesium alpinum*	+				
53	*Utricularia minor*		+			
54	*Vaccinium uliginosum* subsp. *microphyllum*		+		***NT	
55	*Vaccinium vitis-idaea*		+		***LC	
56	*Veronica catenata*		+		***LC	
57	*Veronica scutellata*		+		***LC	

* *The red data book of rare and threatened plants of Greece.*
** 2009. *Red data book of rare & threatened plants of Greece.*
*** Natural Environment and Climate Change Agency (NECCA) (2024) The Greek Red List of Threatened Species, Athens, Greece, available at redlist.necca.gov.gr, accessed 17/08/2024

In the region of Northeastern Greece, taxa that are under protection (international or national) are also recorded. Indicative examples of such taxa are presented in Table 26.

Table 26. Taxa under protection status occurring in the region of northeastern Greece (NE).

A.A.	SPECIES	Annex II species (Directive 92/43/EEC)	Annex IV species (Directive 92/43/EEC)	Species included in Annex V (Directive 92/43/EEC)	Species on the National Red List (RDB)	List of plant species of Decree 67/81
1	*Acer heldreichii*					
2	*Ajuga pyramidalis*				**VU	
3	*Arctostaphylos uva-ursi*					+
4	*Atropa bella-donna*					+
5	*Corylus colurna*					+
6	*Dactylorhiza incarnata*				**VU ***EN	
7	*Dactylorhiza macedonica*				**VU	
8	*Echium russicum*	+				
9	*Epipactis atrorubens* subsp. *spiridonovii*				**EN ***LC	
10	*Epipactis naousaensis*				**EN	
11	*Epipactis pontica*				**VU ***NT	
12	*Galanthus nivalis*			+	**NT ***NT	
13	*Gentiana asclepiadea*					+
14	*Gentiana bulgarica*					+
15	*Gentiana ciliata*					+
16	*Gentiana cruciata* L. subsp. *cruciata*					+
17	*Gentiana lutea* L. subsp. *symphyandra*			+		+
18	*Gladiolus palustris*	+				
19	*Gymnadenia frivaldii*				**VU	
20	*Himantoglossum jankae*	+				+
21	*Juniperus excelsa*					+
22	*Lilium martagon*					+
23	*Minuartia saxifraga* subsp. *saxifraga*				**VU	
24	*Omphalodes luciliae*					+
25	*Onosma visianii*				***LC	+
26	*Picea abies*					+
27	*Ruscus aculeatus*			+	***LC	
28	*Sambucus racemosa*				***LC	+
29	*Spiraea chamaedryfolia*				**NT	

** 2009. *Red Data Book of rare & endangered plants of Greece.*

*** Natural Environment and Climate Change Agency (NECCA) (2024) The Greek Red List of Threatened Species, Athens, Greece, available at redlist.necca.gov.gr, accessed 17/08/2024.

The vegetation of Orvelos

The flora and vegetation of the country has attracted the interest of botanists, who until the 1980s were mainly confined to areas of 'high floral interest'. Such areas are considered to be the high mountains and the Aegean islands, which, due to their geographical position, altitude, geomorphology and/or isolation, have important and interesting floristic elements from a phytogeographical point of view.

The vegetation of an area refers to all the self-growing plant organisms and the relationships between them and the abiotic factors of the area. Vegetation is the expression of the abiotic and biotic factors that influence these ecosystems. The abiotic factors include climate, rock and, by extension, soil and topography, while the biotic factors include the plants themselves, animals and man and his various activities. To these factors should be added time, which determines the duration of the action of each of the abiotic or biotic factors. All these factors interact to determine the form and structure of vegetation (Papanastasis 2006) and determine the habitats in which plant communities develop (Ellenberg 1988).

The results of floral and phyto-sociological surveys carried out in the neighbouring mountain ranges of Orvilos (such as in Elatia Rodopi, Fracto Rodopi, on the peaks of the Falakro Mountain and the Menoi Mountain), attest to the high diversity of plant species and vegetation types in the Greek-Bulgarian border zone. Some of the species and vegetation types that form with their exclusive presence or participation are rare or even unique for the wider Greek and Mediterranean region, a fact which is attributed to the geographical position of the area (latitude and distance from the sea) and the geological history of the area, combined with the migratory history of plant species, mainly during the glacial periods.

However, in the Orvilos section, research on the flora and vegetation of the Greek part of the mountain is limited. In terms of research, the same is observed according to M. Butcher (2017) in areas of medium or lower altitudes, with the result that many such areas have remained unexplored or insufficiently studied. Orbilov and its region, being part of the external national borders, is a border zone between Greece and Bulgaria, two countries that were member states of the rival ideological and strategic coalitions of the Cold War, NATO and the Warsaw Pact respectively. The

creation of a militarised zone during the Cold War period, combined with the lack of road infrastructure, did not favour research work in the area at that time, and subsequently, in the first post-Cold War period, research activity remained non-existent. In the last three decades, few floral surveys limited to a specific plant family or a specific plant community (*Juniperus oxycedrus*) have been carried out in the area. Also, during the implementation of the monitoring project (also referred to as 'monitoring') of the conservation status of habitat types (t.o.) and species of Community interest and '... species of birds living naturally in the wild ...', a certain number of vegetation samples were taken in the Natura 2000 protected area in specific habitat types (4060, 5210, 8210, 9530, 62A0, 91CA, 95A0).

On the other hand, however, for the part of the mountain located within the Bulgarian territory there are published results of floral surveys, according to which the recorded vascular plants of the mountain (excluding bryophytes) are 1,661 taxa belonging to 576 genera from 105 families (Aneva et al. 2015).

The Orvil area is structured by marbles, *para-gneisses* (derived from the metamorphism of marble shales) *ortho-gneisses* (from granite metamorphism), shales. After the Alpine orogeny it was filled with younger classic sediments, which are the Neogene and Quaternary deposits (Spasov et al. 2017).

The vegetation at the lower altitudes of Orvilos is dominated by shrubs (juniper mixed with anchovy, cheno oak, oak and bush mainly in the eastern part) and clumps of oak-bush reaching different altitudes depending on the exposure and the existing slopes. Their form and composition is the result of the interaction of many ecological and biotic factors, the most important of which are: the geomorphology of the mountain, exposure and slope, the type of rock and soil, atmospheric precipitation, floral composition and the influence of humans and animals. At higher altitudes, pine trees (*Pinus nigra*, *P. heldreichii*, *P. sylvestris*) form a pure coniferous belt in mixed or pure condition, while single individuals, usually of bushy *P. heldreichii*, reach almost up to the 'Tsolias' peak (2 212 m). Spruce (*Abies borisii-regis*) and beech (*Fagus sylvatica*) participate in mixed forest structures. At altitudes ranging from 1,400-1,850 m, subalpine grassland vegetation is found with small, low shrubby formations dominated by *Junipeus communis* subsp. *nana*, with the participation of *Arctostaphylos uva-ursi*, *Cotoneaster tomentosus* and *Dryas octapetala.* Rocky limestone slopes, cracks, crevices and crests are dominated by typical limestone chasmophyte species (*Saxifraga stribrnyi*, *Viola delphinantha*, *Daphne oleoides*, *Campanula rumeliana*, etc.), which

have developed adaptive mechanisms required to germinate and grow within rock crevices, even in minimal soil.

According to the classification of forest vegetation in Greece by Dafi (1973), Horvat et al. (1974) and Arabatzis (1998), the following vegetation zones occur in Orvilos:

1. **Paramedian vegetation zone (Quercetalia pubescentis).** It represents the hilly-subalpine area, composed of thermophilic deciduous species dominated by oak, anchovy, foxtail and deciduous oak.
2. **Beech, beech-fir and upland coniferous forests (Fagetalia).** It occupies the upland area of the montane Mediterranean coniferous forests, which extends into the mountainous and subalpine areas where beech forests (pure or mixed with other broad-leaved and coniferous species) predominate, mainly in gorges in the central and eastern part and mainly in western exposures in the western part.
3. **Cold-coniferous zone (Vaccinio-Picetalia).** Represents the mountain-hypalpine zone of the high mountains with the sporadic spread of cold-blooded Eurasian species (such as Scots pine, robinia).
4. **High mountain exodal zone (Astragalo-Acantholimonetalia)** occurring in the high mountains of our country, above forests and arboretums (pseudo-alpine areas). It is composed of mainly herbaceous vegetation, with scattered low shrubs.

From a flora point of view, the vertical succession of vegetation zones is easily discernible along the route from the foothills of Orvilos to its peaks. However, the boundaries of these zones on the Orbílos are intertwined and intertwined in an unclear way as a result of local topographical conditions and anthropogenic disturbances. The vegetation types mapped in the Natura 2000 network site 'Peaks of Mount Orvilos (GR1260005)' show a wide altitudinal gradient due to the different degree of disturbances the mountain has suffered in the past (such as clearings, overgrazing, fires, indiscriminate shavings), the effects of these disturbances on the soil layer, and local differences in weight conditions (Table 27).

Table 27. Altitudes of vegetation types present in the Natura 2000 network site named 'Peaks of Mount Orvilos (GR1260005)'.

Site name	Code	Habitat type	Lowest altitude of occurrence T.O.	Maximum altitude of occurrence T.O.
Tops of Mount Orvilos	8210	Limestone rocky slopes with grassy vegetation	1045	2185
Peaks of Mount Orvilos	4060	Alpine and northern peaks	1370	1675
Tops of Mount Orvilos	95A0	Upper Mediterranean pine forests, high altitude	900	2050
Tops of Mount Orvilos	91CA	Balkan and Rhodope pine forests	1200	1550
Tops of Mount Orvilos	9150	Meso-European calcareous beech forests of Cephalanthero-Fagion	850	1730
Tops of Mount Orvilos	9530	Sub-Mediterranean black pine forests	890	1980
Tops of Mount Orvilos	5210	Tree formations with *Juniperus* spp.	785	1420
Tops of Mount Orvilos	62A0	Eastern sub-mediterranean dry grassy interspersions (Scorzoneratalia villosae)	720	2212
Tops of Mount Orvilos	925A	Oyster, eastern anchovy and mixed thermophilous forests	715	1770

General description of vegetation

Most of the area of the protected area of the 'Orvilos Peaks' is covered by **ostrich, eastern anchovy and mixed thermophilous forests**. They occur from the lowest positions at the foot of Mount Orvilos in the eastern and western part and reach an altitude of up to 1,770 metres. The mountain is poorly covered by **Meso-European calcareous beech forests of the Cephalanthero-Fagion**, rich in orchids of the genera *Cephalanthera*, *Neottia* and *Epipactis,* which are found in ravines mainly in the western and less so in the eastern part of Orvilos. The boundaries of beech woodland occur in several places, lower than the boundaries of oak, eastern anchovy and mixed thermophilous woodland, which is mainly related to local topographical conditions.

A large proportion of the remaining areas of the region are covered by the type '**Eastern Sub-Mediterranean Dry Grasslands (Scorzoneratalia villosae)**', which includes sub-continental, dry to semi-dry grasslands. The mountain grasslands occur at varying exposures, slopes and altitudes (720-2,212 m), dominated by herbaceous perennials and, in particular, grasses. The grasslands occur as an unbroken unit in the central part of the area, while in the western and eastern part they are found mainly above forests of ostrich, eastern anchovy and mixed thermophilous forests. A significant area is occupied **by tree formations with *Juniperus* spp**, which occur in the southeastern and eastern part of the area from 785 m to 1,420 m. These are shrubs,

products of intense degradation, mainly on overgrazed surfaces (Theodoropoulos and Eleftheriadou 2003). At higher altitudes (>880 m), pine trees (**Scots pine** in the west, **white pine** in the east and **black pine**, mainly in the west and east) form a 'belt' of conifers in mixed or undisturbed condition up to the forest edges. Finally, in the south-central part, a smaller area is occupied by the **alpine and boreal rushes** and **limestone rocky slopes with grassy vegetation**. The latter are also found at medium altitudes in the west of the mountain.

Review of the literature on the flora of the protected area

The inventory of the flora species in the study area includes a review of the existing literature and fieldwork that have been carried out in the wider area and involve random statistical plant surveys and plant surveys in the proposed wind turbine sites.

For the flora species of the greater Orvilos area, information was sought from published surveys, which, although not carried out in the study area, covered sites in the wider area [V. Karagiannakidou et al. (1995), K. Theodoropoulos and E. Eleftheriadou (2003), S. Tsiftsis and Z. Antonopoulos (2011), T. Karakiev, R. Tzonev (2011), I.Y. Aneva et al. (2015), Chr. Damianidis and others (2015), Tashev A. and others (2016), K.B. F.G. Dunkel andG. Gottschlich (2018), K. Tan, G. Kofinas and J. Zieliński (2021), K. Tan and G. Kofinas (2022)]. Publications/reports on taxa from the Orvilos Mountain region, either with its Greek name or with the Bulgarian name (=Slavyanka Mountain) were examined. These taxa were then checked whether they were under a protection status. Table 28 shows the taxa included in the Annex of Directive 92/43/EEC (column 2), in the list of plant species of Decree 67/81 (column 3), in the CITES Convention Annex [the symbol II refers to the CITES Convention Annex in which the Greek populations of the commented species are listed, while the symbol B refers to the table of Reg. (EC) No 338/97 in which the Greek population of the species is listed] (column 4). Figures 1 to 4 show some of the important flora species of the protected area "Peaks of Mount Orvilos" that are mentioned in literature sources but **were not recorded** within the sampling plots in the study area (see tables of field records in the next chapter of this paper).

Those species recorded as 'Other important species' in the data form (SDF) for the NATURA 2000 protected area 'Peaks of Mount Orvilos' (column no. 7) were also included in the table.

For the nomenclature of taxa and the identification of spatial units the text "Vascular Plants of Greece. An annotated checklist" (Dimopoulos et al., 2013) was followed, except for the species of the family Orchidaceae for which the nomenclature from "Atlas of Greek Orchids. Volumes I and II" (Tsiftsis and Antonopoulos 2017).

Table 28. Important flora species from the literature review for the area of the protected area "Peaks of Mount Orvilos" with code GR1260005.

A.A.	TAHON	Annex taxon (Directive 92/43/EEC) /	List of plant species of Decree 67/81 [symbol (+)]	International Conventions (CITES)	Greek endemic	Balkan endemic	Other important species from SDF NATURA 2000
	1	2	3	4	5	6	7
1	*Allium macedonicum*		(+)		+		
2	*Allium melanantherum*					+	
3	*Anacamptis coriophora*		(+)	II, B			
4	*Anacamptis morio*		(+)	II, B			+
5	*Anacamptis palustris* subsp. *elegans*		(+)	II, B			
6	*Anacamptis pyramidalis*		(+)	II, B			
7	*Androsace villosa*		(+)				+
8	*Anthemis pindicola*		(+)			+	
9	*Anthyllis vulneraria* subsp. *bulgarica*					+	+
10	*Arctostaphylos uva-ursi*		(+)				+
11	*Arenaria filicaulis* subsp. *graeca*						+
12	*Asperula aristata* subsp. *nestia*					+	+
13	*Asperula aristata* subsp. *thessala*				+		
14	*Campanula orphanidea*		(+)				
15	*Carum appuanum subsp. palmatum*				+		
16	*Centaurea johnseniana*				+		
17	*Centaurea parilica*					+	+
18	*Cephalanthera damasonium*		(+)	II, B			+
19	*Cephalanthera longifolia*		(+)	II, B			+

A.A.	TAHON	Annex taxon (Directive 92/43/EEC) /	List of plant species of Decree 67/81 [symbol (+)]	International Conventions (CITES)	Greek endemic	Balkan endemic	Other important species from SDF NATURA 2000
20	*Cephalanthera rubra*		**(+)**	II, B			+
21	*Coeloglossum viride*		**(+)**	II, B			
22	*Colchicum doerfleri*					+	+
23	*Coralorrhiza trifida*		**(+)**	II, B			+
24	*Cytisus agnipilus*					+	+
25	*Dactylorhiza cordigera*		**(+)**	II, B			
26	*Dactylorhiza incarnata*		**(+)**	II, B			
27	*Dactylorhiza saccifera*		**(+)**	II, B			
28	*Dactylorhiza sambucina*		**(+)**	II, B			
29	*Dianthus gracilis* subsp. *drenowskianus*					+	+
30	*Dianthus gracilis* subsp. *gracilis*		**(+)**				
31	*Dianthus noeanus*					+	+
32	*Dianthus petraeus* subsp. *orbelicus*		**(+)**			+	+
33	*Dianthus simulans*					+	+
34	*Epipactis atrorubens subsp. spiridonovii*		**(+)**	II, B			
35	*Epipactis helleborine*		**(+)**	II, B			+
36	*Epipactis palustris*		**(+)**	II, B			
37	*Erysimum drenowskii*					+	
38	*Festuca pirinica*					+	+
39	*Fritillaria drenovskii*	+				+	+
40	*Fritillaria gussichiae*	+				+	
41	*Galanthus elwesii*			II, B			
42	*Genista subcapitata*					+	+
43	*Gentiana cruciata*		**(+)**				
44	*Gladiolus palustris (code 4096)*	+					
45	*Gymnadenia conopsea*		**(+)**	II, B			
46	*Haplophyllum balcanicum*					+	+
47	*Himantoglossum jankae*	+	**(+)**	II, B			+
48	*Hypericum rochelii*						+
49	*Inula ensifolia*						+
50	*Iris reichenbachii*					+	+

A.A.	TAHON	Annex taxon (Directive 92/43/EEC) /	List of plant species of Decree 67/81 [symbol (+)]	International Conventions (CITES)	Greek endemic	Balkan endemic	Other important species from SDF NATURA 2000
51	*Laserpitium siler subsp. laeve*				+		+
52	*Lathraea rhodopea*					+	
53	*Lilium martagon*		(+)				+
54	*Limodorum abortivum*		(+)	II, B			+
55	*Neotinea tridentata*		(+)	II, B			
56	*Neotinea ustulata*		(+)	II, B			+
57	*Neotia nidus avis*		(+)	II, B			+
58	*Neottia ovata*		(+)	II, B			
59	*Onosma heterophylla*		(+)				
60	*Onosma visianii*		(+)				
61	*Ophrys apifera*		(+)	II, B			
62	*Ophrys scolopax* subsp. *cornuta*		(+)	II, B			
63	*Ophrys sphegodes* subsp. *mammosa*		(+)	II, B			
64	*Orchis pallens*		(+)	+			
65	*Orchis purpurea*		(+)	II, B			
66	*Orchis simia*		(+)	II, B			
67	*Paronychia macedonica*					+	+
68	*Paronychia rechingeri*					+	+
69	*Platanthera bifolia*		(+)	II, B			+
70	*Platanthera chlorantha*		(+)	II, B			+
71	*Poa thessala*		(+)				+
72	*Potentilla apennina* subsp. *stojanovii*					+	+
73	*Pseudorchis albida*		(+)	II, B			
74	*Ruscus aculeatus*	+					
75	*Salvia teddii*		(+)		+		
76	*Saxifraga ferdinandi-coburgi*		(+)				+
77	*Saxifraga stribrnyi*					+	+
78	*Sempervivum heuffelii*		(+)				
79	*Sempervivum leucanthum*		(+)			+	
80	*Sideritis scardica*					+	+
81	*Silene radicosa*					+	+

A.A.	TAHON	Annex taxon (Directive 92/43/EEC) /	List of plant species of Decree 67/81 [symbol (+)]	International Conventions (CITES)	Greek endemic	Balkan endemic	Other important species from SDF NATURA 2000
82	*Silene saxifraga*						+
83	*Silene subconica*		**(+)**				
84	*Spiranthes spiralis*		**(+)**	II, B			
85	*Stachys recta* subsp. *recta*						+
86	*Thymus thracicus*						+
87	*Viola delphinantha*	+	**(+)**				
88	*Viola perinensis*					+	+

Important flora species from the literature review for the area of the protected area code GR1260005.

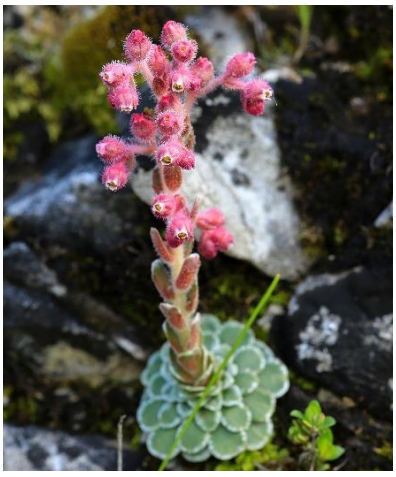
Allium macedonicum Zahar.

Anacamptis coriophora (L.) R.M. Bateman, Pridgeon & M.W.Chase

Coeloglossum viride (L.) Hartm.

Arctostaphylos uva-ursi (L.) Spreng.

Ophrys sphegodes Mill. subsp. mammosa (Desf.) Soó ex E. Nelson



Saxifraga stribrnyi (Velen.) Podp.

Limodorum abortivum (L.) Sw.

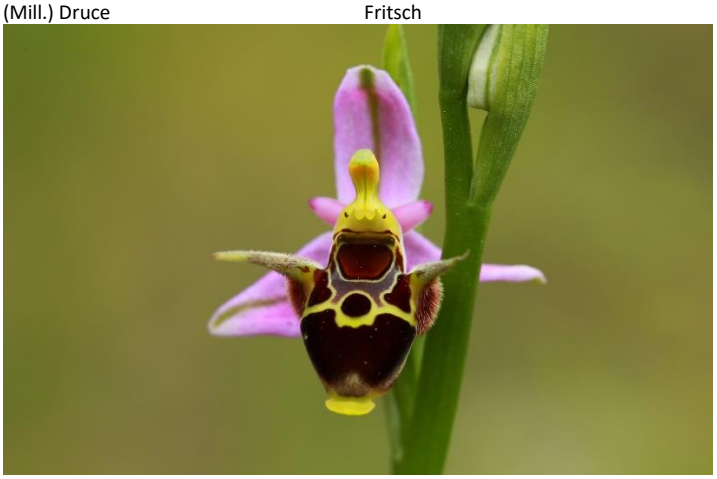
Salvia teddii Turrill

Figure 1. Important flora species from the literature review for the area of the protected area 'Peaks of Mount Orvilos', code GR1260005.

Cephalanthera damasonium (Mill.) Druce

Cephalanthera longifolia (L.) Fritsch

Dianthus noeanus Boiss.



Ophrys scolopax Cav. subsp. cornuta (Steven) E.G. Camus

Neottia ovata (L.) Bluff & Fingerh.

Spiranthes spiralis (L.) Chevall.

Corallorrhiza trifida Châtel.

Himantoglossum jankae Somlyay, Kreutz & Óvári

Figure 2. Important flora species from the literature review for the area of the protected area 'Peaks of Mount Orvilos', code GR1260005.

Anacamptis palustris (Jacq.) R.M. Bateman, Pridgeon & M.W. Chase subsp. elegans (Heuff.) R.M. Bateman, Pridgeon & M.W. Chase

Gentianella bulgarica (Velen.) Holub

Galanthus elwesii Hook. f.

Cephalanthera rubra (L.) Rich.

Sideritis scardica Griseb.

Saxifraga ferdinandi-coburgi Kellerer & Sünd. & *Saxifraga exarata* Vill.

Silene *radicosa*

Figure 3. Important flora species from the literature review for the area of the protected area 'Peaks of Mount Orvilos', code GR1260005.

Cytisus agnipilus Velen.

Gentiana cruciata L.

Androsace villosa L.

Onosma visianii Clementi

Lathraea rhodopea Dingler

Viola delphinantha Boiss.

Haplophyllum balcanicum Vandas

Lilium martagon L.

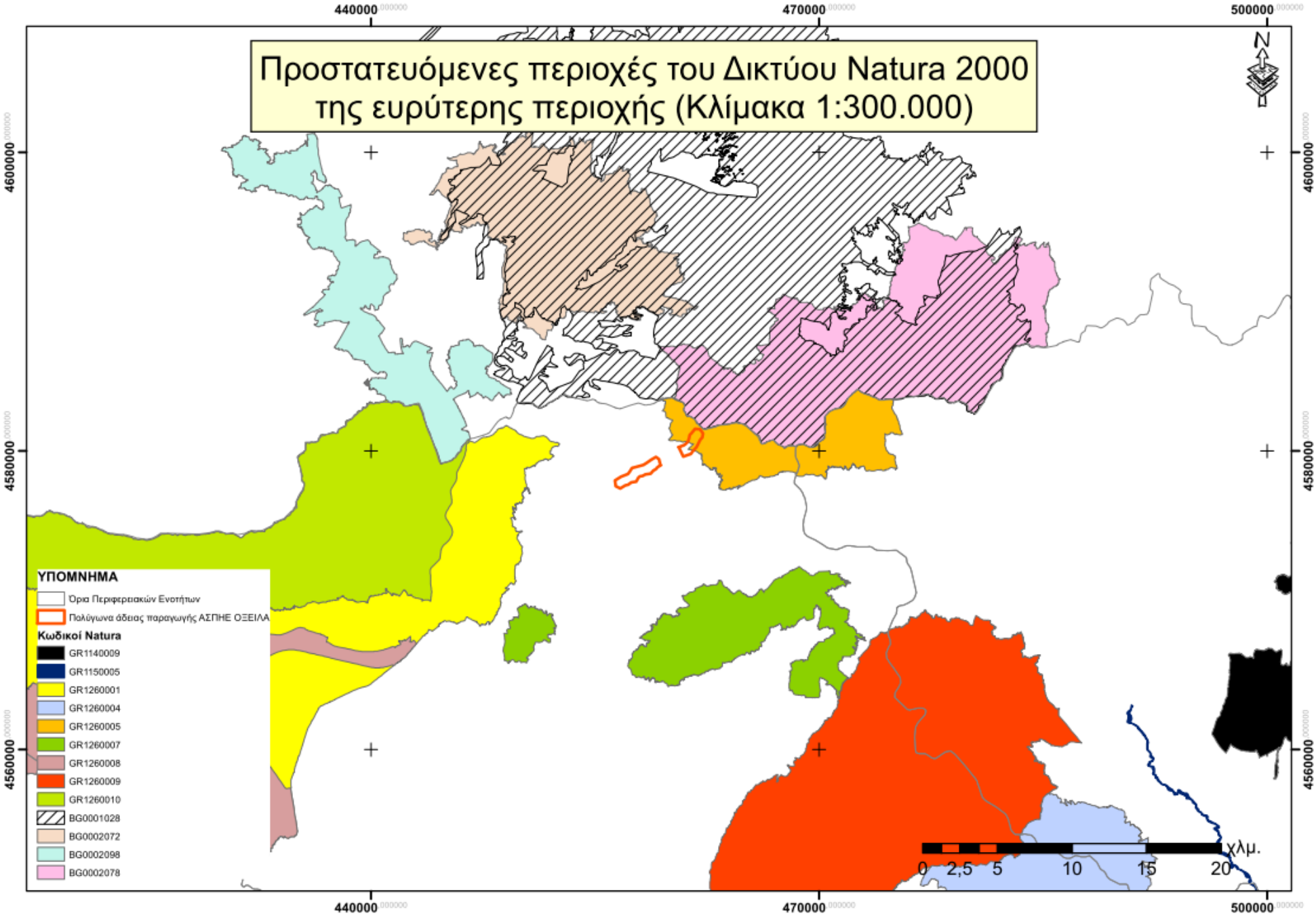
Figure 4. Important flora species from the literature review for the area of the protected area 'Peaks of Mount Orvilos', code GR1260005.

Mapping of the above on Documentation Maps

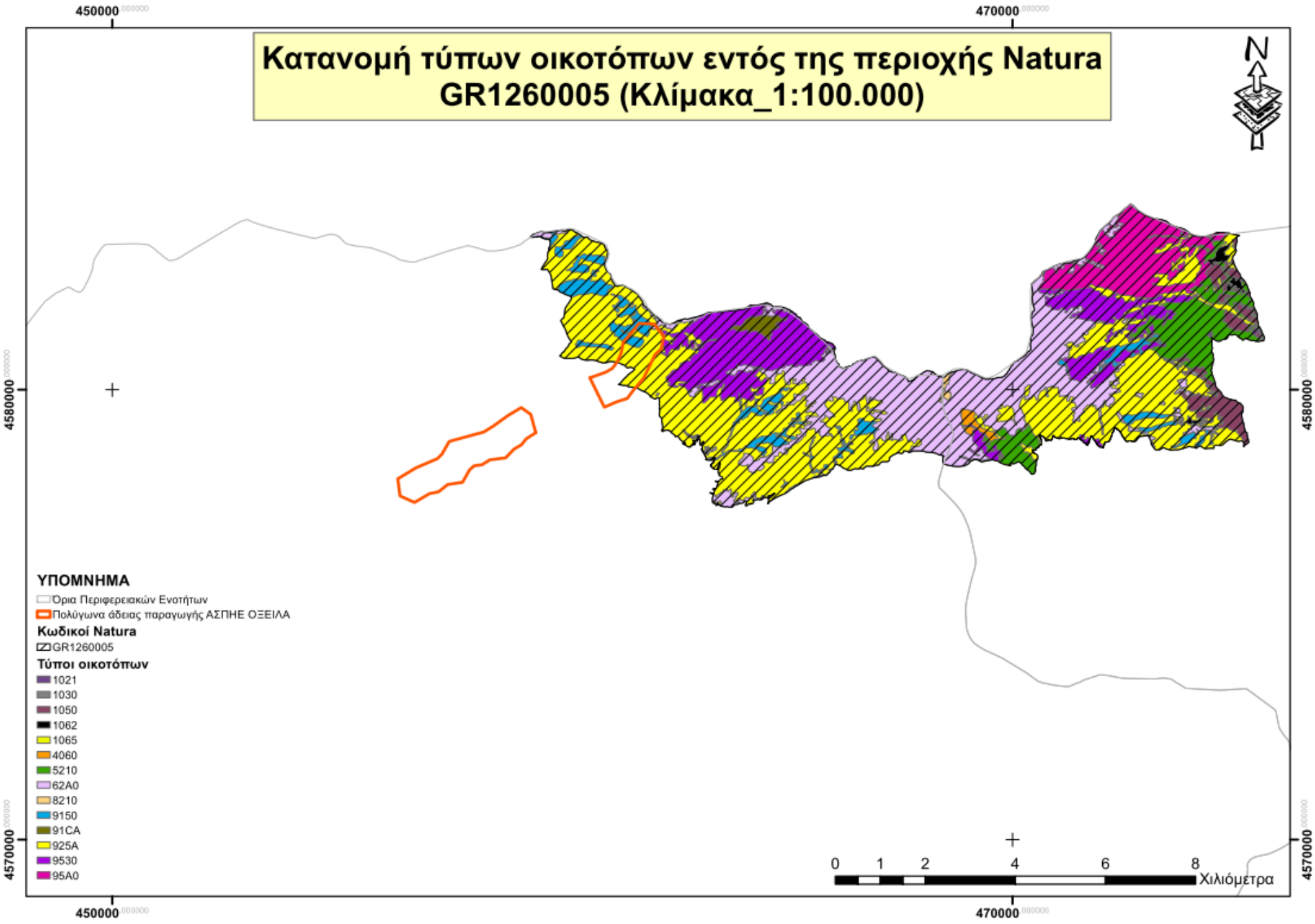
The following sets out all the information mentioned in the previous sections regarding the project site and its location, partly within GR1260005, and also in relation to the other Natura 2000 sites in the wider area, in relation to National Parks and Wildlife Refuges. A land use map of the wider area is also presented, in accordance with the land use mapping of the Corine land cover database 2018, which also shows the location of the project's production polygons and the field survey area.

With regard to the species of interest (avifauna), as defined on the basis of the data examined in the previous section, of the Special Protection Areas under study, which are the main protected species, maps of their distribution and their habitats in the wider project area are presented below, according to the data from the Monitoring and Assessment of the Conservation Status of Species and Habitat Types in Greece Programme of the Ministry of Environment and Energy in response to the country's obligations under the EU legislation. In order to fulfil the above obligation and for the species of interest of the avifauna, based on the specifications of the Special Ecological Assessment, habitat maps were created, in the field of which suitable habitats of the species of interest are depicted, based on their ecological requirements and vegetation structure, as extracted from the land cover database and mapping (Corine land cover 2018), and re mapping from satellite imagery was carried out and areas of suitable habitat identified. Also, as mentioned above, the project under consideration is partially located within Special Conservation Area GR1260005, with the habitat types listed in Annex I of Directive 92/43/EEC and the fauna and flora species listed in Annex II of the aforementioned Directive being protected. With regard to the habitat types of Annex I of the Directive of the main study area GR1260005, as selected for further analysis in the above section of this document, and with regard to the fauna and flora species of interest of Annex II of the Directive (including species of interest of the neighbouring Bulgarian Special Conservation Area BG0001028), as also selected for further analysis in the above section, maps showing their distribution in the wider project area, according to the data available, are presented below.

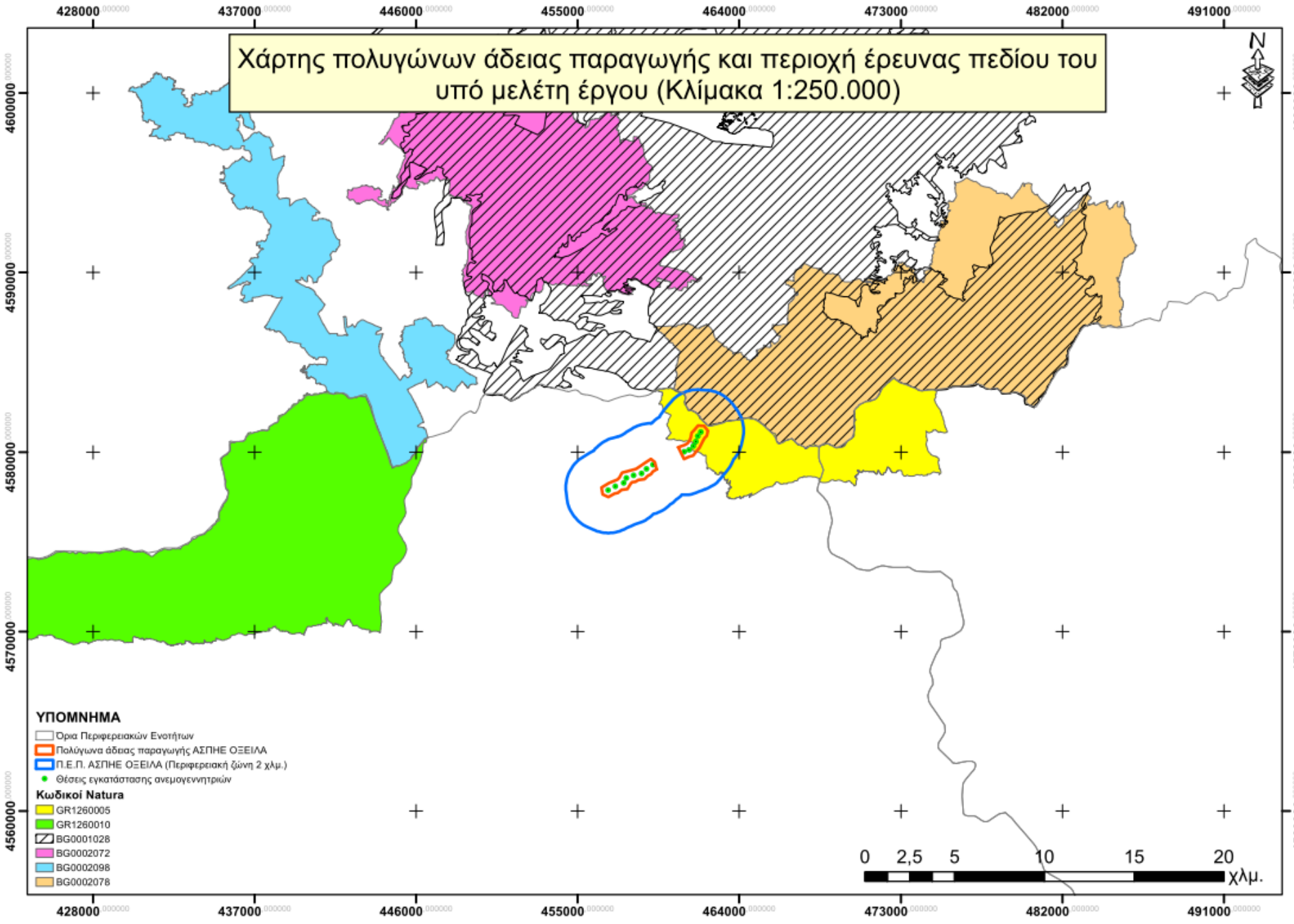
Map 15: Orientation map of the study area and the wider area of the project under study.



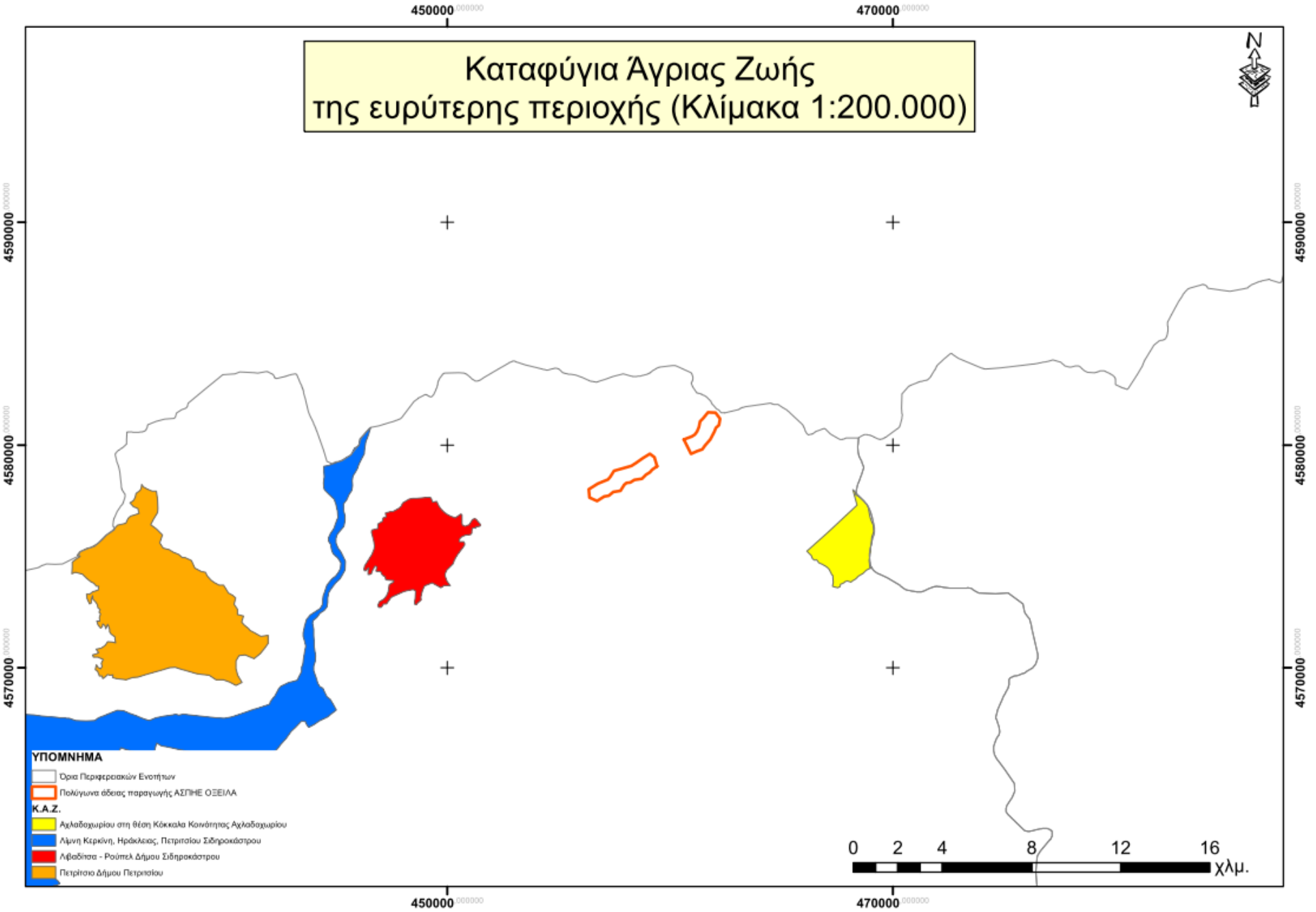
Map 16: Map of the location of the study project site in relation to the Natura 2000 network sites in the wider area.



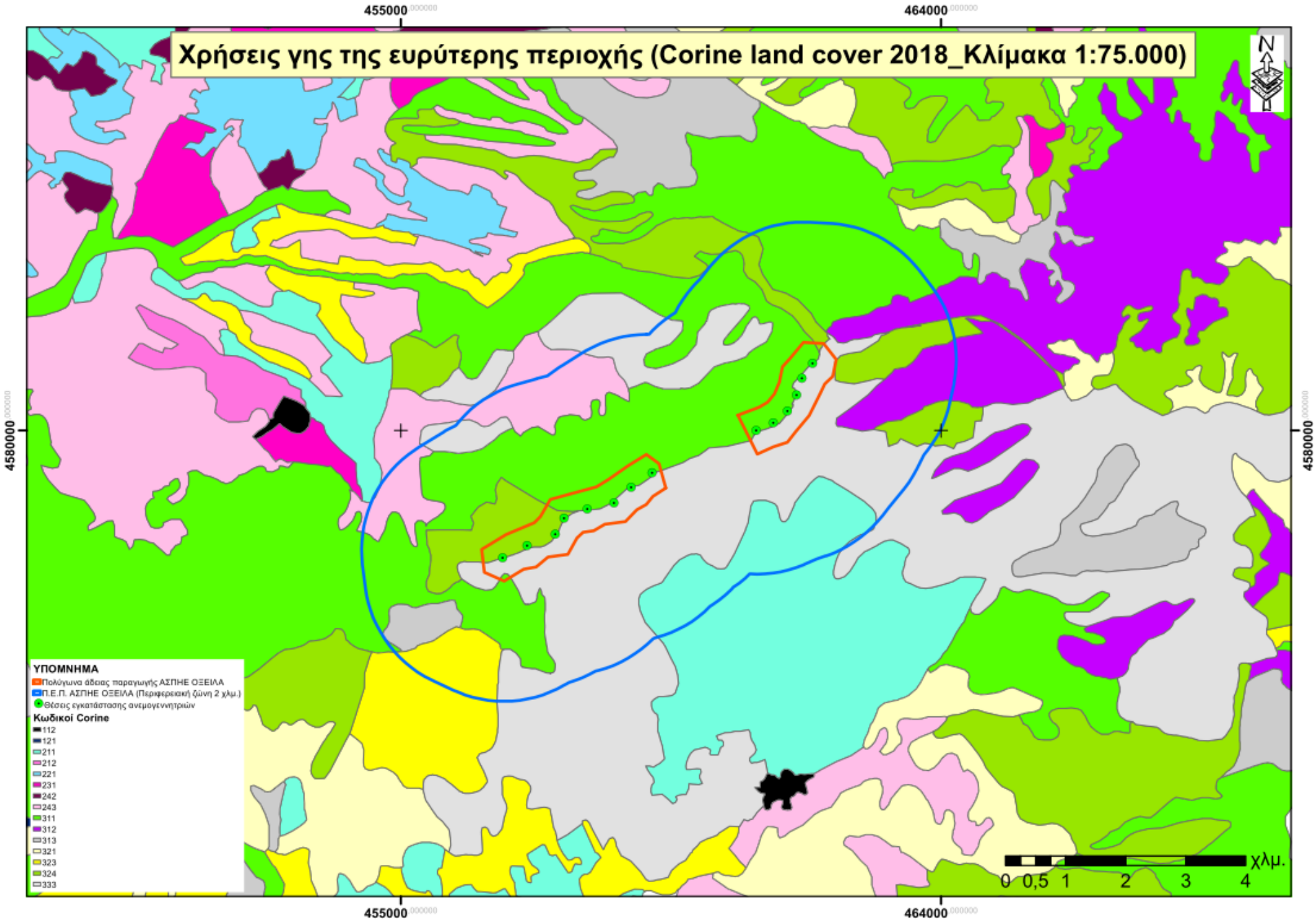
Map 17: Map of the distribution of habitat types within GR1260005, part of which is the area where the project is located.



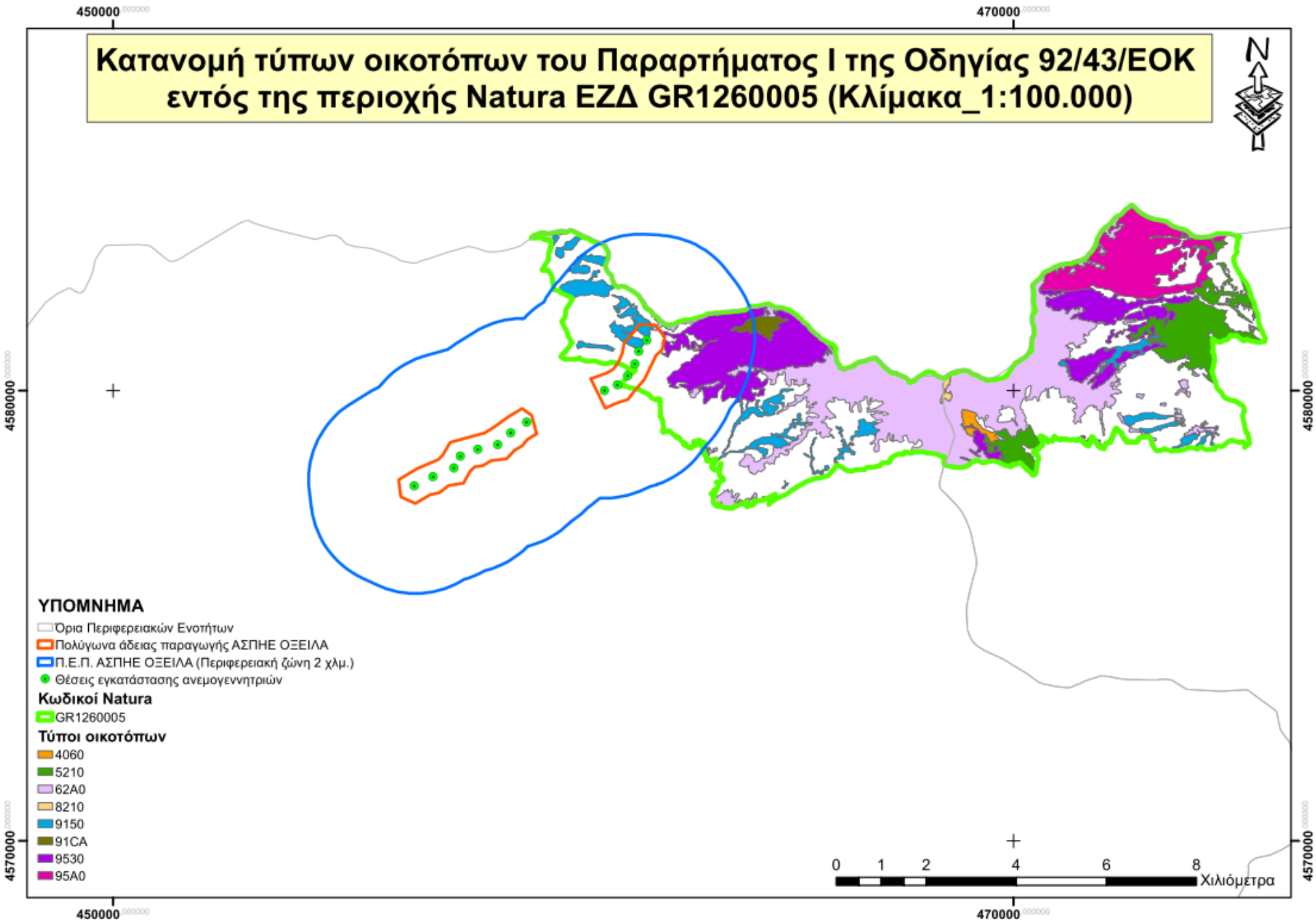
Map 18: Map of the production polygons and field survey area of the project under study.



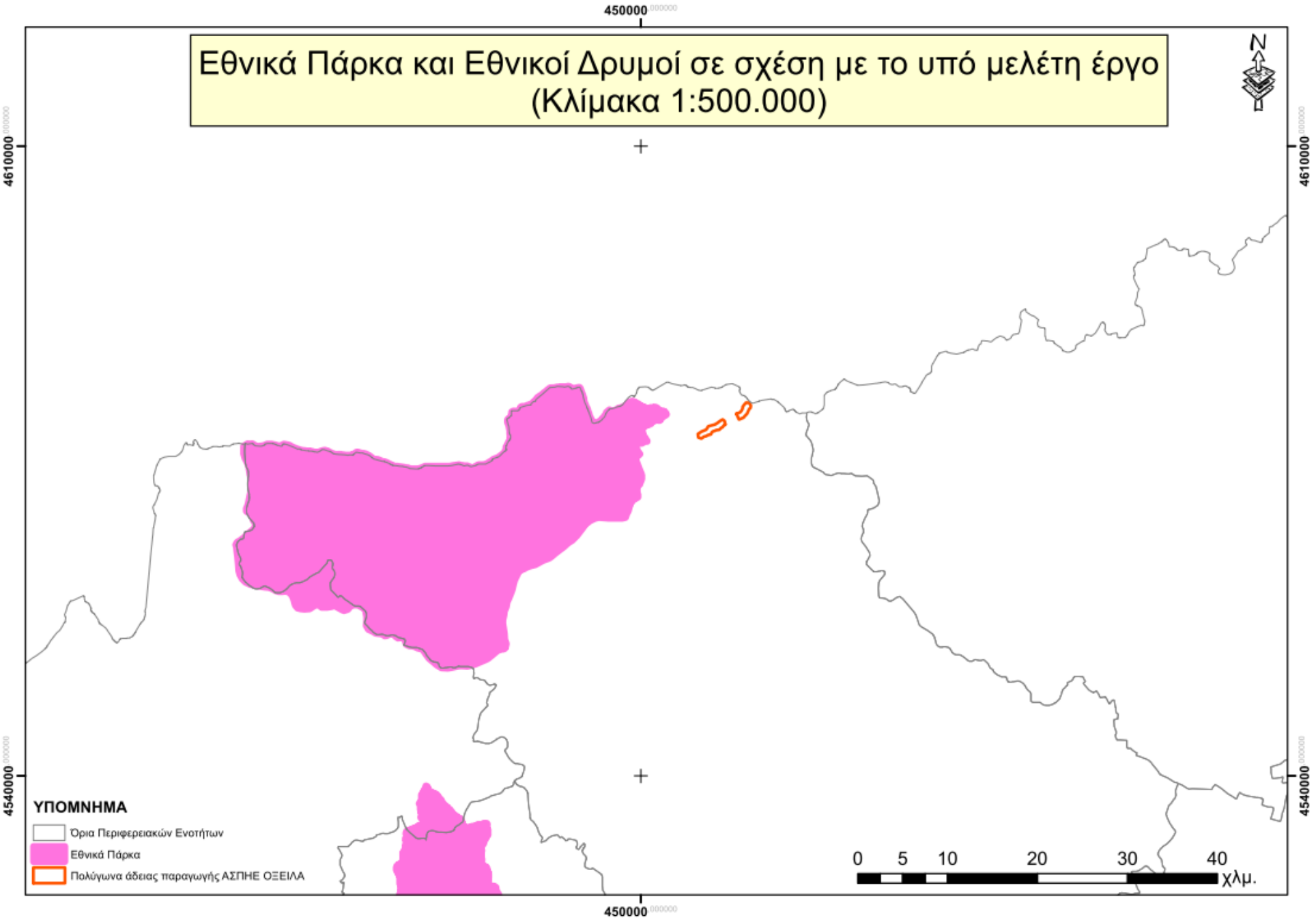
Map 19: Map showing the location of the study project site outside of the Wildlife Refuges of the region.



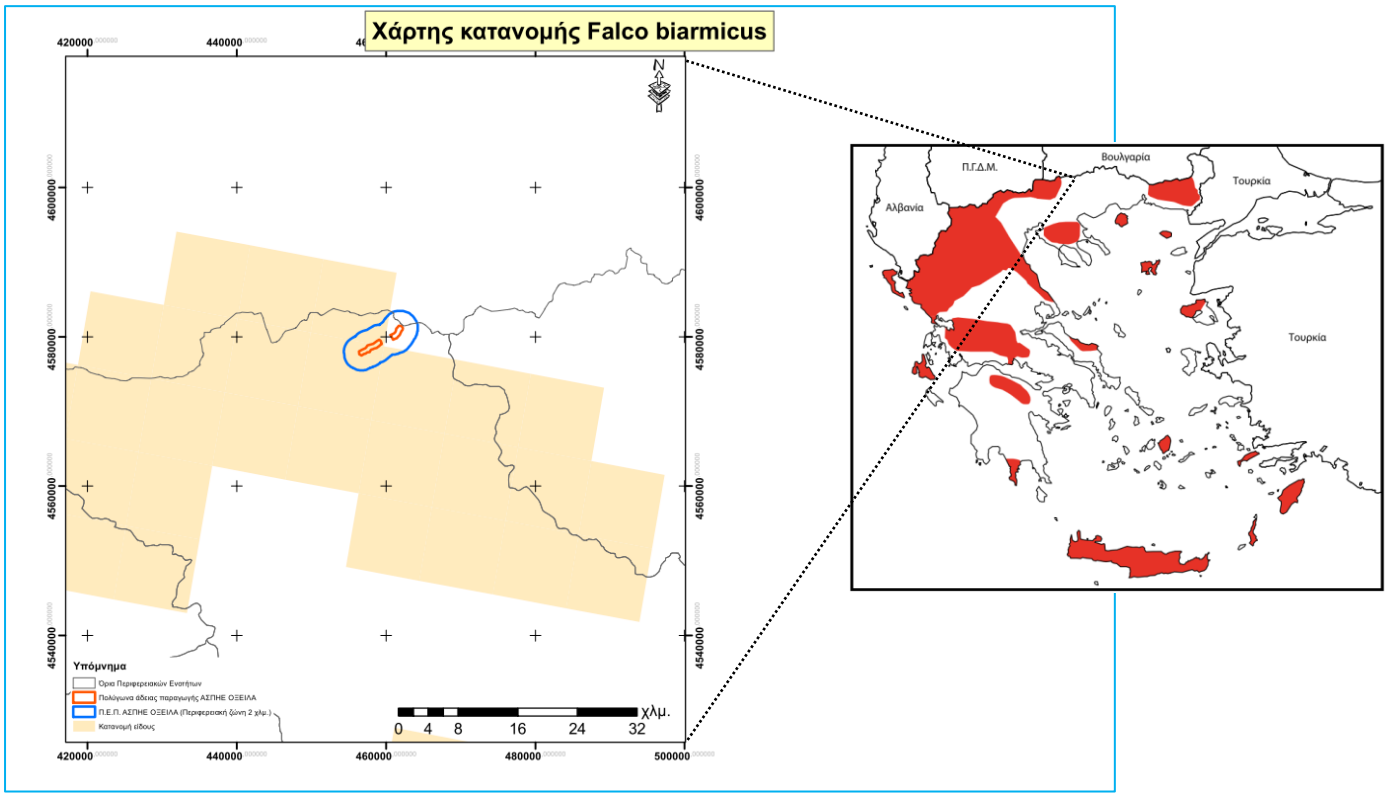
Map 20: Land use map of the study area, according to the land cover database and mapping (Corine land cover 2018).



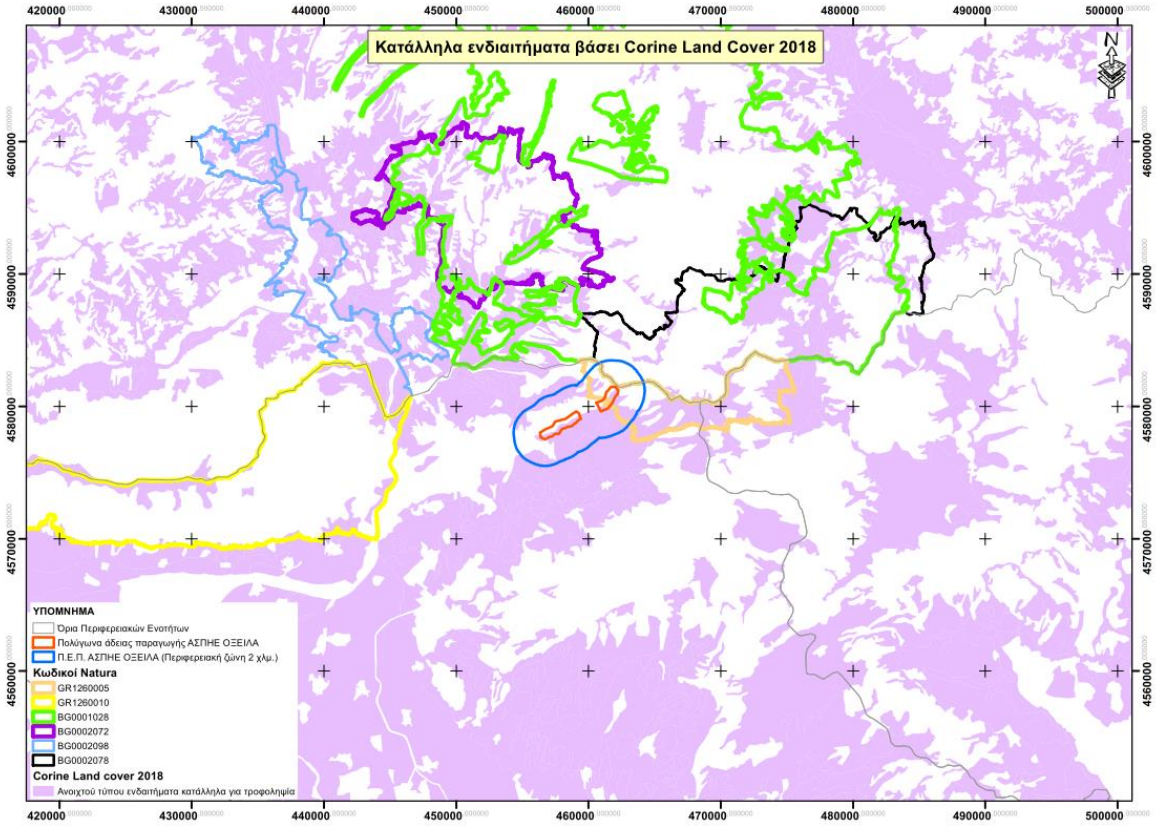
Map 21: Map of the distribution of Annex I habitat types of Directive 92/43/EEC within GR1260005, partially within which the wind farm under study is located



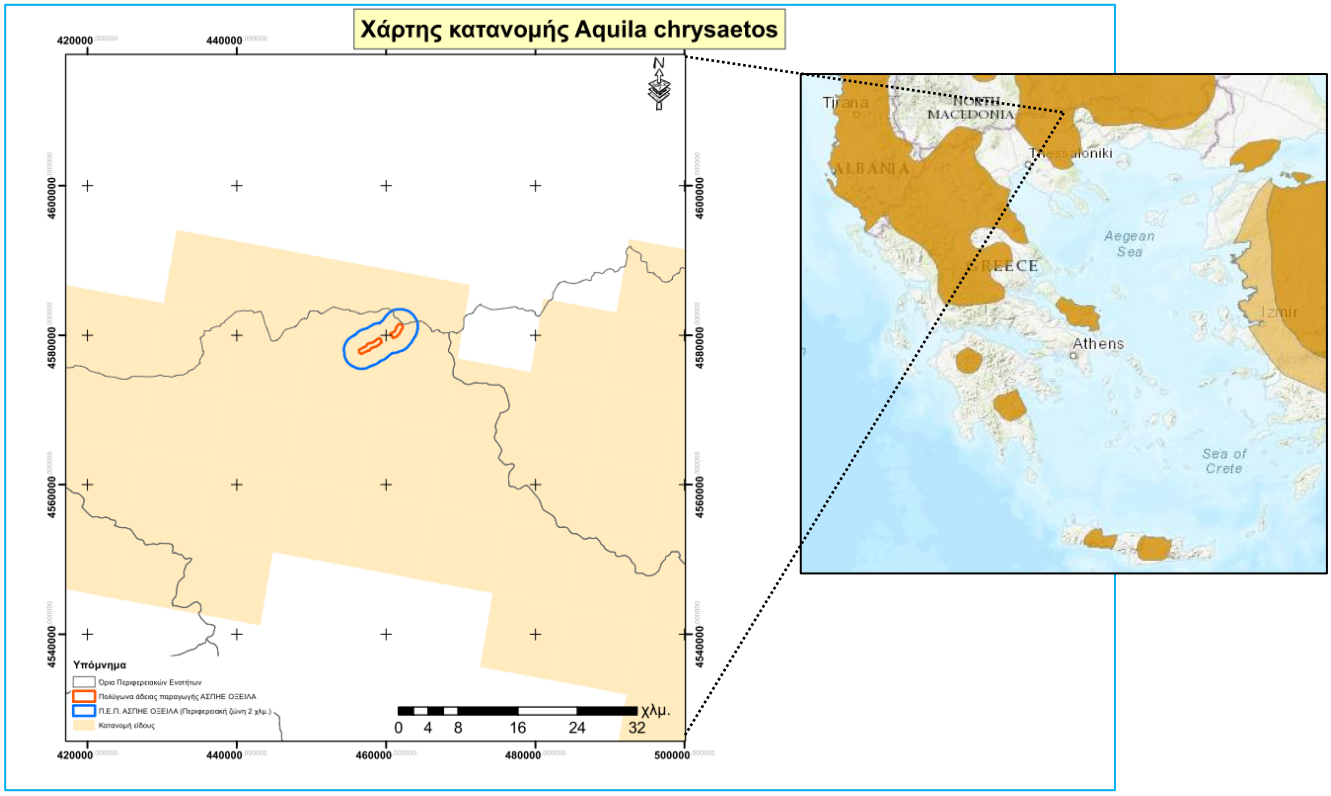
Map 22: Map of the location of the area where the project is to be located outside National Parks and National Forests.



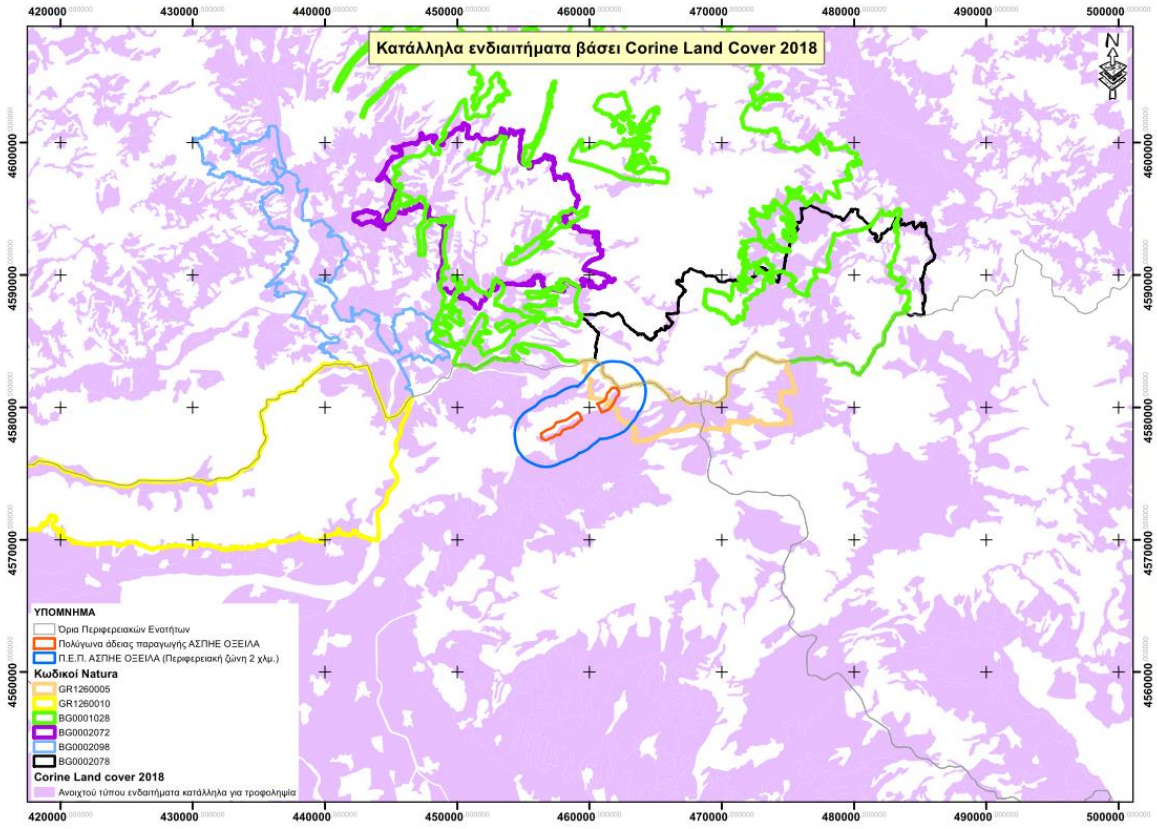
Map 23: Distribution map of *Falco biarmicus* in the study area



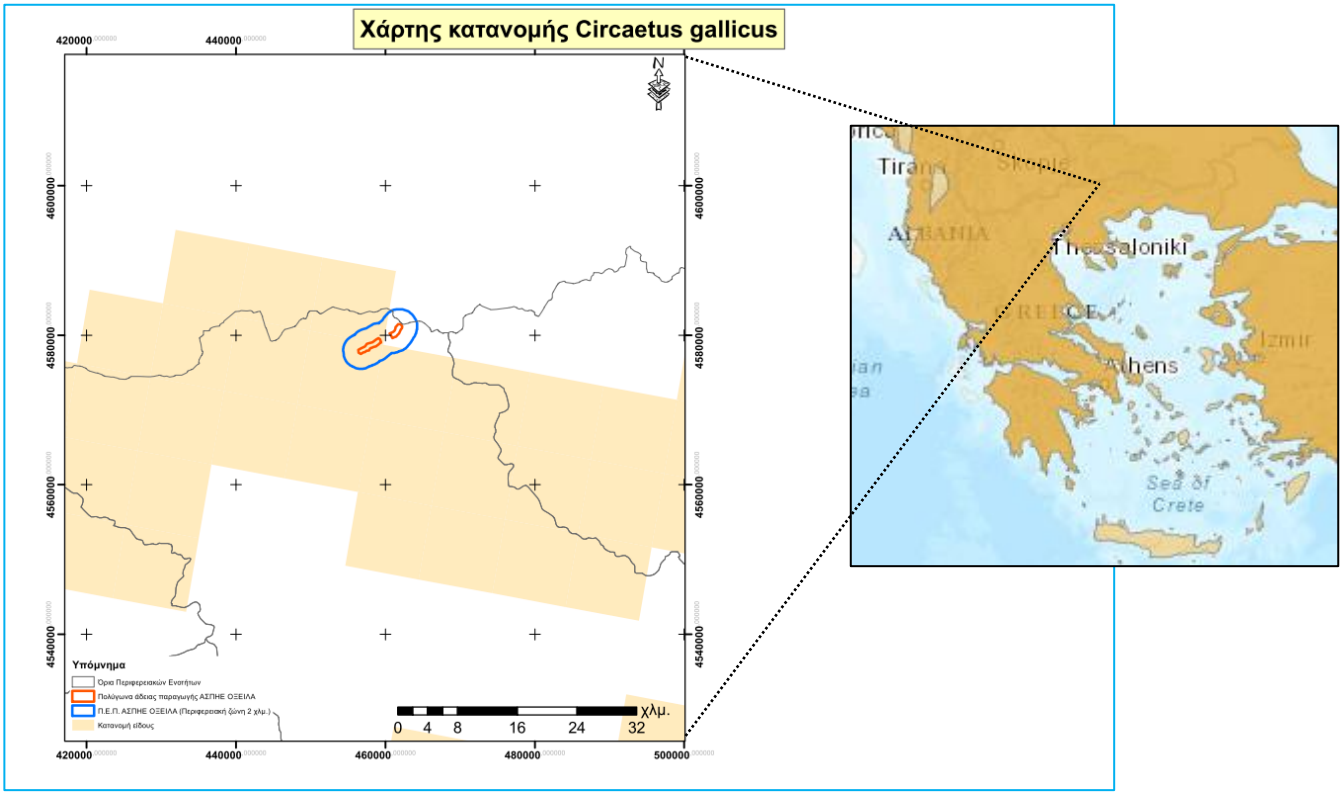
Map 24: Habitat map of *Falco biarmicus* in the study area



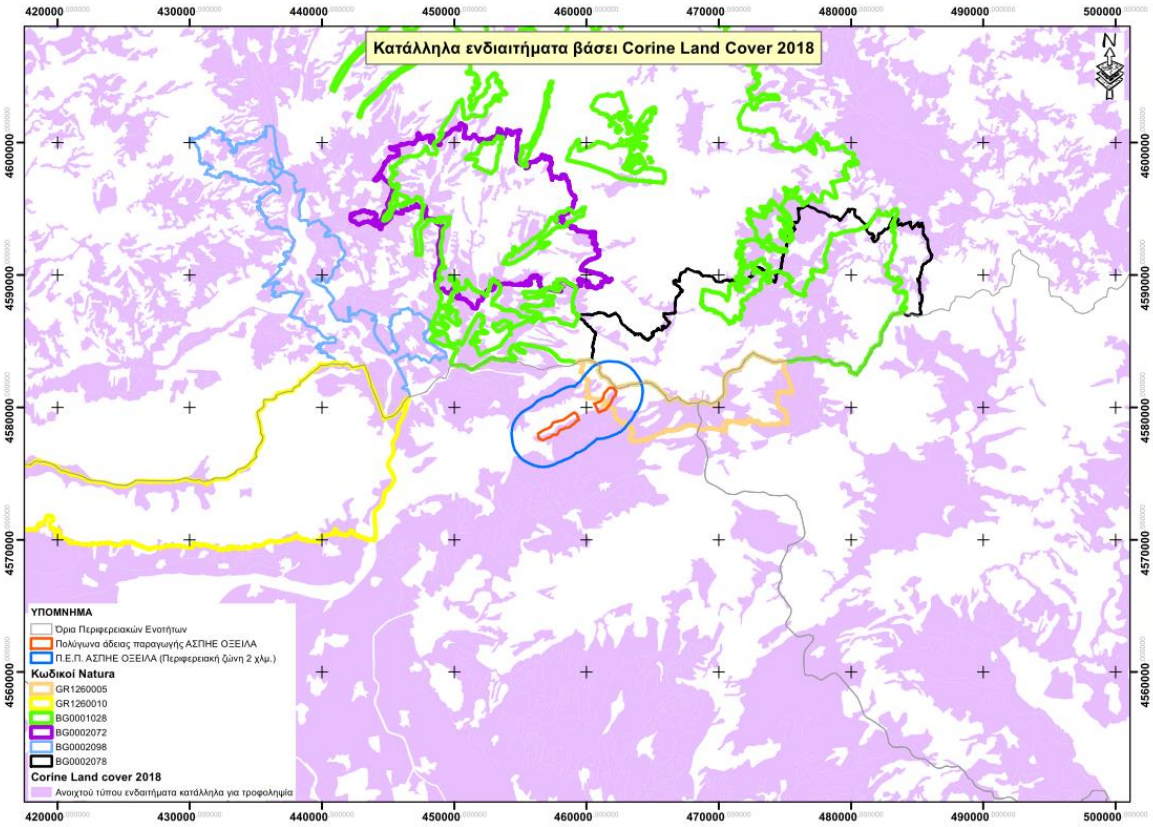
Map 25: Distribution map of *Aquila chrysaetos* in the study area



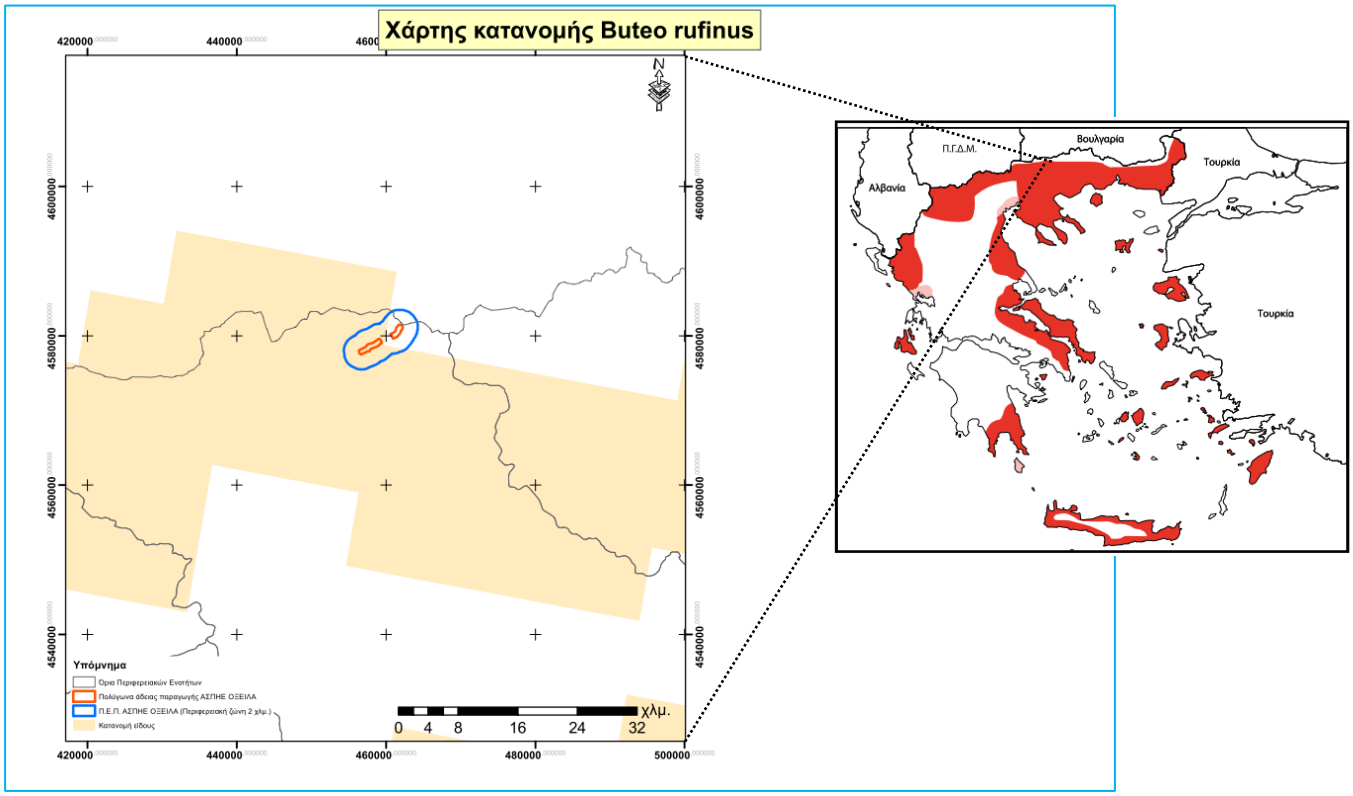
Map 26: Habitat map of *Aquila chrysaetos* in the study area



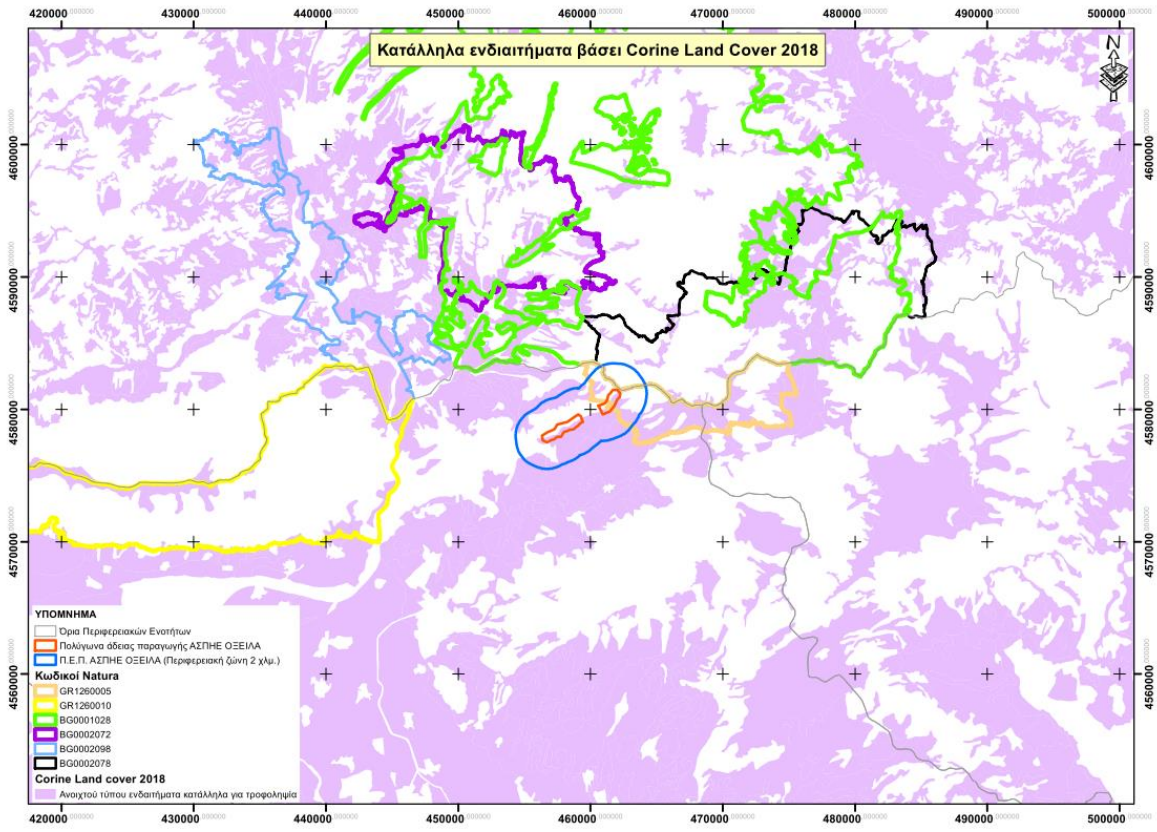
Map 27: *Distribution map of Circaetus gallicus in the study area*



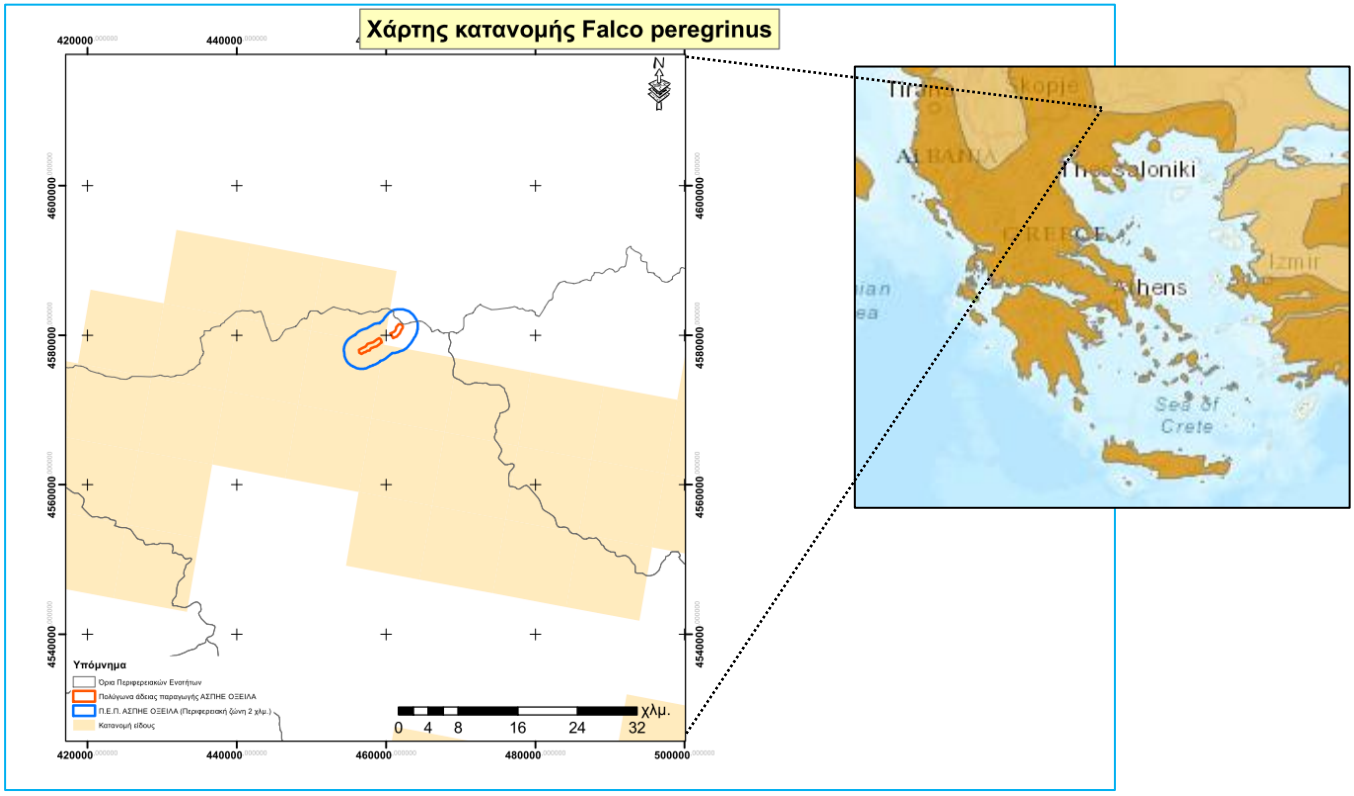
Map 28: Habitat map of *Circaetus gallicus* in the study area



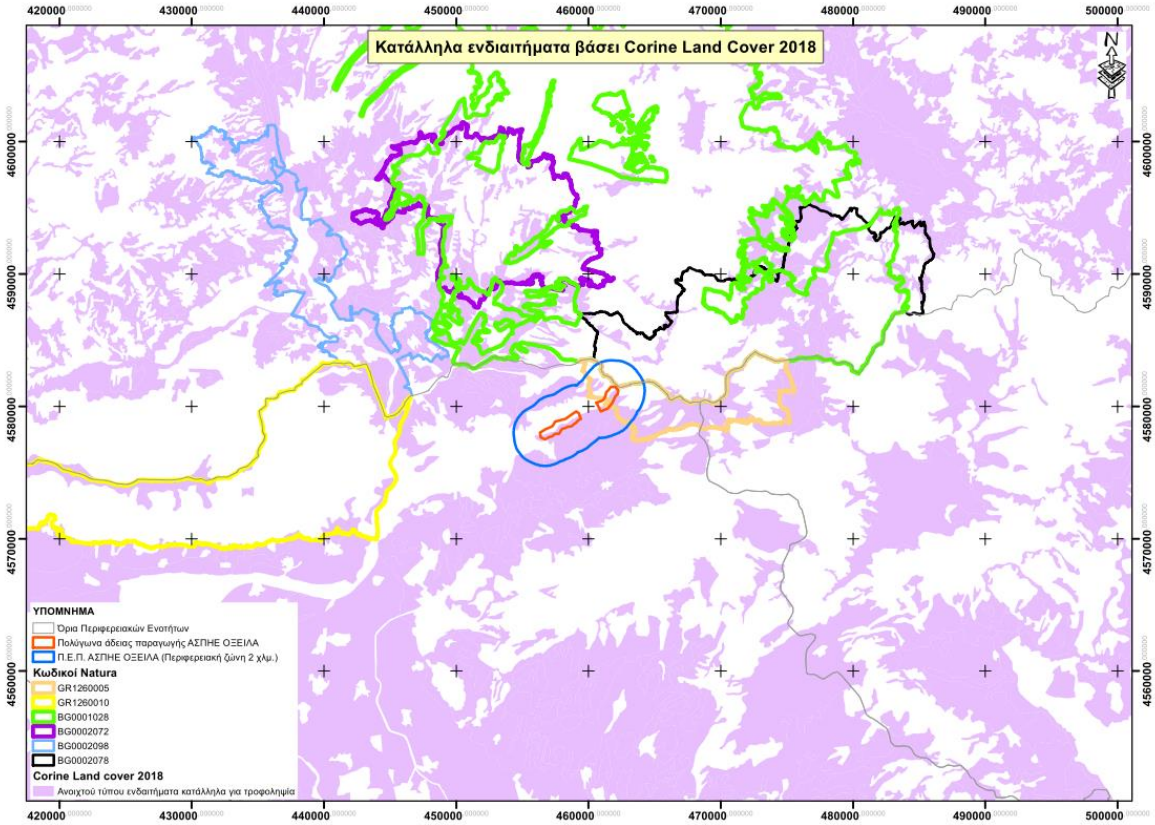
Map 29: Distribution map of *Buteo rufinus* in the study area



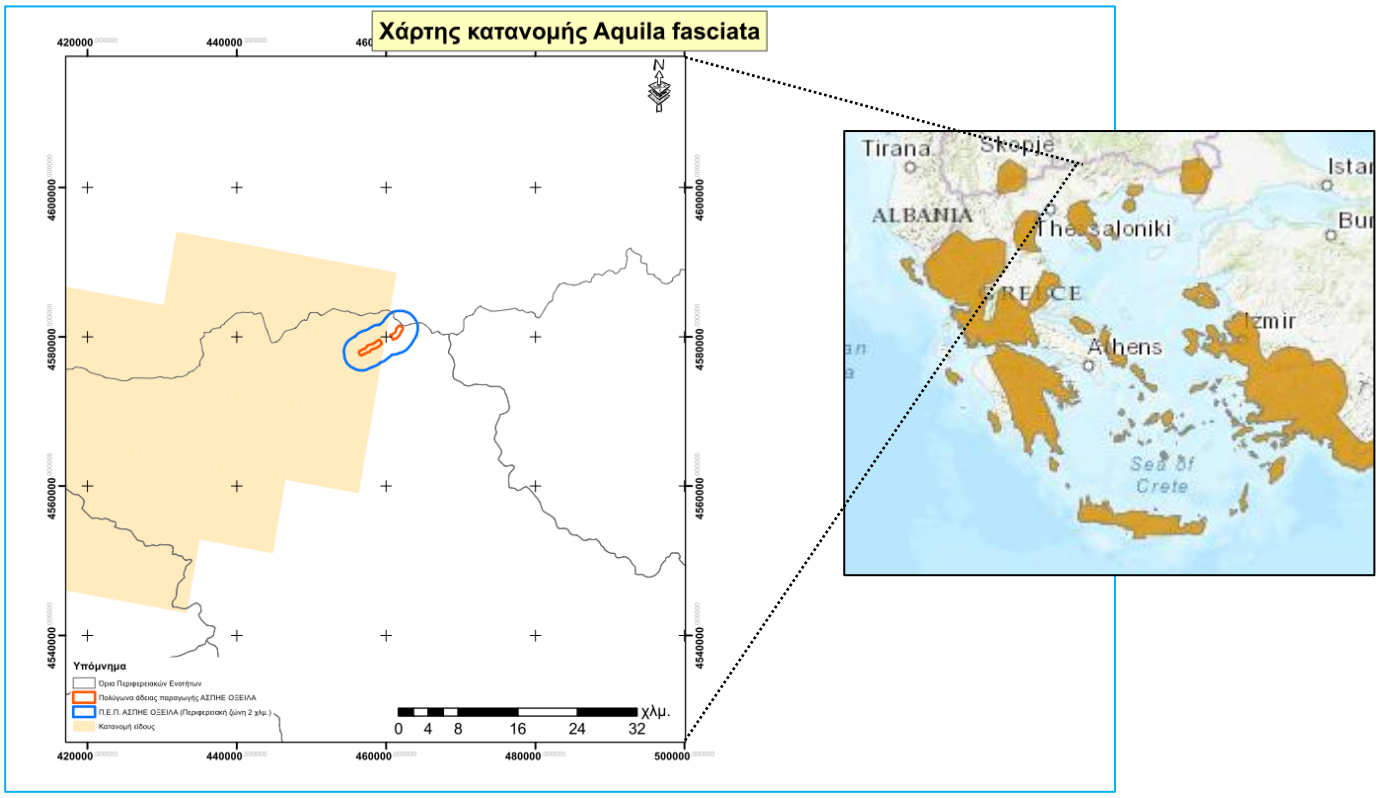
Map 30: Habitat map of *Buteo rufinus* in the study area



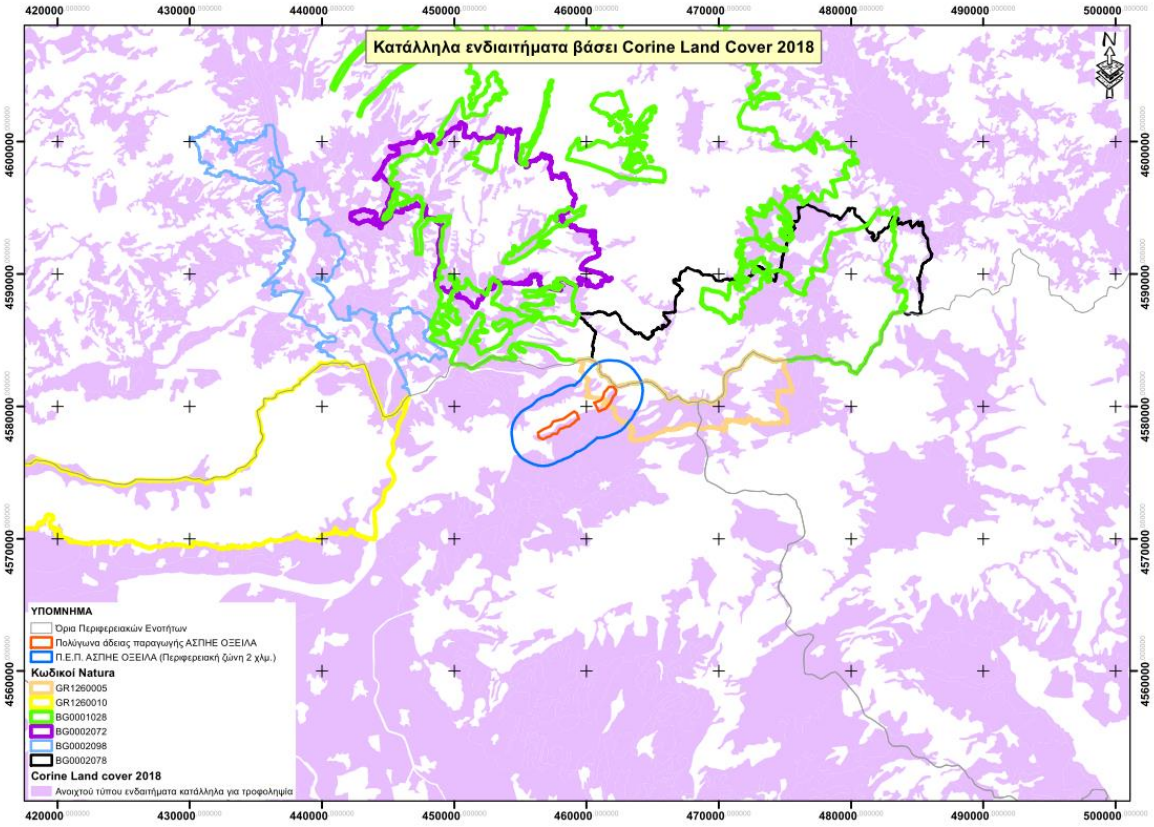
Map 31: Distribution map of *Falco peregrinus* in the study area



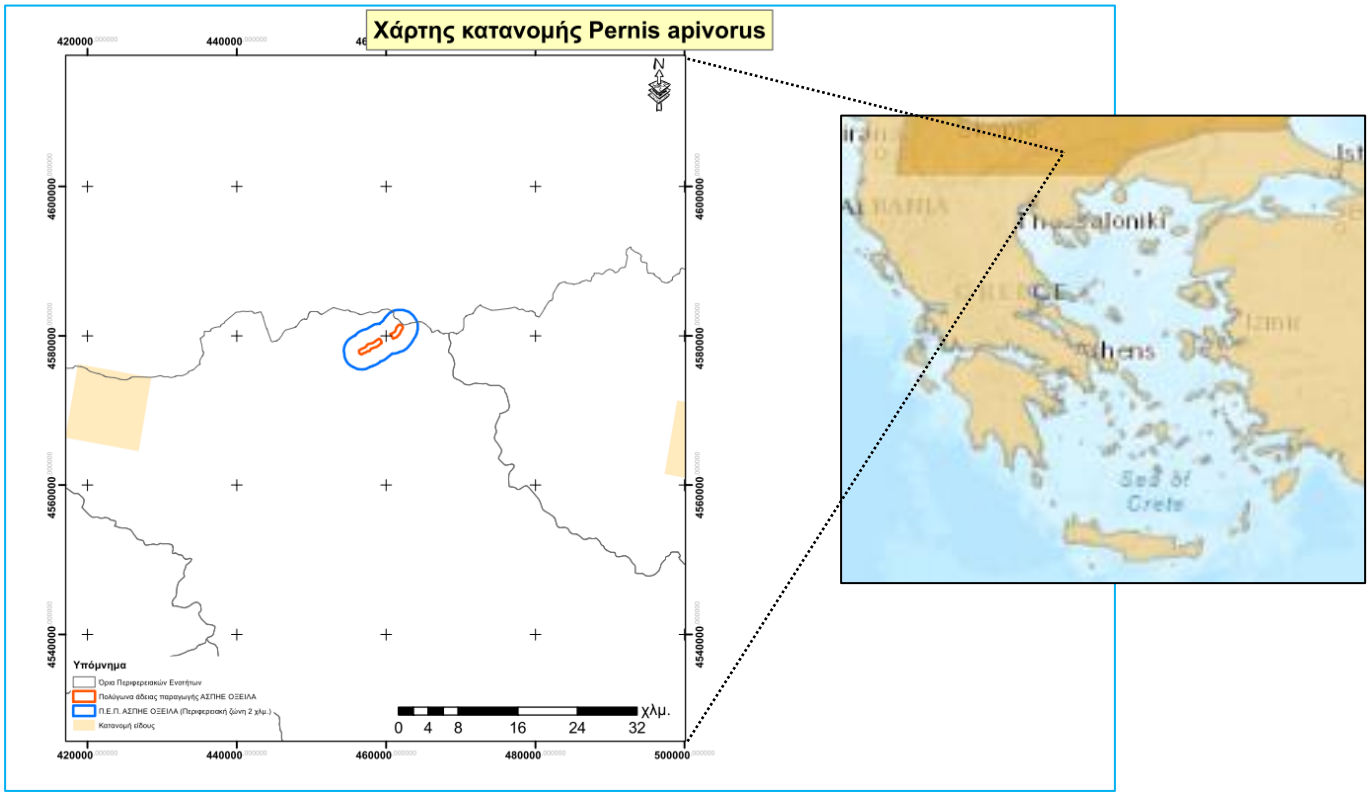
Map 32: Habitat map of *Falco peregrinus* in the study area



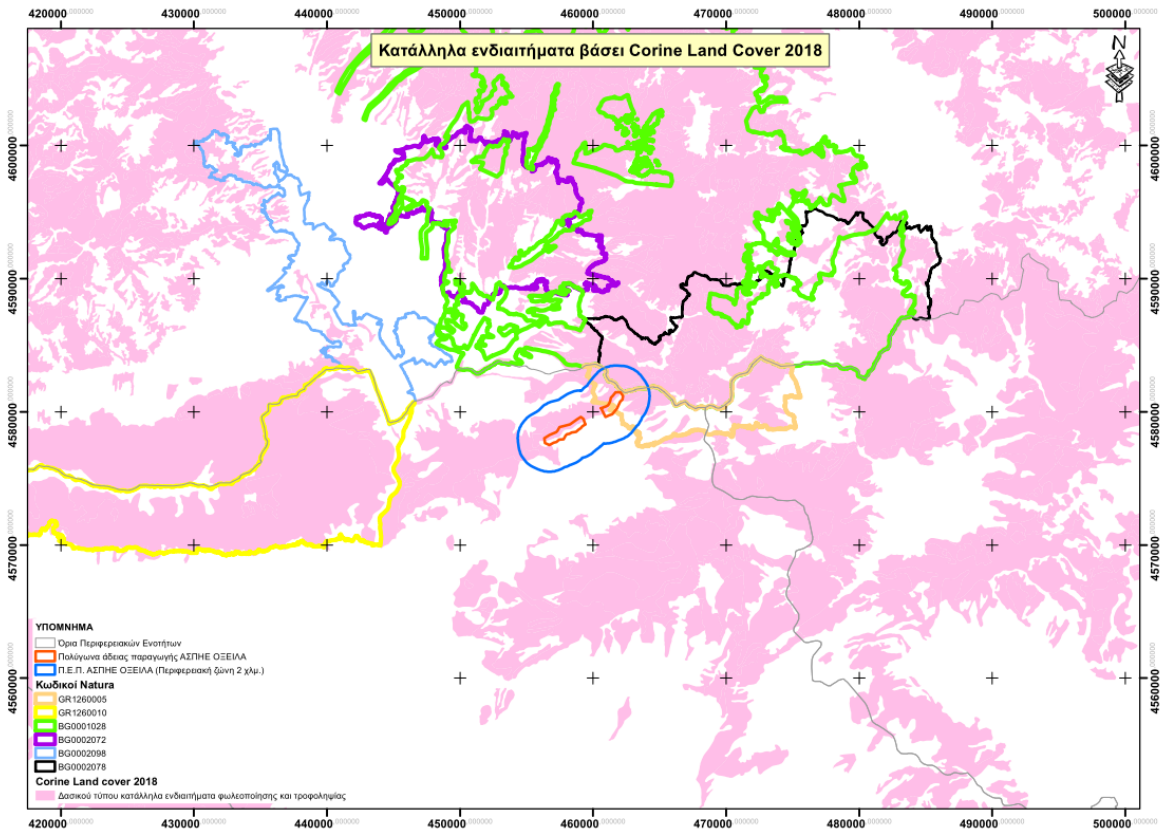
Map 33: Distribution map of *Aquila fasciata* in the study area



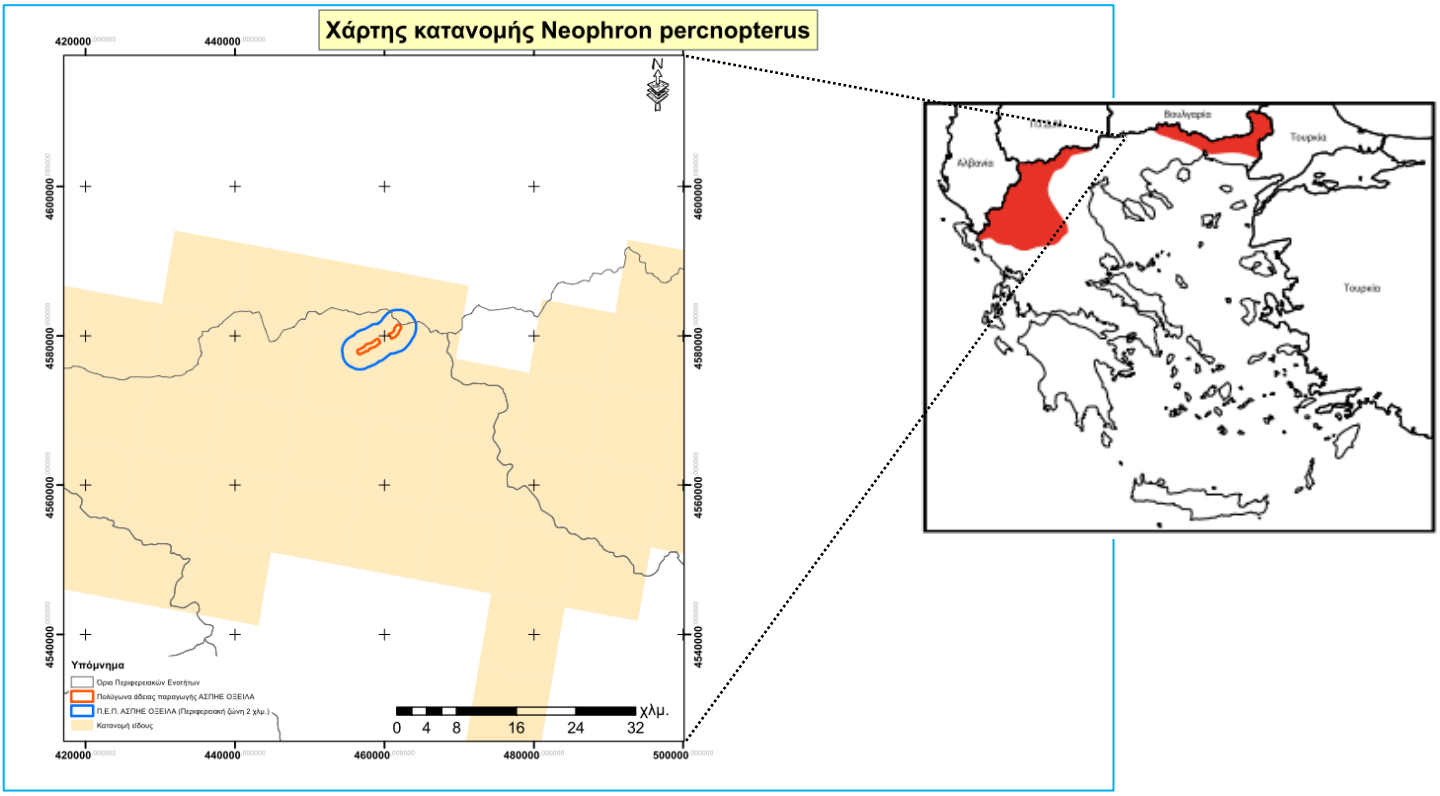
Map 34: Habitat map of *Aquila fasciata* in the study area



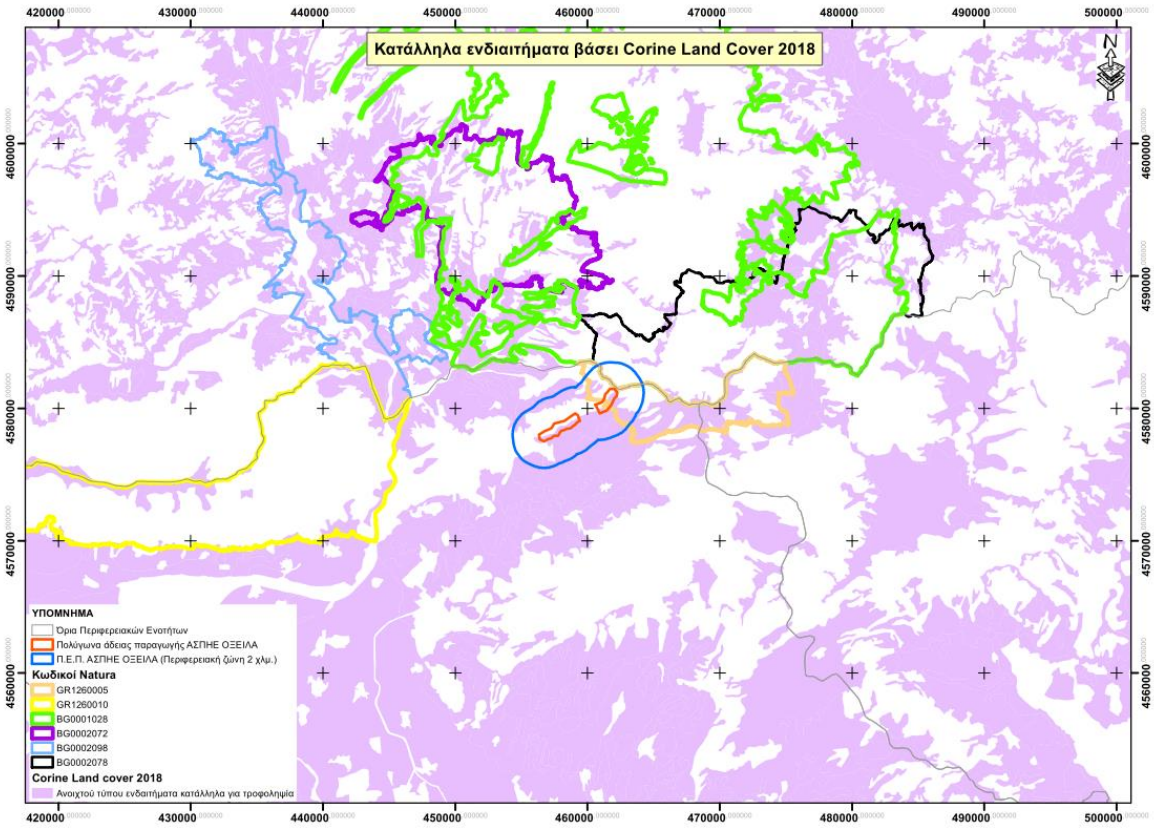
Map 35: Distribution map of *Pernis apivorus* in the study area



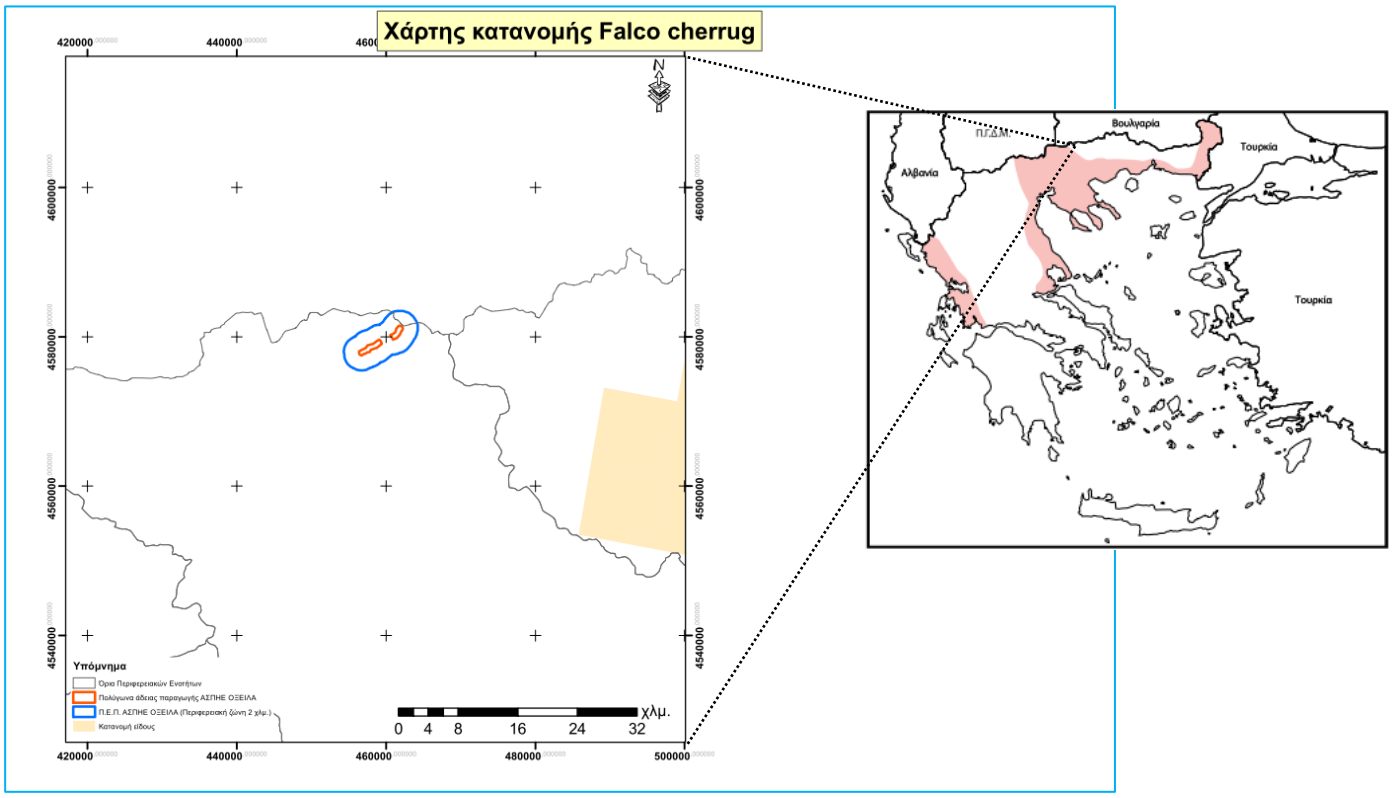
Map 36: Habitat map of *Pernis apivorus* in the study area



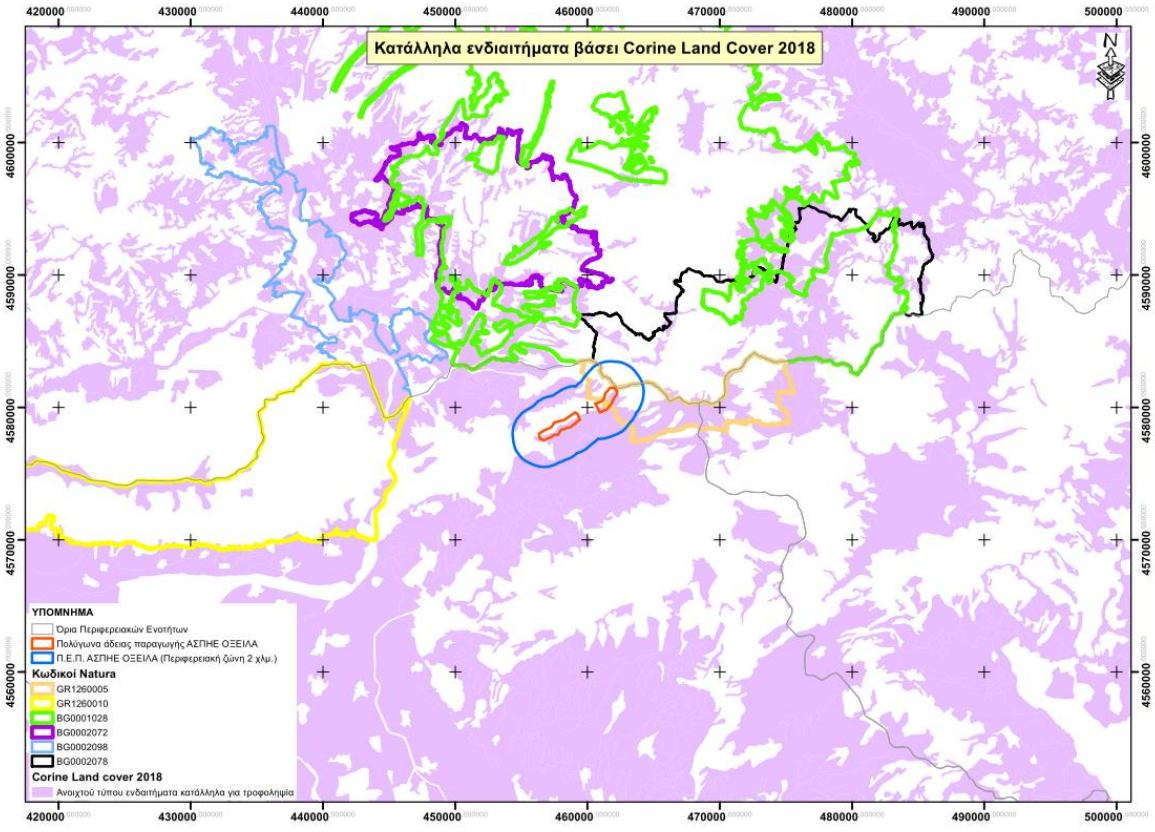
Map 37: Distribution map of *Neophron percnopterus* in the study area



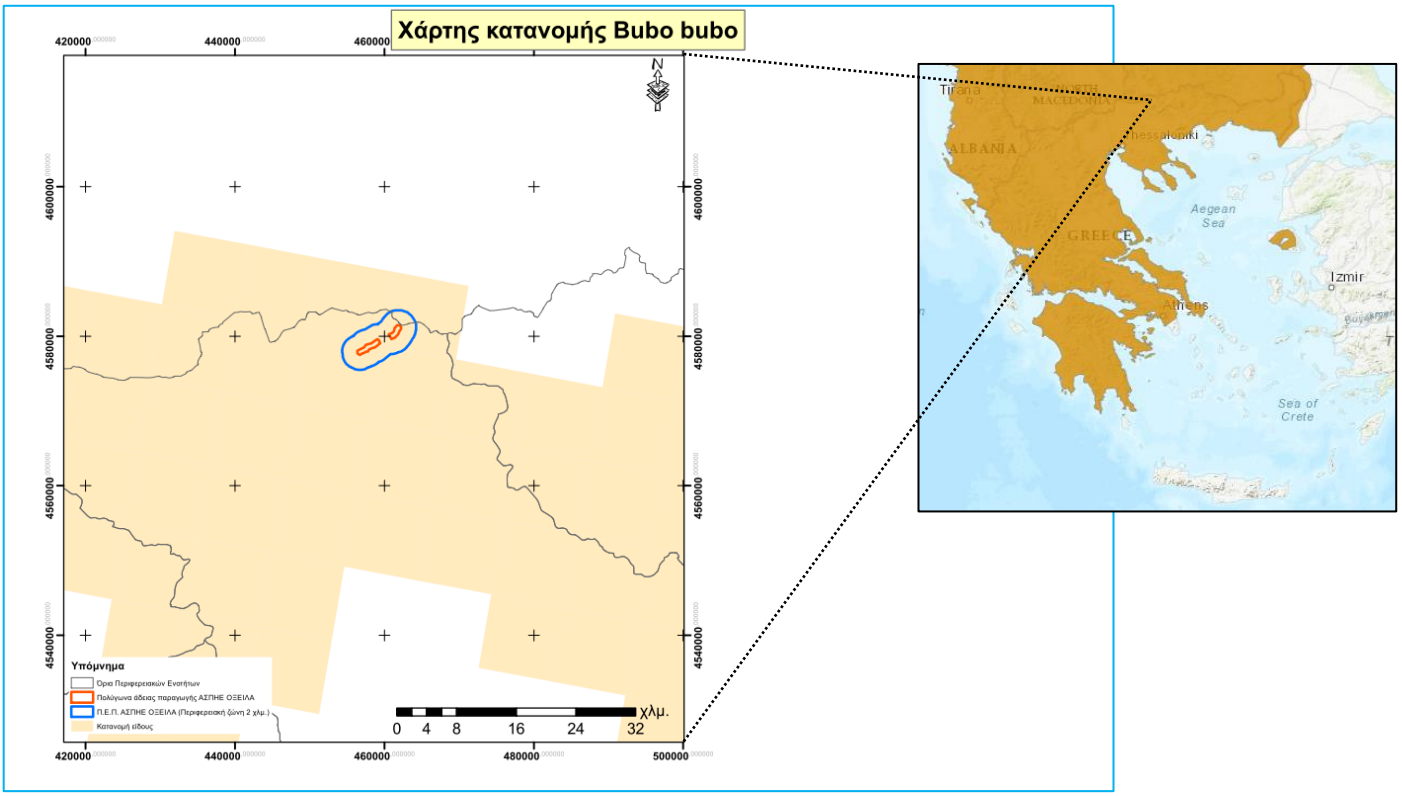
Map 38: Habitat map of *Neophron percnopterus* in the study area



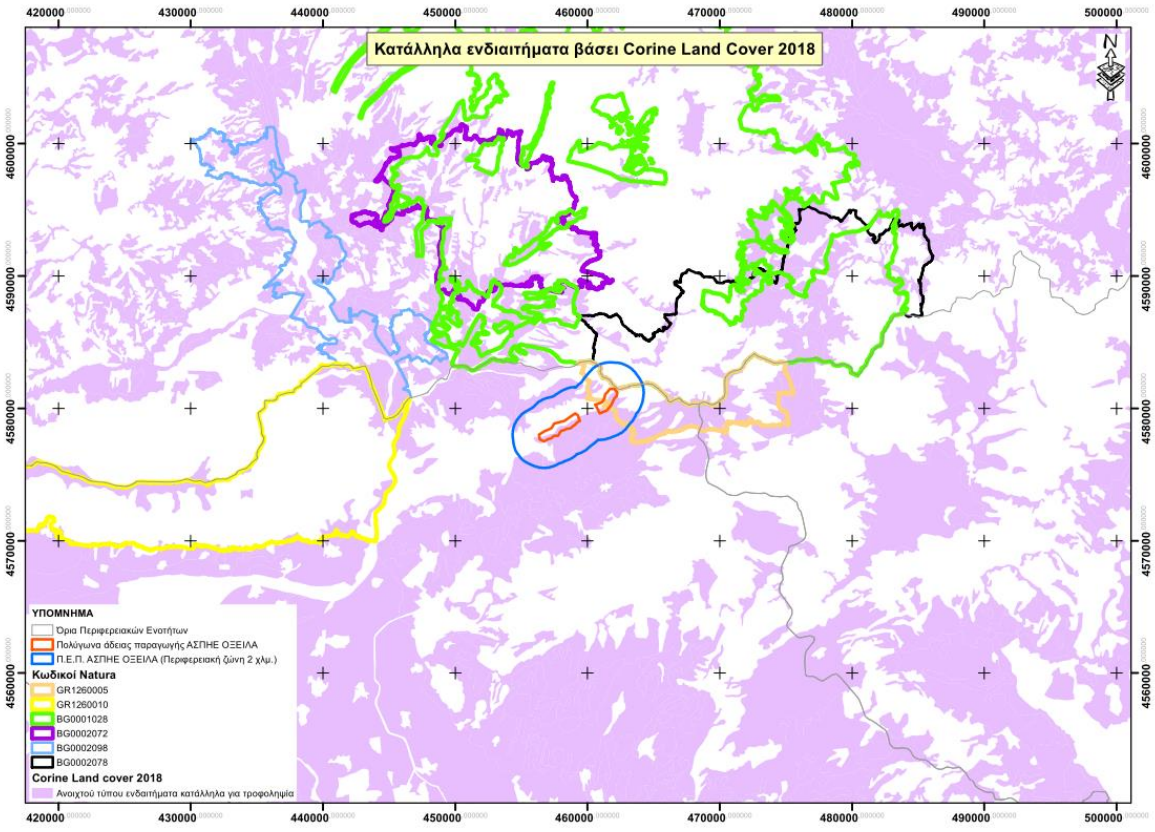
Map 39: Distribution map of *Falco cherrug* in the study area



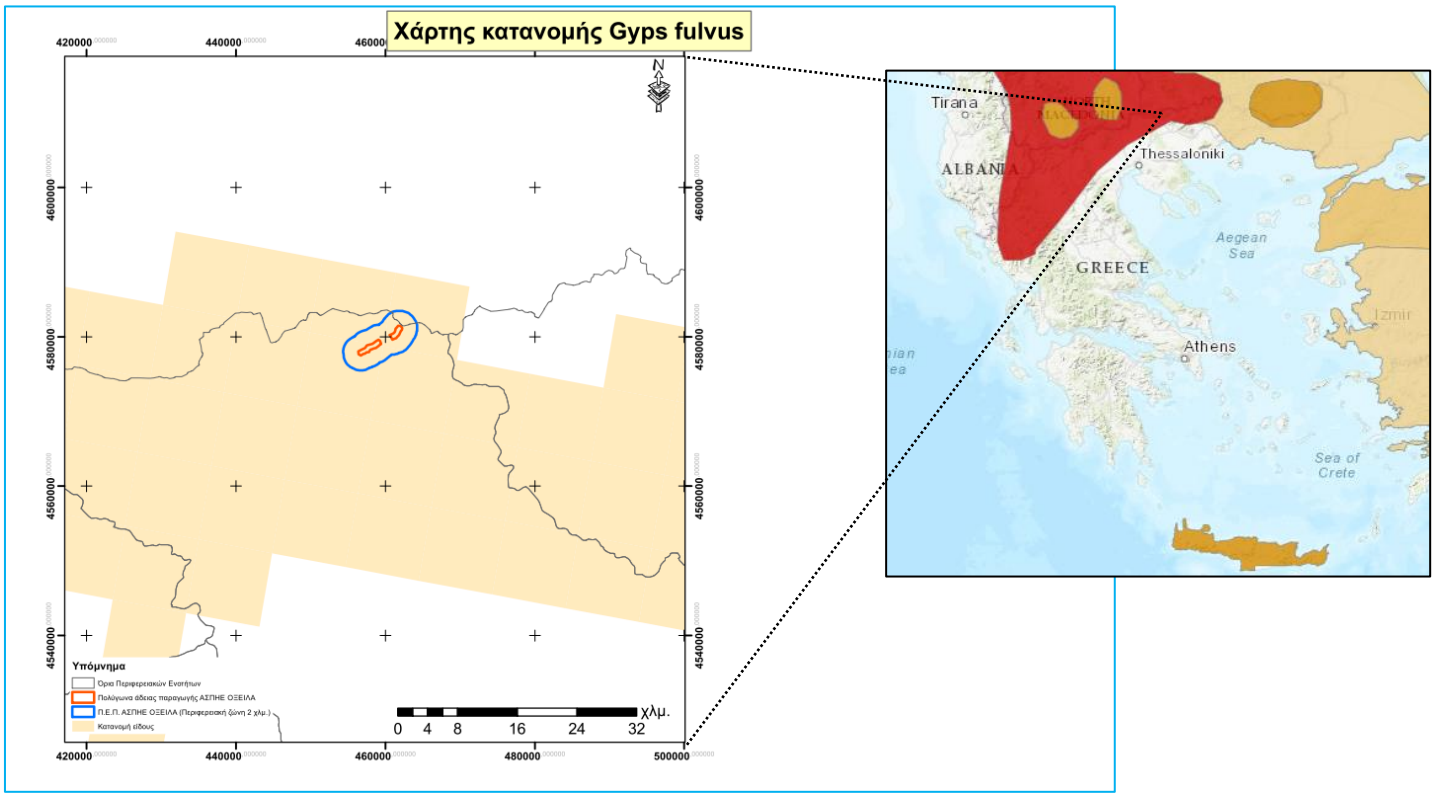
Map 40: Habitat map of *Falco cherrug* in the study area



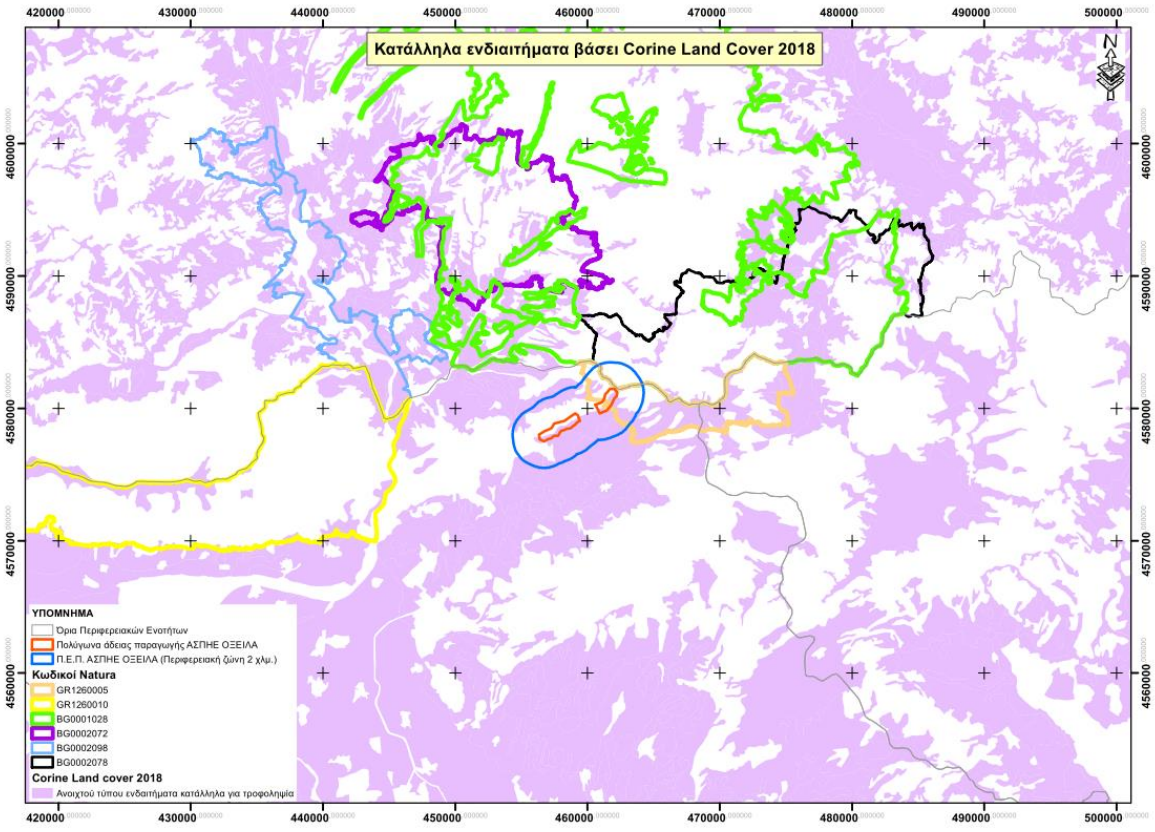
Map 41: Distribution map of *Bubo bubo* in the study area



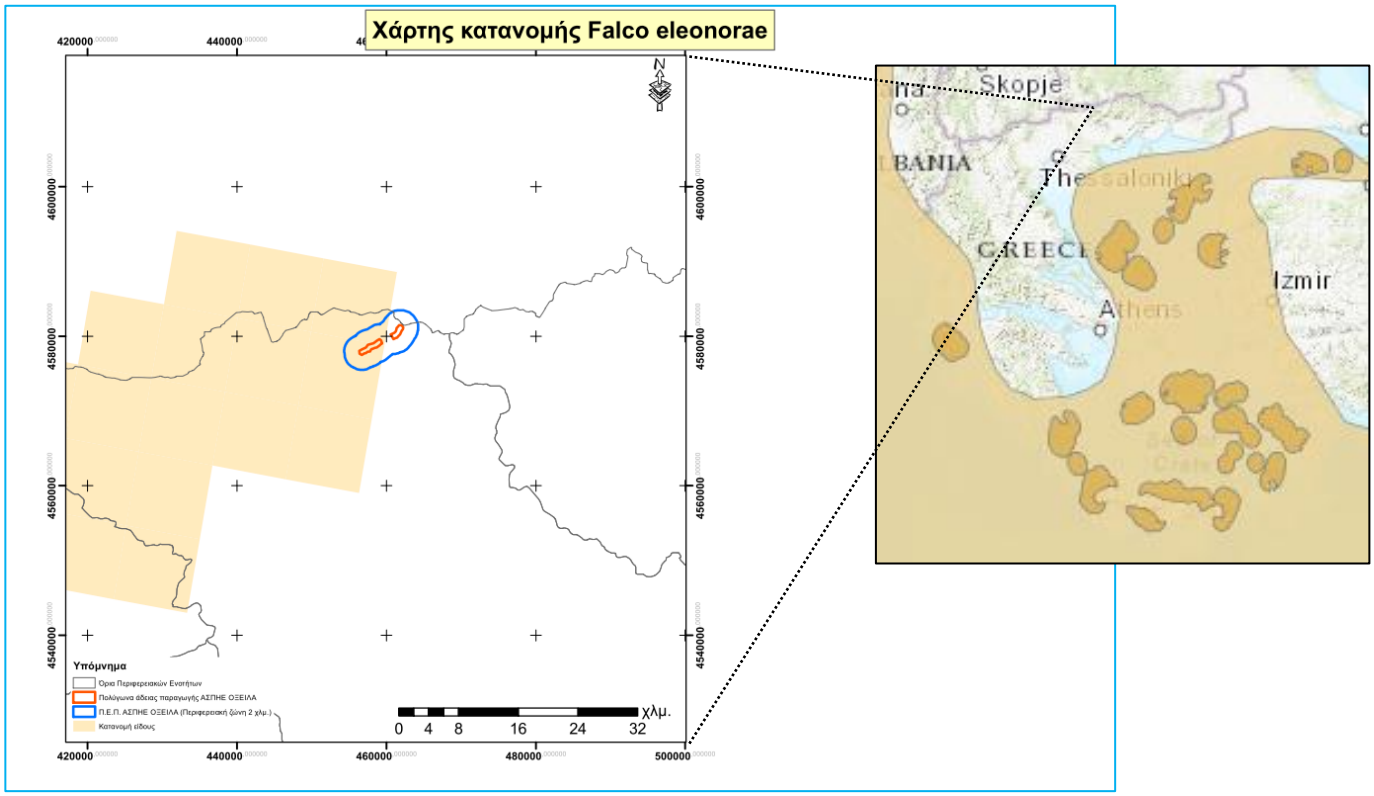
Map 42: Habitat map of *Bubo bubo* in the study area



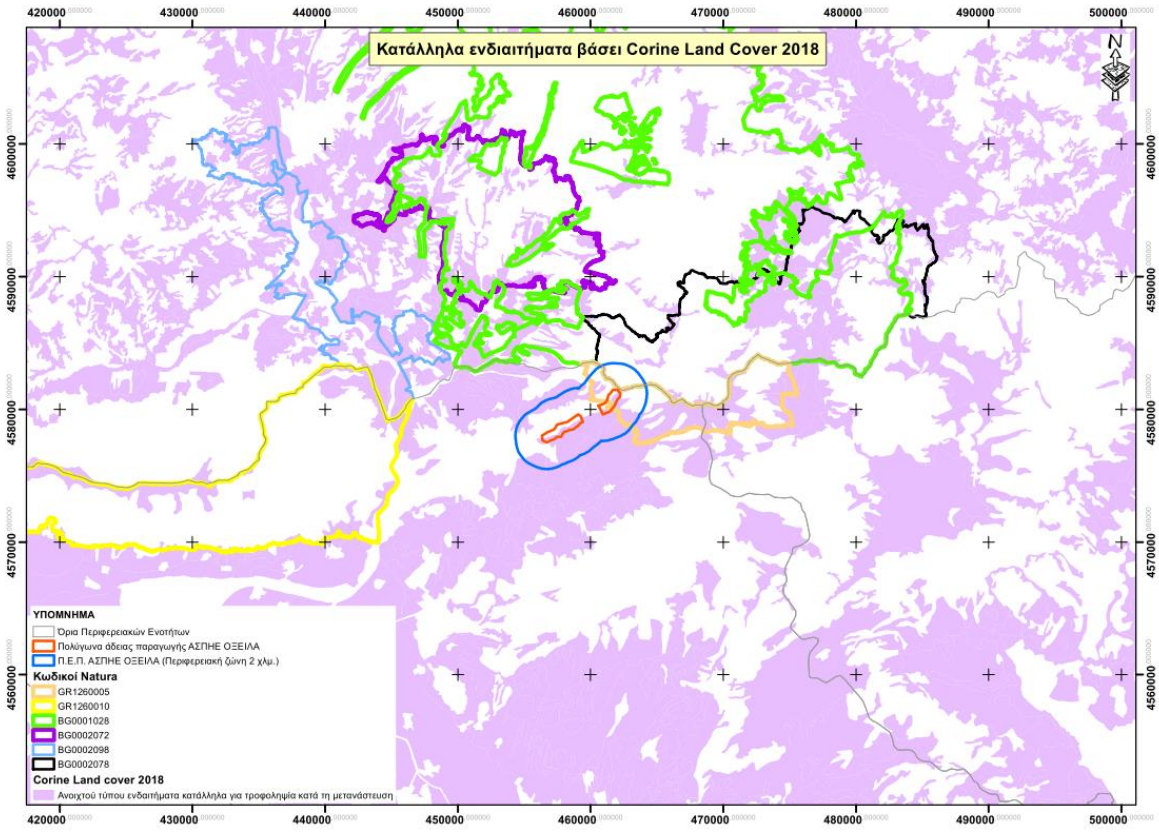
Map 43: Distribution map of *Gyps fulvus* in the study area



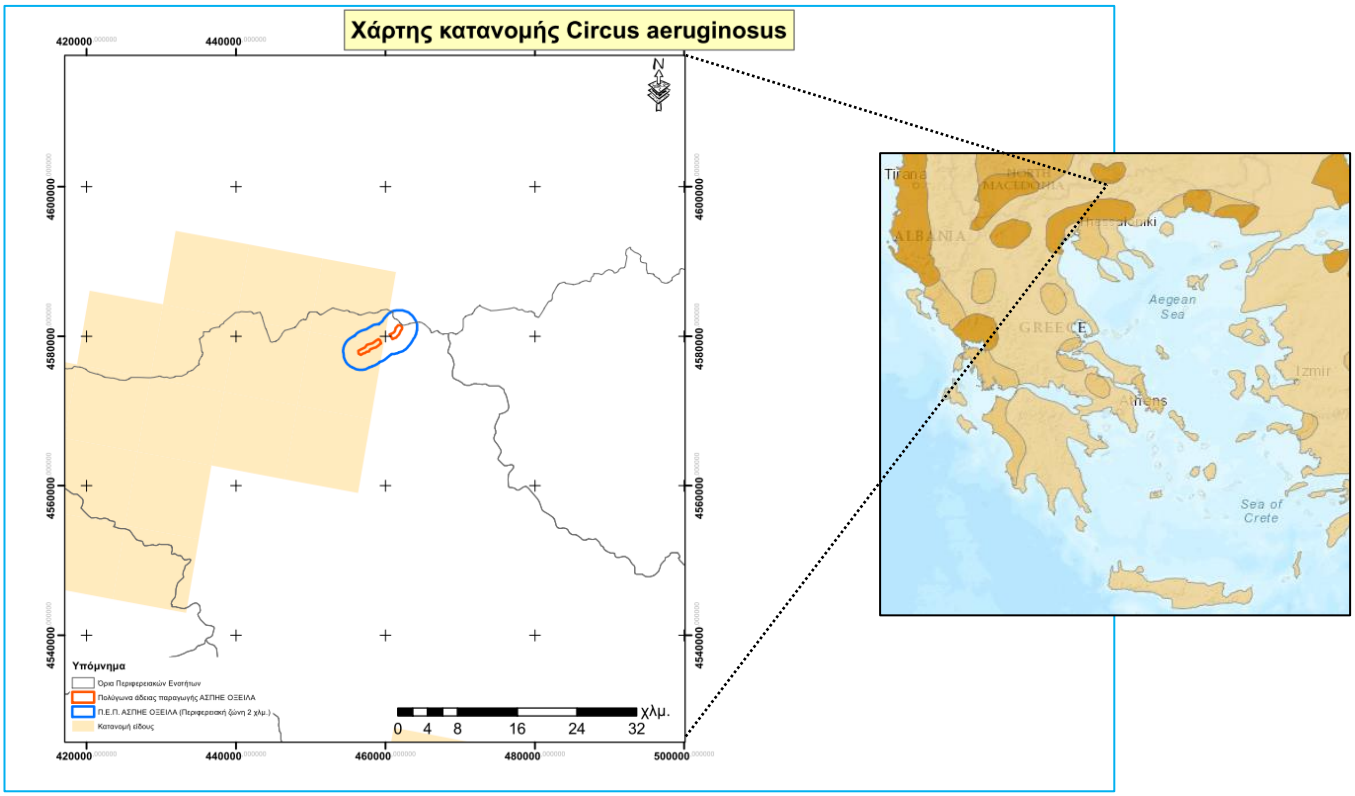
Map 44: Habitat map of *Gyps fulvus* in the study area



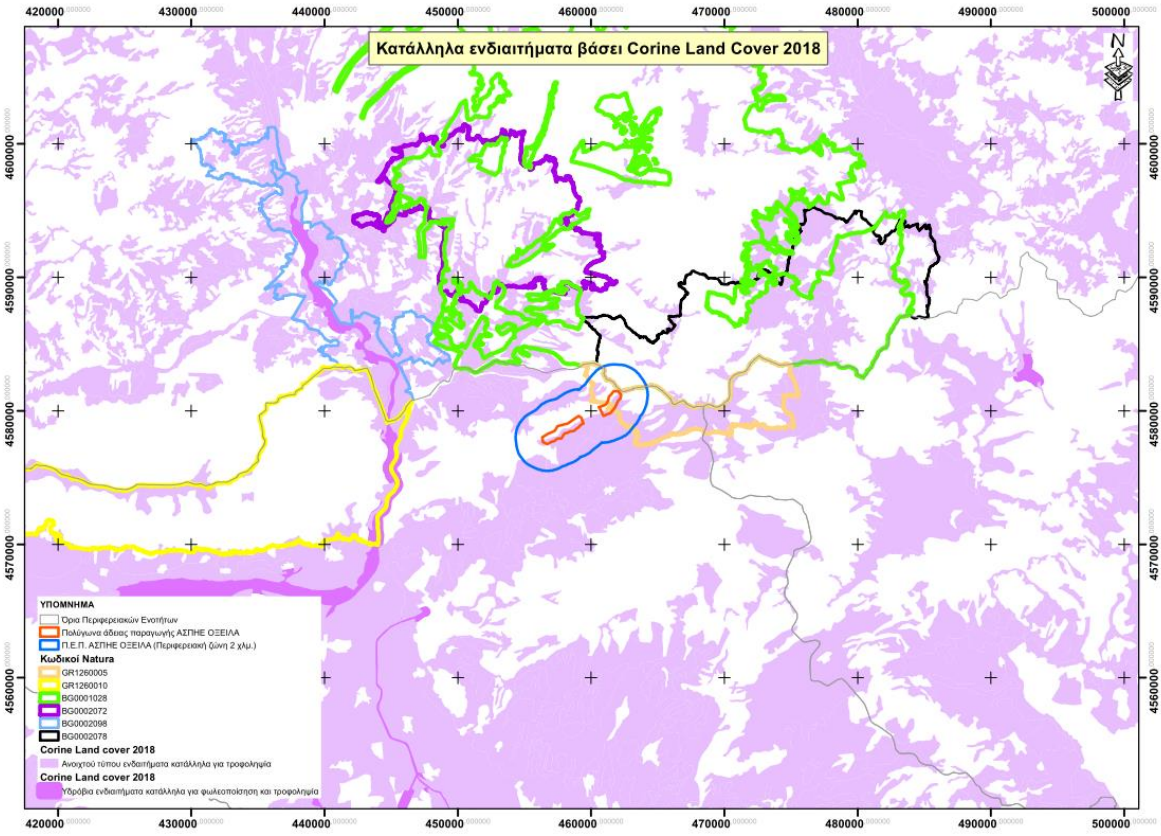
Map 45: Distribution map of *Falco eleonorae* in the study area



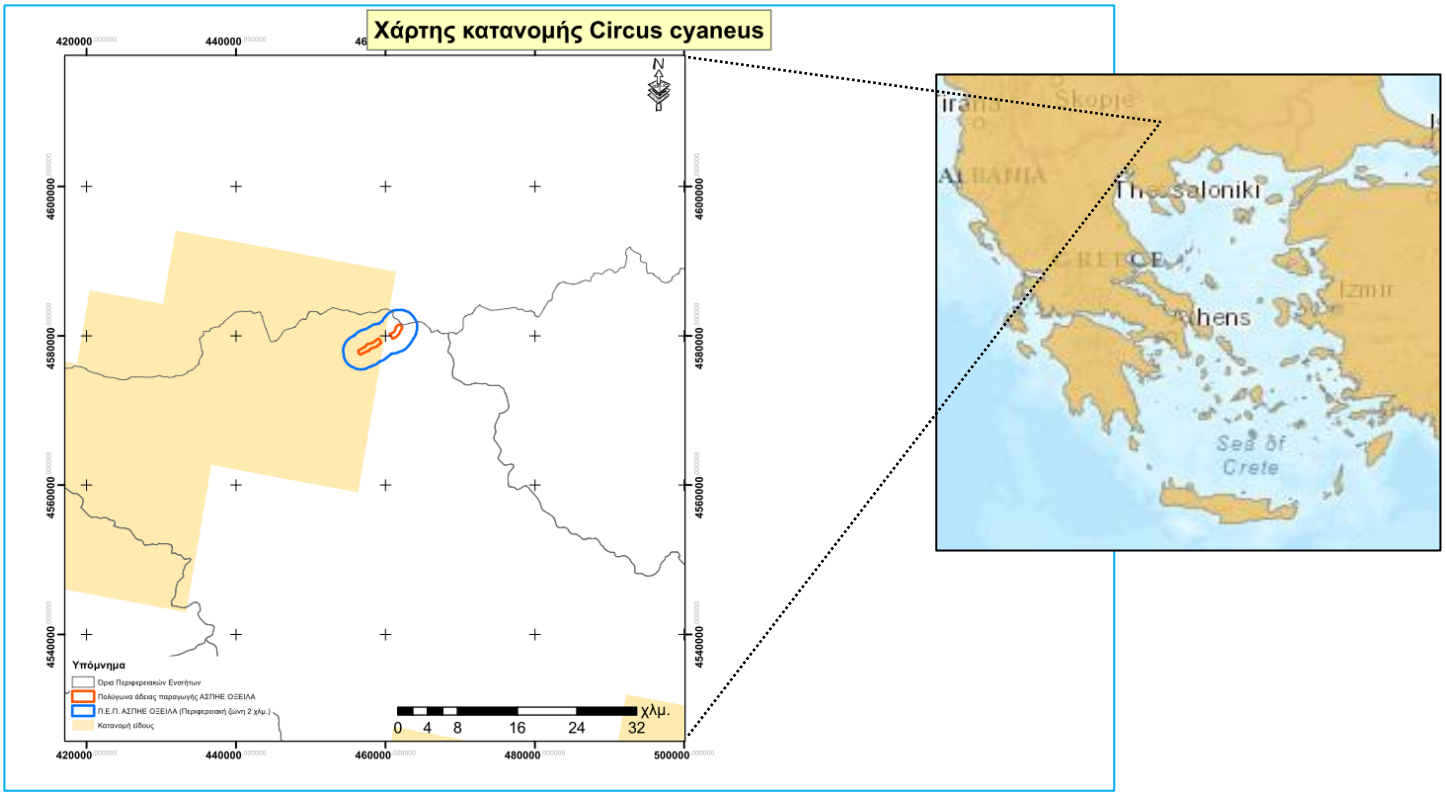
Map 46: Habitat map of *Falco eleonorae* in the study area



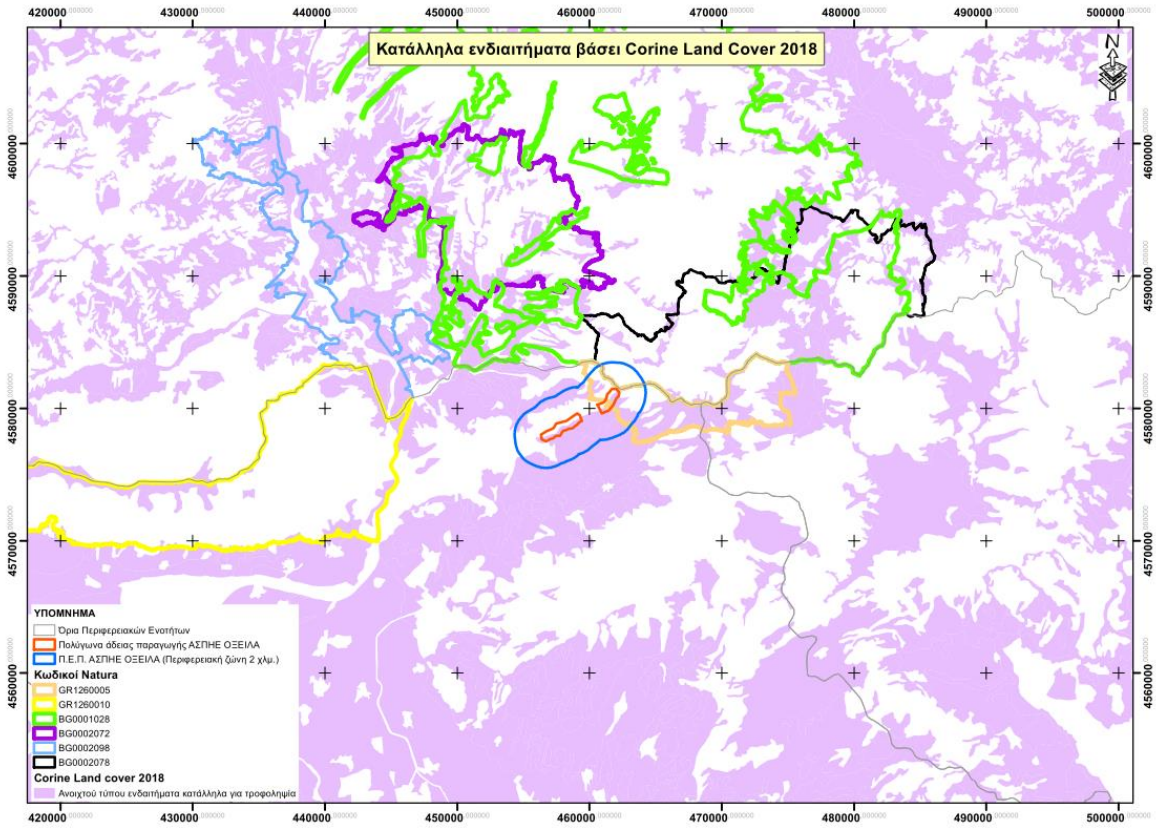
Map 47: Distribution map of *Circus aeruginosus* in the study area



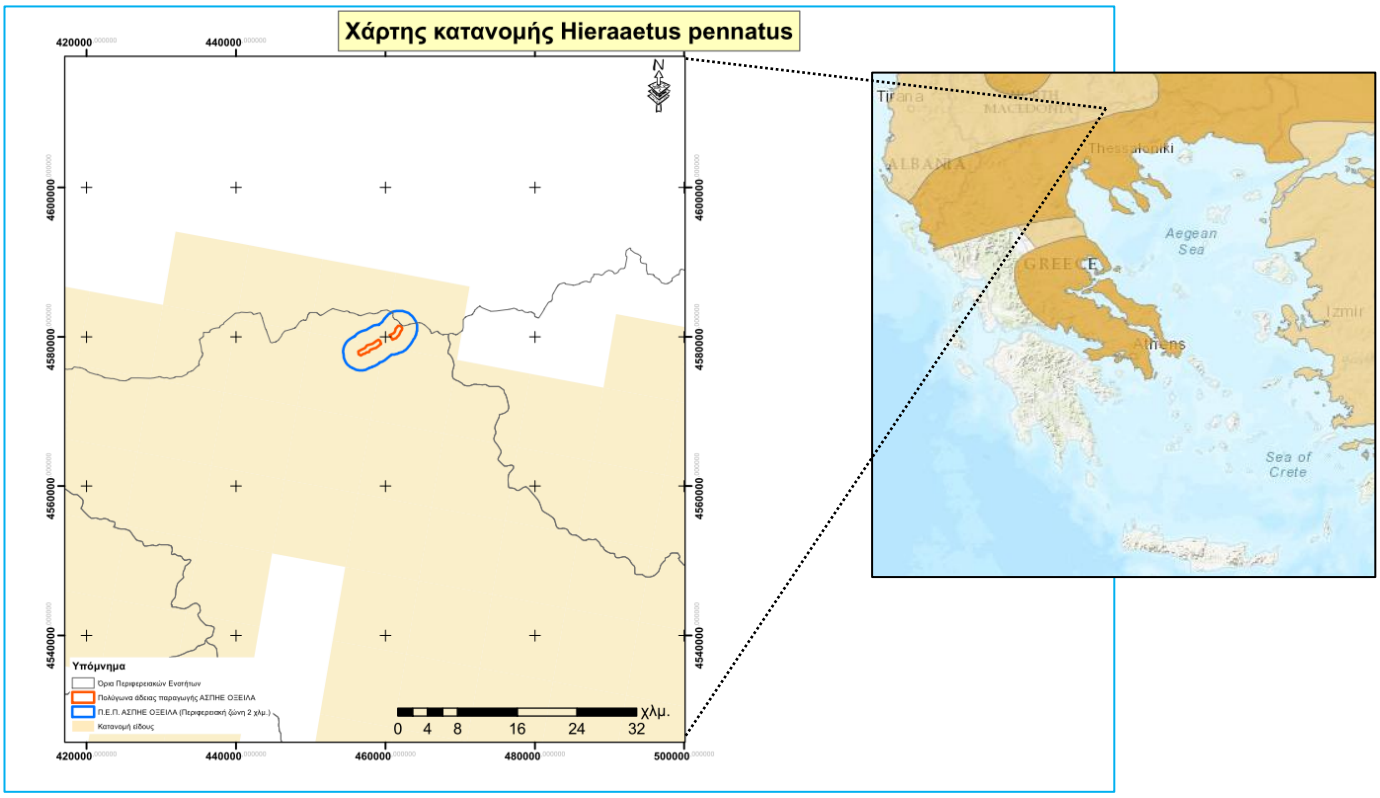
Map 48: Habitat map of *Circus aeruginosus* in the study area



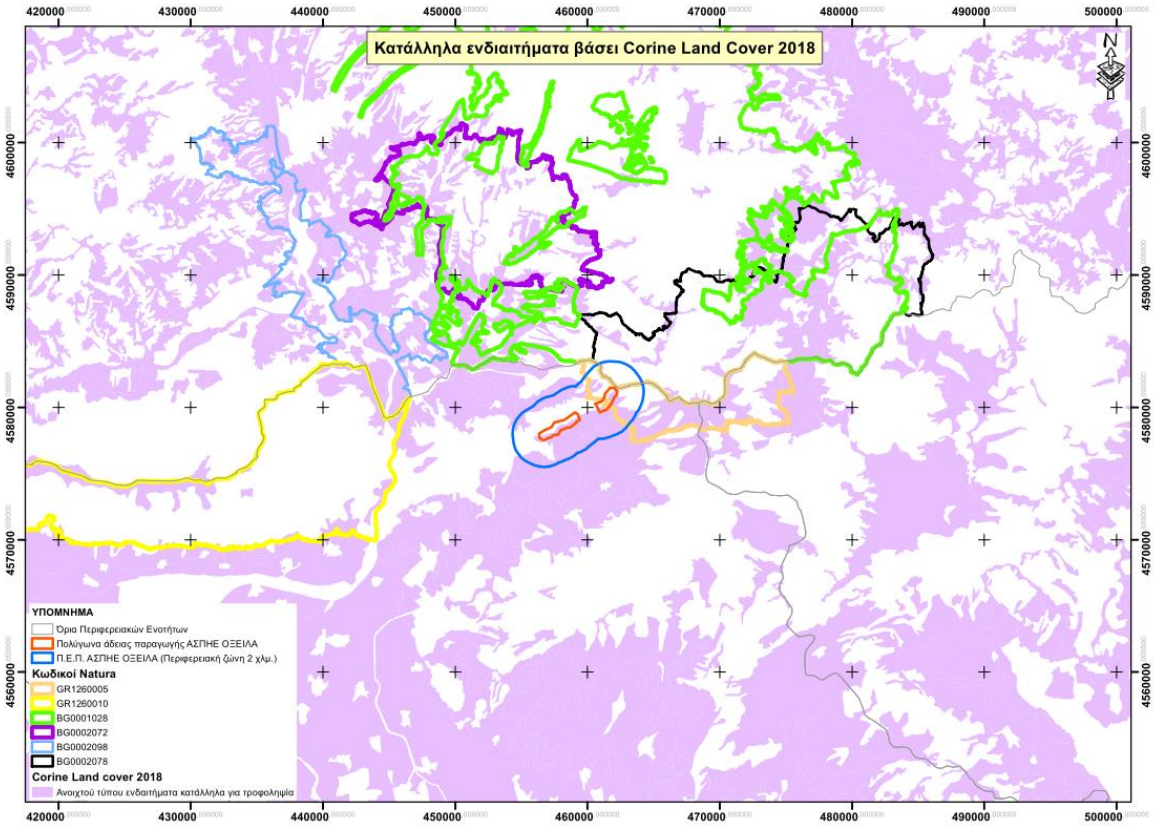
Map 49: Distribution map of *Circus cyaneus* in the study area



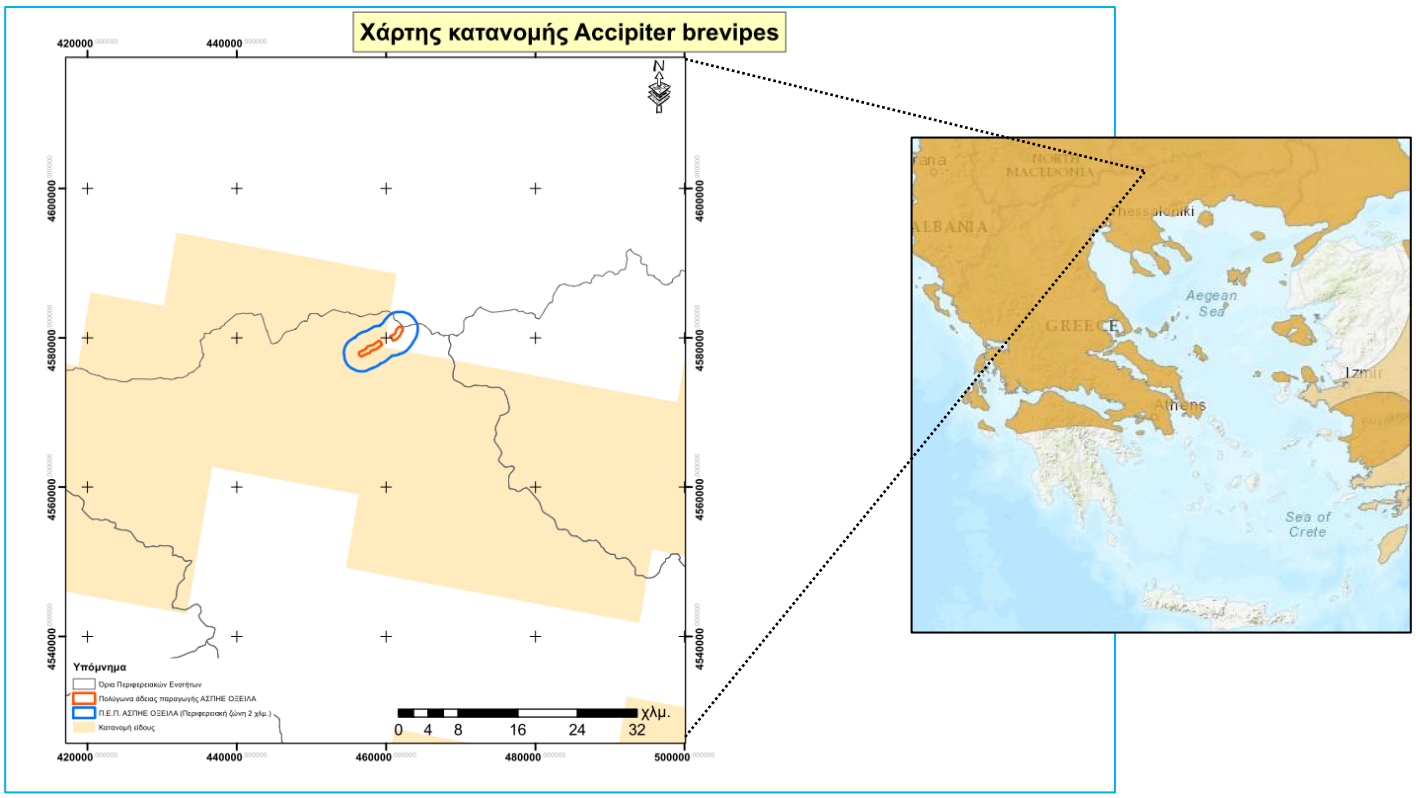
Map 50: Habitat map of *Circus cyaneus* in the study area



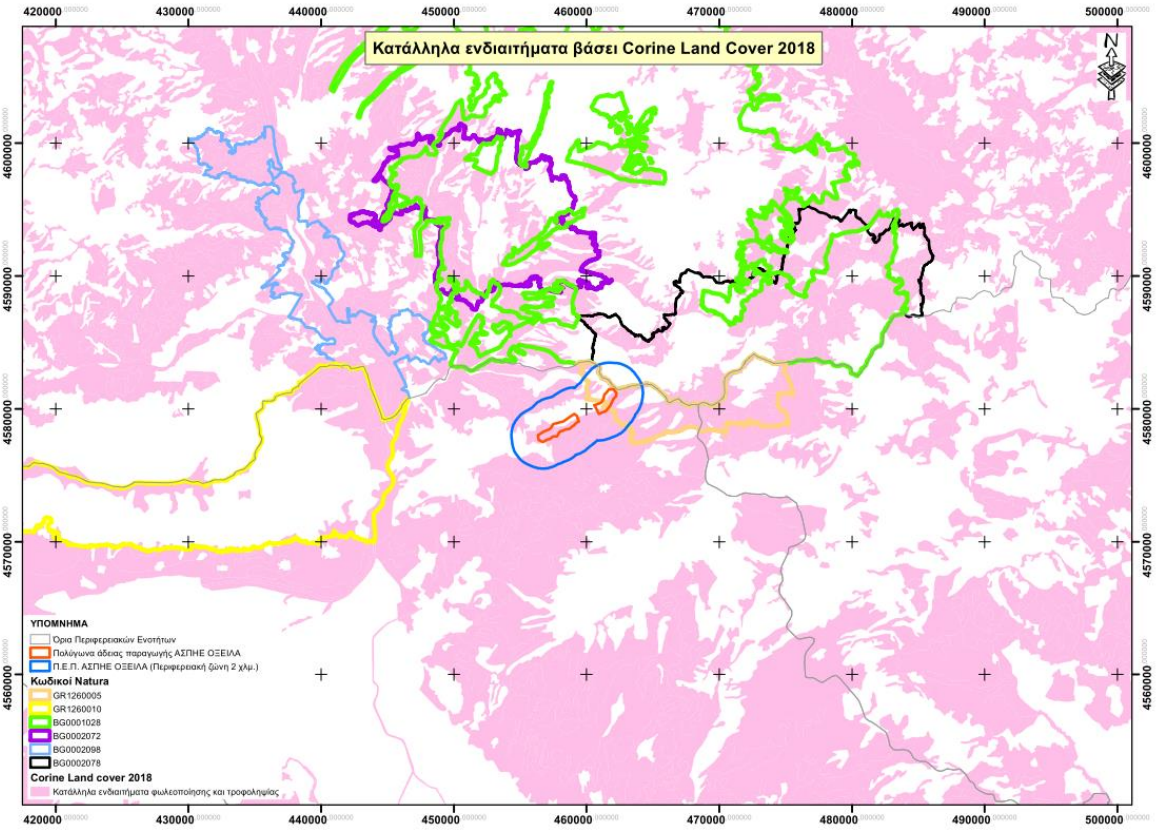
Map 51: Distribution map of *Hieraaetus pennatus* in the study area



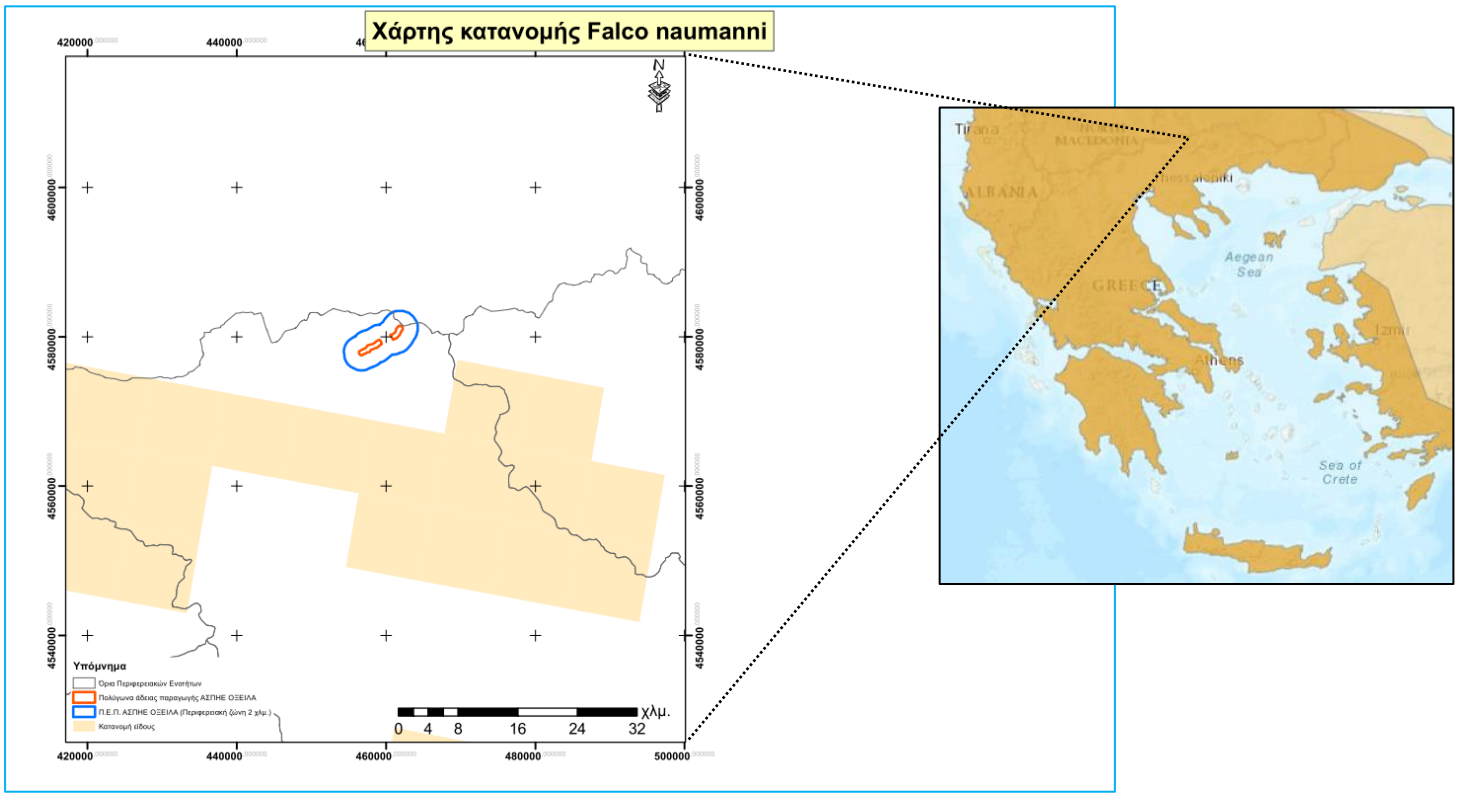
Map 52: Habitat map of *Hieraaetus pennatus* in the study area



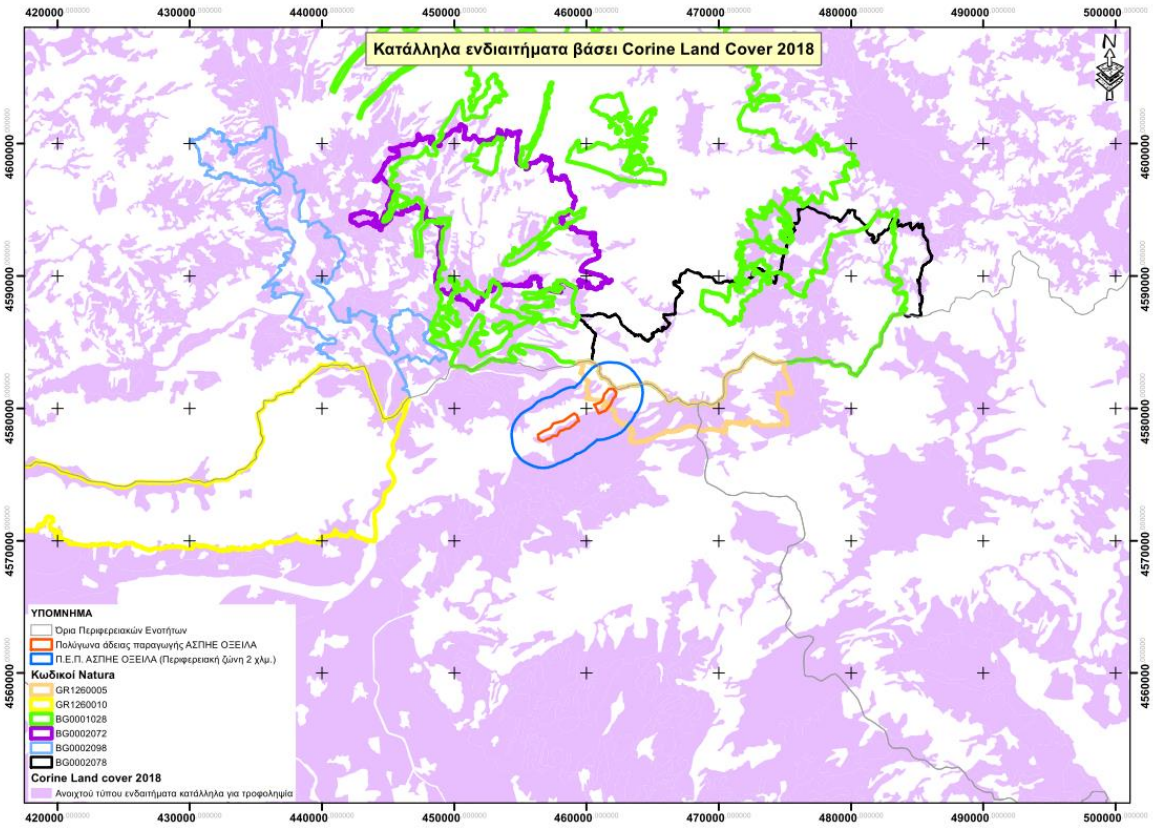
Map 53: Map of the distribution map of *Accipiter brevipes* in the study area



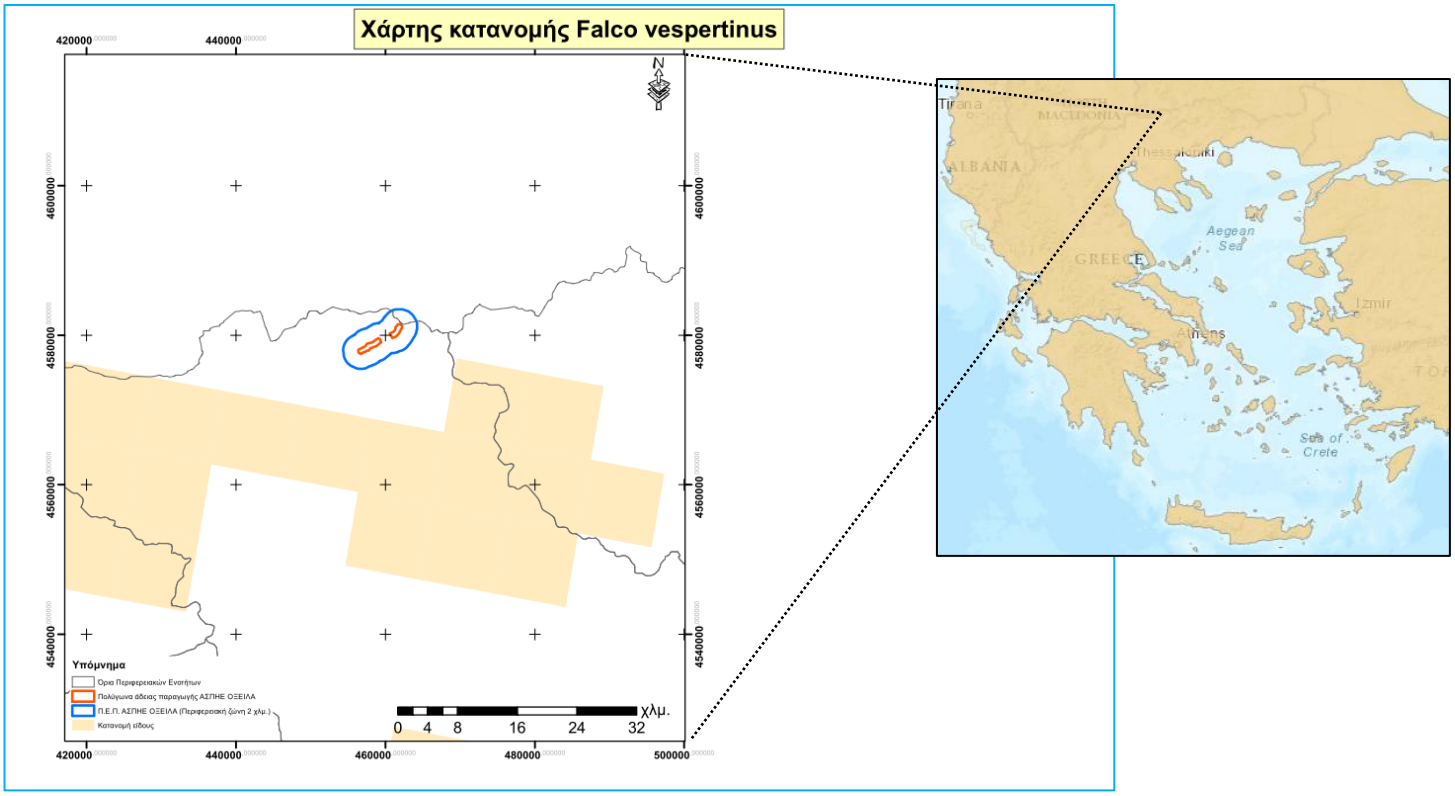
Map 54: Habitat map of *Accipiter brevipes* in the study area



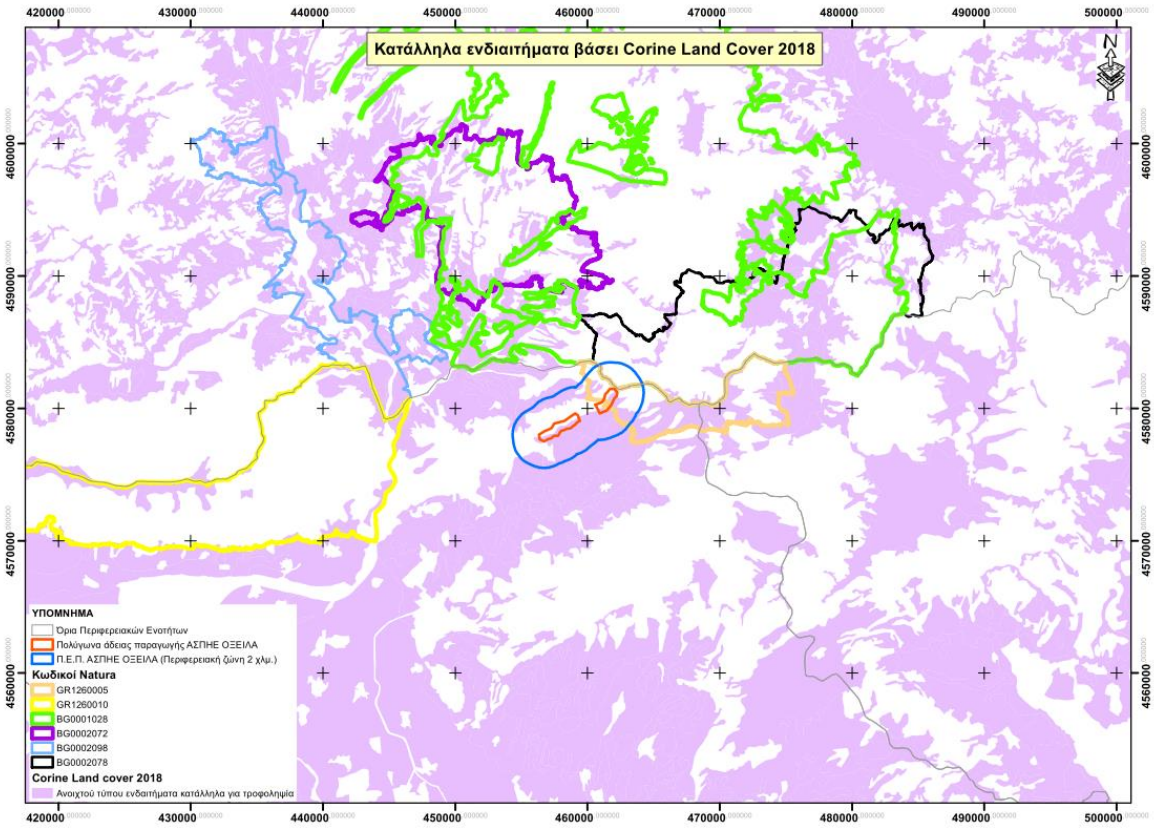
Map 55: Distribution map of *Falco naumanni* in the study area



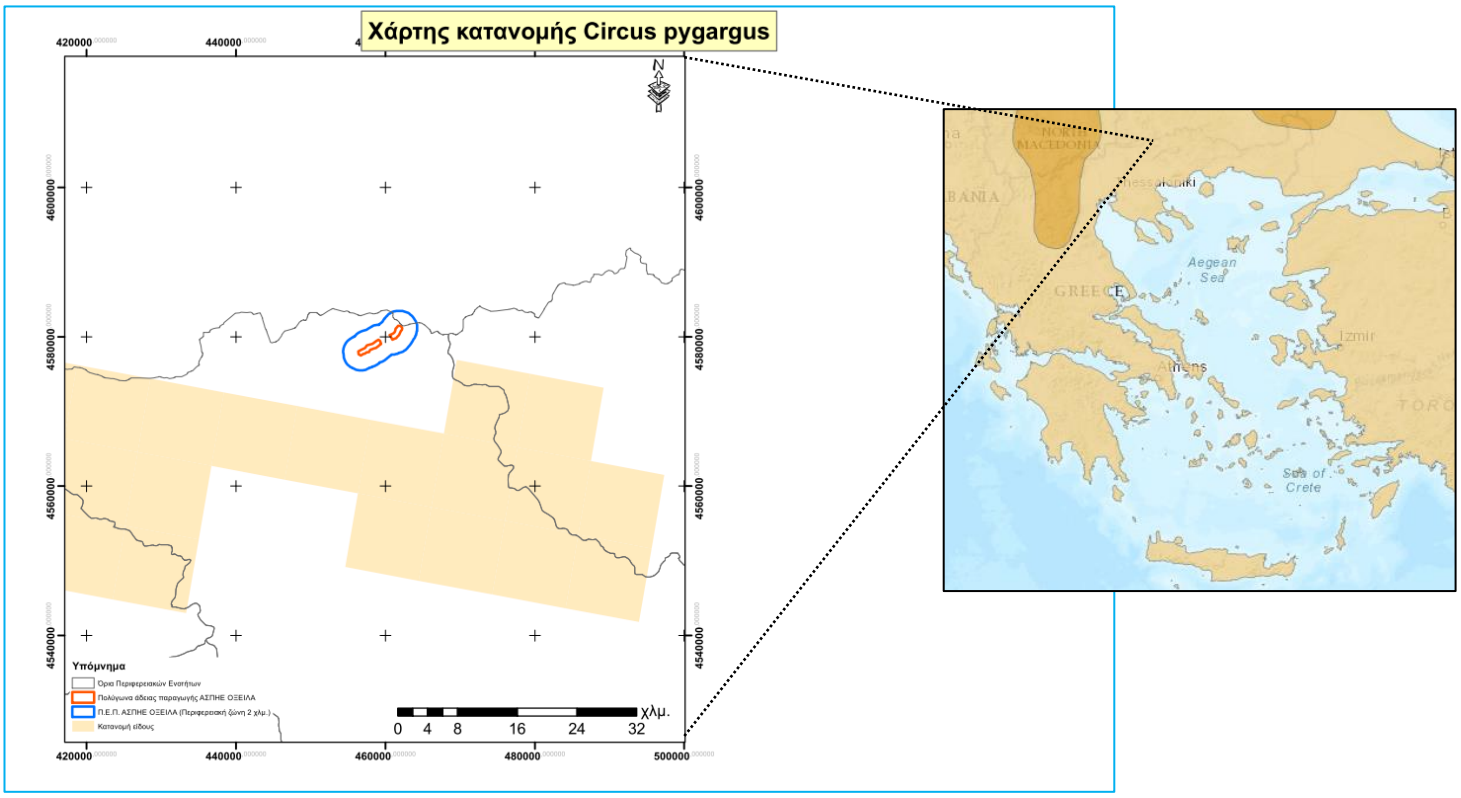
Map 56: Habitat map of *Falco naumanni* in the study area



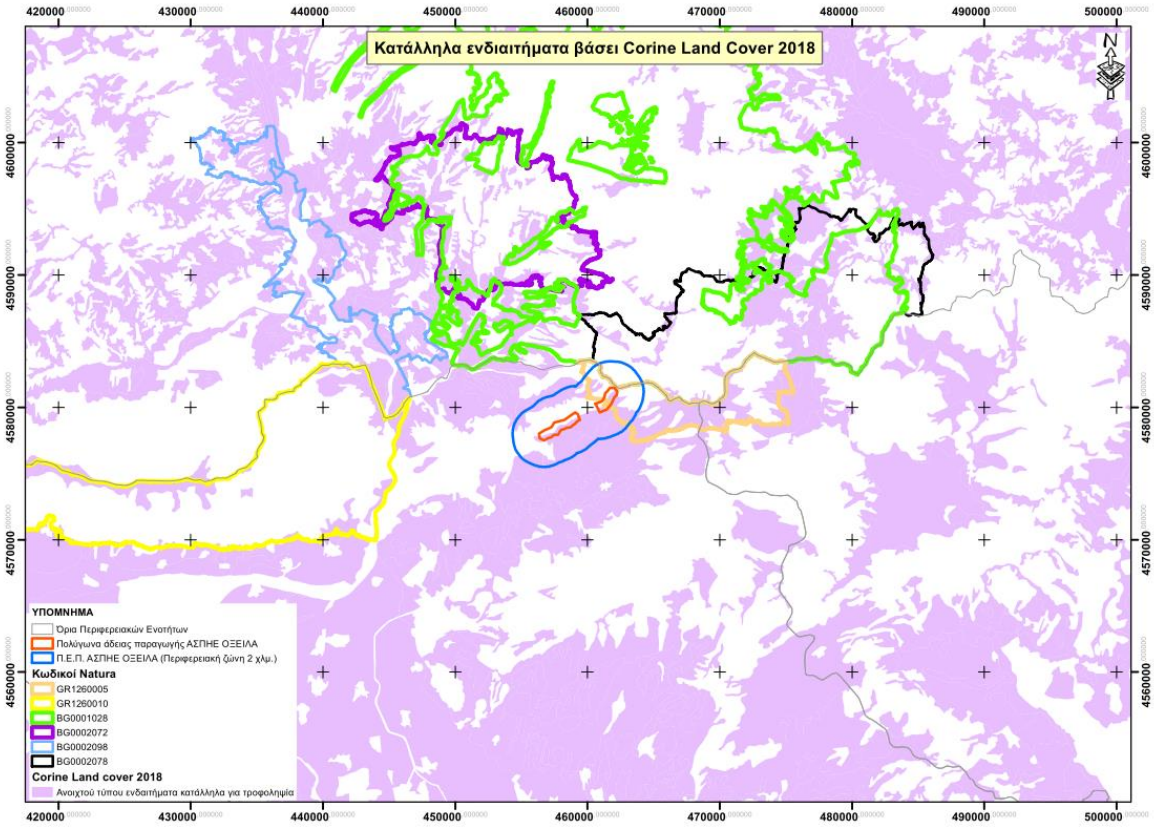
Map 57: Distribution map of *Falco vespertinus* in the study area



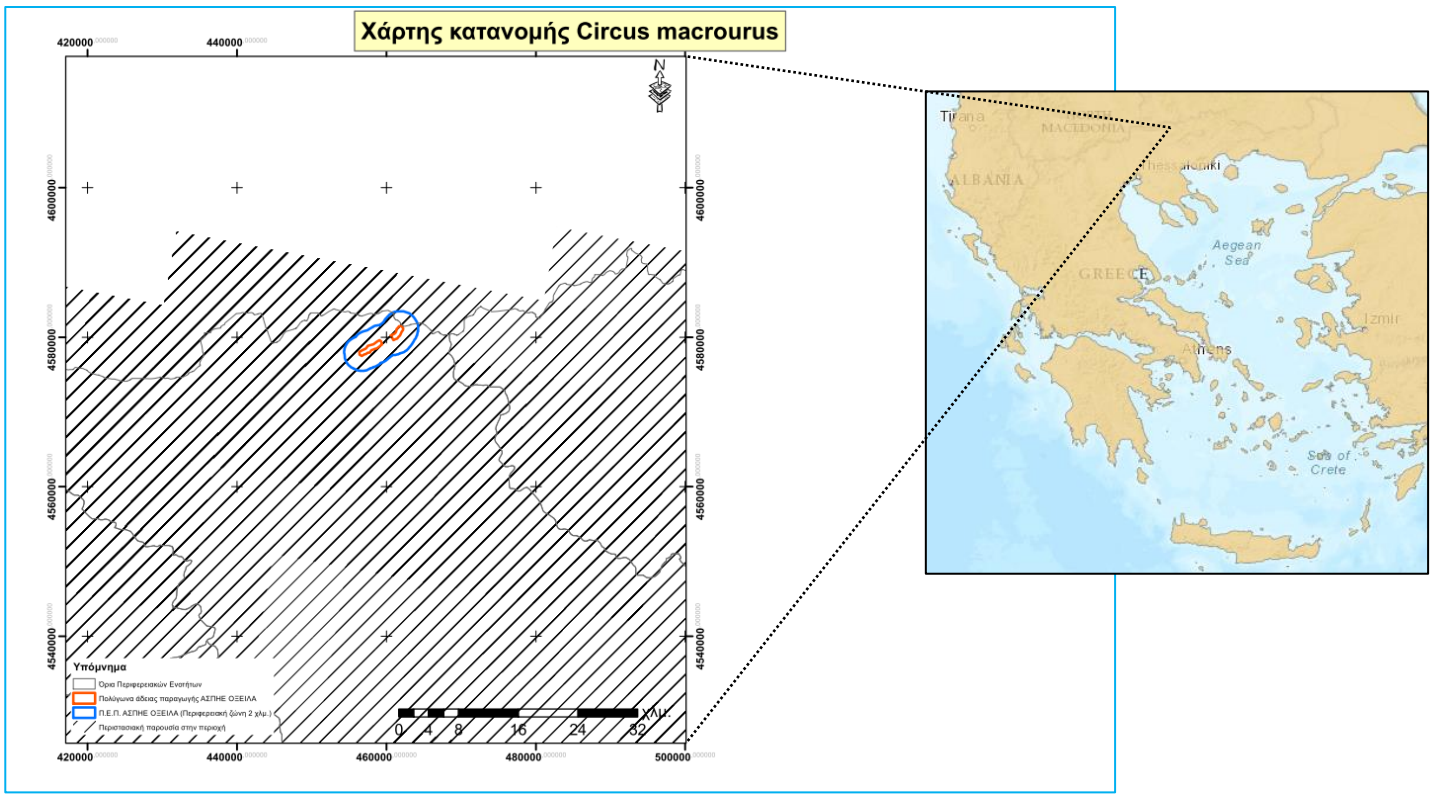
Map 58: Habitat map of *Falco vespertinus* in the study area



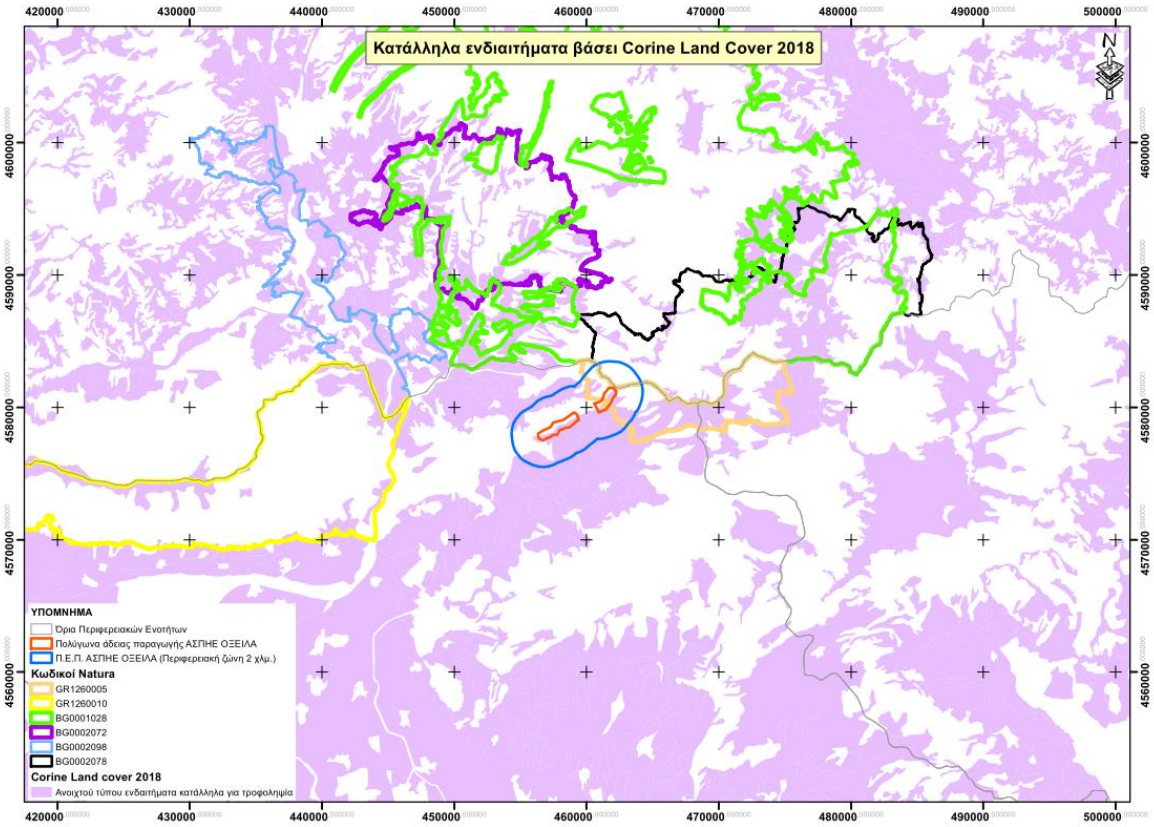
Map 59: Distribution map of *Circus pygargus* in the study area



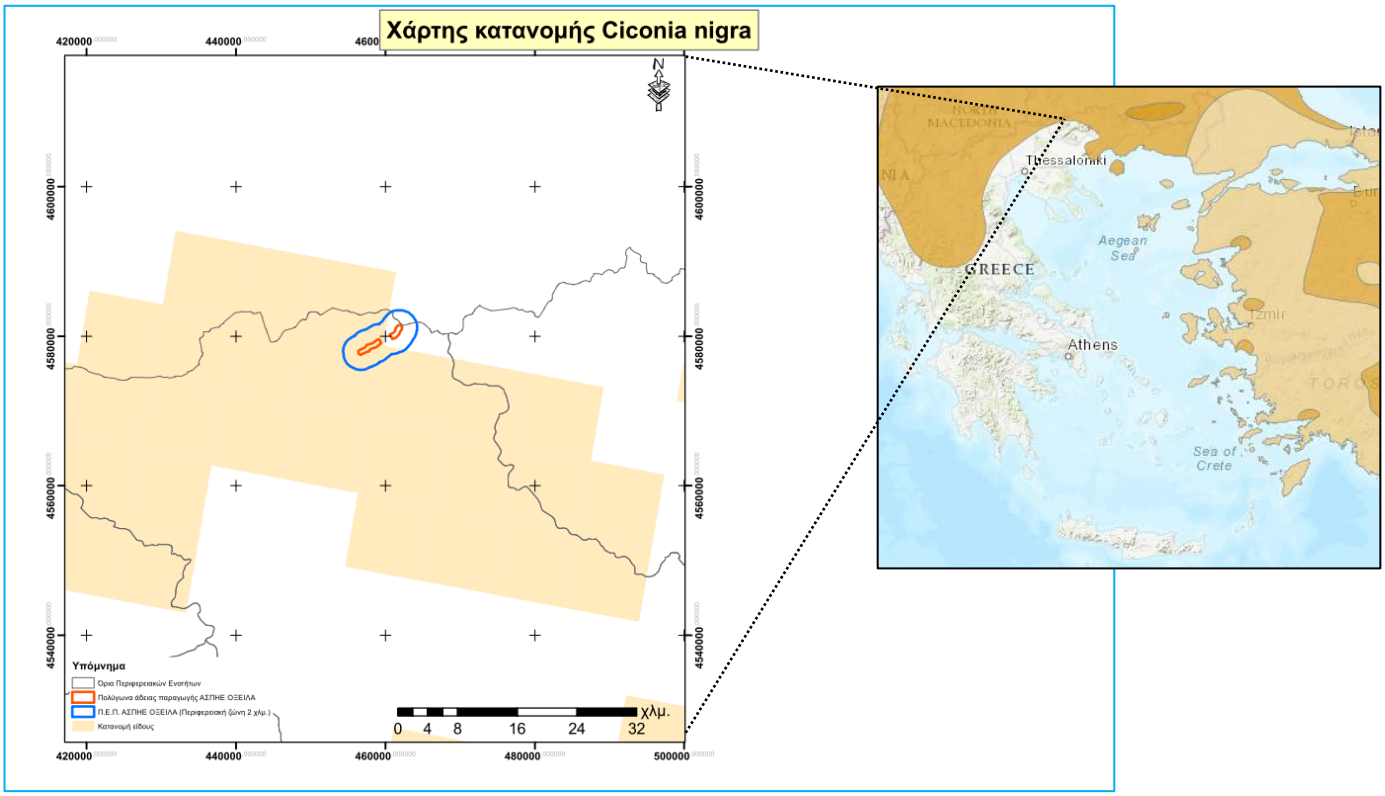
Map 60: Habitat map of *Circus pygargus* in the study area



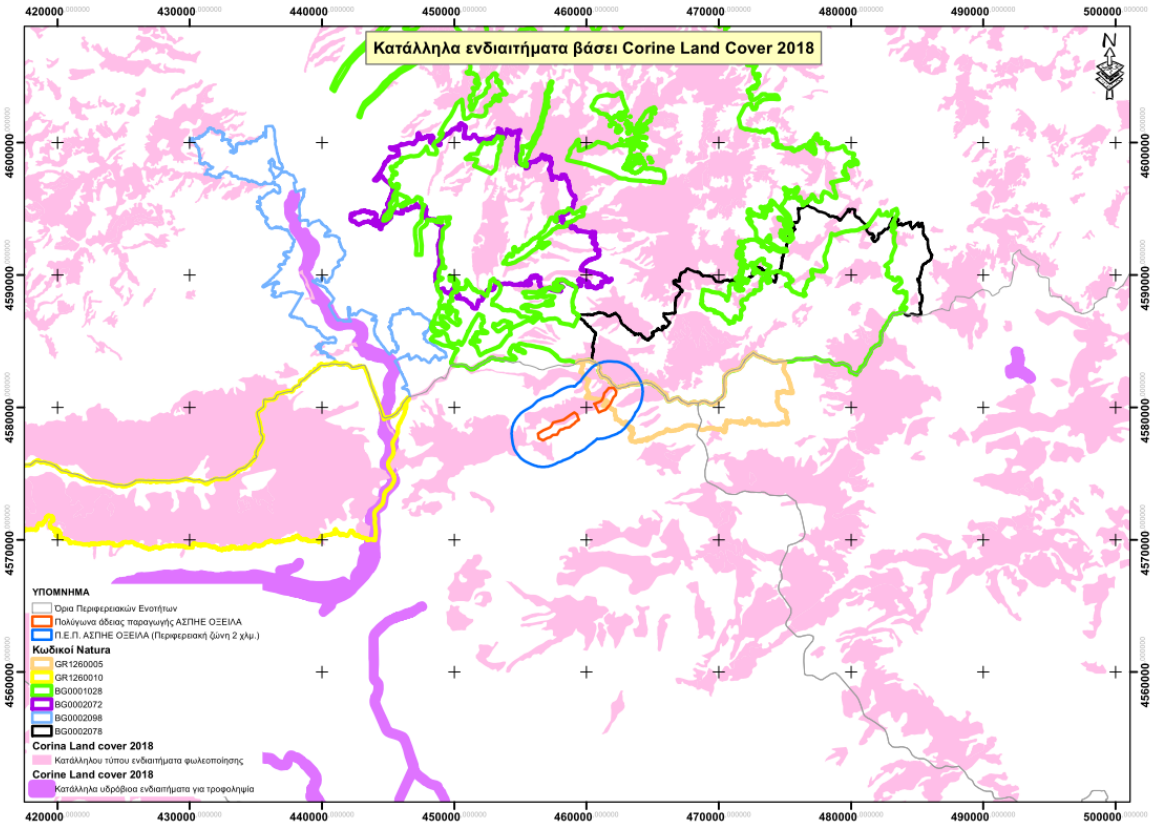
Map 61: Distribution map of *Circus macrourus* in the study area



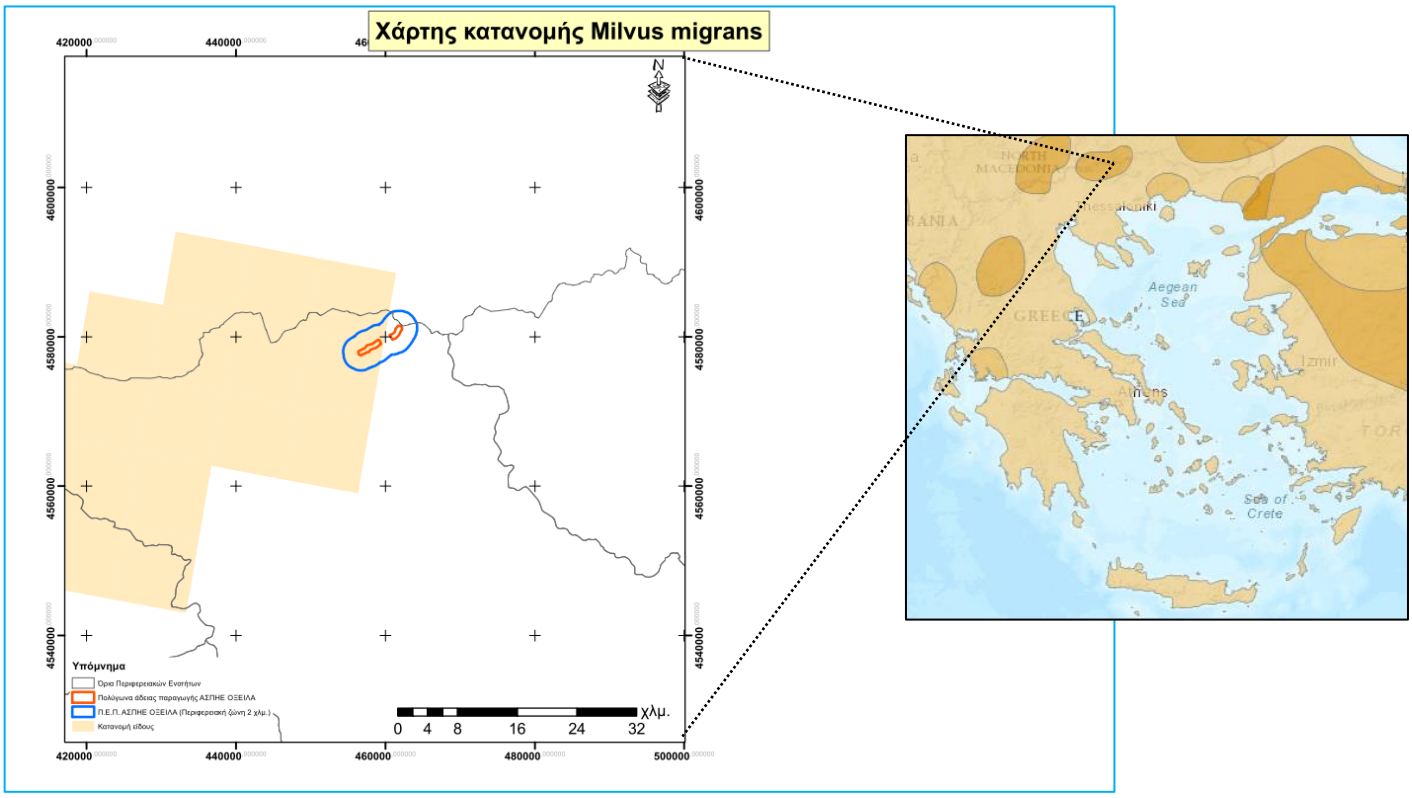
Map 62: Habitat map of *Circus macrourus* in the study area



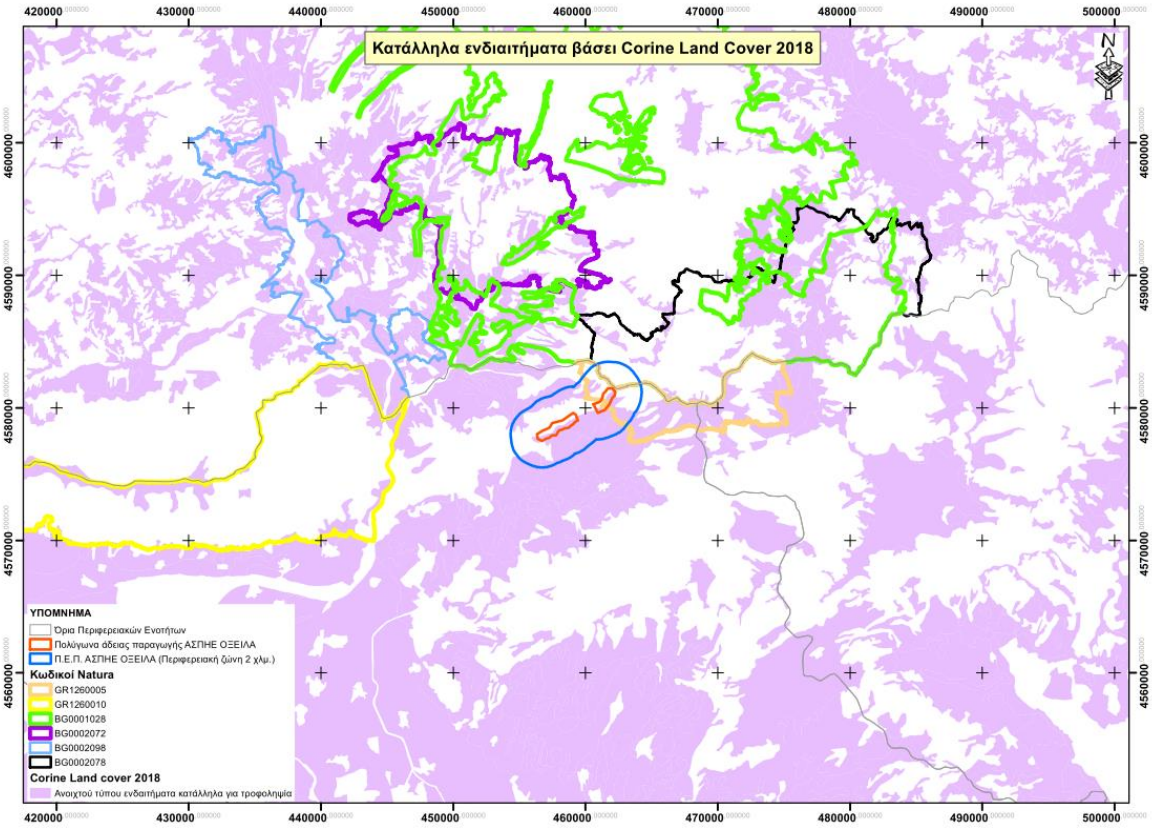
Map 63: Distribution map of *Ciconia nigra* in the study area



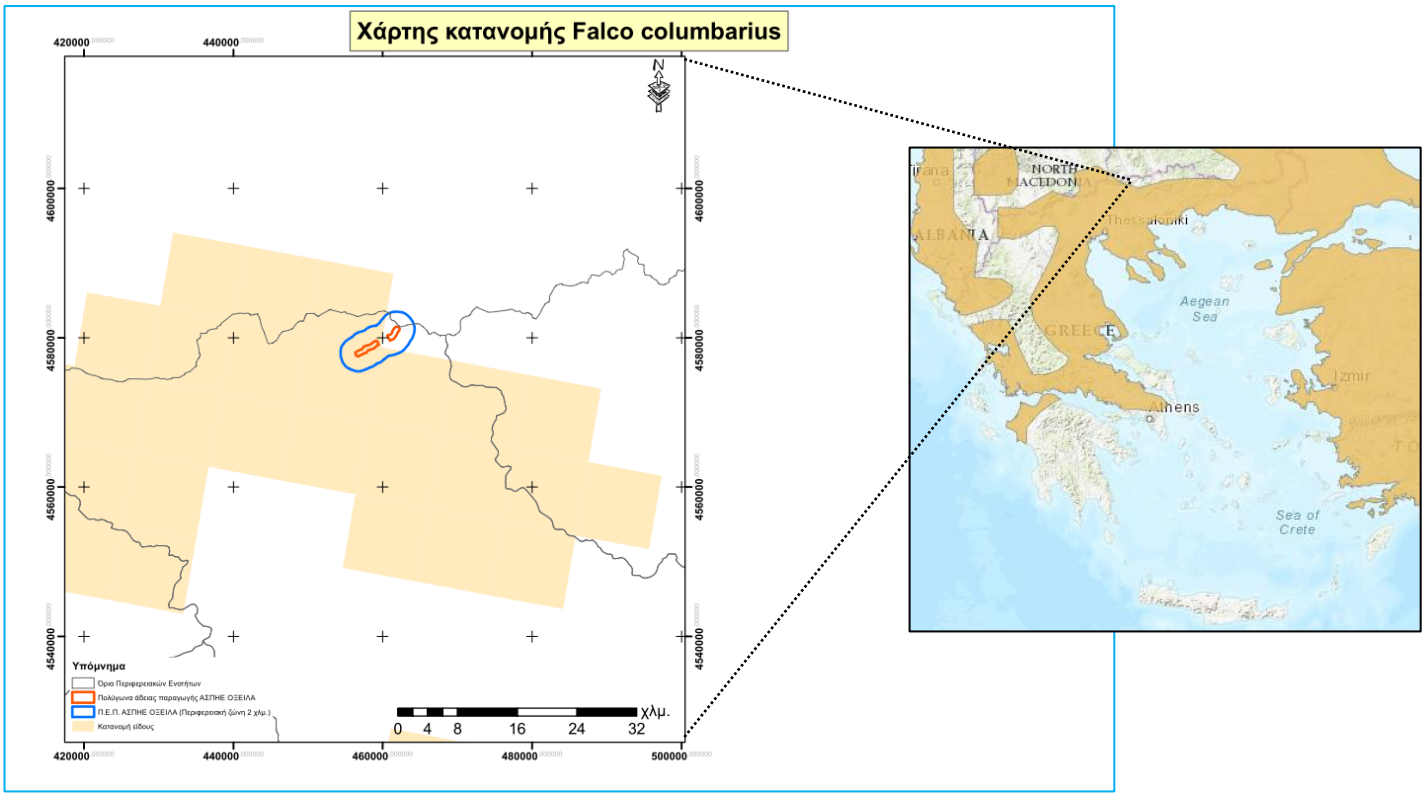
Map 64: Habitat map of *Ciconia nigra* in the study area



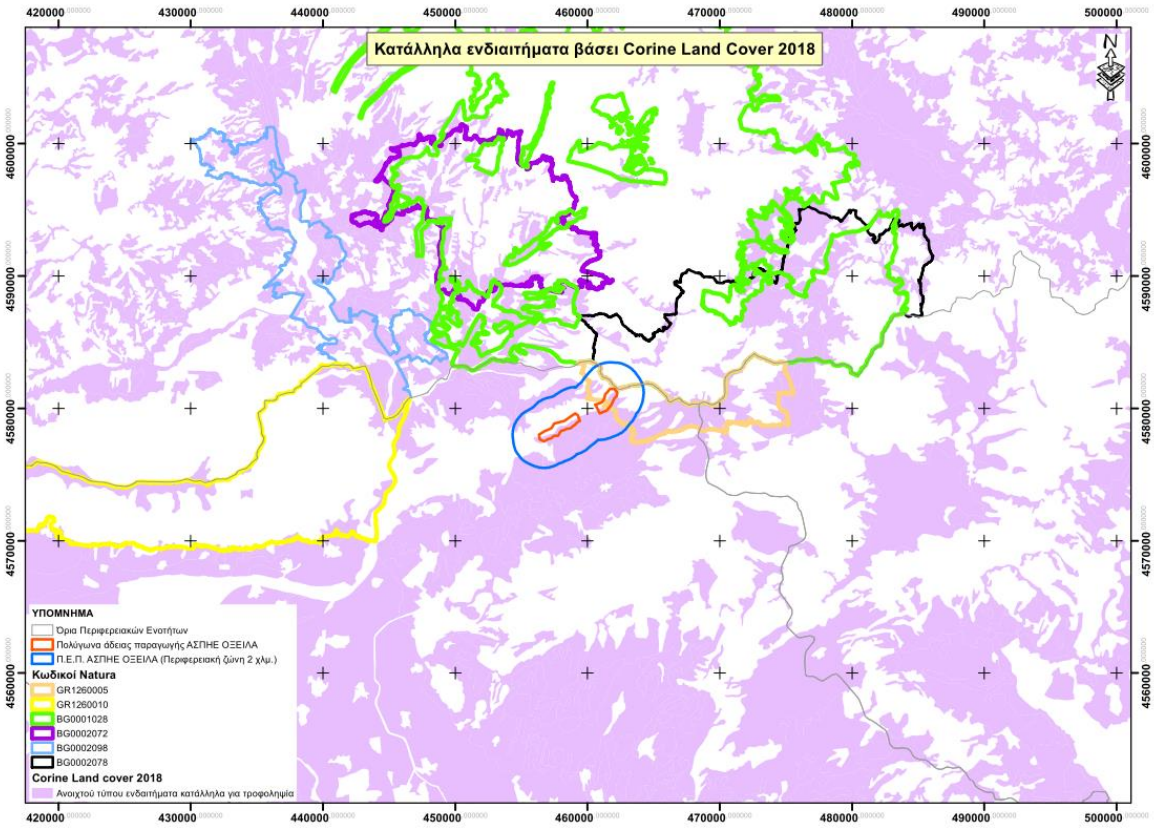
Map 65: Distribution map of *Milvus migrans* in the study area



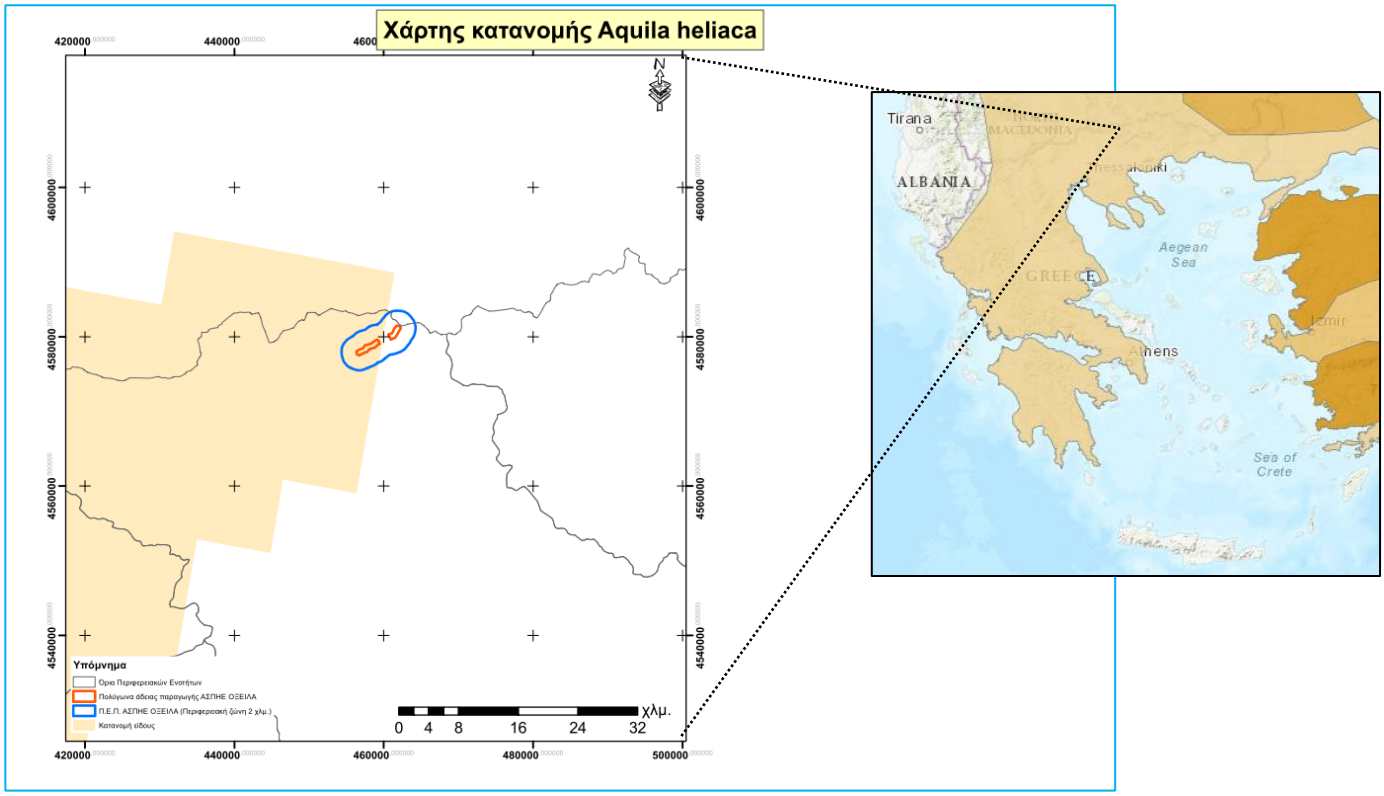
Map 66: Habitat map of *Milvus migrans* in the study area



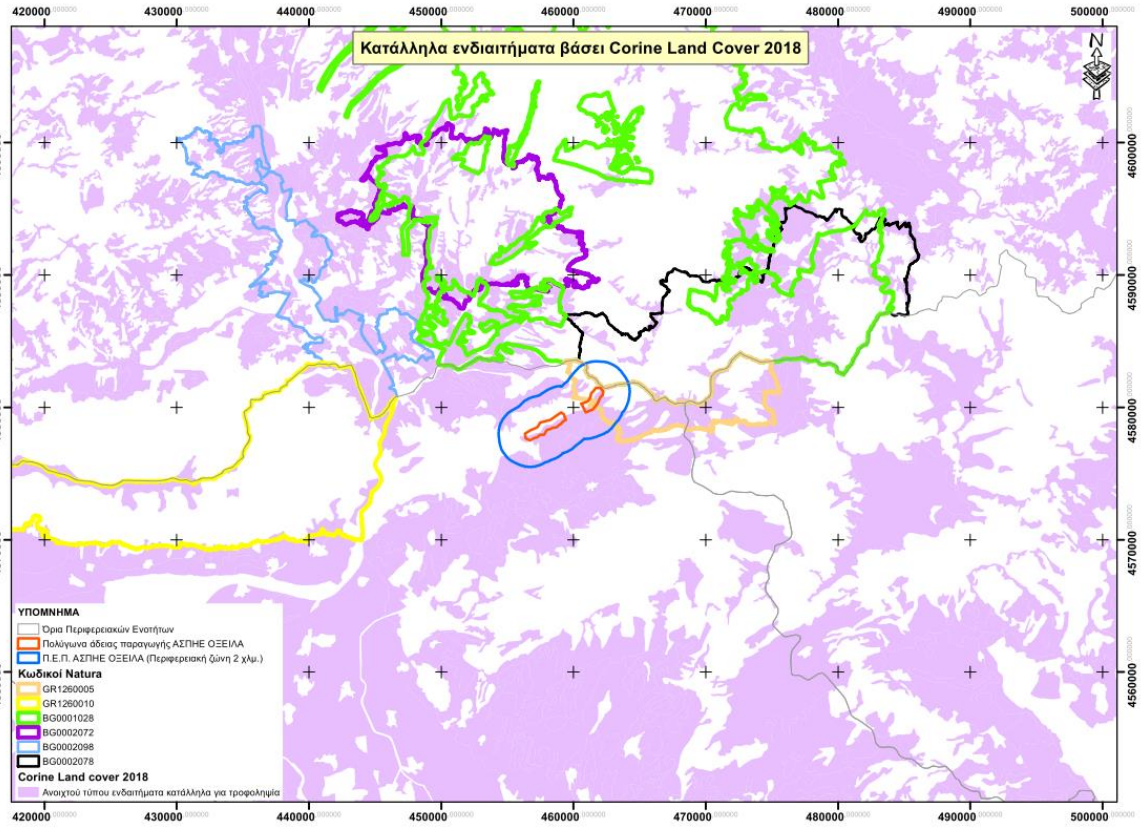
Map 67: Distribution map of *Falco columbarius* in the study area



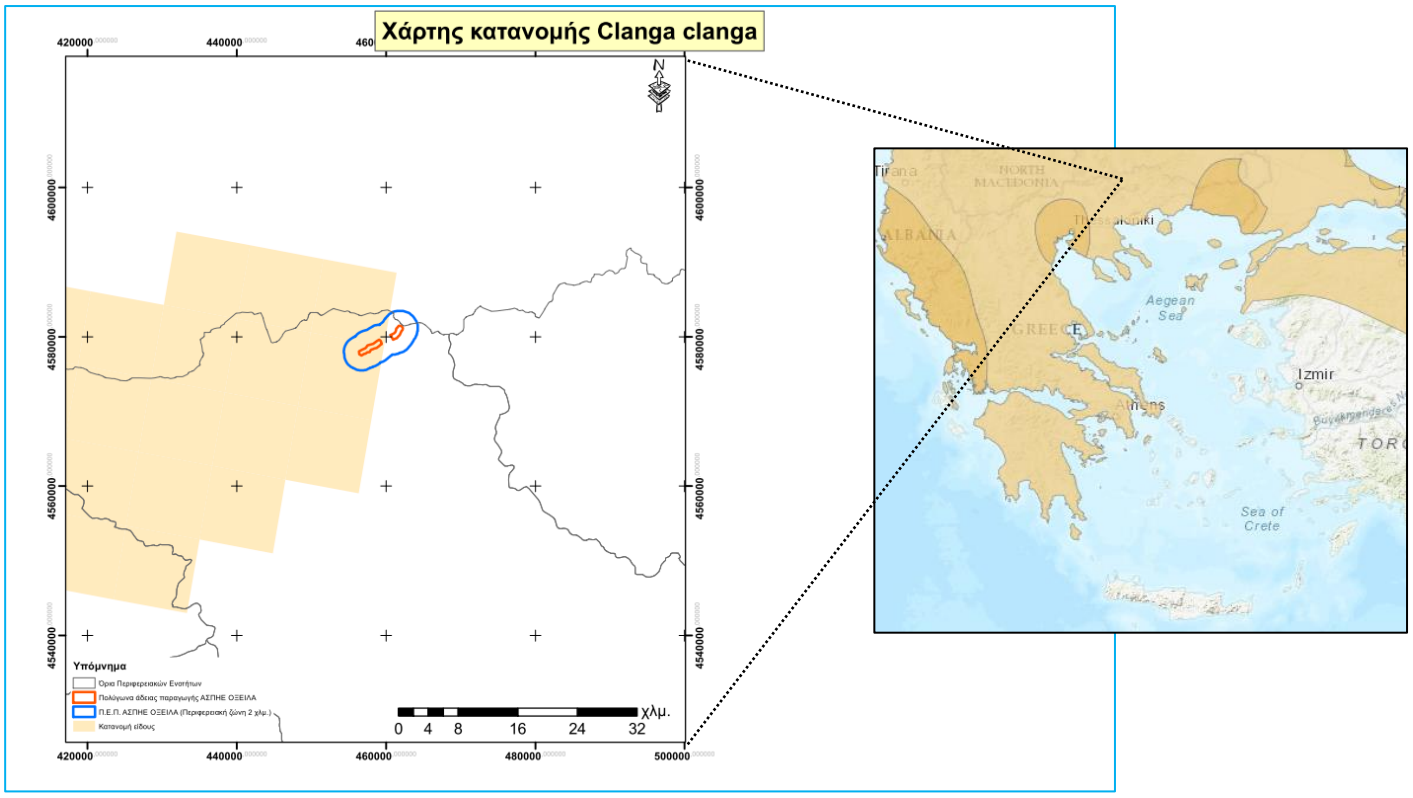
Map 68: Habitat map of *Falco columbarius* in the study area



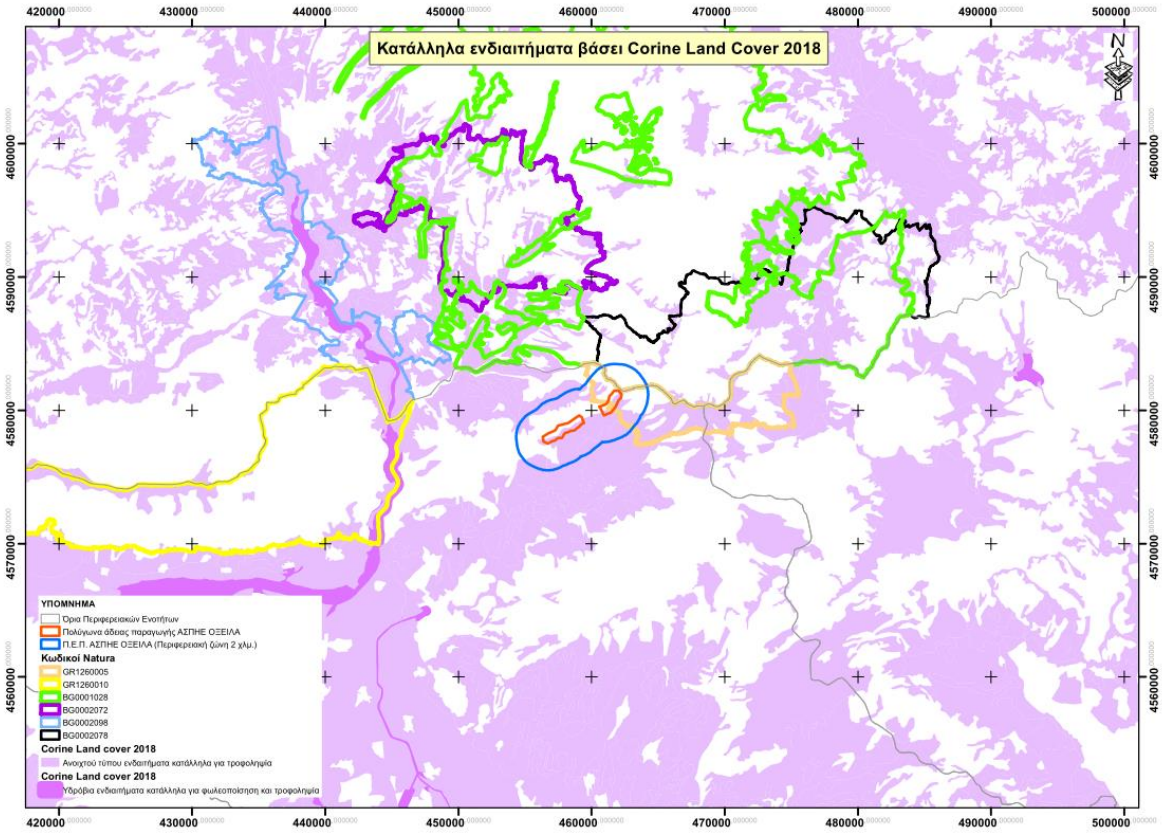
Map 69: Distribution map of *Aquila heliaca* in the study area.



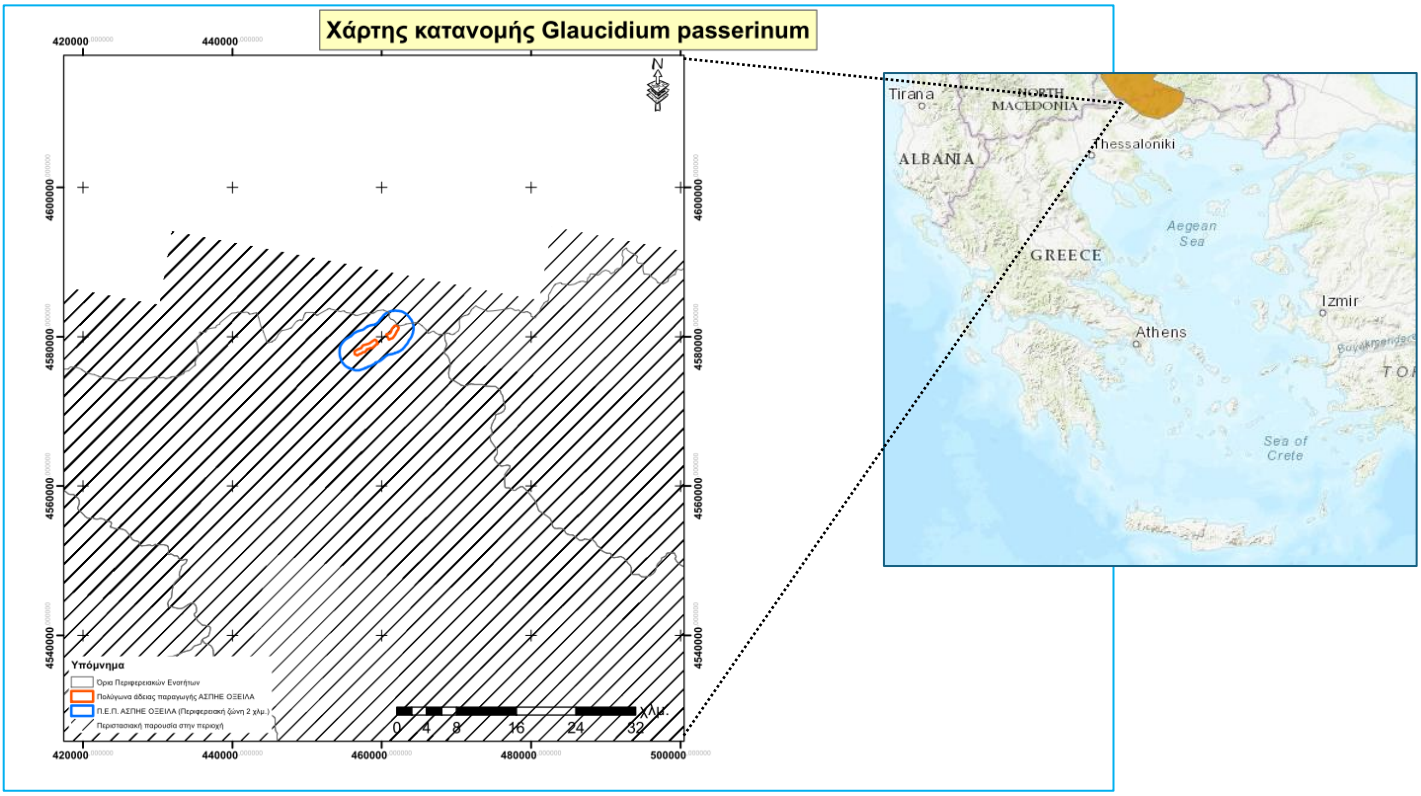
Map 70: Habitat map of *Aquila heliaca* in the study area.



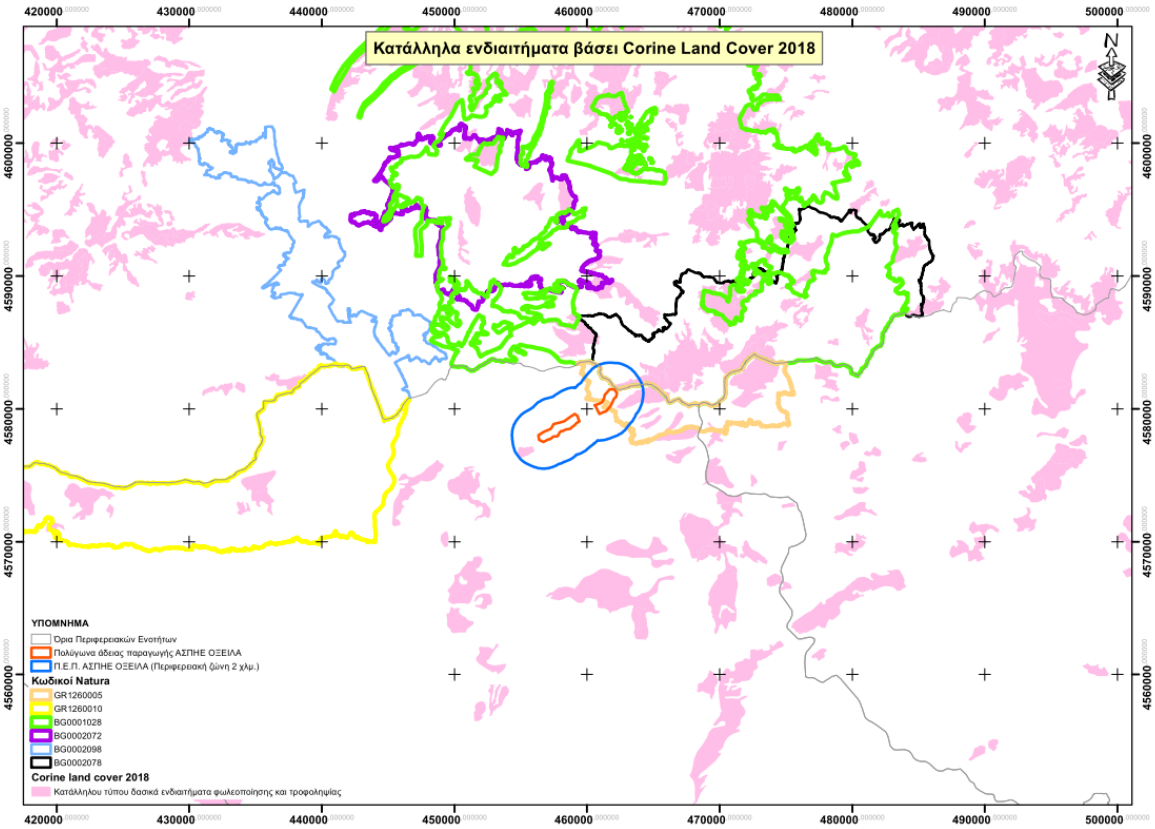
Map 71: Distribution map of *Clanga clanga* in the study area



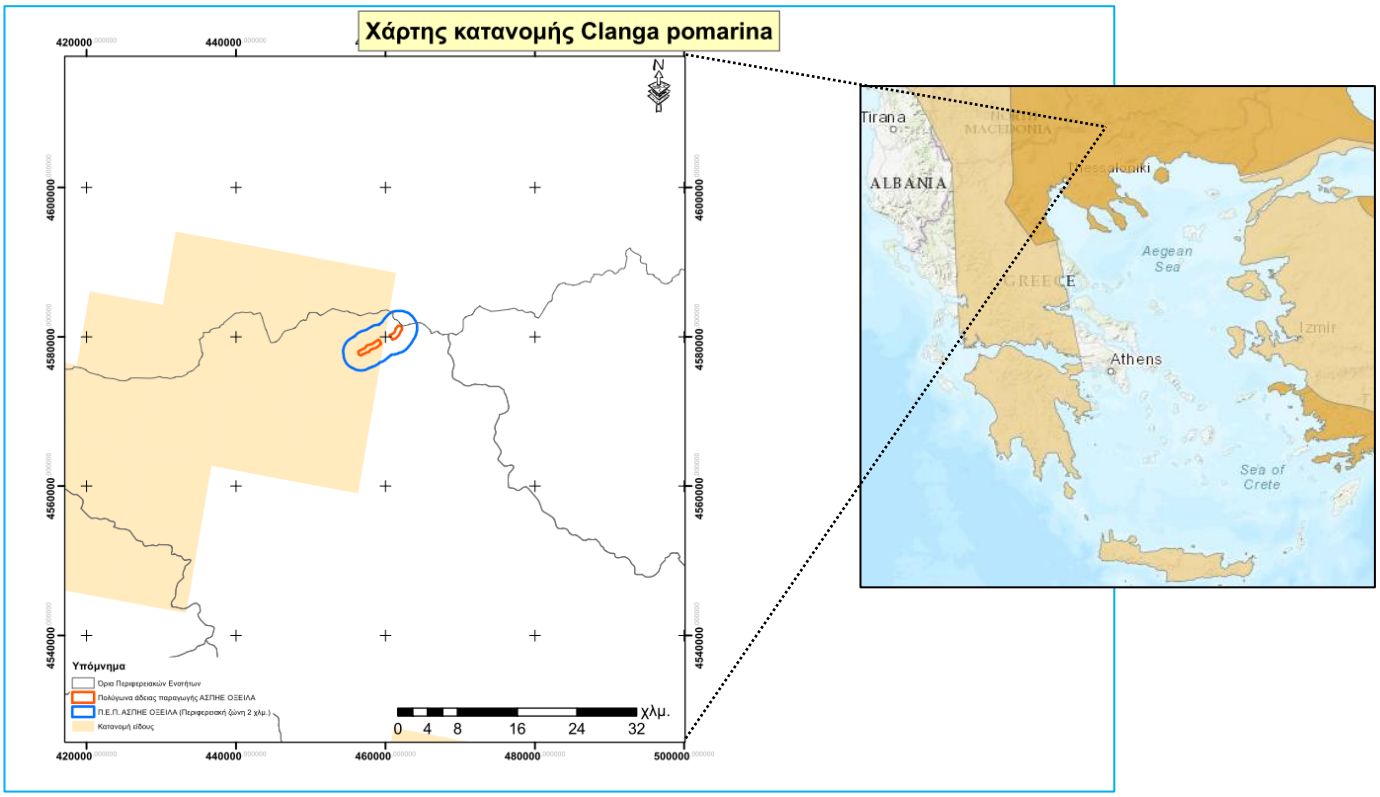
Map 72: Habitat map of *Clanga clanga* in the study area



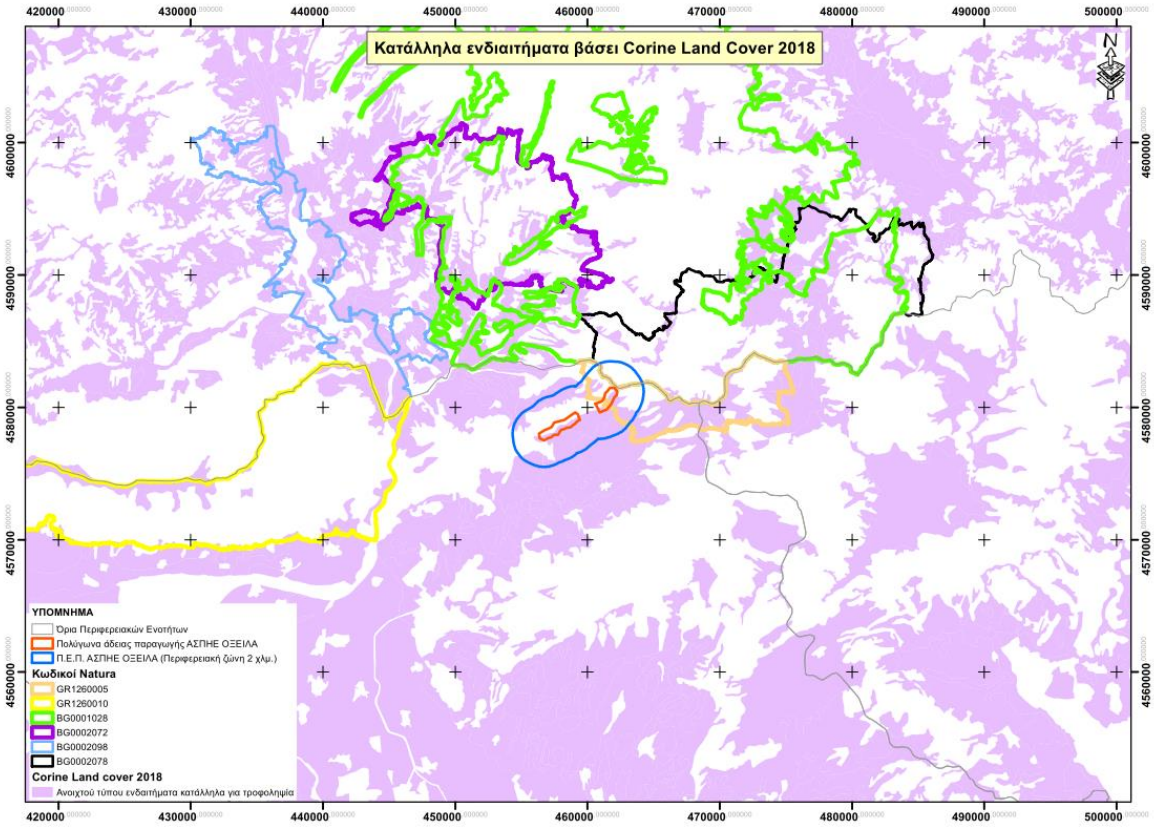
Map 73: Distribution map of *Glaucidium passerinum* in the study area



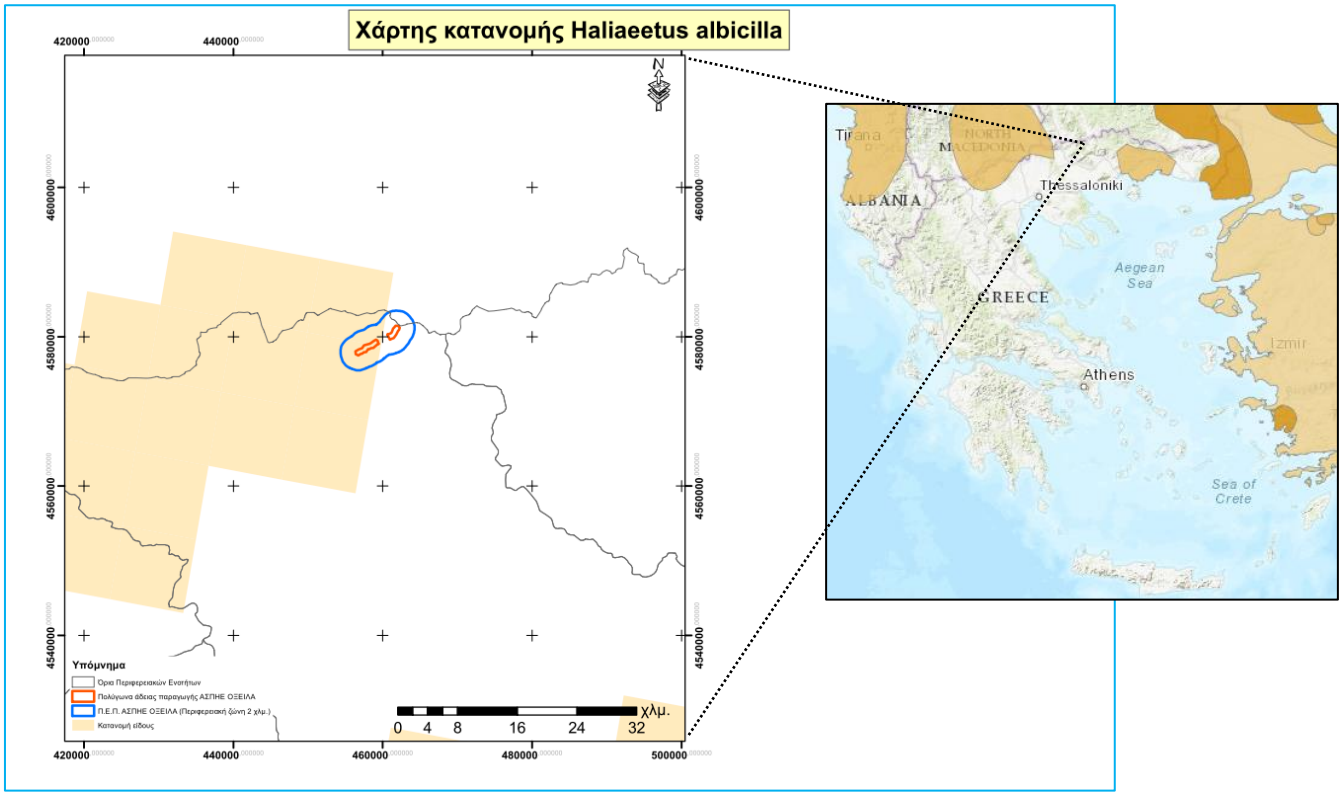
Map 74: Habitat map of *Glaucidium passerinum* in the study area



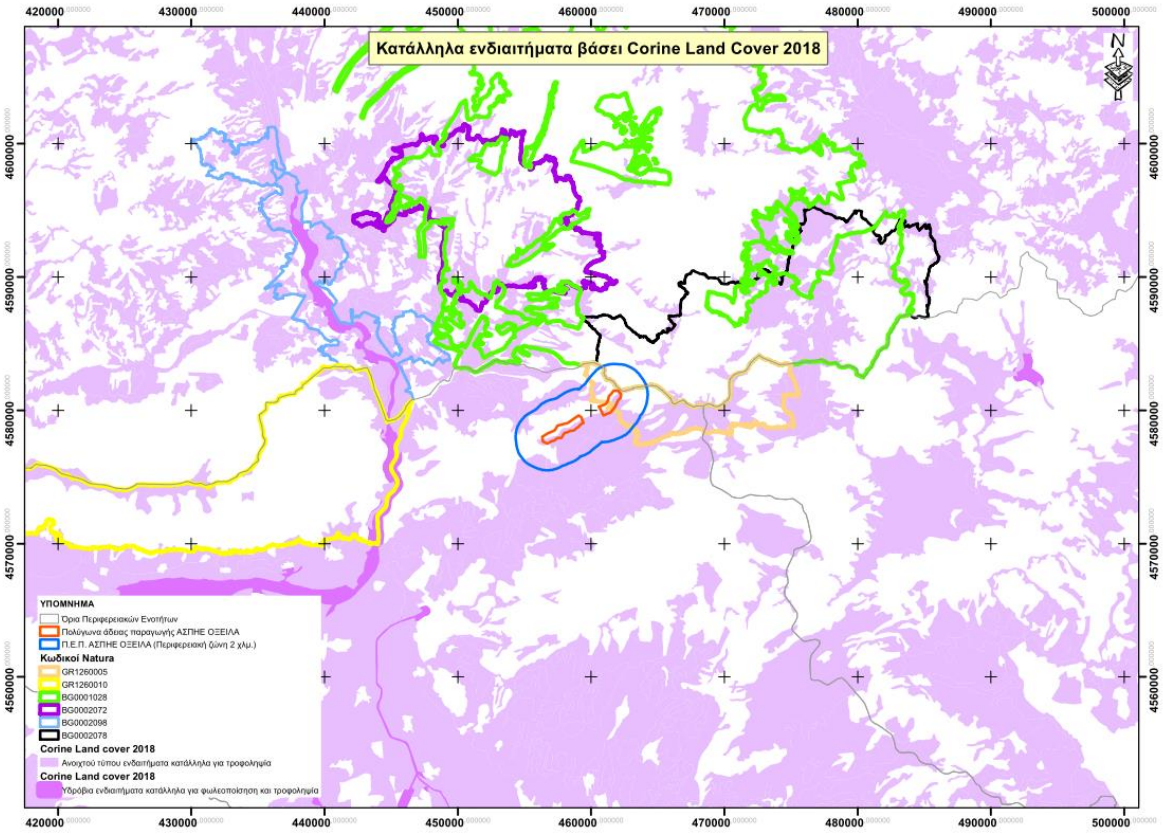
Map 75: Distribution map of *Clanga pomarina* in the study area



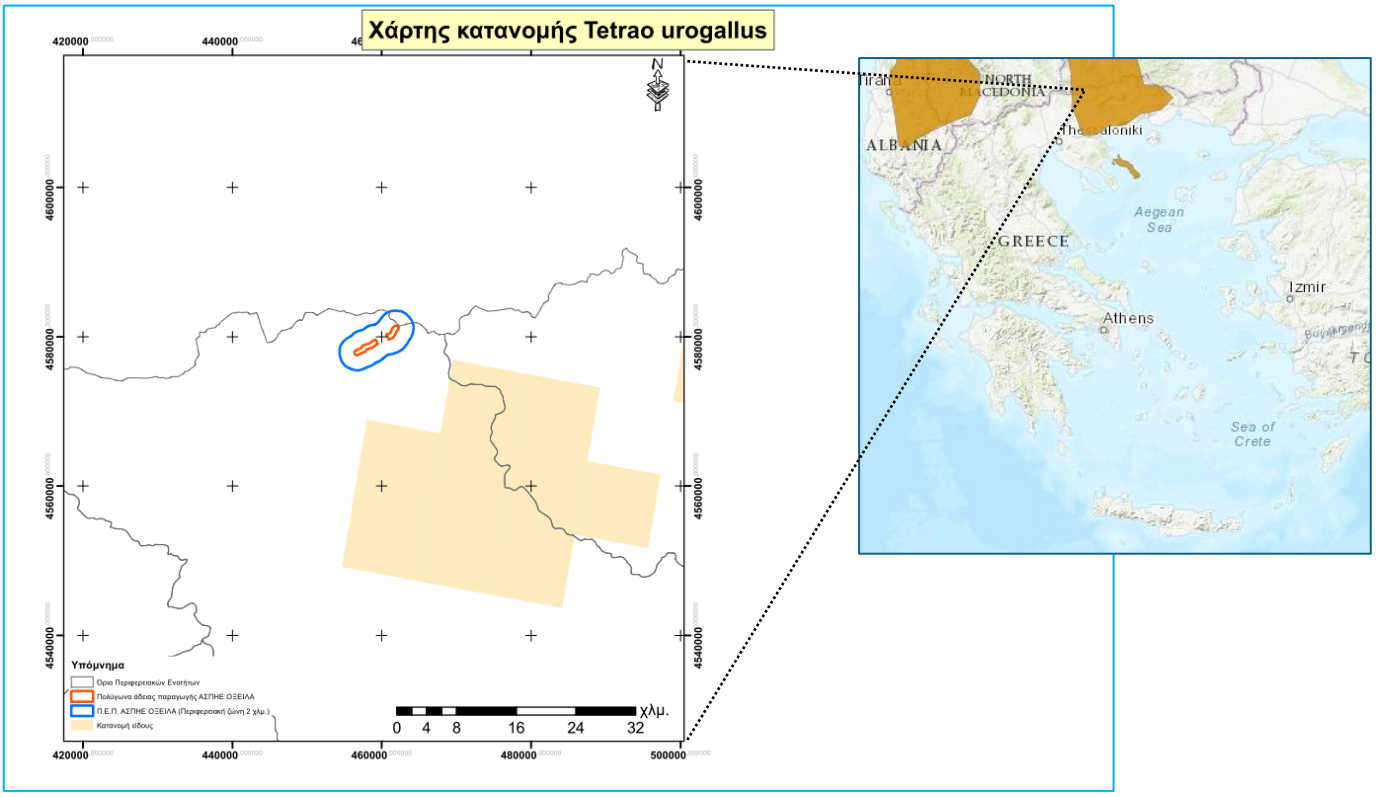
Map 76: Habitat map of *Clanga pomarina* in the study area



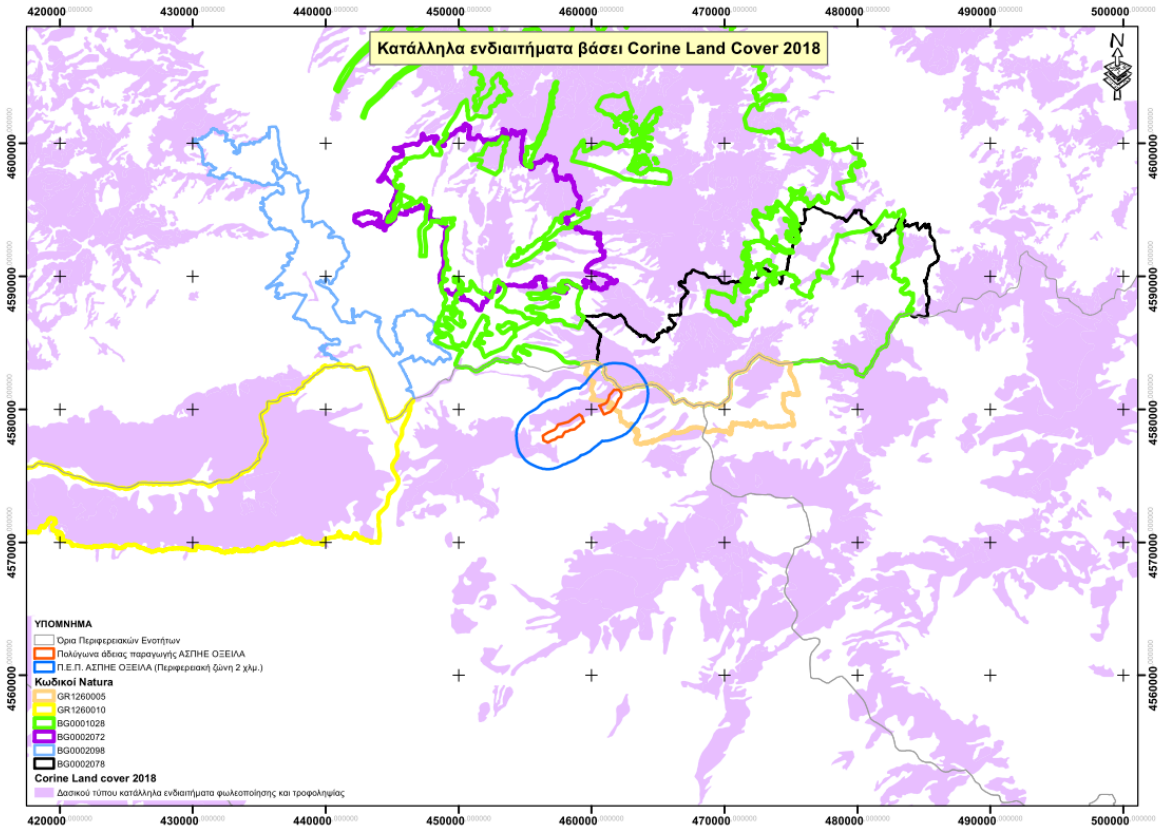
Map 77: Distribution map of *Haliaeetus albicilla* in the study area



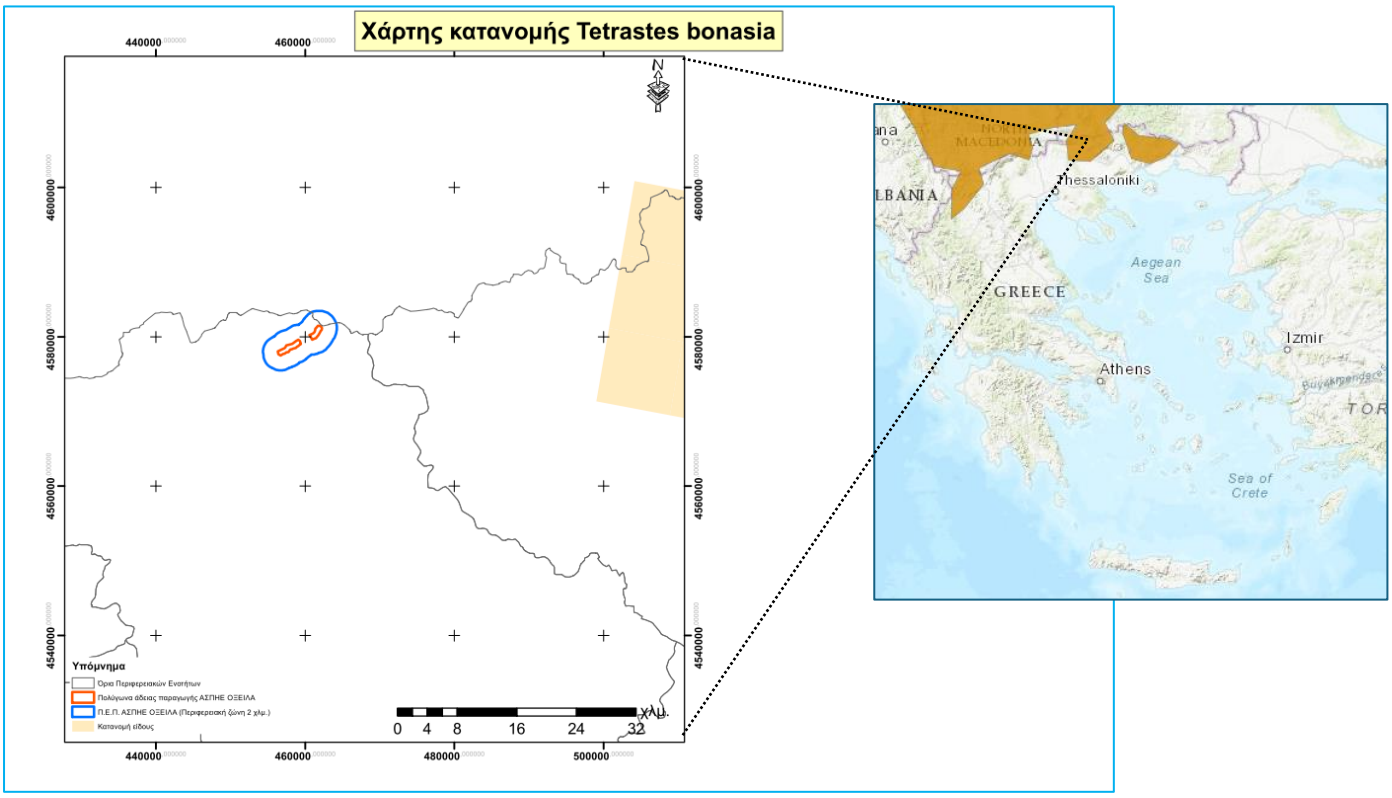
Map 78: Habitat map of *Haliaeetus albicilla* in the study area



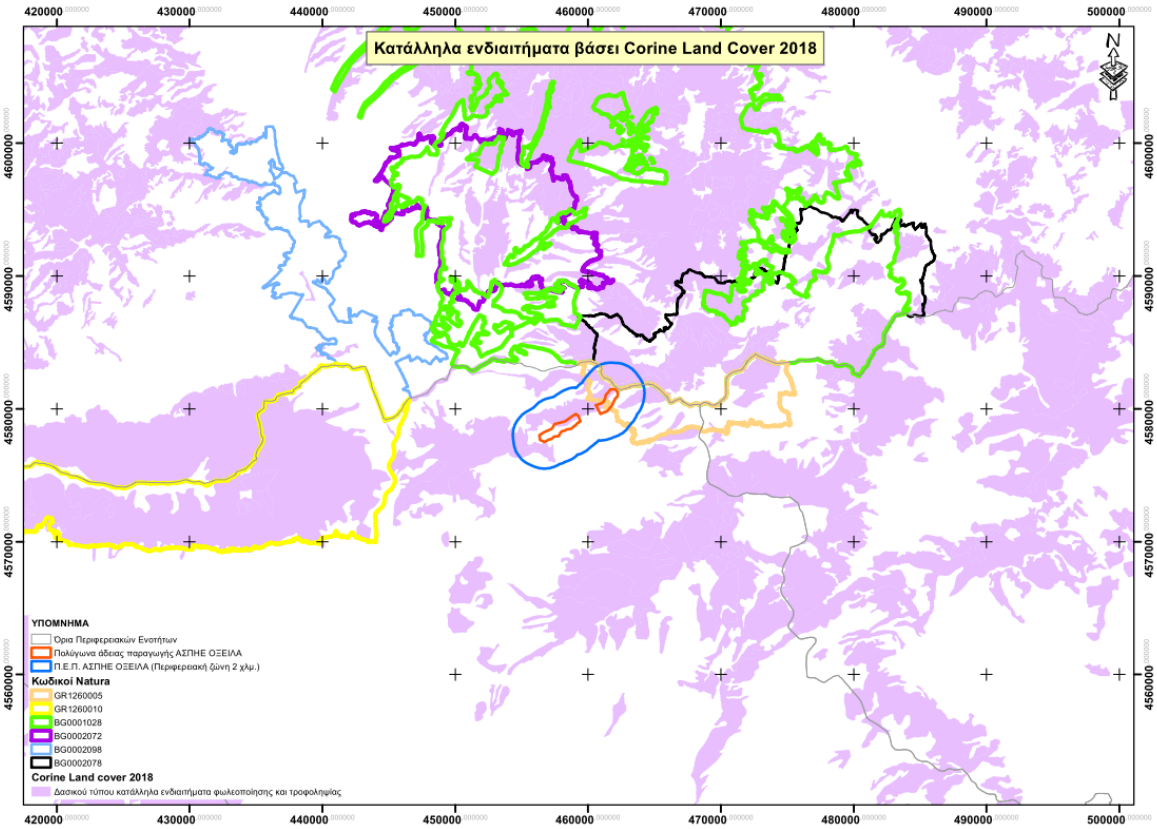
Map 79: Distribution map of *Tetrao urogallus* in the study area



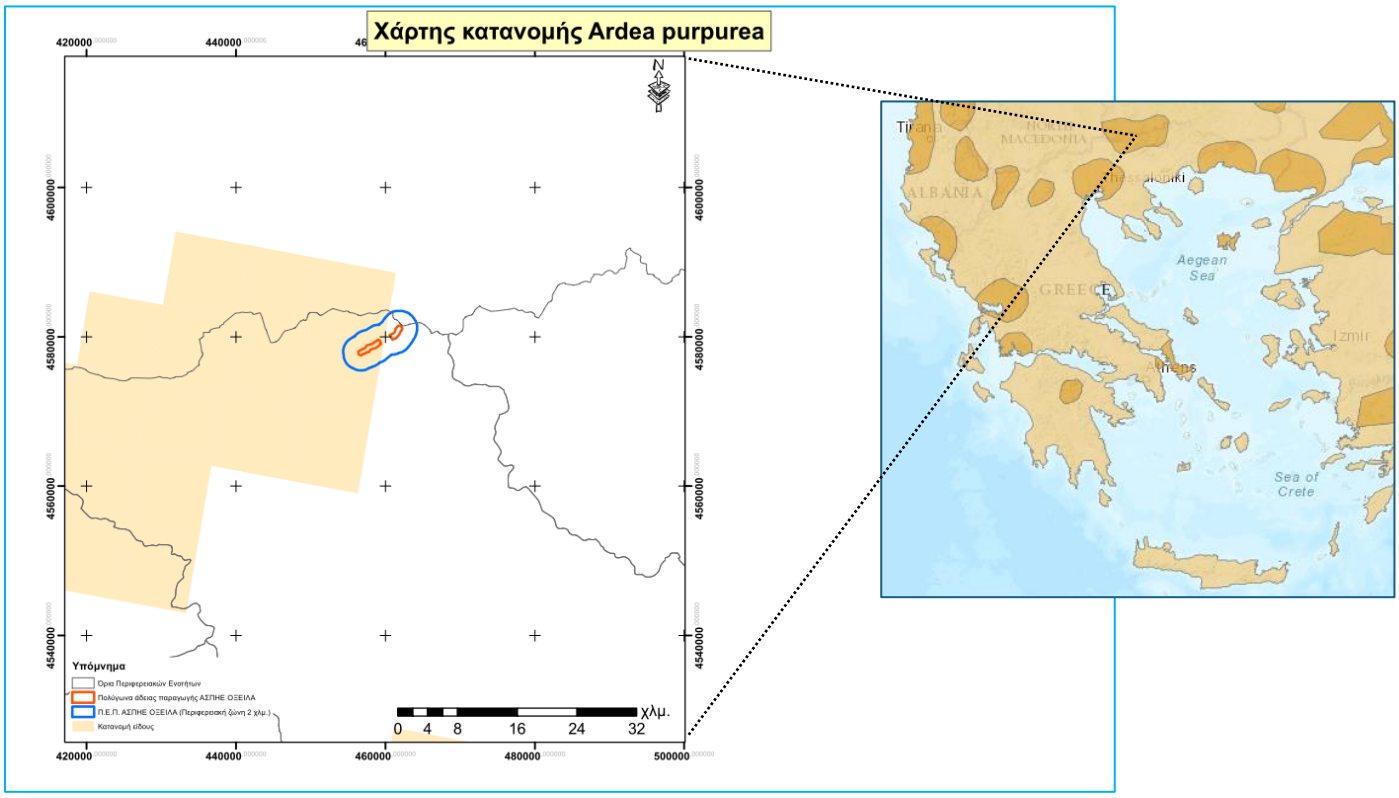
Map 80: Habitat map of *Tetrao urogallus* in the study area



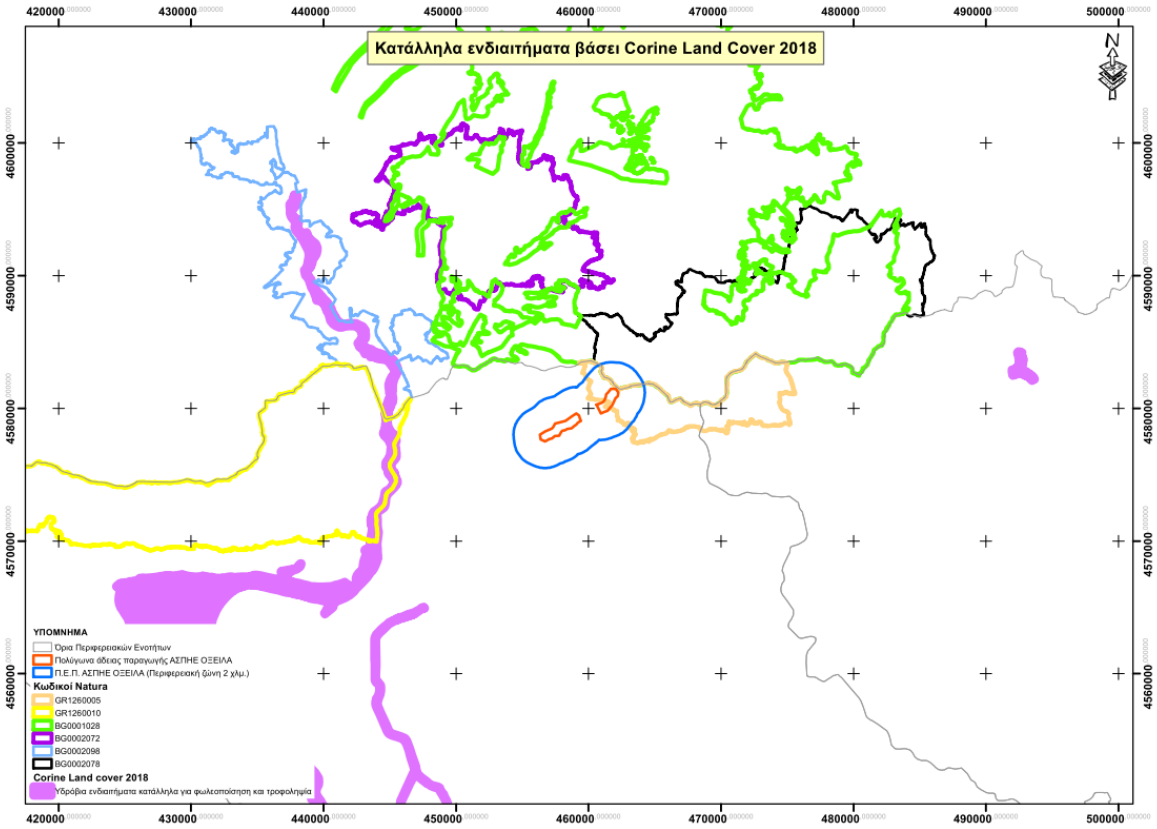
Map 81: Distribution map of *Tetrastes bonasia* in the study area



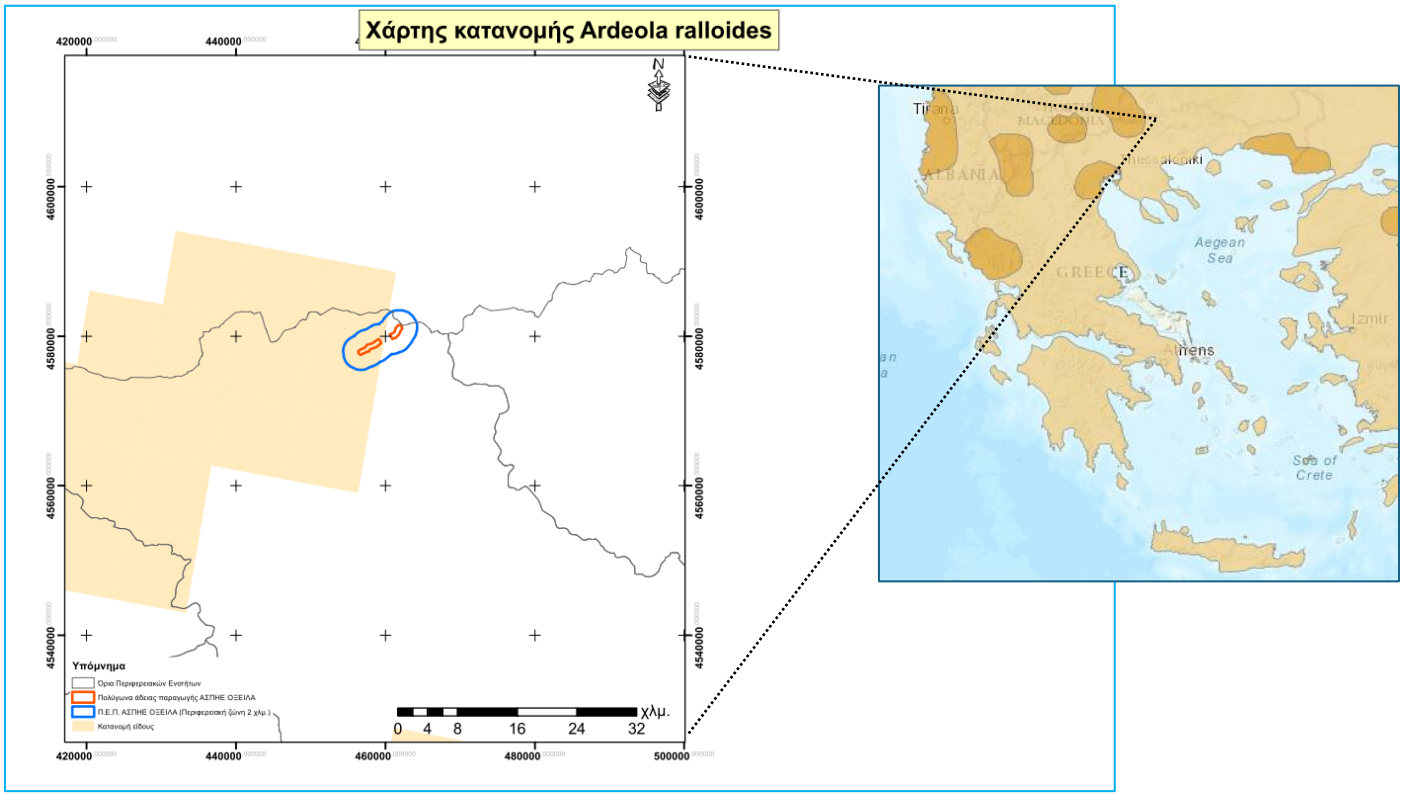
Map 82: Habitat map of *Tetrastes bonasia* in the study area



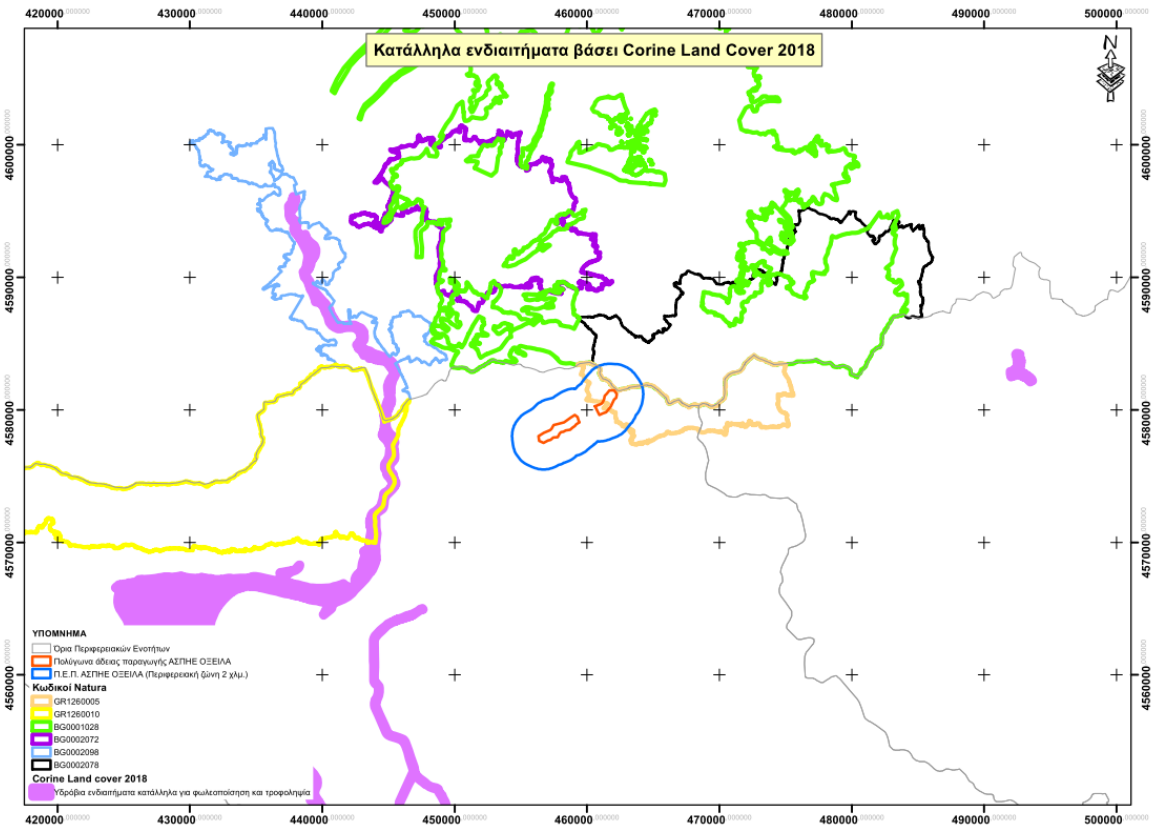
Map 83: Distribution map of *Ardea purpurea* in the study area



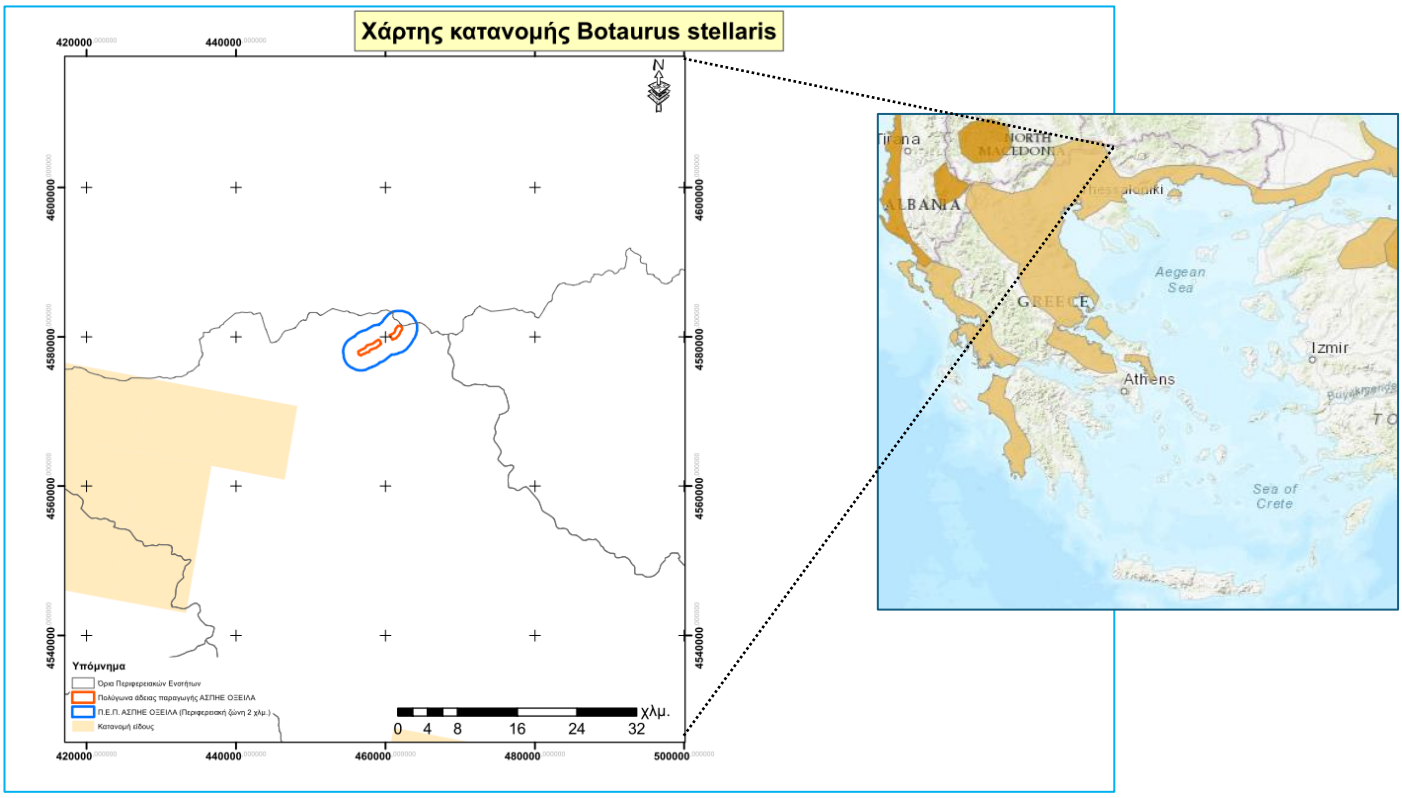
Map 84: Habitat map of *Ardea purpurea* in the study area



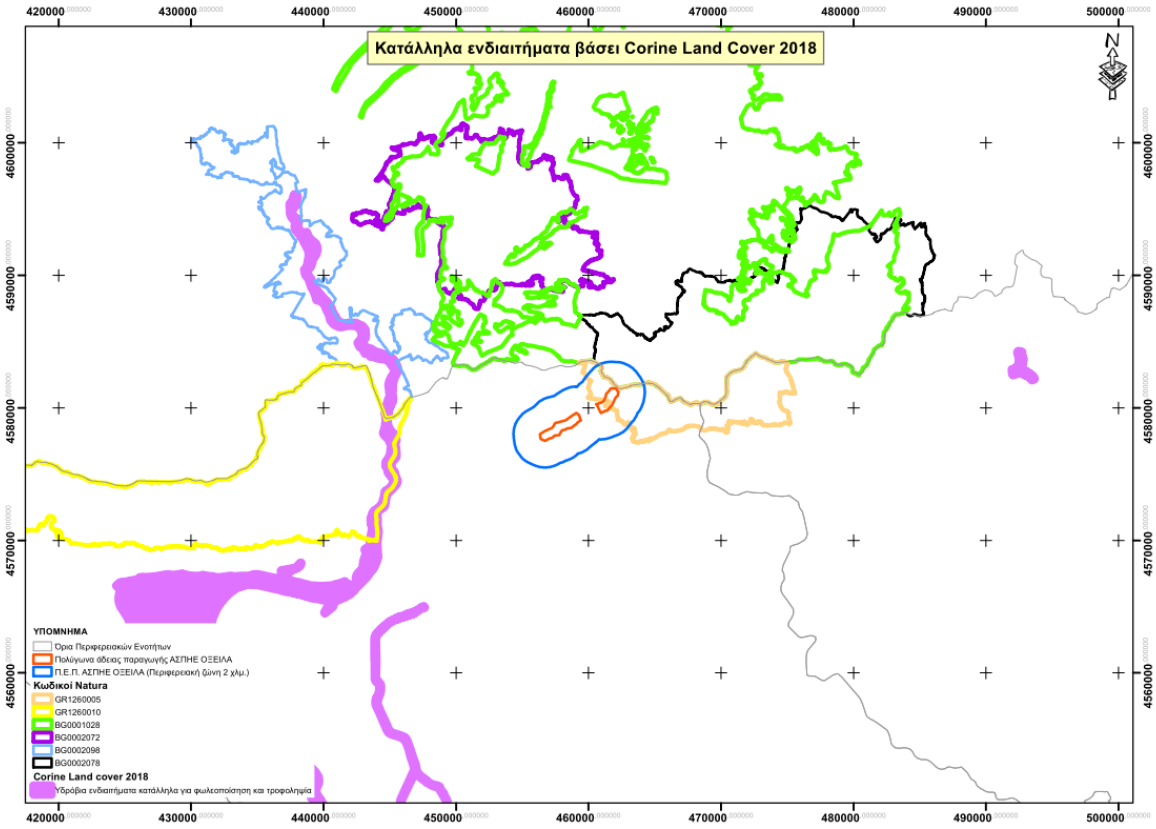
Map 85: Distribution map of *Ardeola ralloides* in the study area



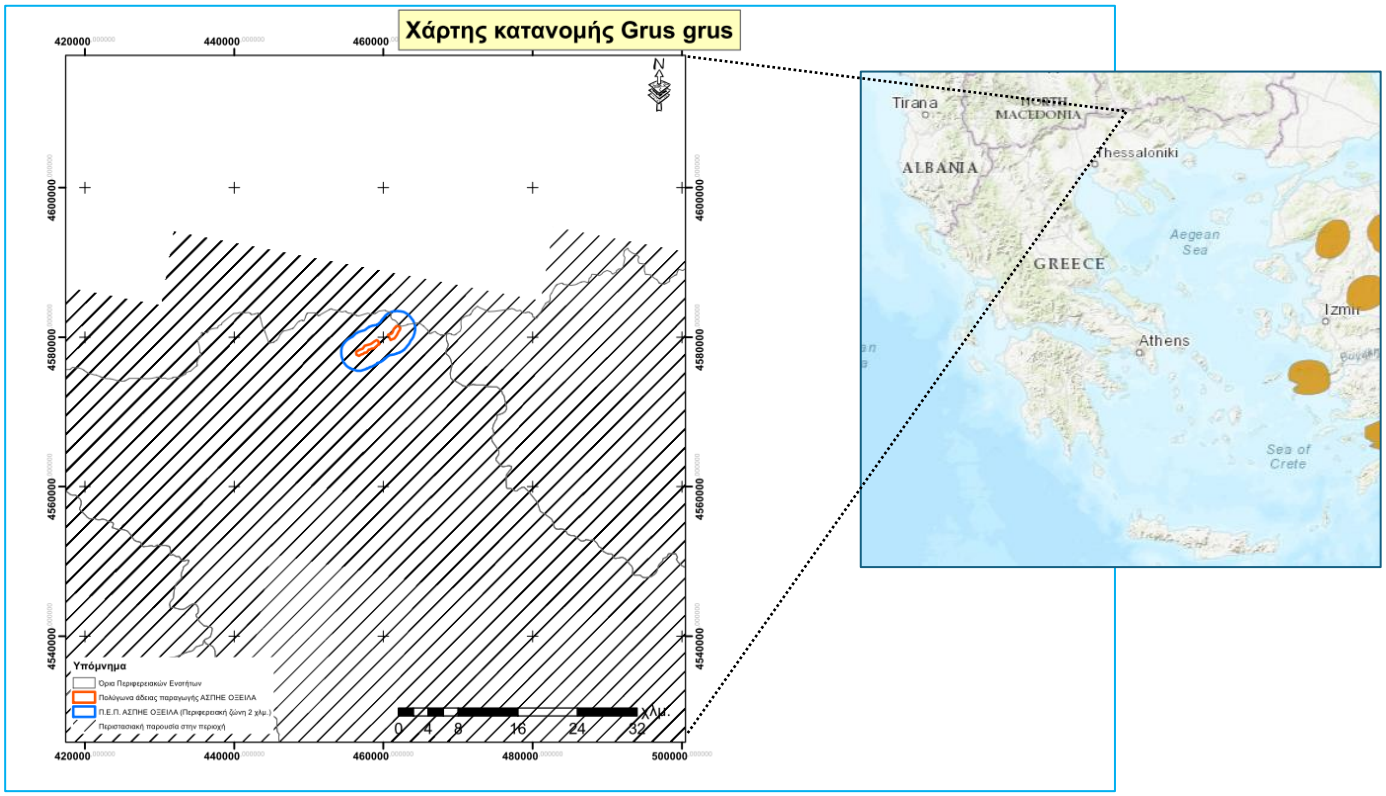
Map 86: Habitat map of *Ardeola ralloides* in the study area



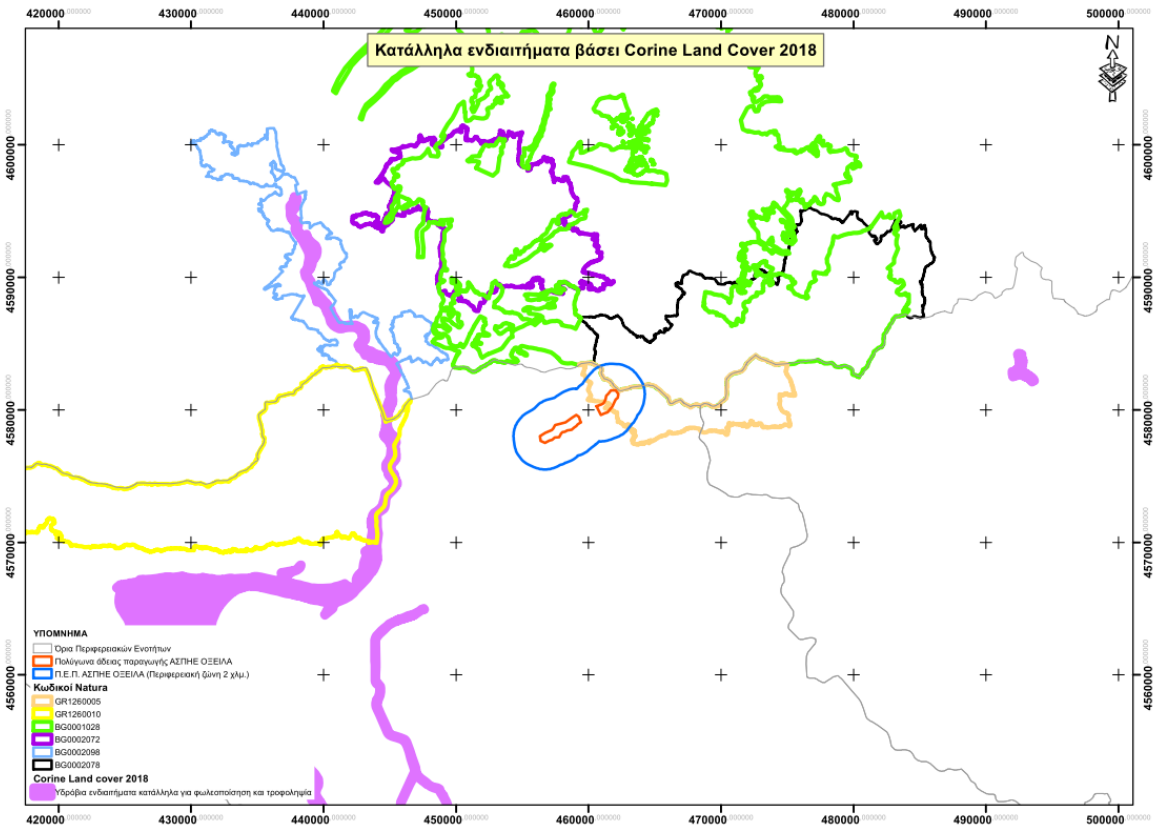
Map 87: Distribution map of *Botaurus stellaris* in the study area



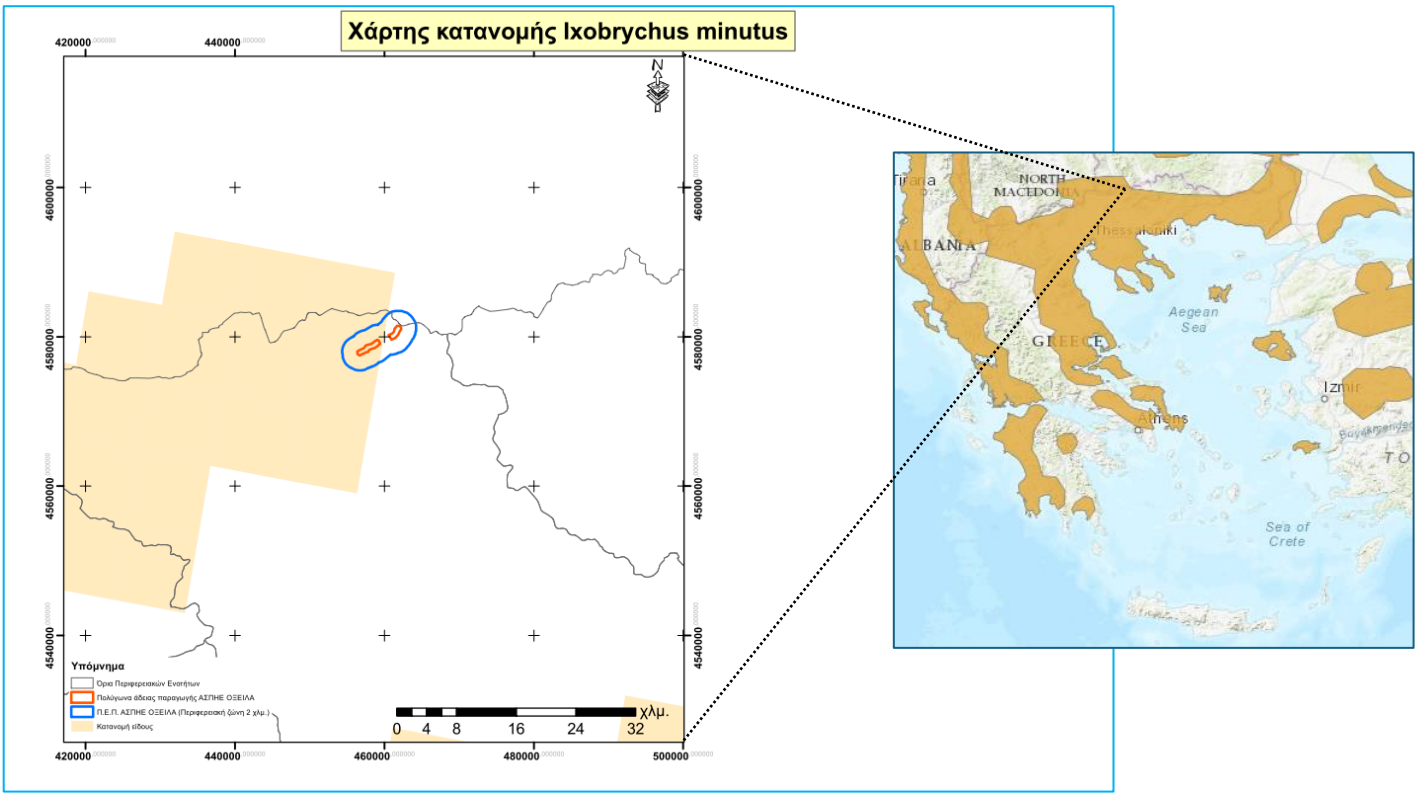
Map 88: Habitat map of *Botaurus stellaris* in the study area



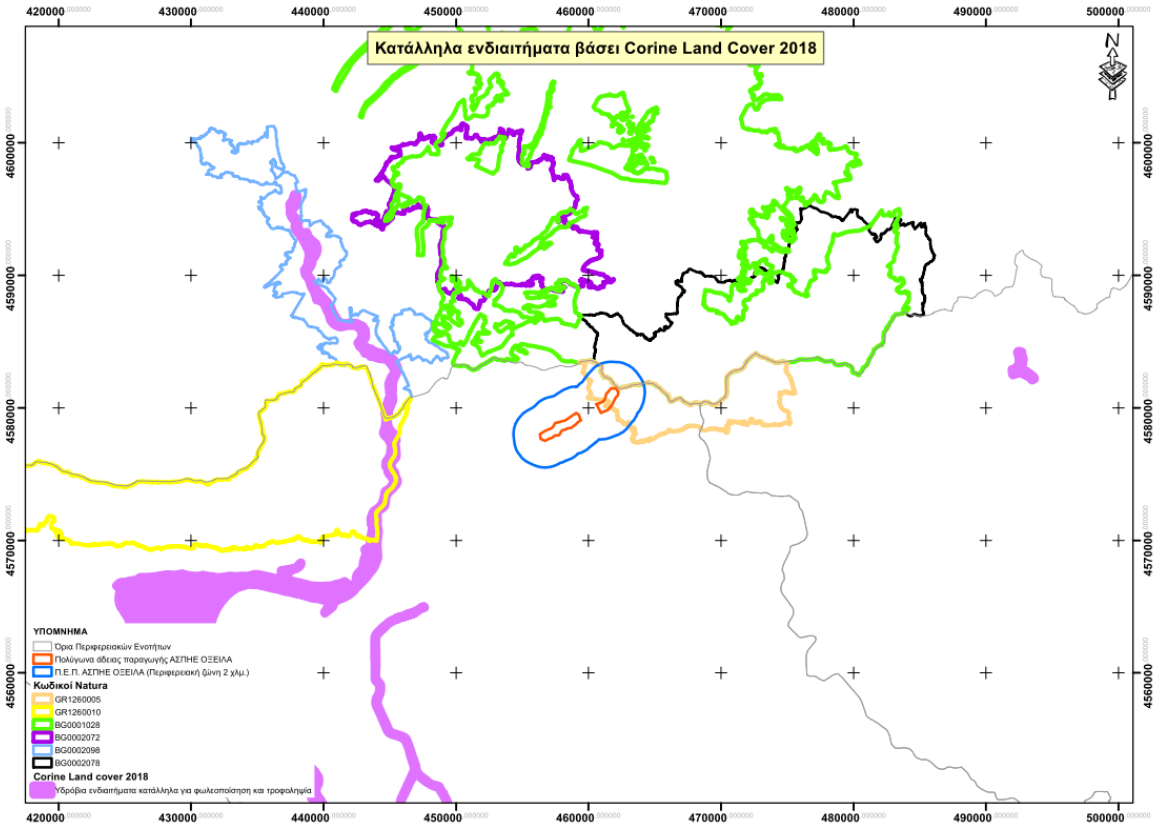
Map 89: Distribution map of *Grus grus* in the study area



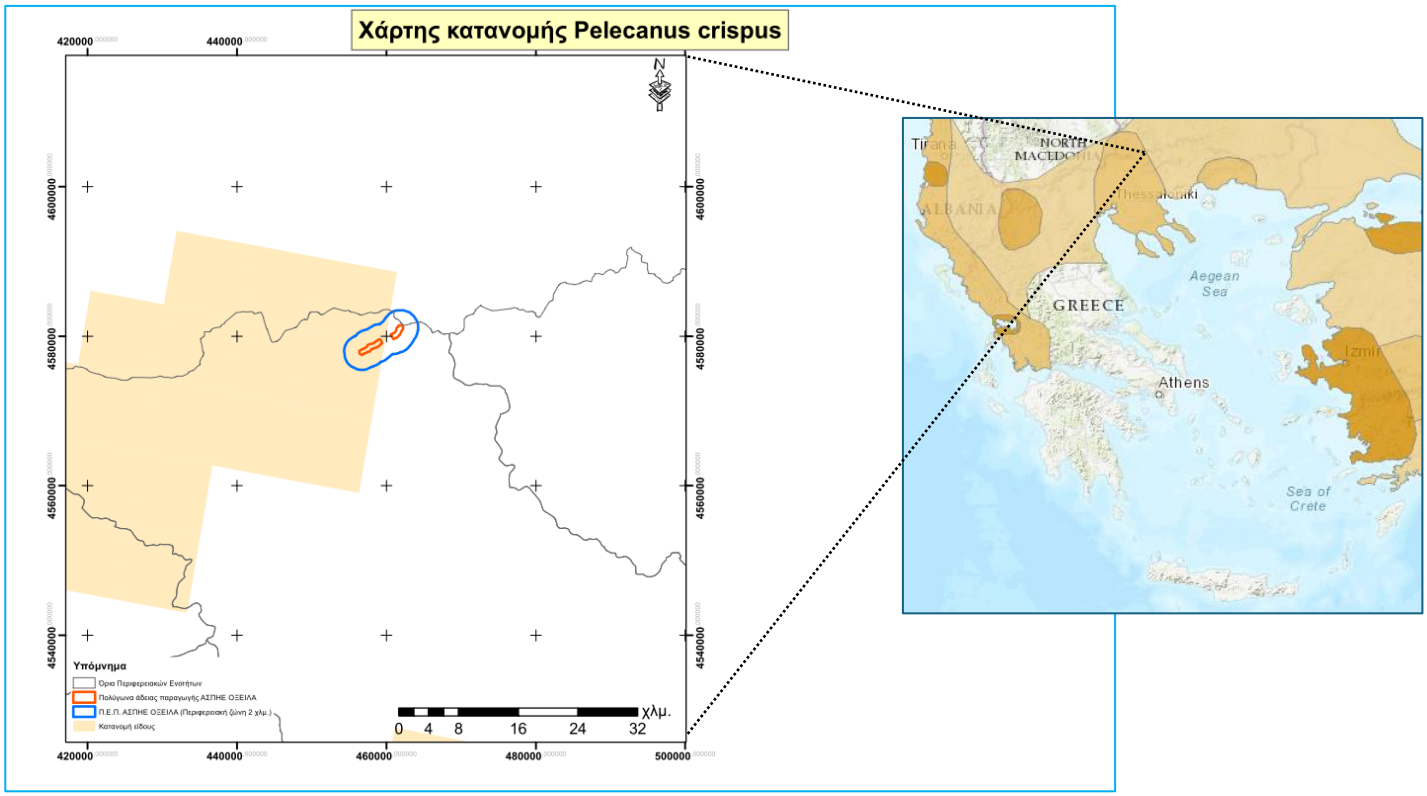
Map 90: Habitat map of *Grus grus* in the study area



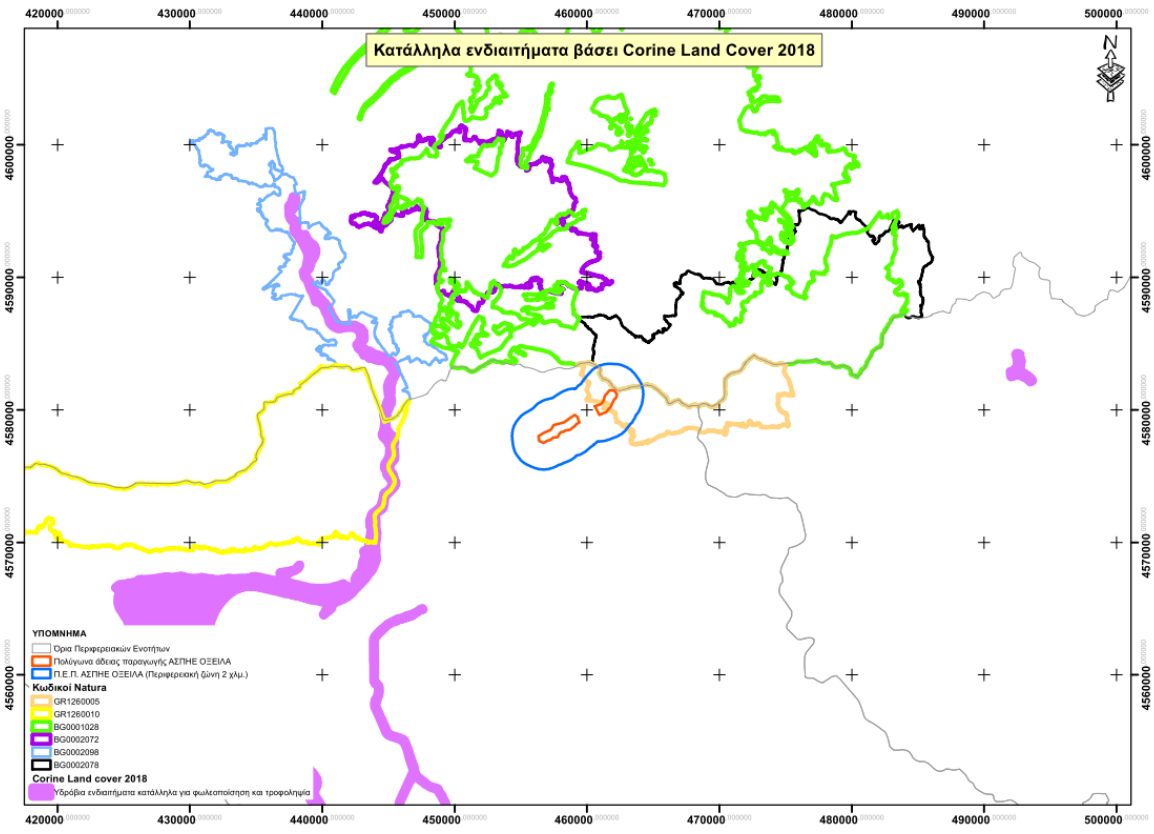
Map 91: Distribution map of *Ixobrychus minutus* in the study area



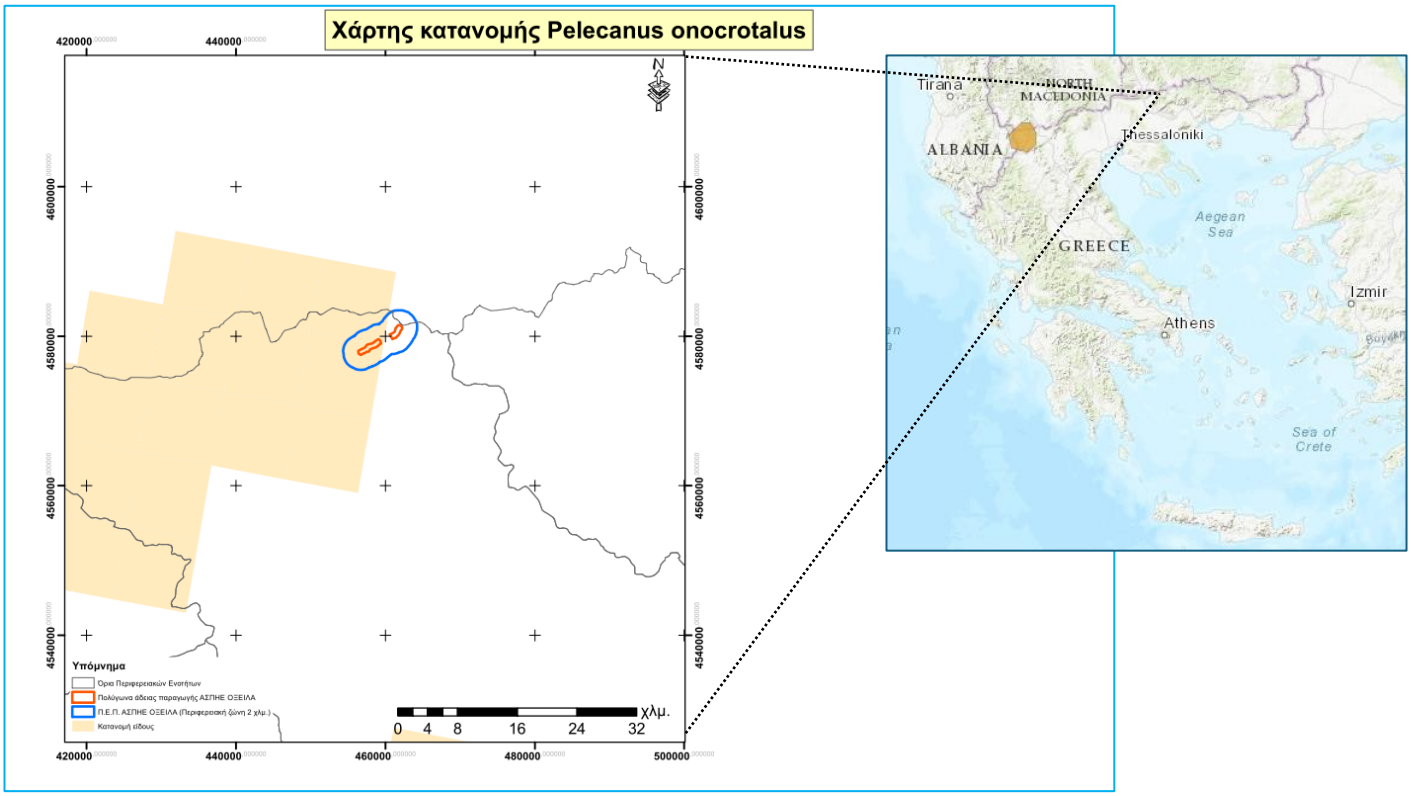
Map 92: Habitat map of *Ixobrychus minutus* in the study area



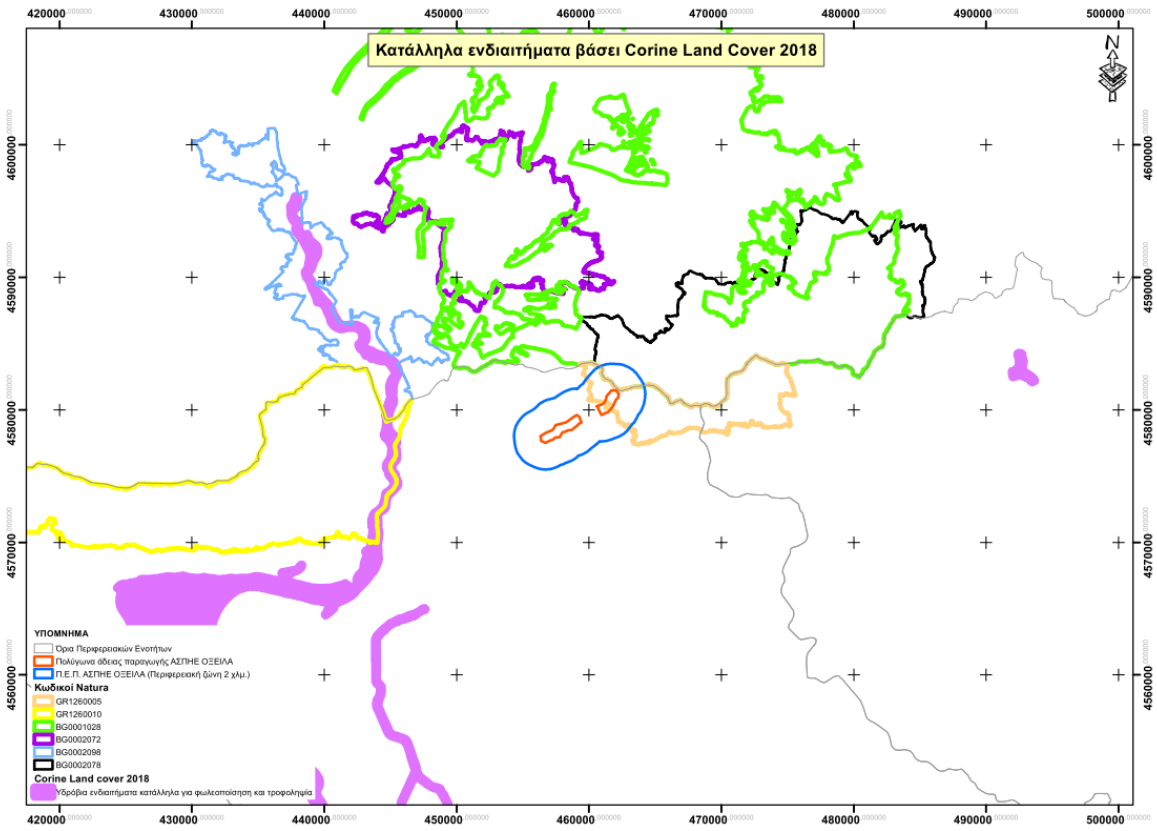
Map 93: Distribution map of *Pelecanus crispus* in the study area



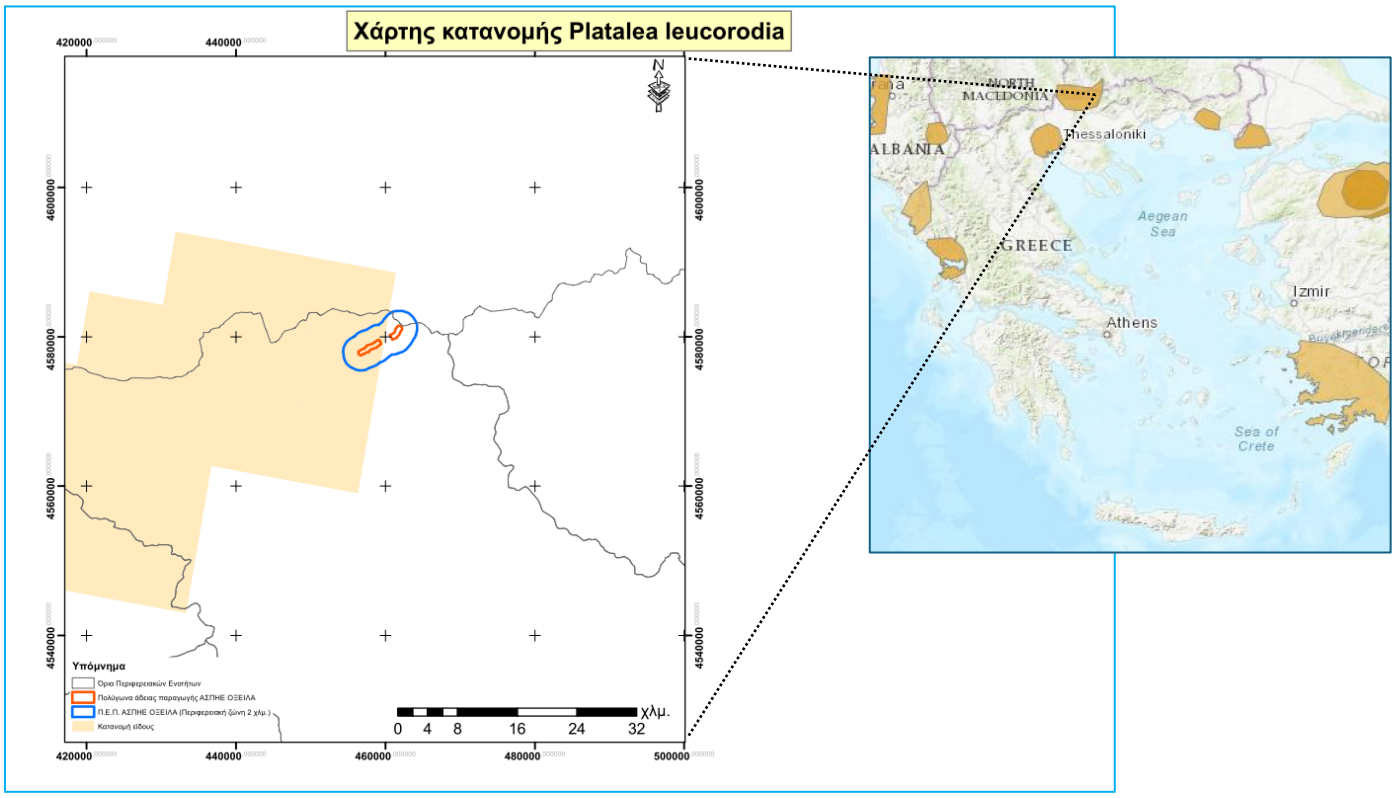
Map 94: Habitat map of *Pelecanus crispus* in the study area



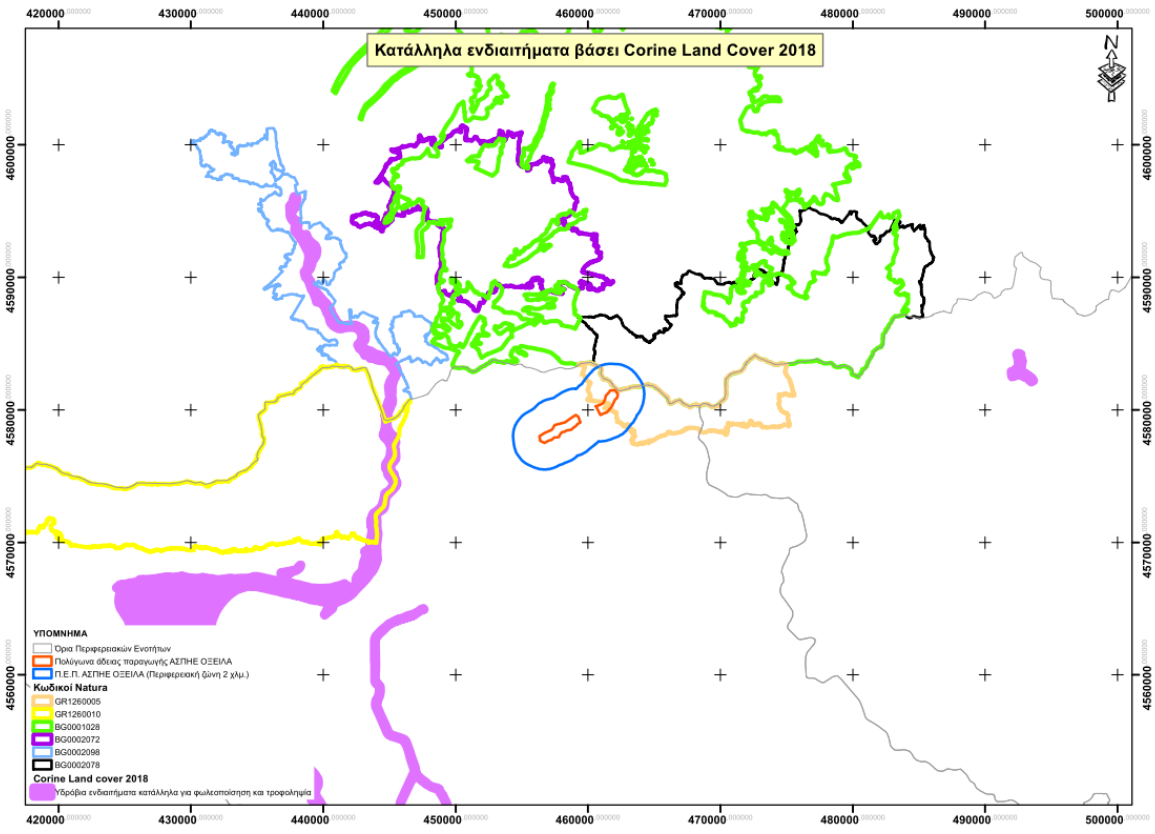
Map 95: Distribution map of *Pelecanus onocrotalus* in the study area



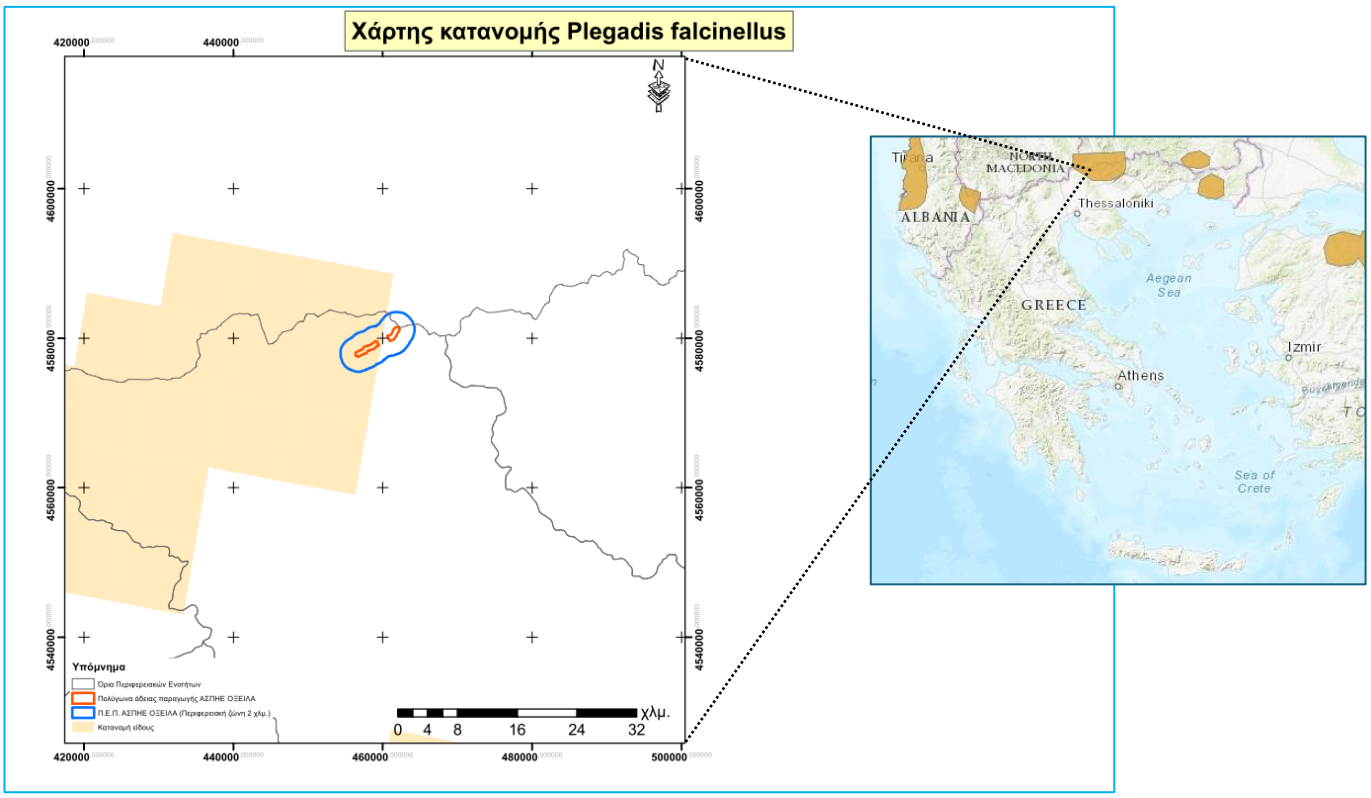
Map 96: Habitat map of *Pelecanus onocrotalus* in the study area



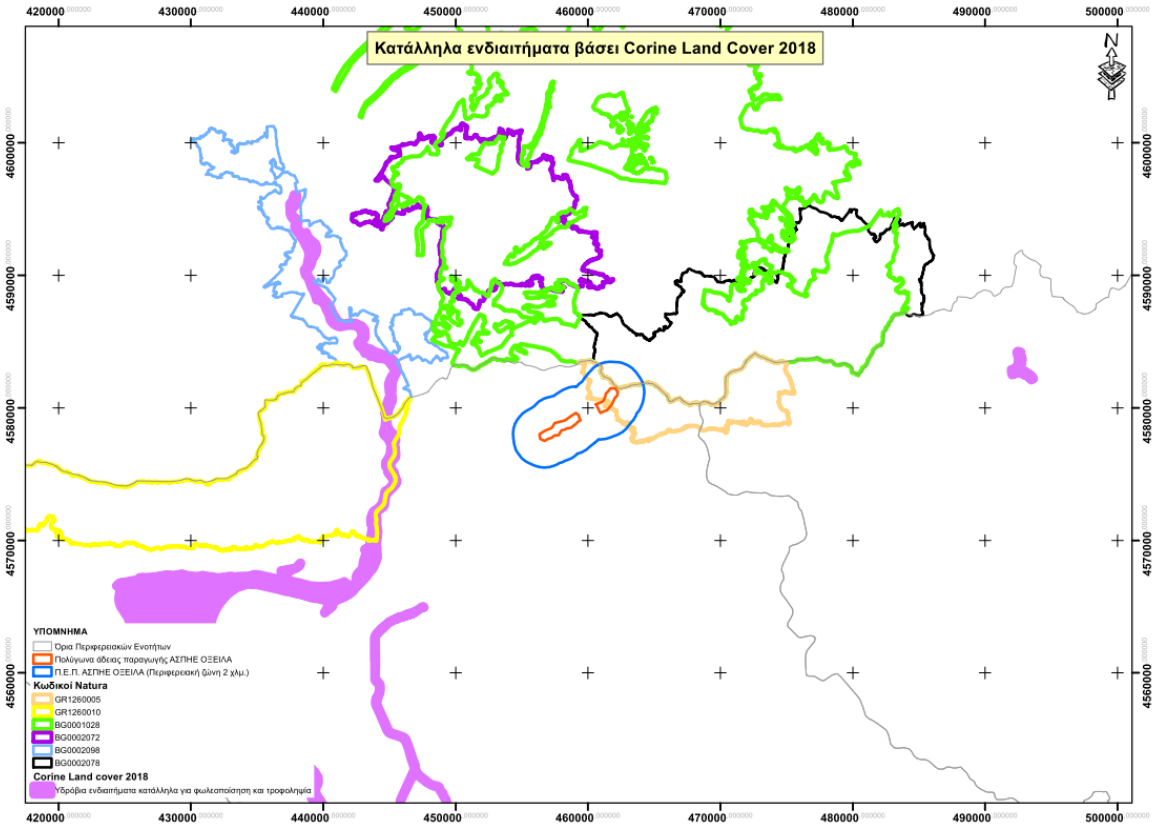
Map 97: Distribution map of *Platalea leucorodia* in the study area



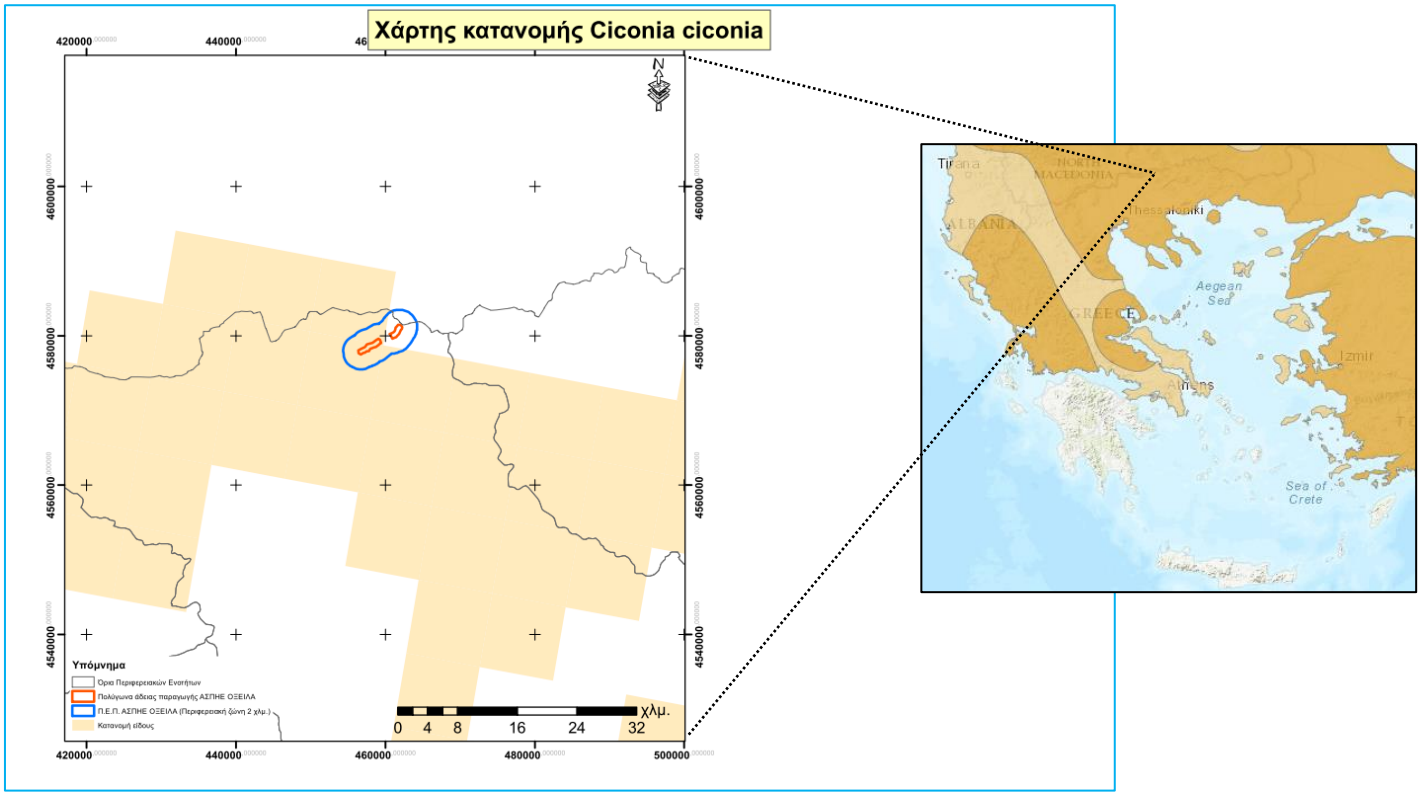
Map 98: Habitat map of *Platalea leucorodia* in the study area



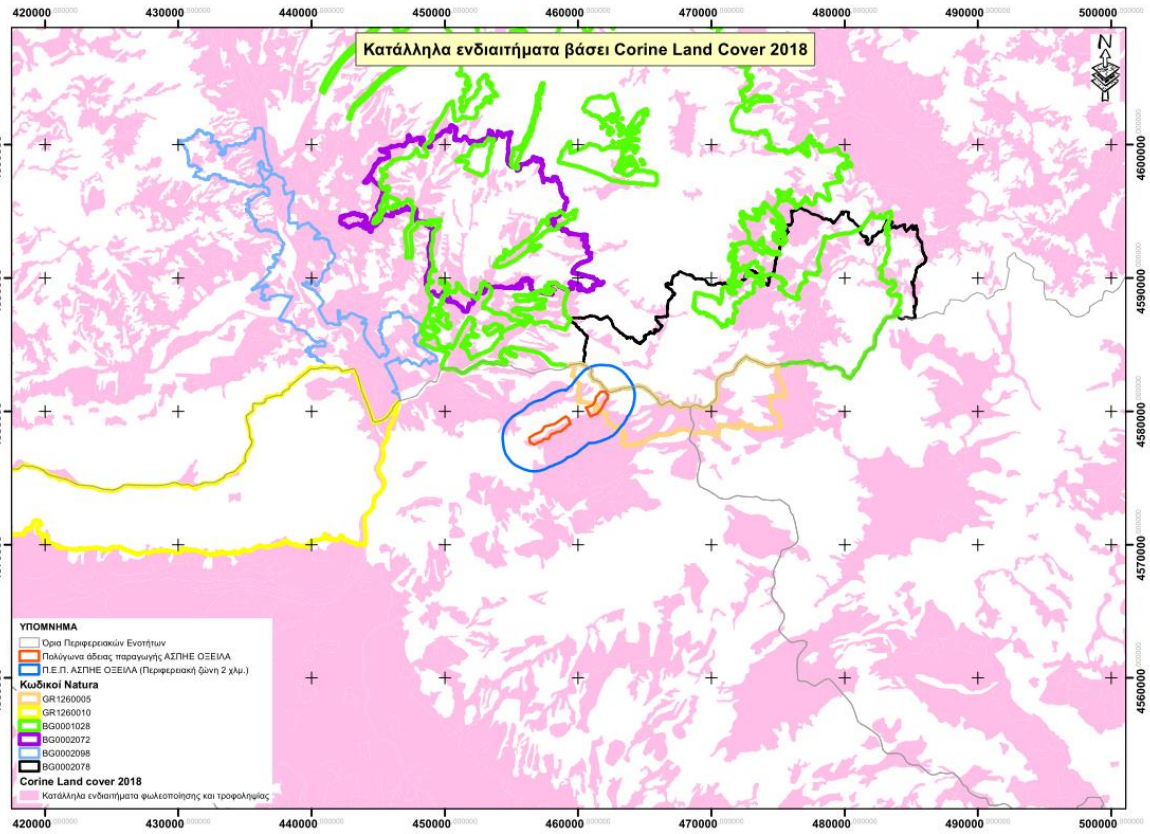
Map 99: Distribution map of *Plegadis falcinellus* in the study area



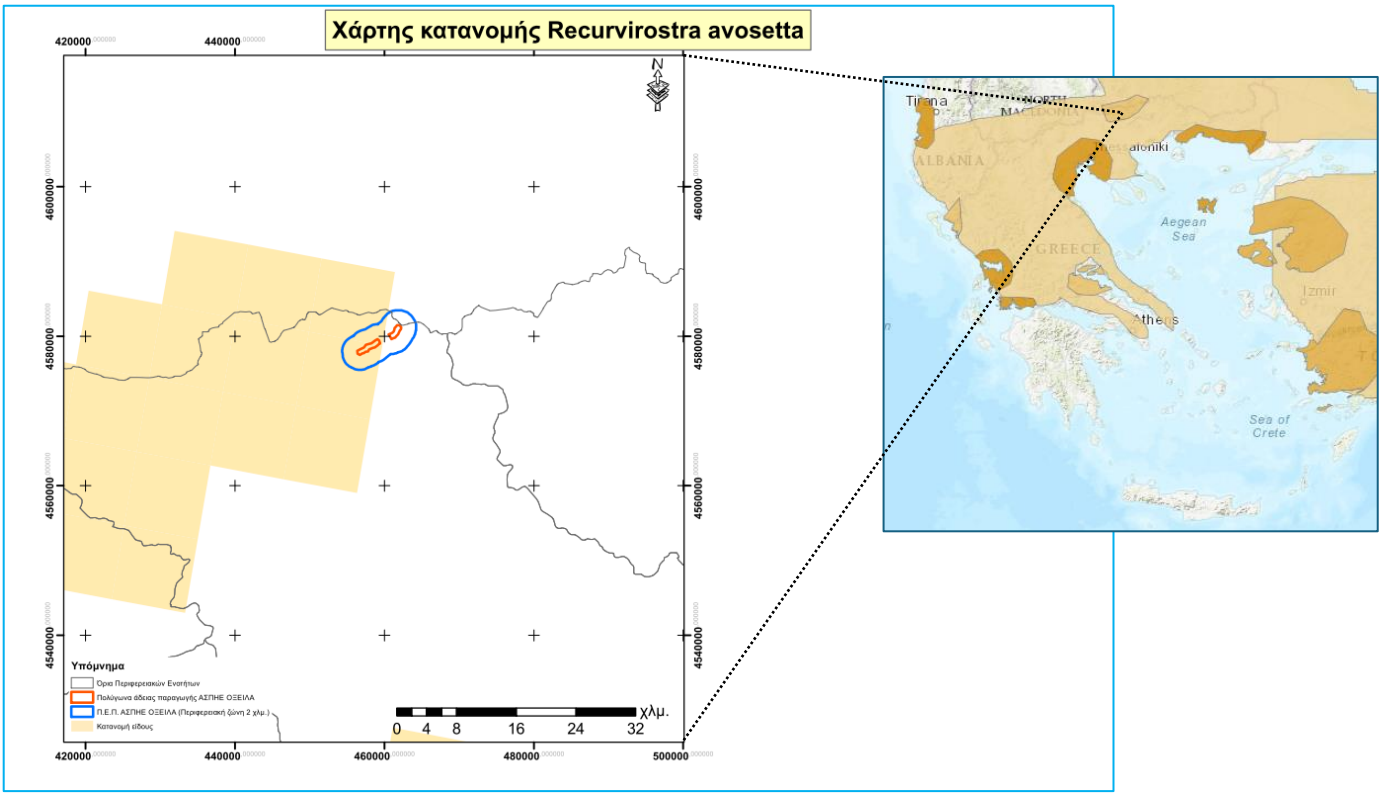
Map 100: Map of suitable habitat for *Plegadis falcinellus* in the study area



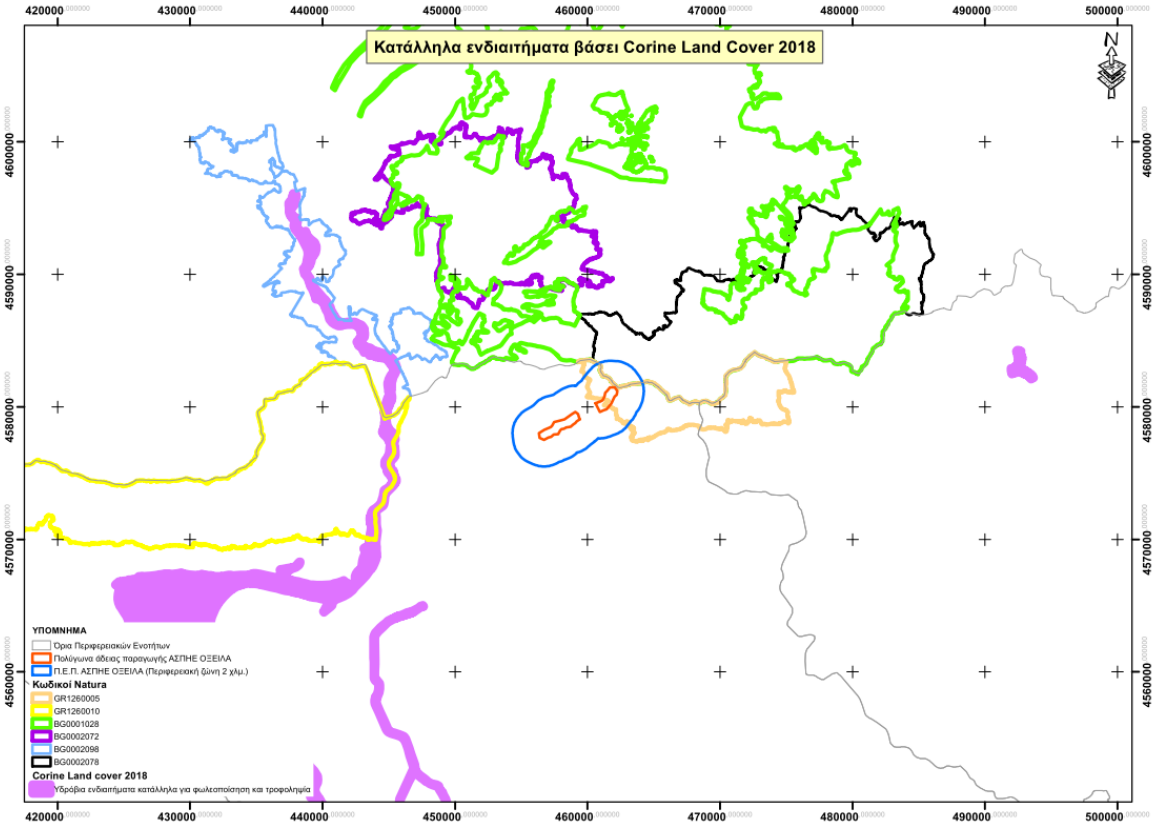
Map 101: Distribution map of *Ciconia ciconia* in the study area



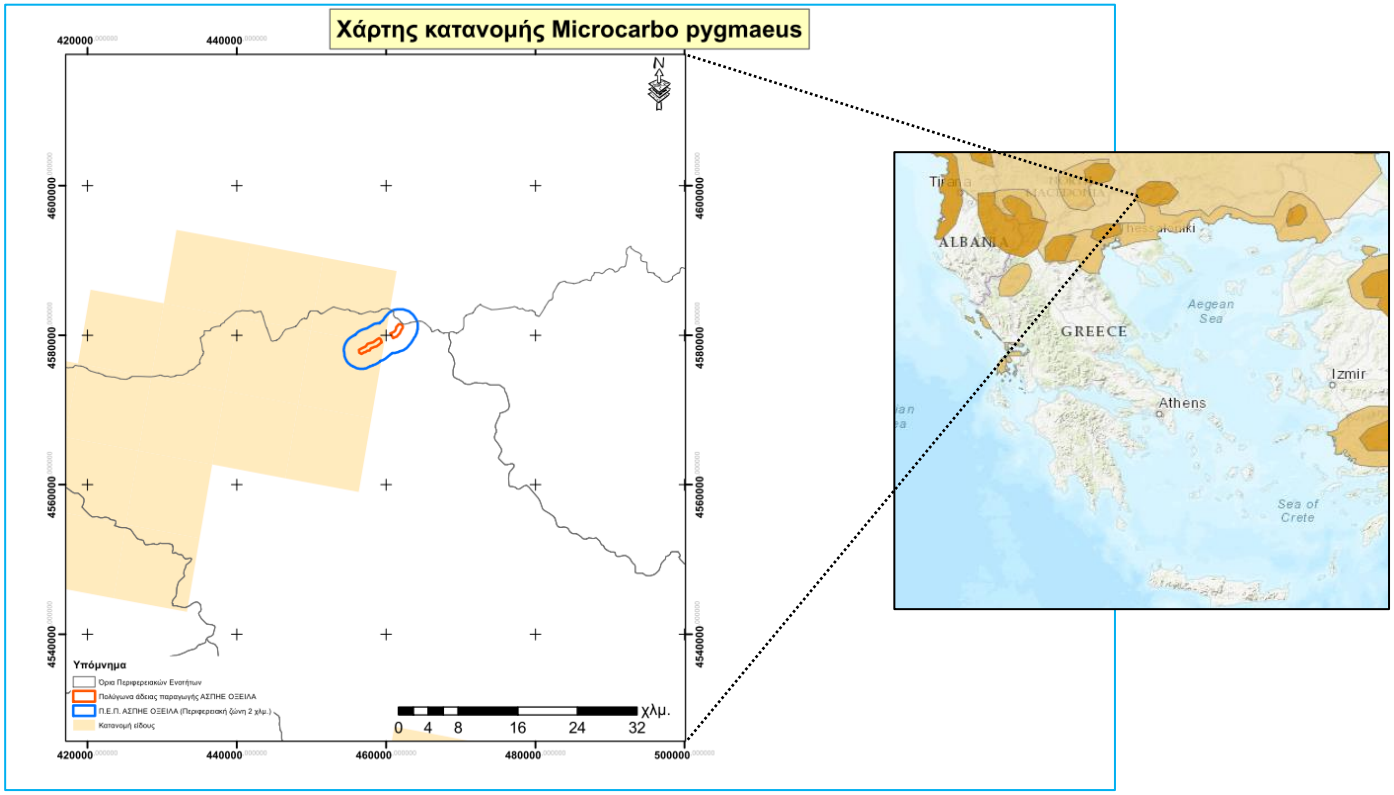
Map 102: Map of suitable *Ciconia Ciconia* habitat in the study area



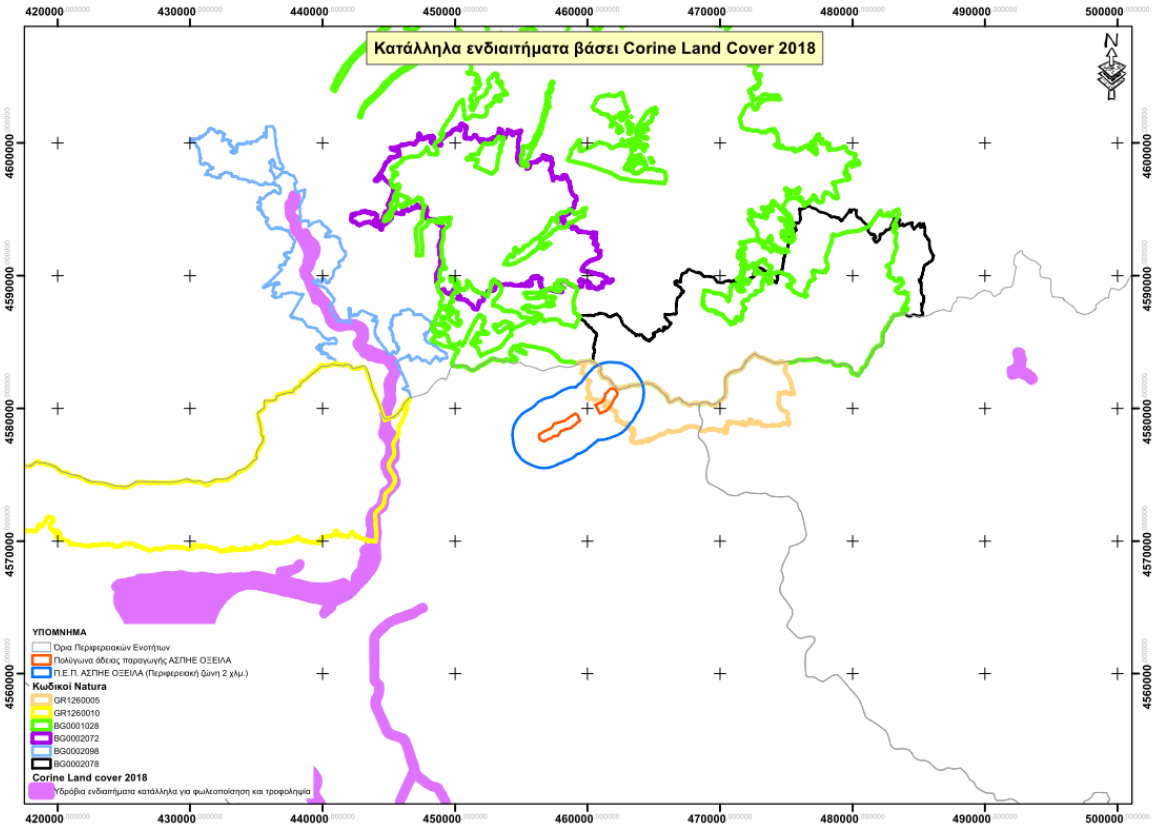
Map 103: Distribution map of *Recurvirostra avosetta* in the study area



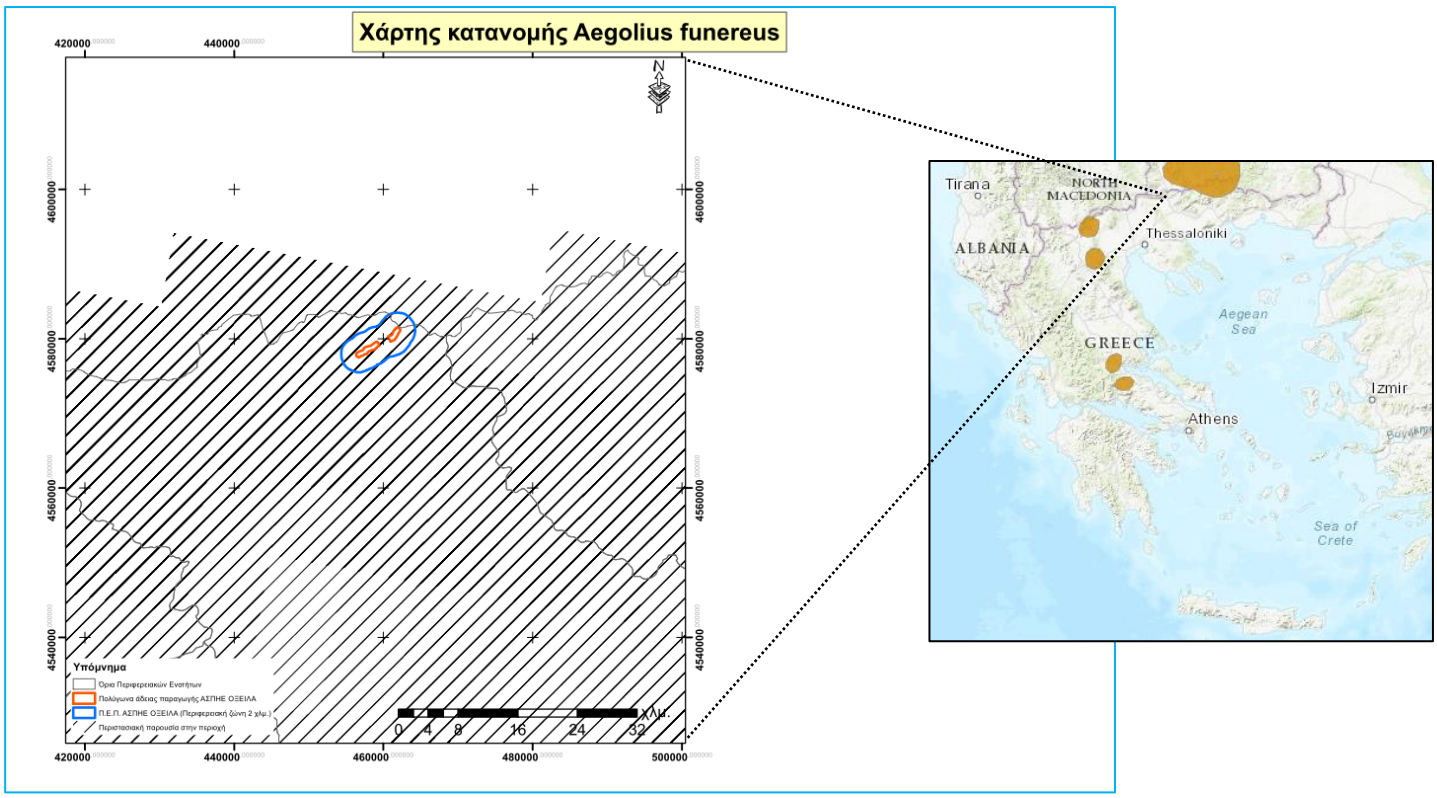
Map 104: Map of suitable habitat for *Recurvirostra avosetta* in the study area



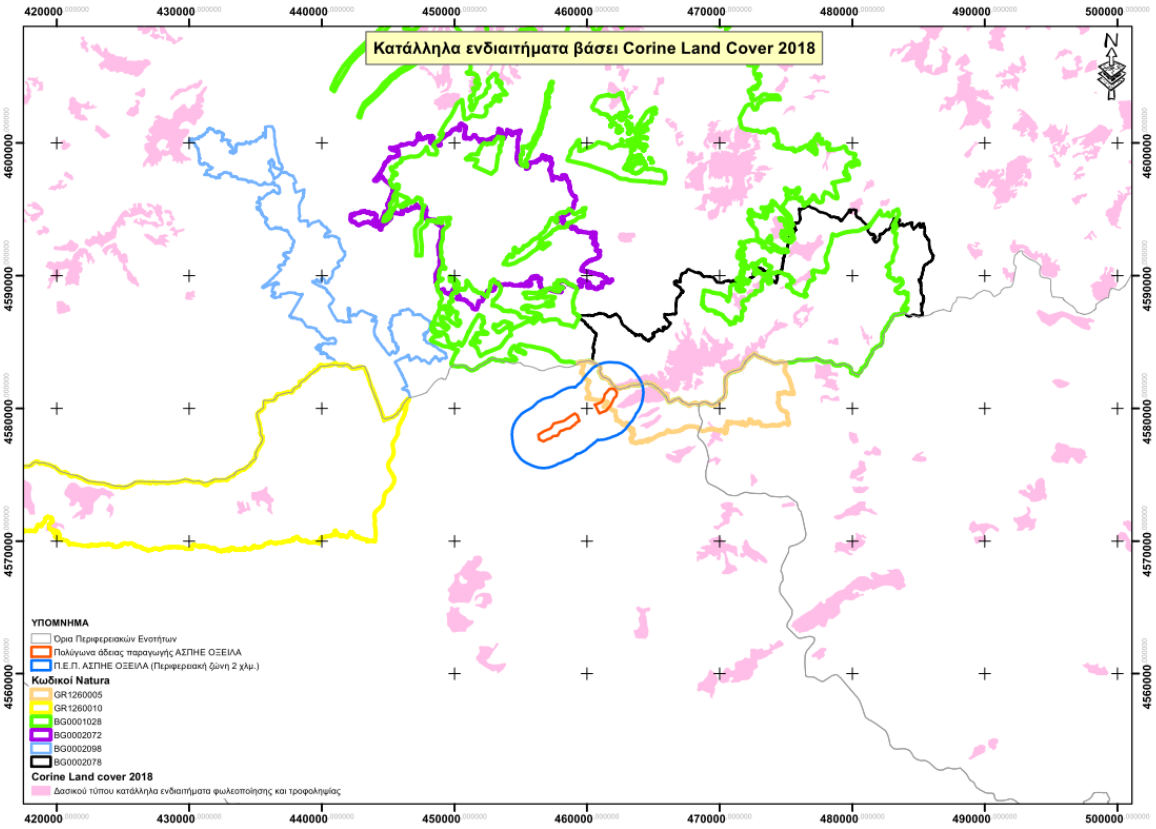
Map 105: Distribution map of *Microcarbo pygmaeus* in the study area



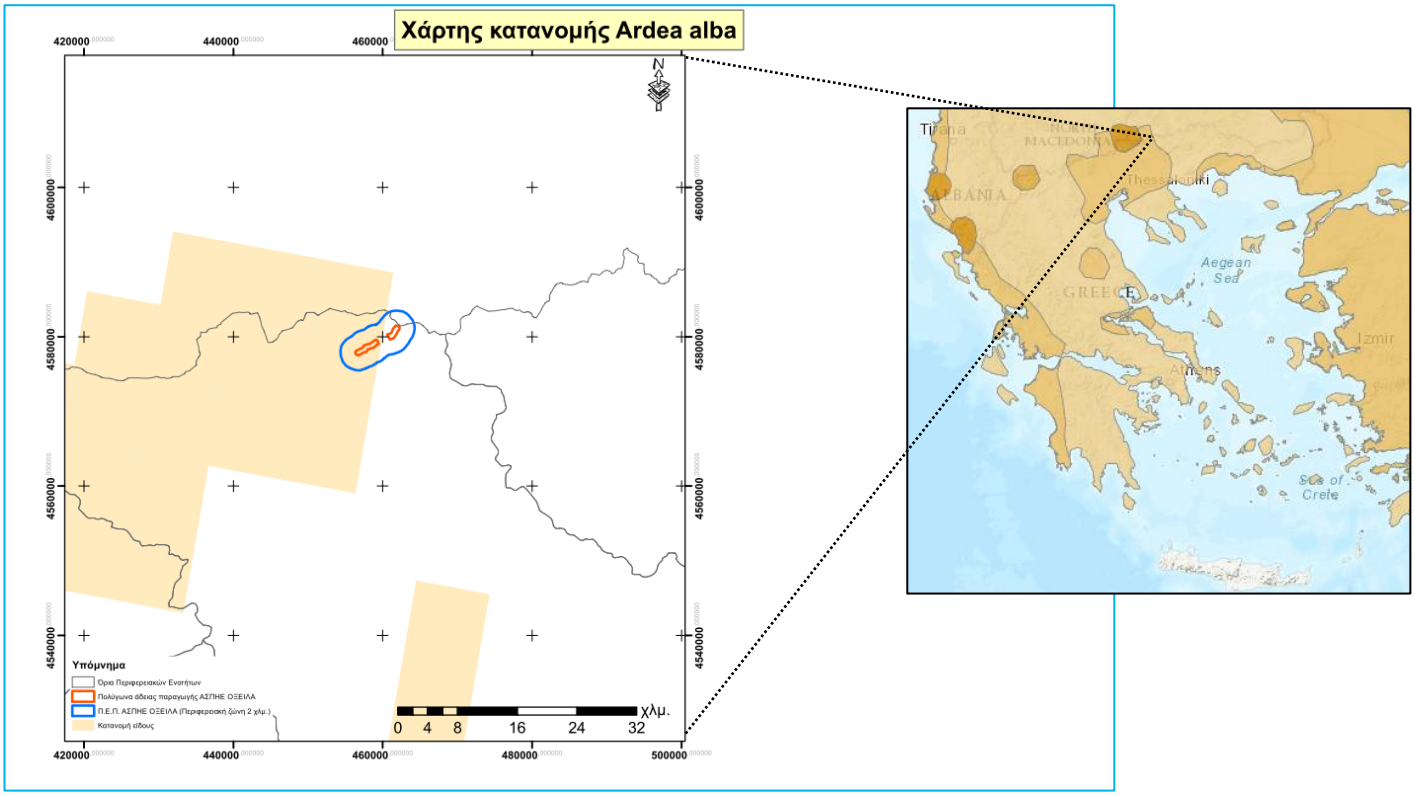
Map 106: Map of suitable habitat for *Microcarbo pygmaeus* in the study area



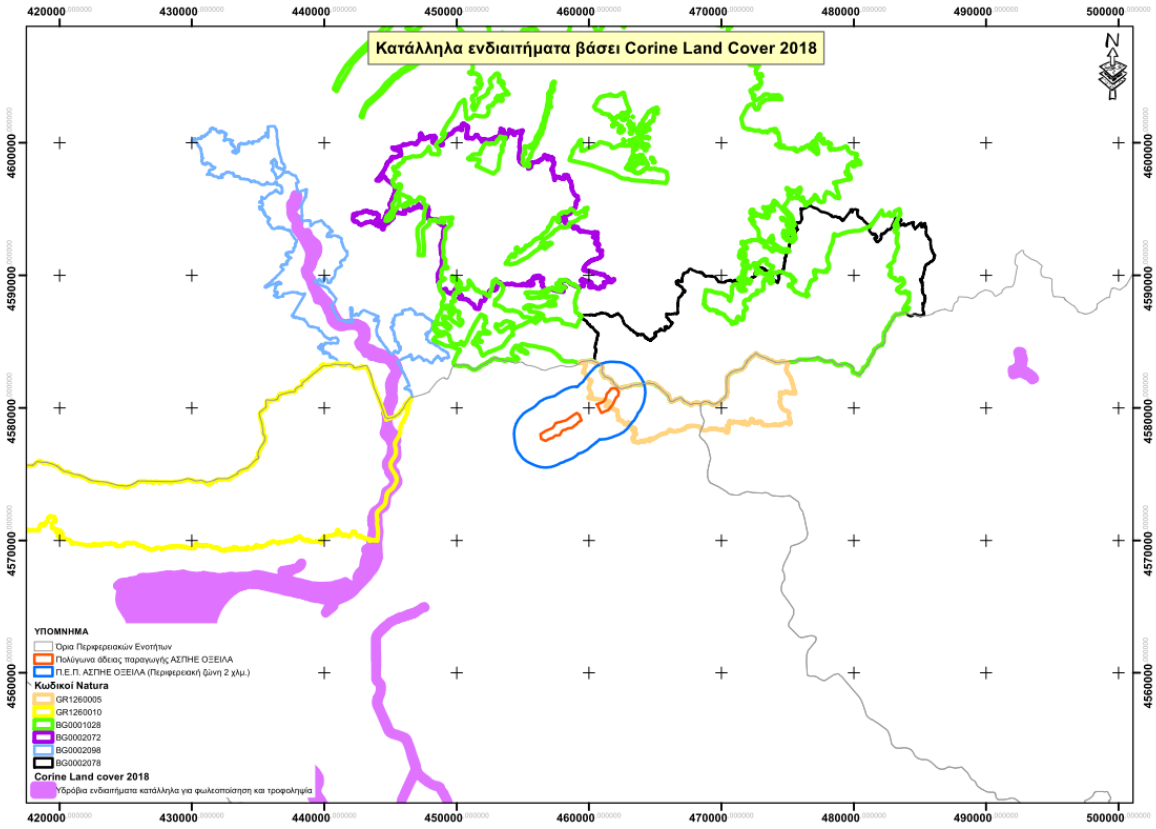
Map 107: Distribution map of *Aegolius funereus* in the study area



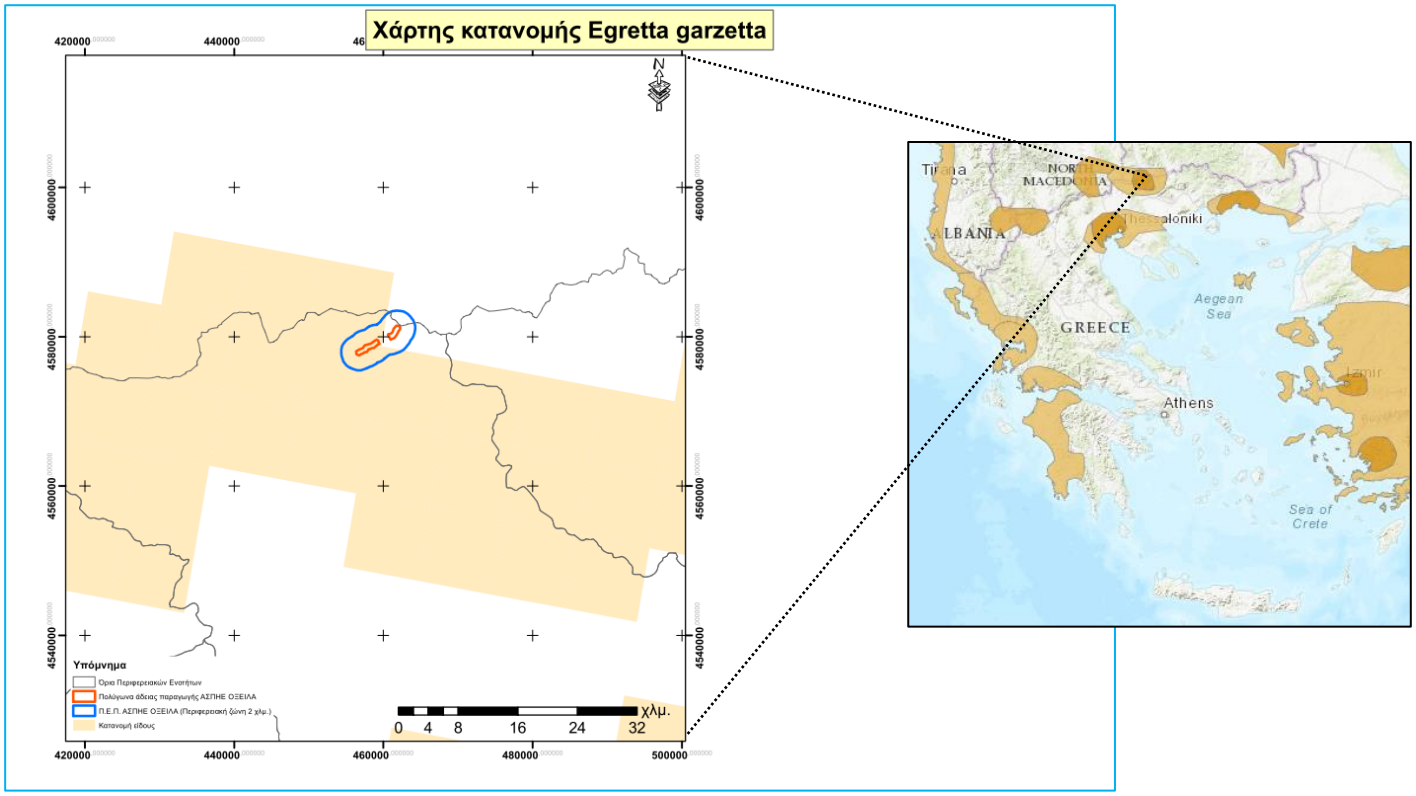
Map 108: Map of suitable habitat for *Aegolius funereus* in the study area



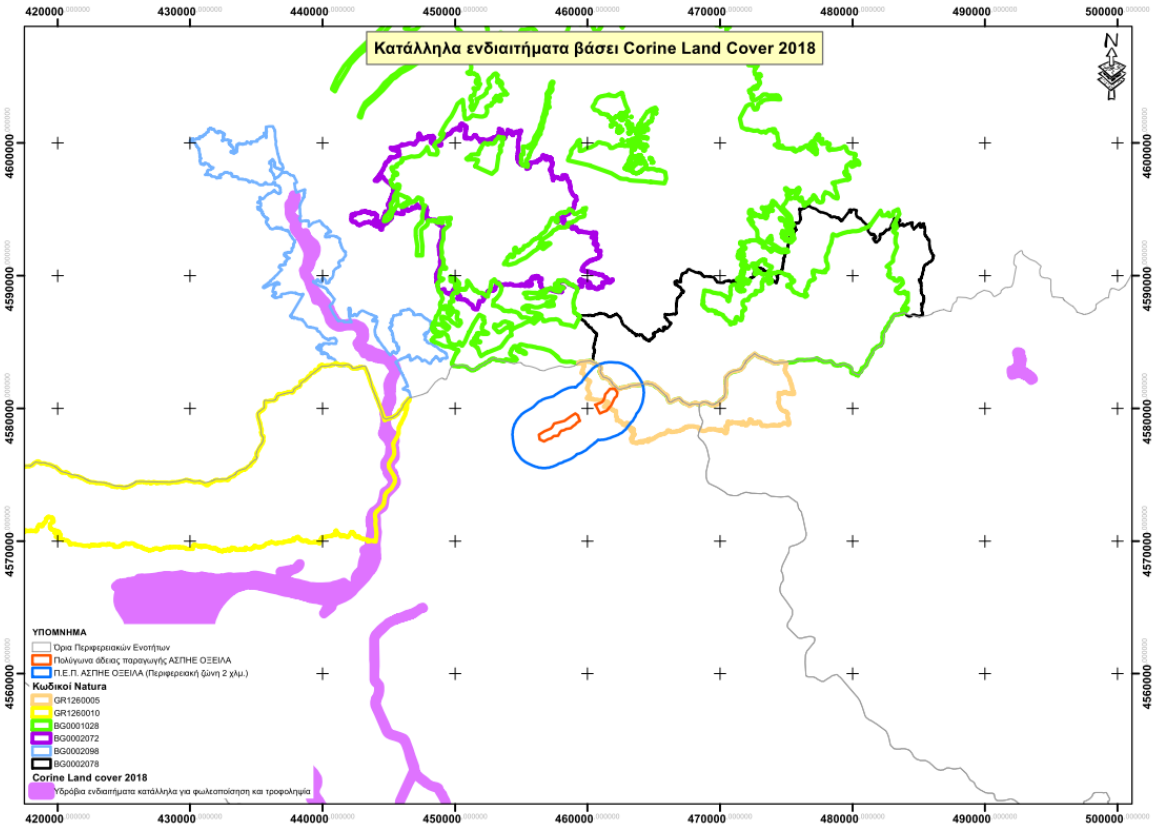
Map 109: Map of the distribution of *Ardea alba* in the study area



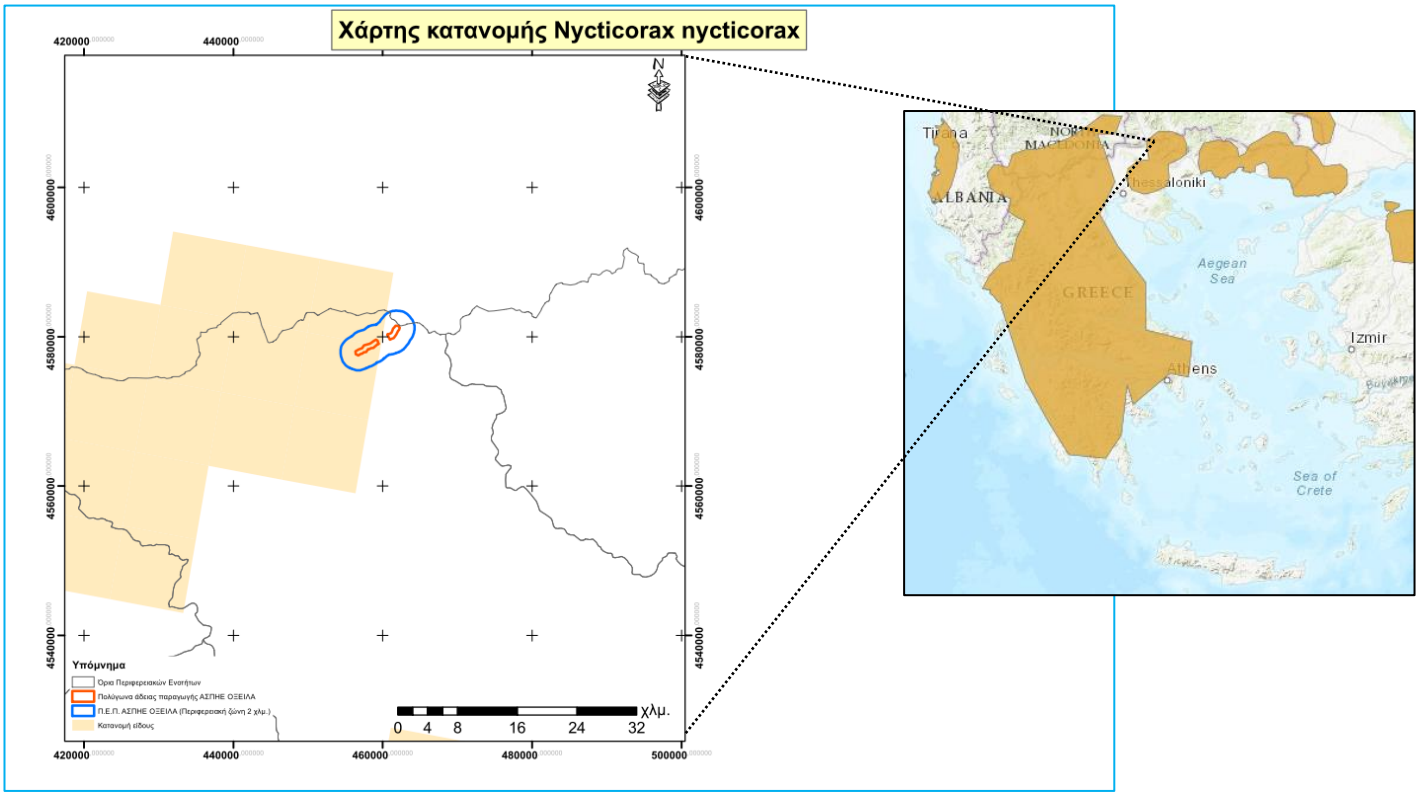
Map 110: Map of suitable habitat for *Ardea alba* in the study area



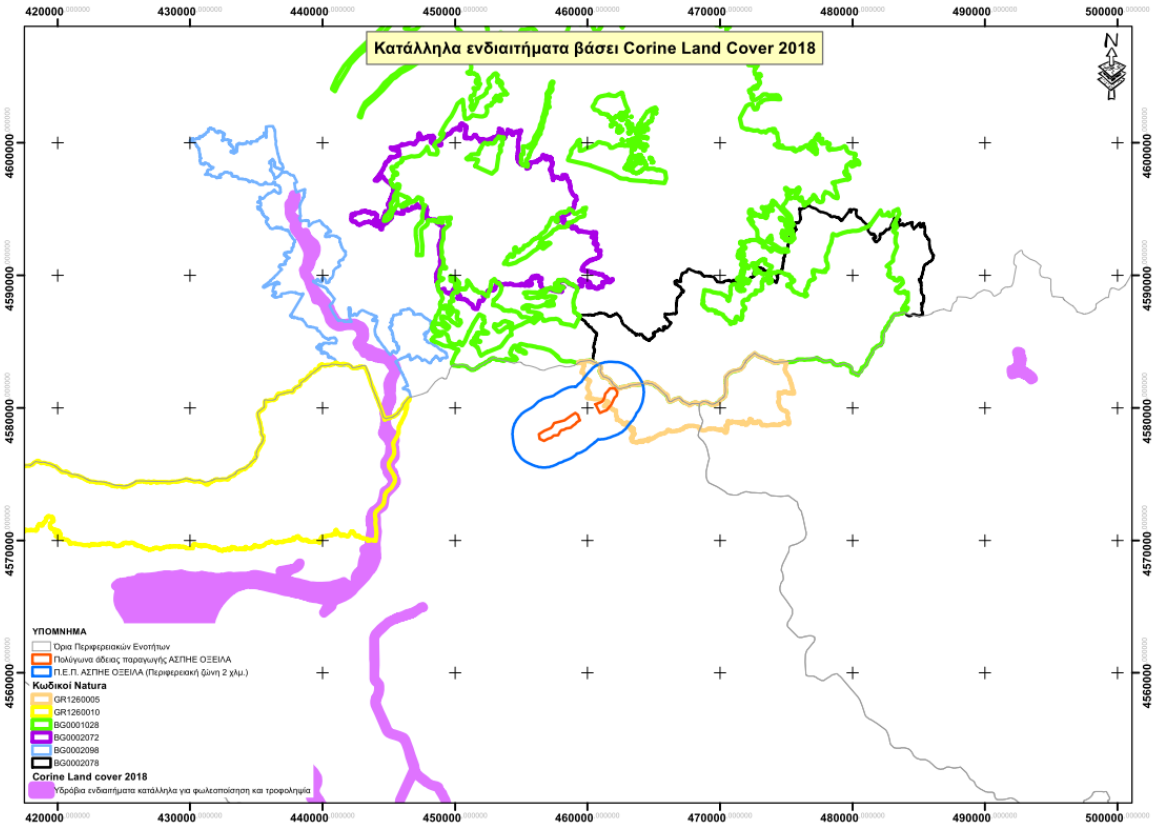
Map 111: Distribution map of *Egretta garzetta* in the study area



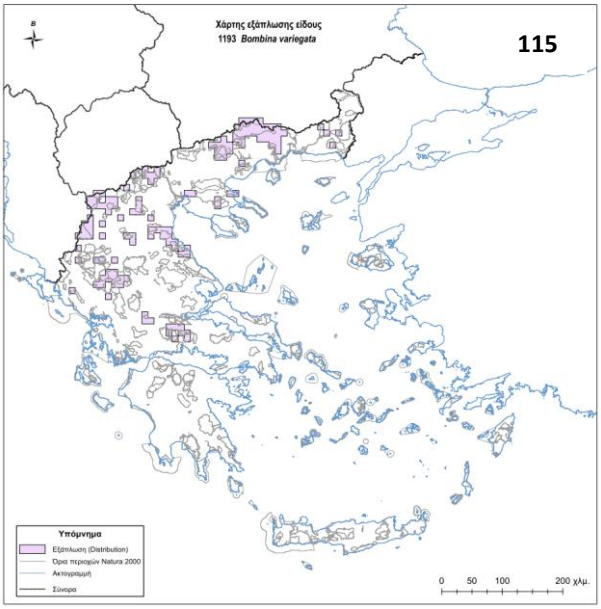
Map 112: Map of suitable habitat for *Egretta garzetta* in the study area

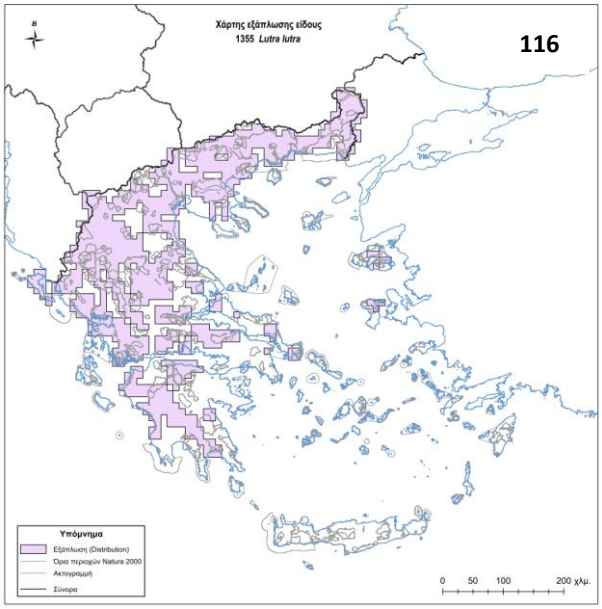


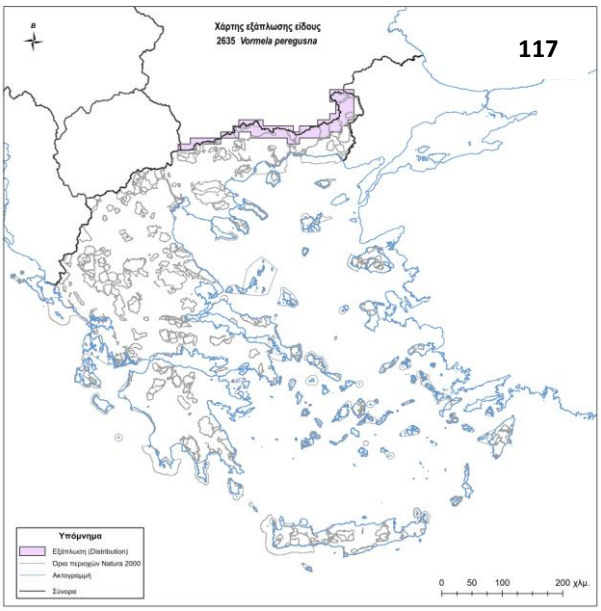
Map 113: Distribution map of *Nycticorax nycticorax* in the study area

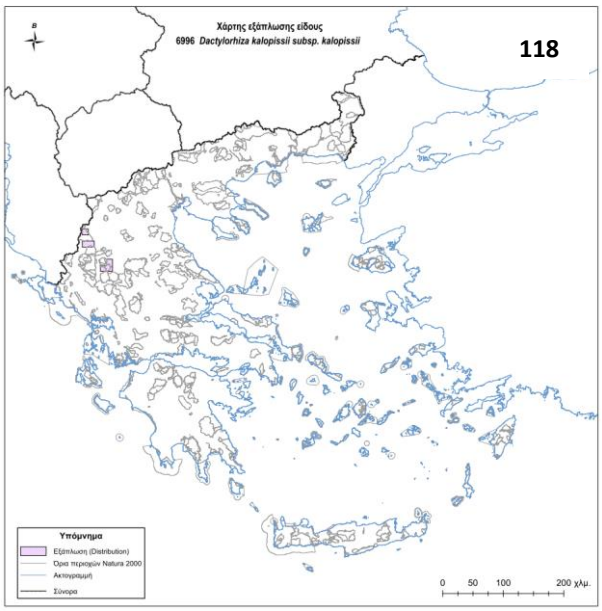


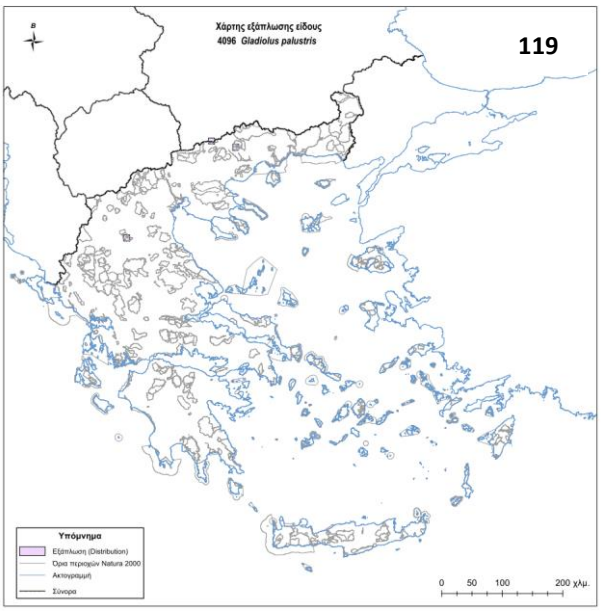
Map 114: Map of suitable *Nycticorax nycticorax* habitat in the study area

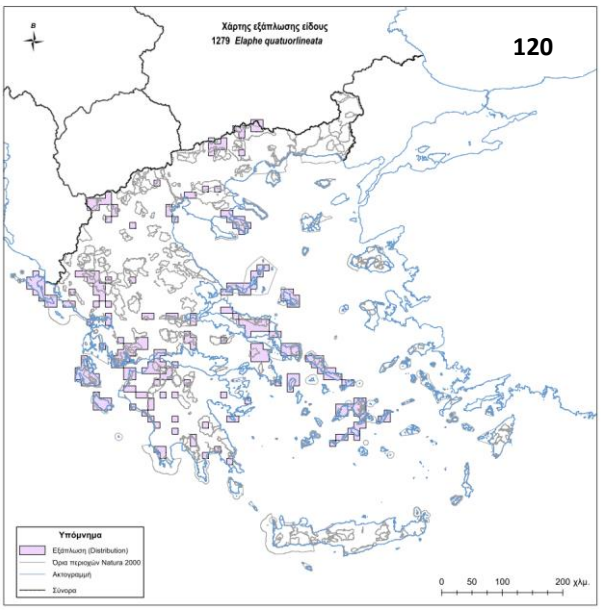

Χάρτης εξάπλωσης είδους
1193 Bombina variegata
115
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

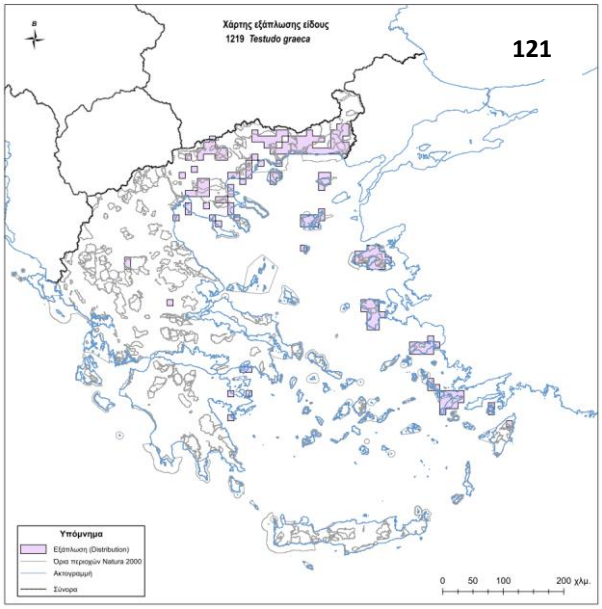

Χάρτης εξάπλωσης είδους
1355 Lutra lutra
116
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

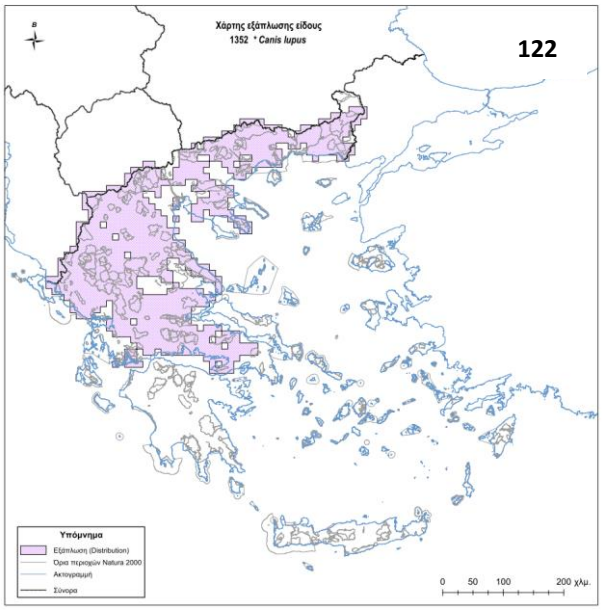

Χάρτης εξάπλωσης είδους
2635 Vormela peregusna
117
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

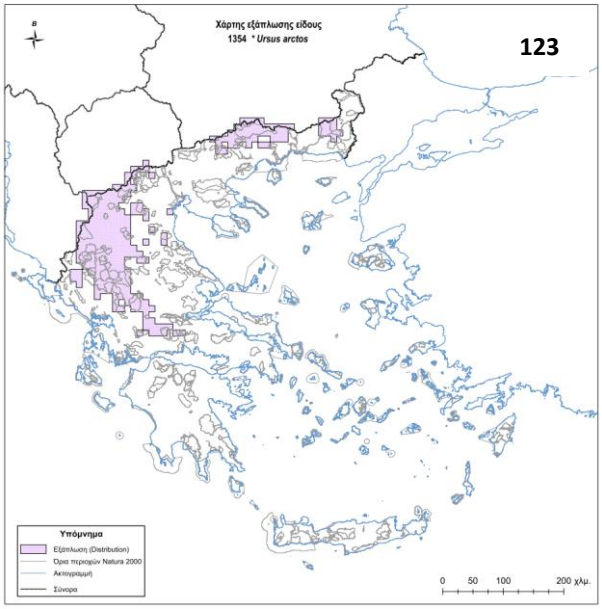

Χάρτης εξάπλωσης είδους
6996 Dactylorhiza kalopissii subsp. kalopissii
118
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

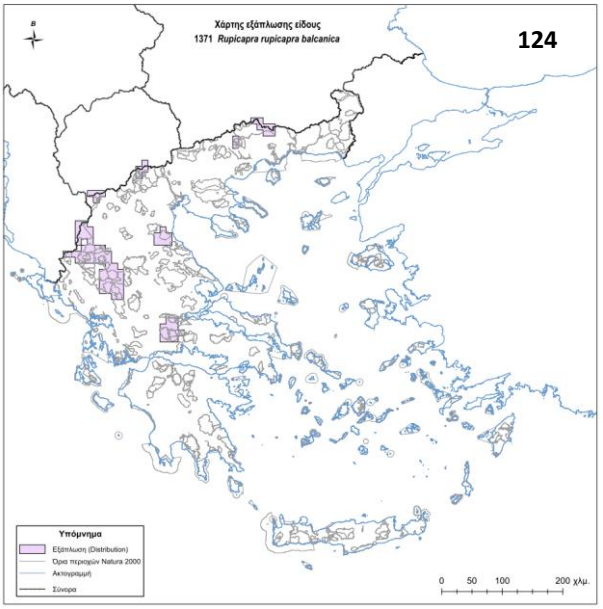

Χάρτης εξάπλωσης είδους
4096 Gladiolus palustris
119
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

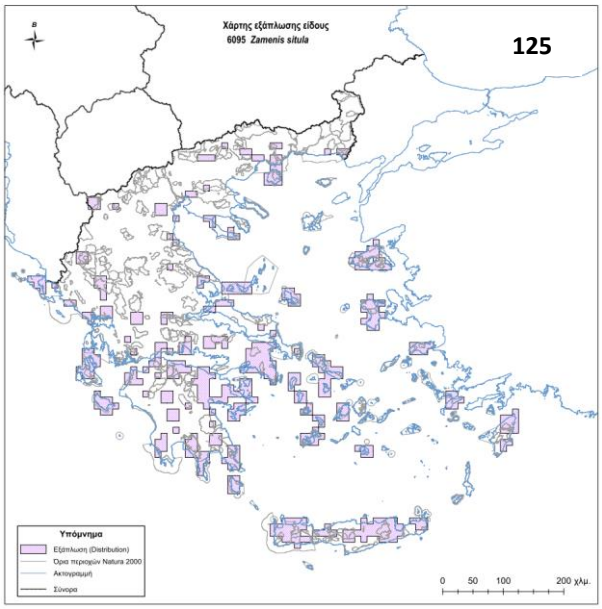

Χάρτης εξάπλωσης είδους
1279 Elaphe quatuorlineata
120
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

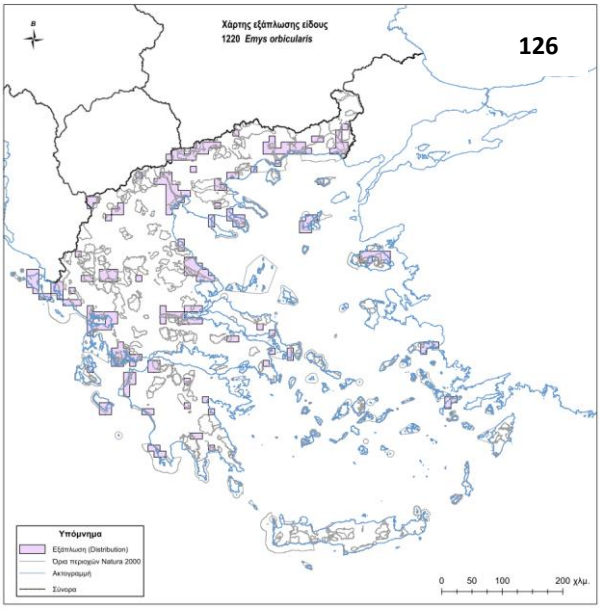

Χάρτης εξάπλωσης είδους
1219 Testudo graeca
121
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

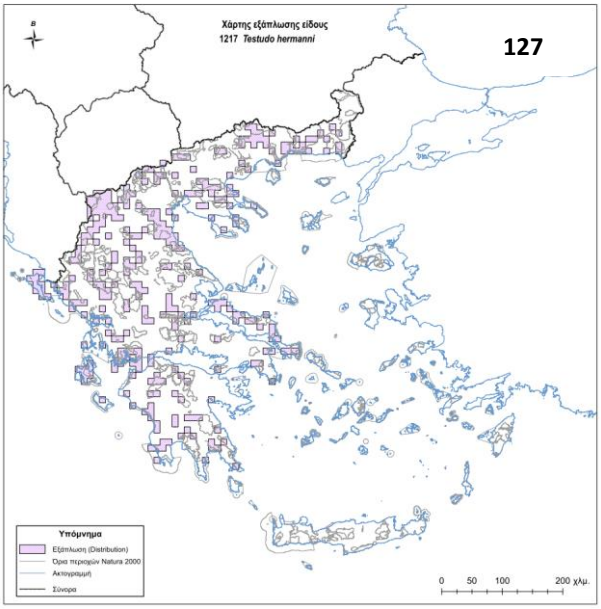

Χάρτης εξάπλωσης είδους
1352 * Canis lupus
122
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

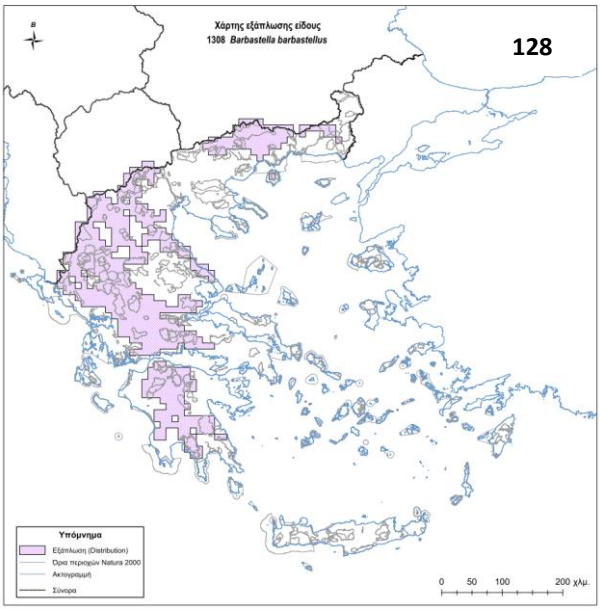

Χάρτης εξάπλωσης είδους
1354 * Ursus arctos
123
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

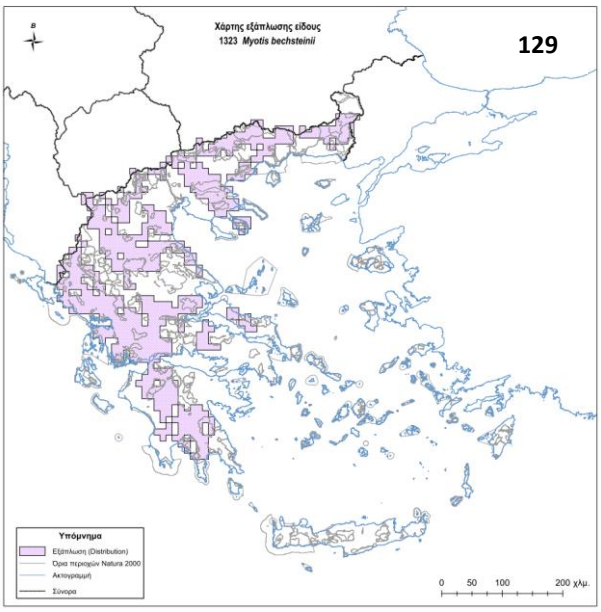

Χάρτης εξάπλωσης είδους
1371 Rupicapra rupicapra balcanica
124
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.


Χάρτης εξάπλωσης είδους
6095 Zamenis situla
125
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.


Χάρτης εξάπλωσης είδους
1220 Emys orbicularis
126
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.


Χάρτης εξάπλωσης είδους
1217 Testudo hermanni
127
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

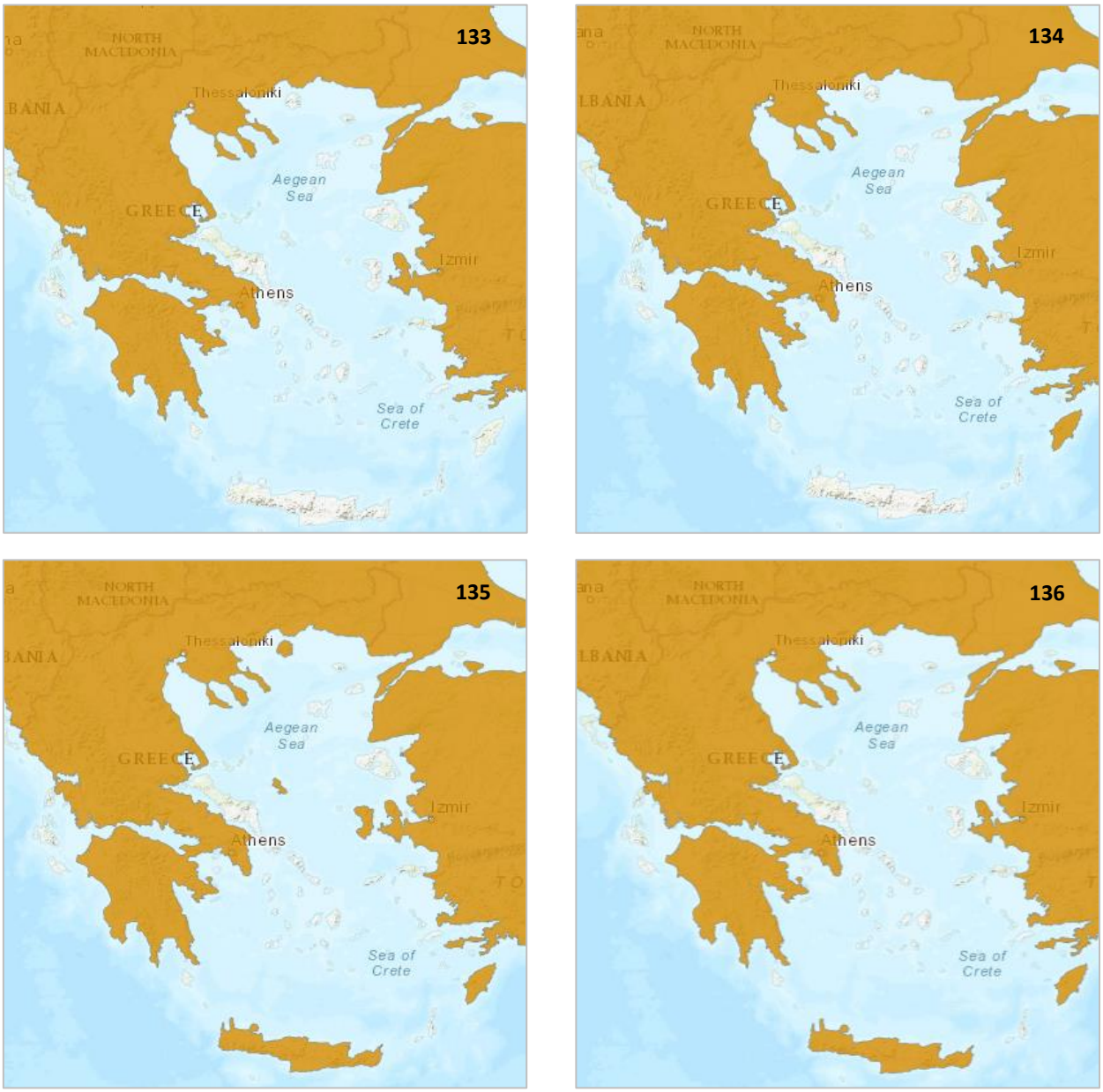

Χάρτης εξάπλωσης είδους
1308 Barbastella barbastellus
128
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.


Χάρτης εξάπλωσης είδους
1323 Myotis bechsteinii
129
Υπόμνημα
Εξάπλωση (Distribution)
Όρια περιοχών Natura 2000
Ακτογραμμή
Σύνορα
0 50 100 200 χλμ.

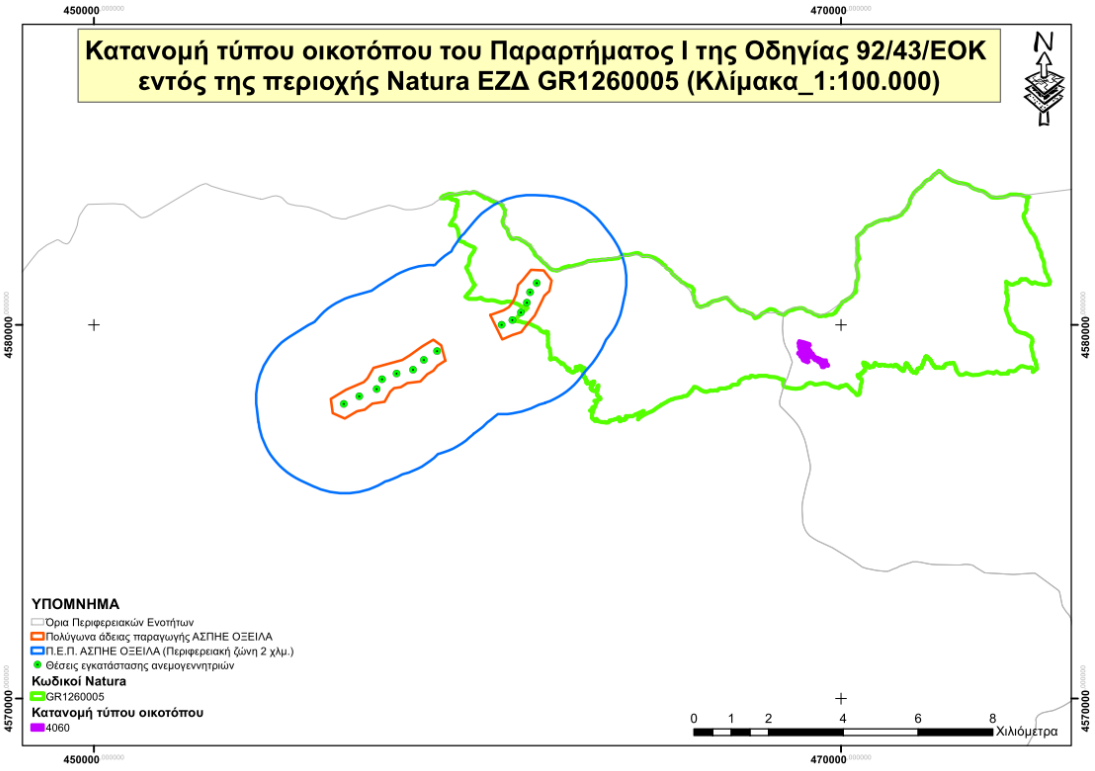
130
NORTH MACEDONIA
ALBANIA
Aegean Sea
GREECE
Izmir
Athens
Sea of Crete

131
NORTH MACEDONIA
Aegean Sea
GREECE
Izmir
Athens
Sea of Crete

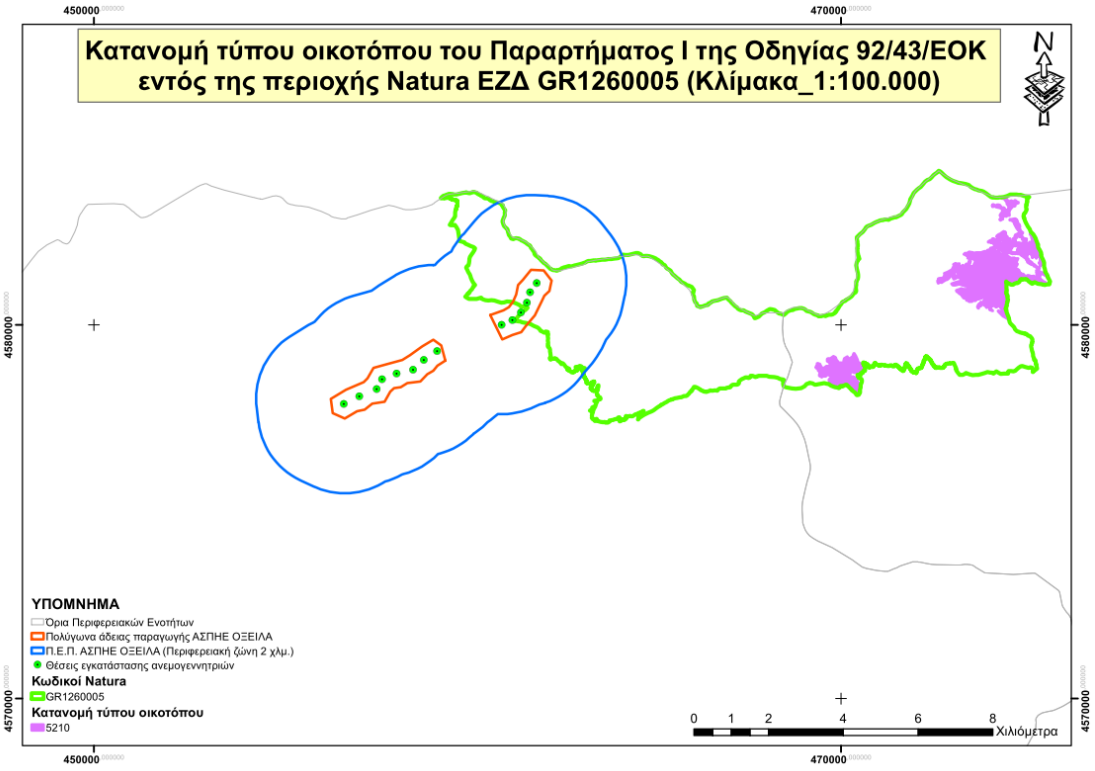
132
NORTH MACEDONIA
Aegean Sea
GREECE
Izmir
Athens
Sea of Crete



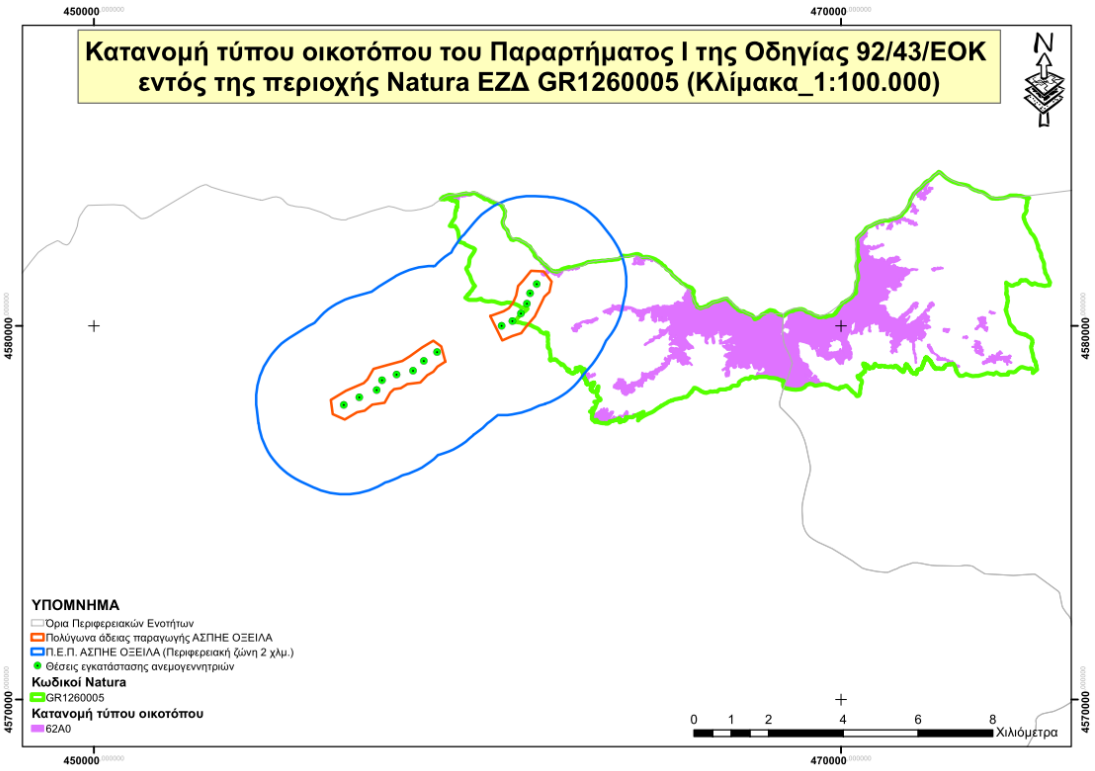
Maps 115 – 136. Distribution maps of species of fauna and flora of interest listed in Annex II to Directive 92/43/EEC: **115.** *Bombina variegata,* **116.** *Lutra lutra,* **117.** *Vormella peregusna,* **118.** *Dactylorhiza kalopissii,* **119.** *Gladiolus palustris,* **120.** *Elaphe quatuorlineata,* **121.** *Testudo graeca,* **122.** *Canis lupus,* **123.** *Ursus arctos,* **124.** *Rupicapra rupicapra balcanica,* **125.** *Zamenis situla,* **126.** *Emys orbicularis,* **127.** *Testudo hermanni,* **128.** *Barbastella barbastellus,* **129.** *Myotis bechsteinii,* **130.** *Miniopterus schreibersii,* **131.** *Myotis blythii,* **132.** *Myotis emarginatus,* **133.** *Myotis myotis,* **134.** *Rhinolophus euryale,* **135.** *Rhinolophus hipposideros,* **136.** *Rhinolophus ferrumequinum*



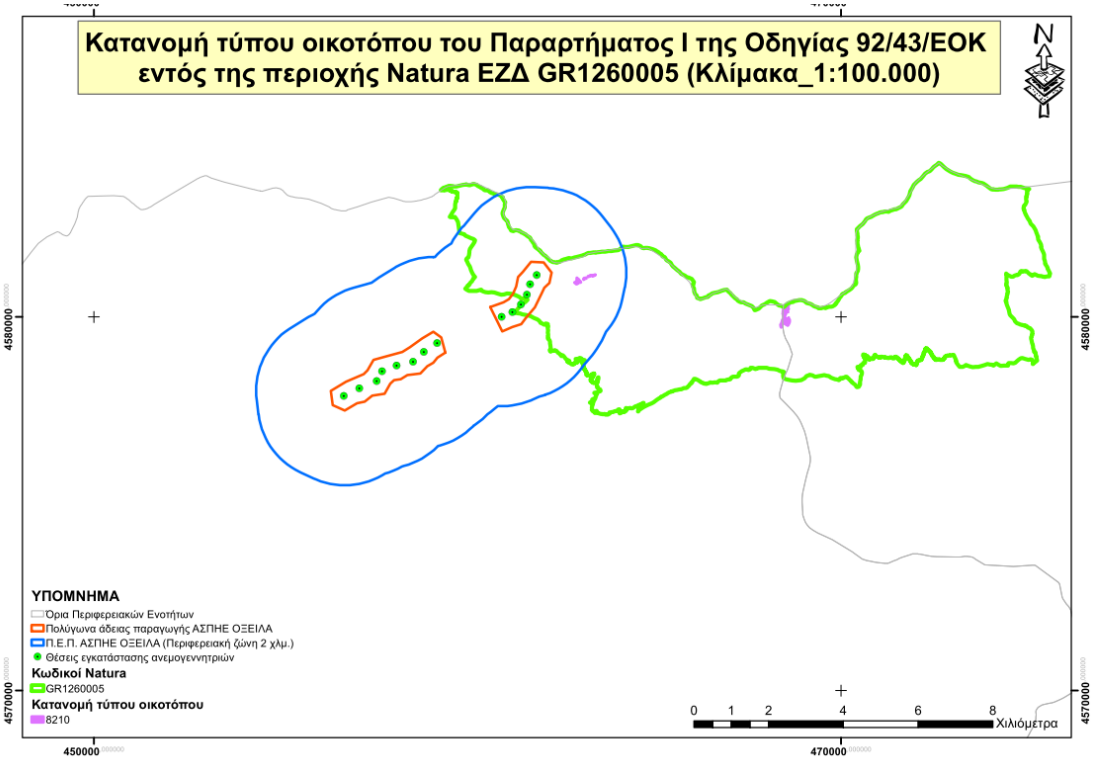
Map 137: Distribution map of habitat type 4060: Alpine and northern heathland



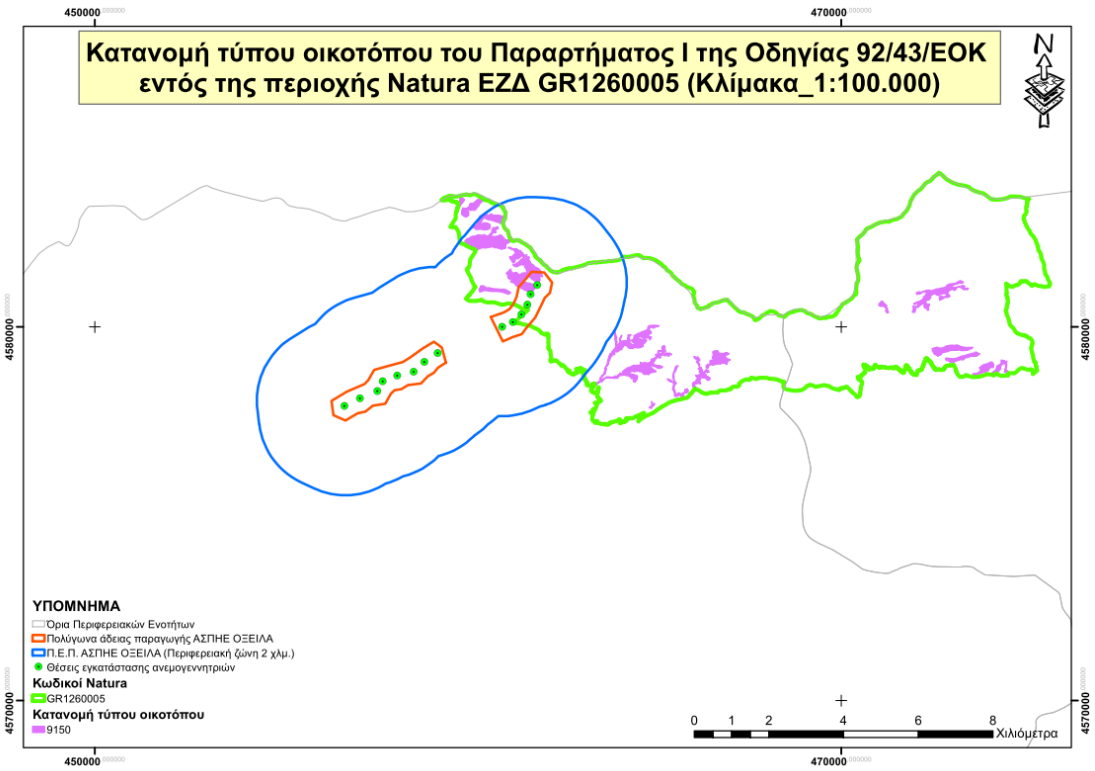
Map 138: Distribution map of habitat type 5210: Tree formations with *Juniperus spp.*



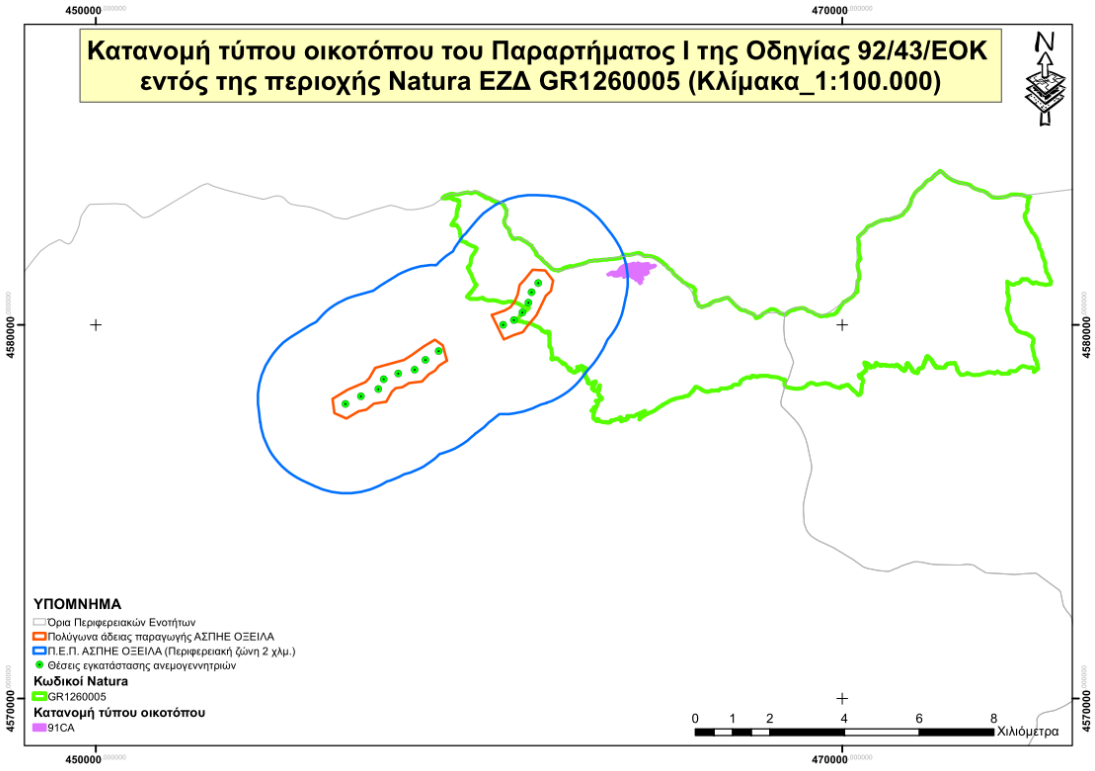
Map 139: Distribution map of habitat type 62A0: Eastern sub-Mediterranean dry grassland (*Scorzoneratalia villosae*)



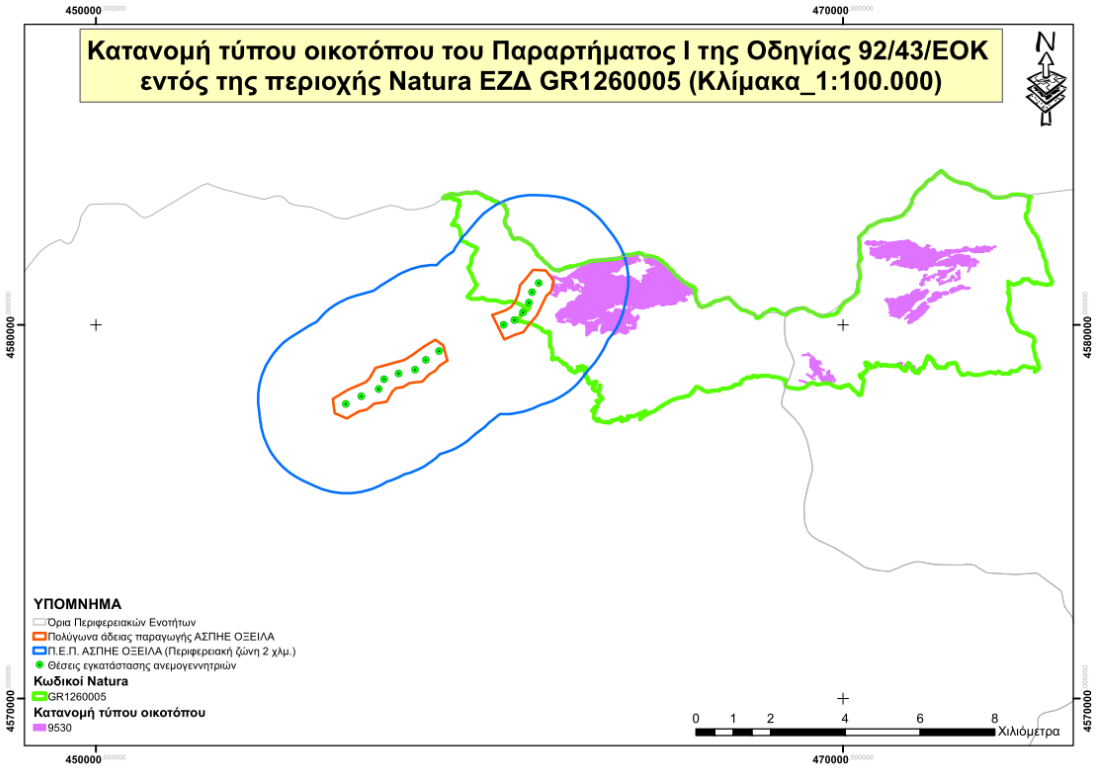
Map 140: Distribution map of habitat type 8210: Calcareous rocky slopes with grass vegetation



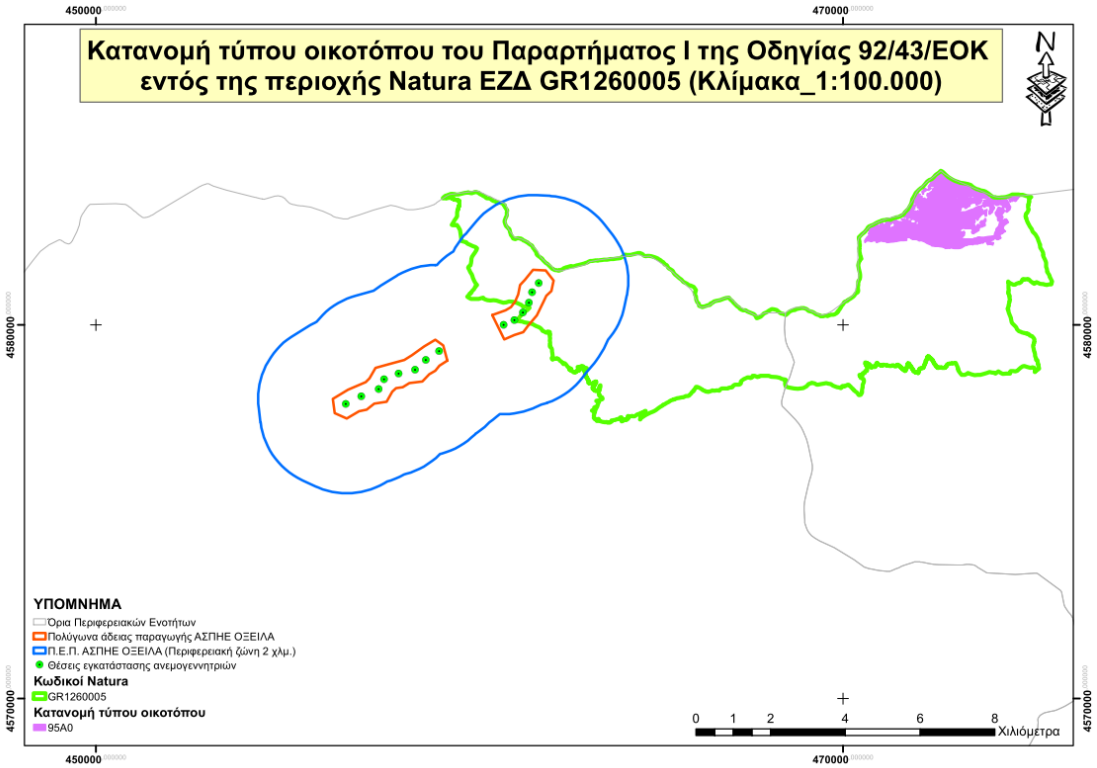
Map 141: Map of distribution of habitat type 9150: Meso-European calcareous beech forests of Cephalanthero - Fagion



Map 142: Distribution map of habitat type 91CA: Balkan and Rhodope pine forests



Map 143: Distribution map of habitat type 9530*: Sub-Mediterranean black pine forests



Map 144: Distribution map of habitat type 95A0: High altitude montane pine forests (*Pinus heldreichii* or *Pinus peuce*)

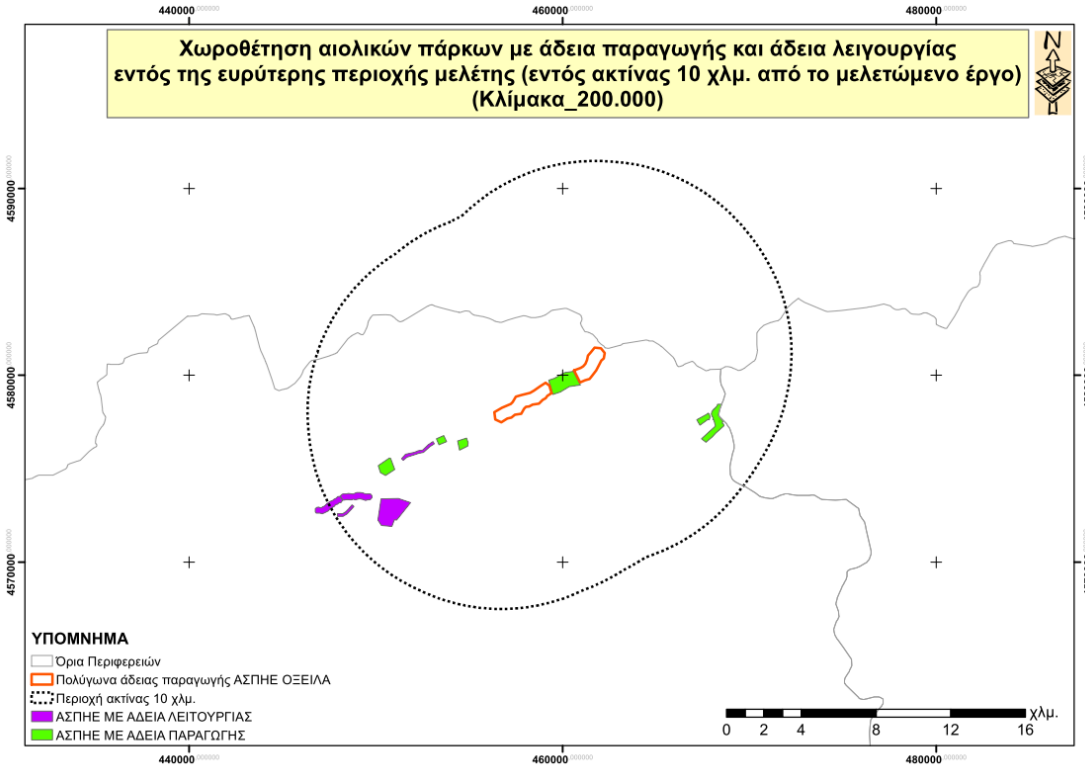
Reference to other existing and/or approved projects or activities in the Study Area

The production licence blocks of the project are partially located within the Special Conservation Area GR1260005, in an area of particular ecological importance. Furthermore, the production licence blocks of the project under study are located in an area with high wind potential. Due to the high wind potential of the wider installation area, it has attracted investment interest for the development of wind farms. However, due to the significant potential adverse impacts of wind farms in the study area, an effort is being made to properly locate and document the suitability of the wind farm location, with the recent geo-information map of the study area (source P.A.E., available 09/12/2024) showing wind farms with installation permits, operating permits, production permits, applications under review, and some denials. It is judged that the wind farms worthy of reference and examination are mainly those wind farms that have received an operating license, an installation license and a production license within a 10 km radius of the project under study.

Therefore, within a radius of 10 km from the boundaries of the production polygons of the project under study, there are four wind farms with an operating licence and five wind farms with a production licence, while there are no wind farms with an installation licence (the nearest of which is located more than 75 km from the boundaries of the production polygons of the project under study (Table 29, Map 145).

Table 29. Wind farms with operating and production licenses in the area of the study project (10 km radius area)

Location	Number A/C	Power (MW)	Distance (km)	Stadium Licensing stage
KORYFI	5	15,0	8,88	Operating licence
STEINOLAKOS	7	23,1	3,54	Operating licence
KORYFI	20	17,0	7,77	Operating licence
TWO PETRES	7	24,0	6,35	Operating licence
COODUNI	1	3,0	5,98	Production licence
STAYROS	1	3,0	2,87	Production licence
ELEVATION_TRIANGULAR-ELEVATION_STONE-CORNER	9	27,0	5,99	Production licence
DASHTO	2	6,0	1,84	Production licence
BEECHWOOD - HOPS	4	20,0	0,04	Production licence



Map 145: Map of wind farms in the wider area with an operating licence and a production licence (within a 10 km radius of the project under consideration).

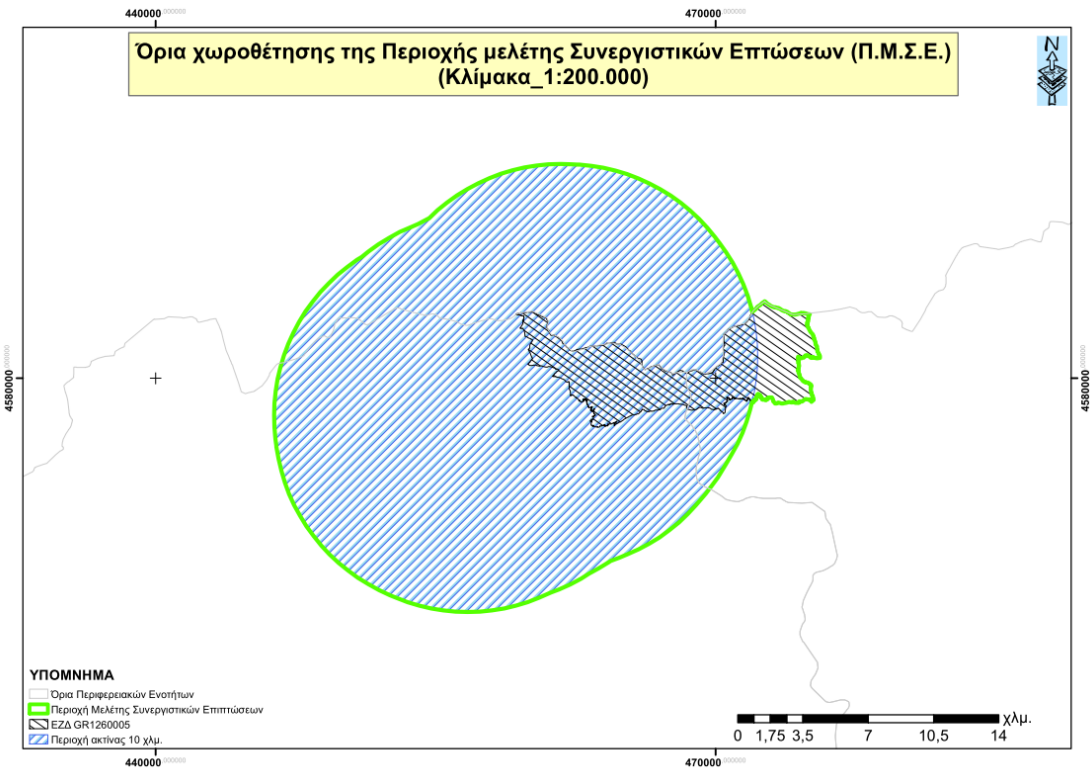
Specifically, in the wider area of the project under study, and within a radius of 10 km, there are four wind power plants that have received an operating license (Source: P.A.E. available on 09/12/2024), which have a total capacity of 79.1 MW, and consist of 39 wind turbines. Of the four wind power plants in operation (licensed), none is located within 2 km of the proposed project. It is worth noting that of the four wind farms with an operating licence, one (KORYFI wind farm, consisting of 20 turbines) is partially located within the 10 km radius area (Map 145), with the result that of the 20 turbines of which the above wind farm consists, 15 of them are located within the area. Therefore, the total number of turbines of the wind farms in operation within a 10 km radius of the project under consideration is 34 turbines. Also, in the area of the study project, and within a radius of 10 km, there are five wind farms, which have received a production license (Source: R.A.E.. available on 09/12/2024), which have a total capacity of 59 MW and consist of 17 wind turbines. Of the above five wind farms with a production license, two are located less than 2 km from the proposed project.

Despite the fact that, as shown in Table 29 above, there are wind farms (two) in the wider area that have a production licence and are located even less than 2 km from the project under study, the above reference to their synergistic effects should not be

taken into account (although it is taken into account in the relevant section in the following chapter), as the above wind farms may receive a negative opinion up to the stage of obtaining the operating licence and therefore cannot be considered to have a synergistic effect.

The synergistic effects of the installation of a project in an area result from the cumulative effect of all types of impacts of these projects and almost exclusively affect the avifauna of the area. According to the international literature and the Guidelines, synergistic effects can be considered at two levels. Projects located within a very short distance and radius from the project under consideration (usually < 2 km) and those located over a larger radius and area (usually between 2 km and 10 km). The reason is that in the first case the project in question may be small in size with little or no impact on bird species, but within a short radius around it many other small or larger projects may be located and in total impact on species and in the second case, irrespective of the assessment of the project in question, numerous projects, irrespective of the size of the impact, may be located within a larger radius and multiply the impact of the project under consideration.

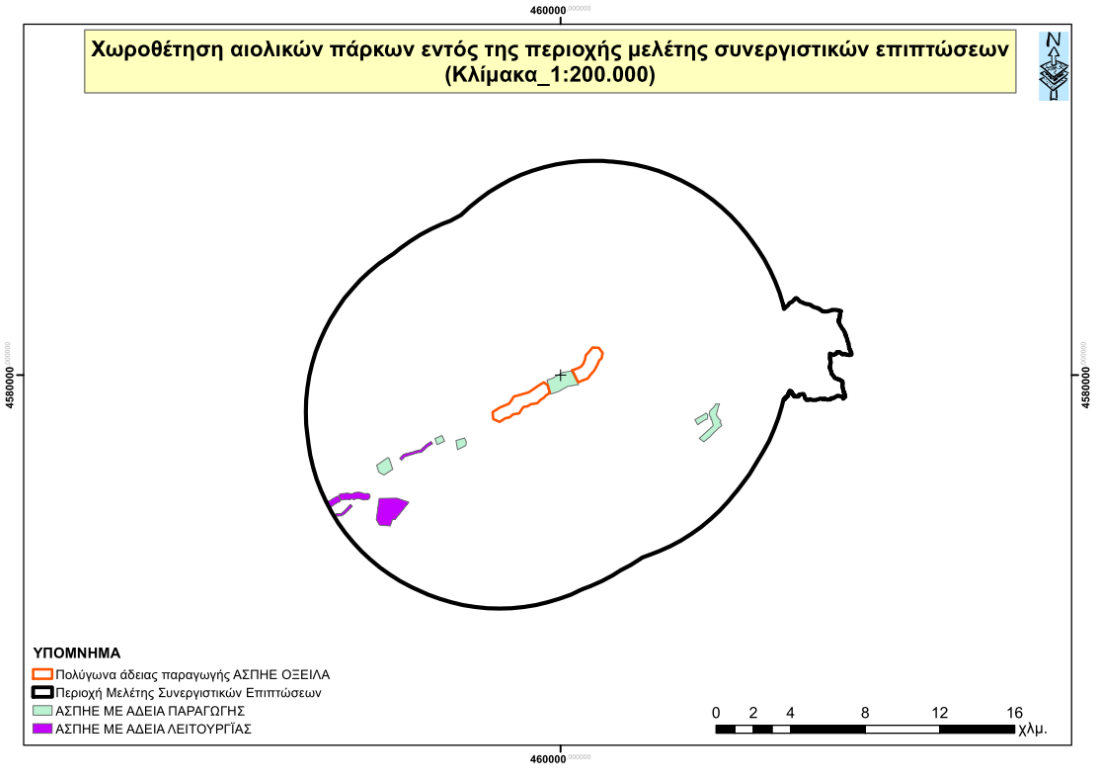
With regard to the main area under study, Special Conservation Area GR1260005, and given the location of the project partially within it, in order to better address its synergistic effects, as there are wind farms outside its boundaries but within a 10 km radius, the project will have to be carried out within a 10 km radius. of the project under study, it was chosen by the study team, in this Special Ecological Assessment to take into account the wider boundaries of the entire area enclosed within the above-mentioned protected Natura site (GR1260005) and the area within a 10 km radius of the project under study. Therefore, the area resulting from the merging of the boundaries of the two areas mentioned above will henceforth be referred to as the 'Cooperative Impact Study Area' (Map 146).



Map 146: Zoning boundary map of the study areaGR1260005, the area within a 10 km radius from the boundaries of the production license blocks of the studied wind farm OXEILA and boundaries of the Cooperative Impact Study Area (total area of the studied Special Conservation Area and the peripheral area of 10 km from the studied project).

Therefore, there are 4 wind farms (operating license) within the Co-operative Impact Study Area. These wind power plants in operation have a total capacity of 79.1 MW and consist of 39 wind turbines (Map 147). It is worth noting that one of the four wind power plants in operation is partially located within the Synergistic Impact Study Area, so that five of the 20 wind turbines that make up the above wind power plant are located outside the study area. In the analysis and evaluation of the synergistic impacts, only the area of the polygonal operation of the above wind farms that is located within the Synergistic Impact Study Area will be counted, but also the number of wind turbines located within it. Therefore, the area of the polygons of the above wind farms in operation (total area of the polygons located within the Study Area of the Co-operative Impact Study) is 289.03 ha and the total number of wind turbines (in operation within the Study Area of the Co-operative Impact Study) is 34. Finally, within the Cooperative Impact Study Area, there are five wind farms, with a production license, which have a total capacity of 59 MW. Therefore, as stated above for the licensed wind power plants, only the area of licensed wind power plants located within the Cooperative Impact Study Area will be counted, but the total number located within the Cooperative Impact

Study Area will be counted. The total area of the polygons where wind farms with a production licence are installed (total area of polygons located within the Co-operation Study Area) is 301,45 ha, and the total number of wind turbines is 17 (wind turbines with a production licence within the Co-operation Study Area) (Map 147). Within the above five wind farms with a production licence, the project under study is not included, which, as mentioned above, has a total capacity of 58.8 MW, consists of 14 wind turbines and the area of its production polygons is 366.76 ha.



Map 147: Map showing the location of wind farms with an operating licence and a production licence within the 'synergistic impact study area'.

Other relevant information relating to the Study Area

In this section, according to the specifications of the Special Ecological Assessment, as defined in the 170225/20-01-2014 KYA (Government Gazette 135/B/27-01-2014), the designer may, at his/her discretion, mention general information about the study area related to works, studies, etc. that constitute a source of information for the study area and are available and were used during the preparation of the Special Ecological Assessment, as well as any problems and difficulties that arose during its preparation and any assumptions and methods that were resolved.

As mentioned above, the project under consideration is partly located within the Natura 2000 network site GR1260005, which is designated as a Special Area of Conservation. It was chosen by the study team of this Special Ecological Assessment to examine the potential impacts of the project under study on its protected objects, which are the flora and fauna species listed in Annex II of Directive 92/43/EEC, and the habitat types listed in Annex I of the Directive.

Also, as mentioned above, due to the nature of the proposed project, it was chosen to examine the nearest Natura 2000 network sites, which are designated as Special Protection Areas, with the protected object being the bird species listed in Annex I of the Birds Directive. Therefore, all of the large and non-predatory, as well as other large important species, of Annex I of the Directive 2009/147/EC, included in the SDFs of all the nearest Special Protection Areas under study were selected.

Regarding the statutory Greek Special Protection Area GR1260005, which was selected to be considered, in terms of the impacts of the project under study on the protected objects of this Special Protection Area, with emphasis on those species of avifauna that have a large area of endemism, capable of covering the distance to the site of the project under study, according to the publication *"Identification of compatible activities in relation to the species characterization of the Special Protection Areas of avifauna, Supplementary deliverable: National List of Special Protection Area designation species" with the contracting authority being the Ministry of Environment and Spatial Planning - Environmental Planning Directorate, Department of Natural Environment Management (Dimalexis 2010)",* as well as in accordance with the decision no. H.P.8353/276/E103 (Government Gazette 415/B/23-02-2012), the only species designated is *Aquila pomarina (Clanga pomarina).*

With regard to the Greek Natura 2000 network site GR11260010, it was chosen by the team of the present Special Ecological Assessment to present the most important species of the avifauna of this Special Protection Area, as described in the 2019 edition of their Standard Data Forms (TED/SDF) (End 2018_15/03/2019). Having in mind the purpose of providing and evaluating all the available information of the study area, the reason for choosing not to take into account the revised version of the SDFs of this area, consists both in the fact that the latter is included in full, without the slightest difference, in the version (2019) chosen, and in the existence of large birds of prey that, according to their ecology, are active over a large radius, capable of covering the distance to the study area. These important birds of prey (e.g. *Aquila chrysaetos, Aquila heliaca, Clanga pomarina, Buteo rufinus, Circus aeruginosus, Circus pygargus, Falco biarmicus, Falco naumanni, Gyps fulvus, Haliaeetus albicilla, Hieraaetus pennatus, Milvus migrans, Neophron percnopterus*) for which the above-mentioned Greek protected area, as mentioned in a previous subsection of this report, is very important, are not included in the latest version of the SDFs of the area (the species of the area *Clanga pomarina* is not mentioned either). Also, important species listed in Annex I of Directive 2009/147/EC, such as *Ciconia nigra, Ciconia ciconia,* etc. are not mentioned.

In addition, the species of cephalopods listed in Annex II of the above Directive, listed in the SDFs of the neighbouring Bulgarian Special Conservation Area BG0001028, were selected, except for *Myotis capaccinii* and *Rhinolophus blasii*, which show non-significant numbers (population criterion D). Finally, of the remaining fauna species listed in Annex II of the above mentioned Directive, listed in the SDFs of the adjacent Bulgarian Special Conservation Area BG0001028, the species *Lutra lutra was* selected, *Canis lupus* (belonging to Annex V, see species analysis below), *Rupicapra rupicapra balcanica, Ursus arctos, Vormela peregusna*, as important species with a large area of endemism, as well as three species of reptiles *Zamenis situla, Emys orbicularis* and *Testudo hermanni*.

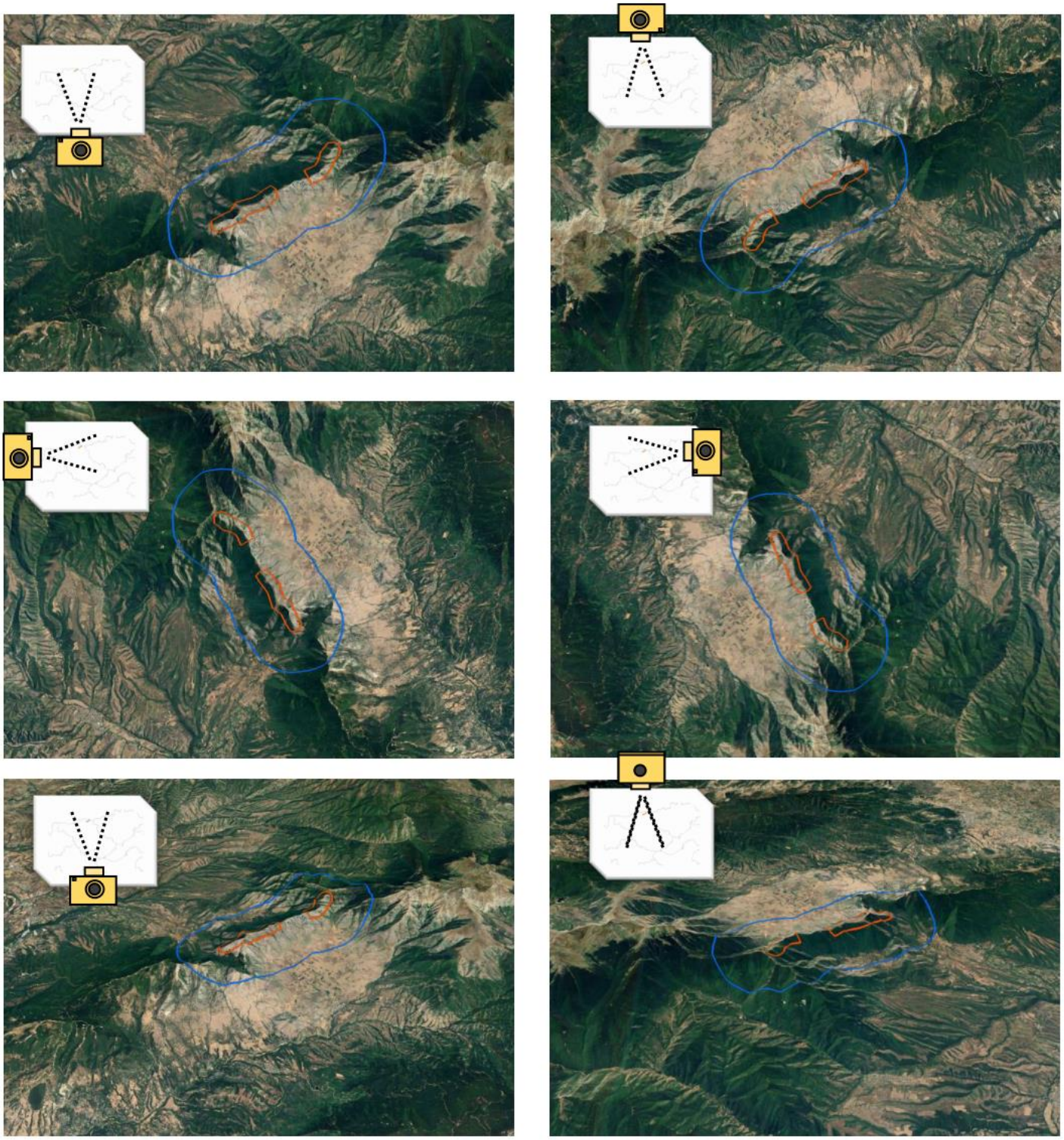
In addition, regarding *Aquila heliaca*, which is listed in the SDFs of the Greek Special Protection Area under study, the following is mentioned. Kerkini, Kalamas Delta etc.), while a few individuals, mainly juveniles, migrate south in autumn along the Ionian coast (Messolonghi, western Peloponnese etc.) (Chandrinos 1992, Handrinos and Akriotis 1997, EOE data) (Legakis and Maragou 2009): "*Common in Greece and widely distributed species in the pre-war years and until the 1960s, the population of*

Aquila heliaca suffered a dramatic decline and today it is probably no longer breeding in Greece: The last known pairs survived in the southern part of southern Evros until the mid-1980s, although perhaps 1 pair still nests (Handrinos and Akriotis 1997; BirdLife International 2004). Today Aquila heliaca is a rare and local winter visitor, with an average of 6-10 individuals per year, mainly in the large wetlands of northern Greece (Evros Delta, L. Kerkini, Kalamas Delta, etc.). A few individuals, mainly juveniles, migrate south in autumn along the Ionian coast (Messolonghi, Western Peloponnese, etc.) (Chandrinos 1992; Handrinos and Akriotis 1997; EOE data). There are 10 recoveries in Greece of ringed individuals in Hungary (5), Slovakia (4) and Bulgaria (Akriotis and Chandrinos 2004).".

Finally, as mentioned in a previous section of this Special Ecological Assessment, the production license polygons of the project under study are located in a larger area that has high wind potential. Due to the high wind potential of the broader installation area, it has attracted investment interest.

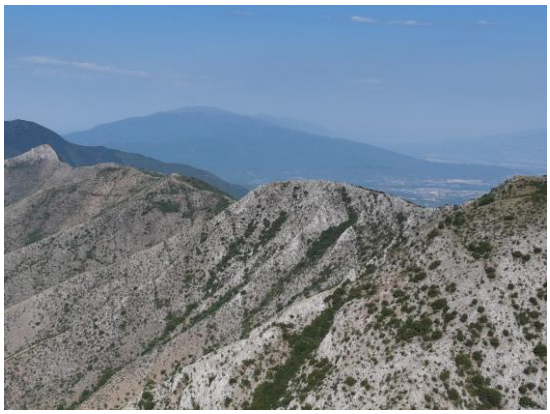
Photo documentation

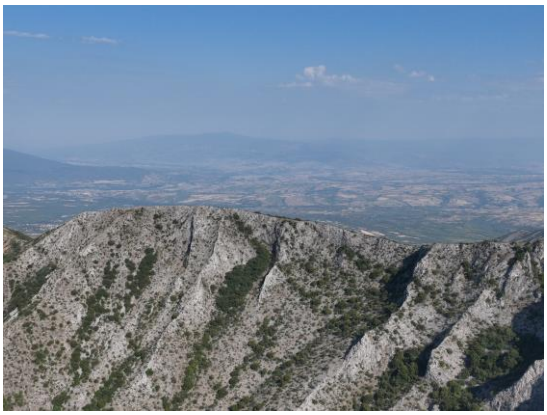
In order to better visualize the location of the project from characteristic points of the immediate and the wider area and to create a complete image of the surrounding area of the production license polygons of the project under study, it was chosen to render the mapping of the area from a combination of satellite images, so that within them there are georeferenced and the production license polygons and the peripheral zone of 2,000 meters that defines the maximum of the wider area of recording natural environment data (field survey area) (no Both the immediate and the wider project area are then presented in photographs (satellite image extracts) from the four different locations (shooting orientation N, S, E, W) with a relative indication of shooting orientation in the orientation map inset within each photograph.

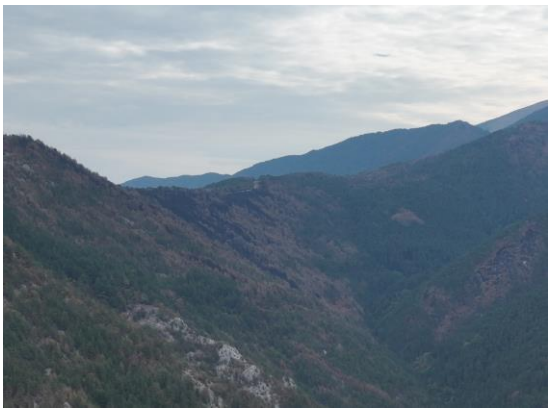


Photos 1 to 6: Photographs (satellite image extracts) with georeferenced production polygons of the project under study (red) and the field survey area (blue), taken from different directions of the horizon in vertical projection (top and middle), and taken from the south and north directions at a shooting angle (bottom left and bottom right respectively).

Aerial photographs of the site of the project and the surrounding area







Photos 7 to 64: Aerial photographs of the project site and the wider area, taken from different altitudes and from different horizon directions to better capture the wider study area.

Screening

At this point, after collecting and presenting the necessary information about the Study Area and before analysing the necessary data of the Field Survey Area, the section of the preliminary screening was chosen, which essentially provides a first assessment of the likelihood of the project installation causing negative impacts on the protected Natura 2000 Special Conservation Area GR1260005, partially within which the project is located, the nearest protected areas of the Natura 2000 network, zones E

From all the above data provided, in the most detailed way, the habitat types of Annex I of Directive 92/43/EEC, listed in the SDFs of the main Special Conservation Area under study GR1260005, were selected for further assessment, except for the habitat type 9540, which has ceased to exist within this protected area (zero area). In addition, the fauna and flora species listed in Annex II of the above Directive, which are listed in the SDFs of this Special Conservation Area, were selected for further analysis. In addition, all of the large and non-predator species, as well as other large important species, of Annex I of Directive 2009/147/EC, listed in the SDFs of all the nearest Special Protection Areas under study were selected (within which there is also the only species of designation of the Greek Special Conservation Area under study GR1260010 - *Clanga pomarina*). In addition, the Annex II species of the above mentioned Directive's chiroptera species listed in the TDFs of the neighbouring Bulgarian Special Conservation Zone BG0001028 were selected, except for *Myotis capaccinii* and *Rhinolophus blasii,* which show non-significant numbers (population criterion D). Finally, of the remaining fauna species listed in Annex II of the above Directive, which are listed in the TDBs of the neighbouring Bulgarian Special Conservation Area BG0001028, the species *Lutra lutra* was selected*, Canis lupus (belonging to Annex V, see species analysis below), Rupicapra rupicapra, Ursus arctos, Vormela peregusna*, as important species with a large area of endemism, as well as three species of reptiles *Zamenis situla, Emys orbicularis* and *Testudo hermanni.* Therefore, the total of 68 species analysed below, and henceforth referred to as "species of interest", consists of: *Bombina variegata, Lutra lutra, Vormela peregusna, Dactylorhiza kalopissii, Gladiolus palustris, Elaphe quatuorlineata, Testudo graeca, Barbastella barbastellus, Miniopterus schreibersii, Myotis bechsteinii, Myotis blythii, Myotis emarginatus, Myotis myotis, Rhinolophus euryale, Rhinolophus hipposideros, Rhinolophus ferrumequinum, Canis lupus, Ursus arctos, Rupicapra rupicapra*

balcanica, Zamenis situla, Emys orbicularis, Testudo hermanni, Accipiter brevipes, Aegolius funereus Aquila chrysaetos, Aquila heliaca, Buteo rufinus, Bubo bubo, Clanga clanga, Clanga pomarina, Ciconia ciconia, Ciconia nigra, Circaetus gallicus, Circus aeruginosus, Circus cyaneus, Circus macrourus, Circus pygargus, Falco naumanni, Falco eleonorae, Falco biarmicus, Falco peregrinus, Falco vespertinus, Falco columbarius, Falco cherrug, Gyps fulvus, Haliaeetus albicilla, Hieraaetus pennatus, Aquila fasciata, Milvus migrans, Neophron percnopterus, Pernis apivorus, Nycticorax nycticorax, Ardea alba, Egretta garzetta, Microcarbo pygmaeus, Ardeola ralloides, Tetrastes bonaisa, Tetrao urogallus, Grus grus, Ixobrychus minutus, Pelecanus crispus, Pelecanus onocrotalus, Platalea leucorodia, Plegadis falcinellus, Recurvirostra avosetta, Botaurus stellaris, Glaucidium passerinum, Ardea purpurea.

From the above literature data, which were additionally presented in corresponding documentation maps, for the main protected area under study ΕΖΔ GR1260005, partially within which the project is located, it is evident that:

- The production permit polygons of the project under study, covering an area of 366.76 ha, are small compared to the 4,871.04 ha of the Special Conservation Area in question, and cannot have a minimal impact on its values and protection purpose.
- Since the project is partially located within the above-mentioned Natura 2000 network protected area, only 86,08 ha of the total area of the production blocks is located within the protected area.
- The 86,08 ha, which relates to part of the one production polygon located within the protected area, is located within habitat types 62A0, 9150, 925A, 9530, of which 62A0 and 9150 are habitat types listed in Annex I to Directive 92/43/EEC and 9530* is a priority habitat under the above Directive.
- Of the 86,08 ha of habitat types occupied by a part of one of the production licence blocks of the project under consideration, 70,81 ha cover habitat type 925A, which is not included in the habitat types of Directive 92/43/EEC, 0,73 and 14,27 ha cover habitat types 62A0 and 9150 respectively, which are Annex I habitat types, while only 0.27 ha cover priority habitat 9530, which is located within the boundaries of the production licence polygon (see Map 1 in the previous section). Of the total area of priority habitat 9530 within the protected

area, only 0.04% is covered by the production licence polygon of the proposed project.

- Only three of the 14 wind turbine sites of the project are located within the Special Conservation Area under protection, and none of the three are located within either of the two habitat types listed in Annex I to Directive 92/43/EEC or within the single priority type of the area. Only a very small part of the access road between turbines 13 and 14, as well as the squares of the turbines in question, is sited within habitat type 9150, covering less than 1 ha (approximately 0.7 ha) of this Annex I habitat type, covering approximately 5% of the 14.27 ha of this habitat type sited within the part of the one production licence block of the project under consideration. It is worth noting that of the total 268.5 ha covered by habitat 9150 within the Special Conservation Area under study, the percentage covered by a very small section of the access road between wind turbines 13 and 14 and their plazas is much smaller, amounting to only 0.26%.

In conclusion, the habitat types occupied by the production polygons of the proposed project are abundant in the study area and therefore it cannot be assumed that the proposed project will cause dispersal, fragmentation or any form of significant habitat loss. It is worth noting here that the interference within the production polygons of the project under study will be much less than their total area, since only the areas within them that will be used for the installation of the wind turbines (foundations, infrastructure works, etc.) will be affected, while the opening of access roads will be kept to a minimum. This is positively supported by the road network existing in the study area, which ensures access to the project under study without the requirement of very large new forest road openings and therefore without too great a burden on the area from the above-mentioned induced habitat loss or from the cascading effects that the presence of a new road network in an area could cause as a consequence of increased human visitation to new locations. The above is reinforced by the fact that only a very small part of the planned new opening will take place within the protected Special Conservation Area, and is essentially the access road between the three wind turbines located within it, and indeed without passing through any type of priority habitat. Furthermore, the impacts on the natural environment from the electrical interconnection works of the project under study (voltage step-up substation and high

and medium voltage lines, as well as the transmission lines), are minor and are mainly limited to the construction phase, and with regard to the transmission lines in particular, in this Special Ecological Assessment it is proposed that they be installed underground and up to the substation, so as not to cause any negative impact on the avifauna of the area. Also, the wider area of the project under consideration is not fenced and the disturbance is of short duration and intensity and ultimately reversible after construction activities are completed. In addition, as with any project constructed within forested areas, horticultural restoration of the encroachment areas is planned. Finally, as mentioned above, to ensure that the significance of disturbance during the construction phase is limited, it is proposed that construction take place outside of the breeding season of the area's fauna (March - June).

It is clear from the above information that no significant impacts are likely to result from the construction and operation of the project in relation to the objectives, protected objects, conservation status and integrity of the study area. As noted above, the habitat types that would be occupied by the installation of the project under consideration are abundant in the study area, and therefore it cannot be assumed that the project under consideration would cause dispersal, fragmentation, or any form of significant habitat loss.

With respect to bats, the literature review indicates that the closest location for bats is approximately 5.40 km away (referring to a distance from a wider feeding area of 5 km radius from significant locations for bats, as noted and discussed below). According to the LIFE GRECABATS project, the 230 most important bat refuges in Greece (caves, mines, buildings, etc.) and caves as habitats of Directive 92/43/EEC (8310: Caves which are not exploited for tourism) were selected to be proposed as protection sites by the specific Environmental Studies and the following Management Plans under preparation. The main criteria for their selection were the number of species and colony sizes of cephalopods and the number of typical species and narrowly endemic species of invertebrates for the 8310 habitat. The proper management of most of the Annex II species of bats of the Habitats Directive, but also of cave colonies and their other typical and important species, requires proper management of the surrounding area. This space feeds the bats, but also determines the availability and quality of organic matter and water inside the bedrock and caves, and plays a decisive role in their microclimate. Based on the above, **protection areas around each important cave site or wider feeding areas** were designed and proposed by the above

project. Of the above defined important caves and protection areas (cairns and wider foraging area) of 5 km radius, it was found that none of them are located both within the production license polygons of the studied project and within its field survey area, with the nearest wider foraging area being the location of "Kataraktes, Tristomo and Warm Water Cave". More specifically, this wider protection area (kurnia and wider feeding area) is, as mentioned above, approximately 5.40 km south of the production polygons of the project (Map 165).

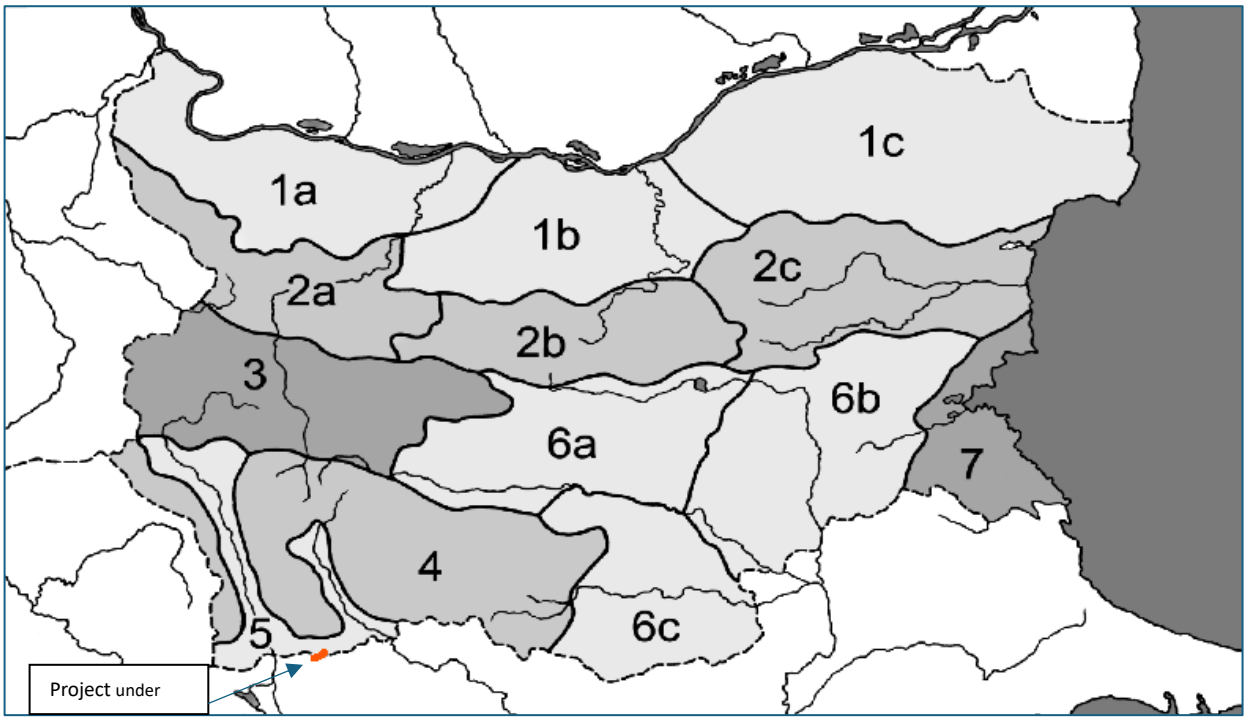
The study area was also assessed in terms of the vegetation and habitat types within it. The study area, specifically the production polygons of the project under study, is not located within a mature broadleaf forest that would from the outset negatively predict potential negative impacts of project installation on bats due to high mortality (Dürr 2007, Kelm et al. 2014) and the severe habitat impacts that such placements can cause to all bat species. Also, no other habitats that are particularly important to bats, such as tree lines, hedgerow networks, wetlands, water bodies and streams (e.g. Limpens et al. 1989; Limpens and Kapteyn 1991; de Jong 1995; Verboom and Huitema 1997; Walsh and Harris 1996a, b; Kelm et al. 2014). Based on the above, no significant impacts are initially expected from the project installation on the bats in the study area.

With regard to the neighbouring Bulgarian Special Conservation Area under study BG0001028, 11 species of Annex II bats of Directive 92/43/EEC (*Barbastellus barbastellus barbastellus, Miniopterus schreibersii, Myotis bechsteinii, Myotis blythii, Myotis capaccinii, Myotis emarginatus, Myotis myotis, Rhinolophus Euryale, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus blasii*), nine of which were included by the study team in the species of interest in this Special Ecological Assessment and were fully discussed in a previous section of this Special Ecological Assessment.

Bulgaria covers the central and eastern part of the Balkan Peninsula and from a biogeographical point of view, it presents a broad transition zone between Mediterranean tree forests and European mixed forests of southeastern Europe. The territory of Bulgaria includes a wide mosaic of habitats, from semi-arid steppes and coastal scrublands to forests and alpine meadows in its high mountains. It lies in the zone of the Mediterranean subtropical climate gradient (which essentially affects the southern part of the country) and temperate climates, with maximum rainfall in spring and autumn. It is bordered by the Black Sea in its eastern part, the Danube River and

the Danubian plains in the north, which complete the diversity of the country's topography. About a quarter of the total area of the country is located in the semi-mountainous zone and above, while at the same time the eastern and northern parts of the country are almost at sea level. The effect of this highly varied altitudinal gradient, the mosaic of habitats and the extensive dominance of carbonate rocks results in a highly varied karstic landscape. This landscape covers about 23 % of the country and often takes the form of large rocky crags and spacious natural caves (over 4 200 caves are known in Bulgaria). The unique geographical location, the diverse topography and climate, as well as the highly structurally diverse landscape, continuously influenced by post-neolithic anthropogenic rearrangements, set the pattern for very high biodiversity (Sakaljan and Majni 1993). This fact also leads to the great variety of chiral species found in the country. The amount of information on the distribution, fauna and classification of bats in Bulgaria is much greater than in any other country in the south-eastern Mediterranean and south-eastern Europe in general. In Bulgaria, there are species of wrens typical of the mixed forests of central and northern Europe, species of wrens which are mainly found in the Mediterranean with Bulgaria being the northernmost part of their distribution range, but also species of wrens which, due to their distribution and basic ecological requirements, are intermediate transition between the two above mentioned categories.

According to Benda et. al. 2003, who compiled a comprehensive list of all bat species recorded in Bulgaria, based on both literature and field data, at least 32 bat species have been recorded at 2,127 sites in Bulgaria, including species listed in Annex II of Directive 92/43/EEC, which are listed in the TED of the neighbouring Bulgarian Natura 2000 site BG0001032. A map of Bulgaria is given below (Map 148, Source: Benda et al. 2003), subdivided into seven main areas, delimited in relation to the vegetation maps of the Balkan Peninsula (Horvat et al. 1974, Bondev 1991, Velčev 2002) and modified in relation to the traditional zoogeographical subdivision of the Bulgarian territory (Drenski 1966, Georgiev 1982, Hubenov 1997), as well as Table 30, within which the records of the 11 species of bats that are listed in the SDF of the studied BG0001028 are shown, nine of which belong to the species of interest of this Special Ecological Assessment.



Map 148: Map of Bulgaria, showing the subdivision of the country into biogeographic regions. The production licence polygons of the project under study are georeferenced in red outline.

Table 30. Part of a table showing the number of records of the 11 Annex II species of the Annex II of Directive 92/43/EEC listed in the TADs of BG0001028, in individual biogeographic sites in Bulgaria (Source: Benda et al. 2003)

Species	1a	1b	1c	2a	2b	2c	3	4	5	6a	6b	6c	7	Total
Rhinolophus ferrumequinum	11	24	21	85	17	16	18	37	14	1	5	28	19	296
Rhinolophus hipposideros	6	17	15	82	15	12	20	38	18	2	5	27	16	273
Rhinolophus euryale	3	13	5	32	4	12	3	5	7		3	8	9	104
Rhinolophus blasii		4	2	24	1	2	5	3	3		2	9	5	60
Myotis myotis	9	14	11	62	8	15	10	25	6	2	2	16	4	184
Myotis blythii	1	10	8	36	5	10	7	22	5	1	2		9	116
Myotis bechsteinii		1		11	3	2		4	1		1	2	2	27
Myotis emarginatus		10	3	17	5	5	1	13	5		3	3	6	71
Myotis capaccinii	3	14	6	26	4		3	5	2		3	8	5	79
Barbastella barbastellus		1		3	5	1		8	1	1		1	2	23
Miniopterus scribblersii	5	22	15	48	9	24	13	11	2	1	4	7	13	174

As shown in Table 30 above, sub-area 5, which is most adjacent to the site of the project under study, contains the fourth smallest number of sites in the whole of Bulgaria in the total of 11 species of chimpanzees, behind only 6a, 6b and 1a, while although the area immediately adjacent to the project site, under area 4, has the second largest number of sites in the total of 11 species of bats (171), about 44% of these (75

sites in total) are *Rhinolophus ferrumequinum* and *Rhinolophus hipposideros, which,* according to the same source, are the most abundant bat species in Bulgaria. Both of these species have been found at more than 270 sites and represent 27.1 % of all bats recorded in Bulgaria (Benda et al. 2003).

In addition, the largest parts of Area 5 include the valleys of the Struma and Nestos rivers. These habitats are suitable and particularly important for bats (wetlands, water bodies and streams) (Limpens et al. 1989; Limpens and Kapteyn 1991; de Jong 1995; Verboom and Huitema 1997; Walsh and Harris 1996a, b; Kelm et al. 2014). The project under study is located approximately 10 km from the Struma River, which is the closest (in a straight line). (from its nearest boundary), and as will be shown below in the distribution maps of the 11 species of bats, nine of which are species of interest here, most of the recording sites of these species are located on both sides of the Struma and Nestos riverbeds.

Another numerous group of species with 174 and 184 sites respectively includes *Miniopterus schreibersii* and *Myotis myotis* (together 17.1% of all bats recorded in Bulgaria). The four species mentioned above are mainly cave species, forming numerous colonies in caves, and can be considered as the most numerous species in the country. They are also the only ones found in all 13 biogeographic sub-regions of Bulgaria. *Rhinolophus euryale, Myotis blythii, Pipistrellus pipistrellus, Nyctalus noctula* and *Plecotus austriacus* can also be considered abundant, according to the same source (the latter three are not mentioned in the section of the table above, as they are not Annex II species of Directive 92/43/EEC, but are also not listed in the TEDs of the Bulgarian study area BG0001028, and for this reason they are not included in the species of interest). The above mentioned species *Rhinolophus euryale* and *Myotis blythii* (which are species of interest) have been found at 104 and 116 sites respectively, and together with species*, Pipistrellus pipistrellus, Nyctalus noctula* and *Plecotus austriacus* represent 24.1% of all bat records in Bulgaria, and have been found in 12 out of 13 biogeographic sub-areas of the country.

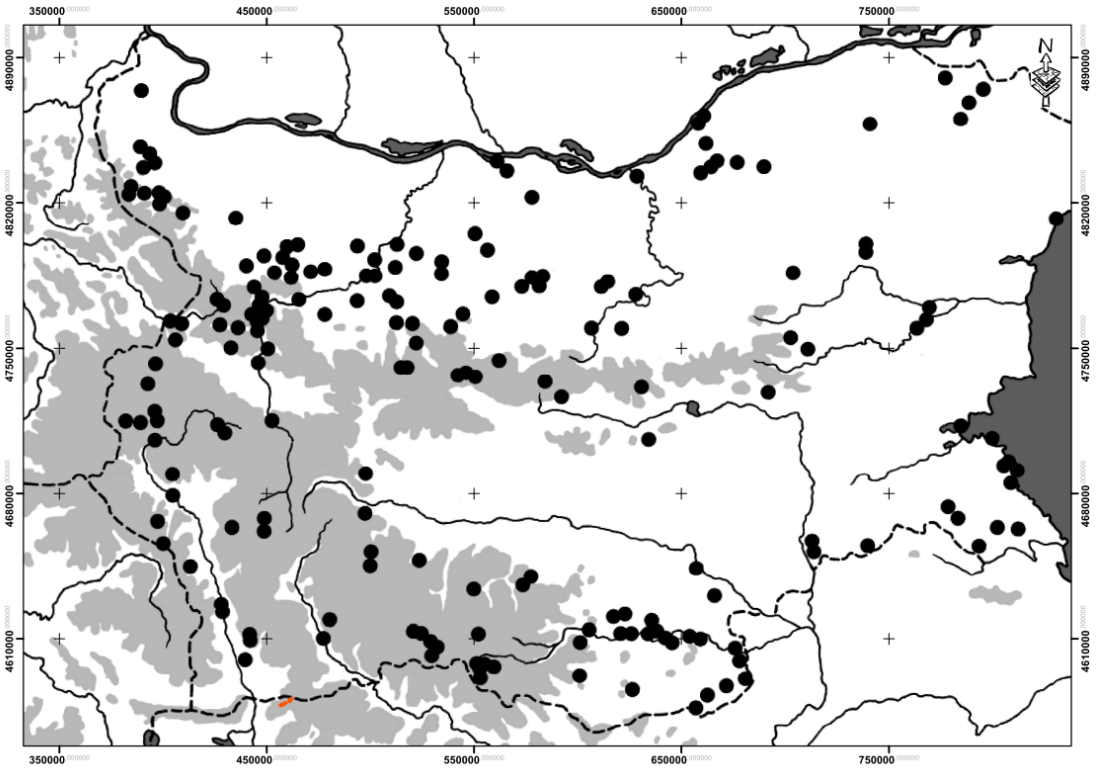
All of the above species are the dominant bat species in Bulgaria, accounting for 68.3% of all records.

Also, a group of relatively numerous bat species includes *Rhinolophus blasii, Myotis emarginatus, Myotis capaccinii, Eptesicus serotinus* and *Hypsugo savii* (the latter three are not listed in the section of the table above, as they are not Annex II species of Directive 92/43/EEC, but are also not listed in the TADs of the Bulgarian

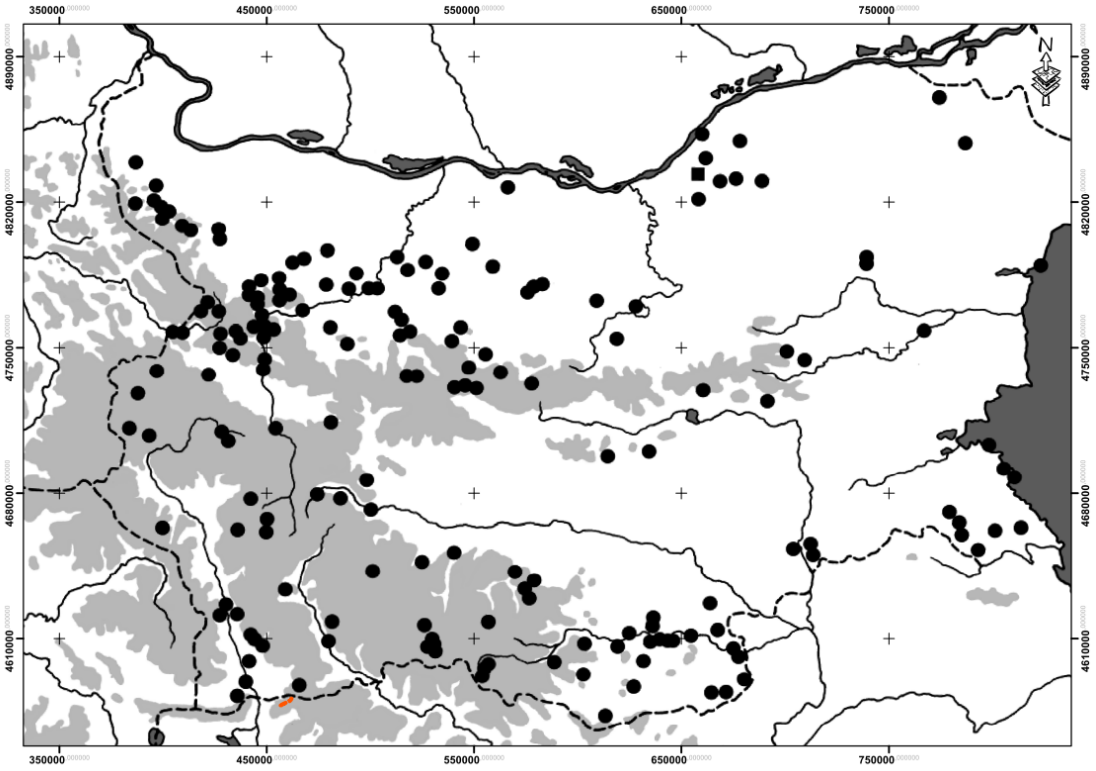
study area BG0001028, and therefore have not been included in the species of interest). All species in this group were found at 60 to 80 sites (60 for the species of interest *Rhinolophus blasii,* 71 for the species of interest *Myotis emarginatus,* 79 for the species of interest *Myotis capaccinii*) per species and represent (all five) 17.1% of all bat records in Bulgaria.

All species reported above are distributed throughout Bulgaria and, except for *P. pipistrellus* and *N. noctula,* belong to the Mediterranean species (*M. capaccinii* was included in this group with some reservation). The remaining 17 species (a total of only 14.6% of bat records in Bulgaria) were mainly found in isolated areas at less than 40 sites (1-36). This group includes species found mainly in northern and central Europe (*Myotis bechsteinii*, *M. nattereri*, M. *brandtii*, *M. daubentonii*, *Barbastella barbastellus* and *Plecotus auritus*), the Mediterranean species (*Rhinolophus mehelyi, Myotis aurascens, Pipistrellus kuhlii* and *Tadarida teniotis*), and the migratory species (*Vespertilio murinus, Pipistrellus nathusii, Nyctalus leisleri and Nyctalus lasiopterus*).

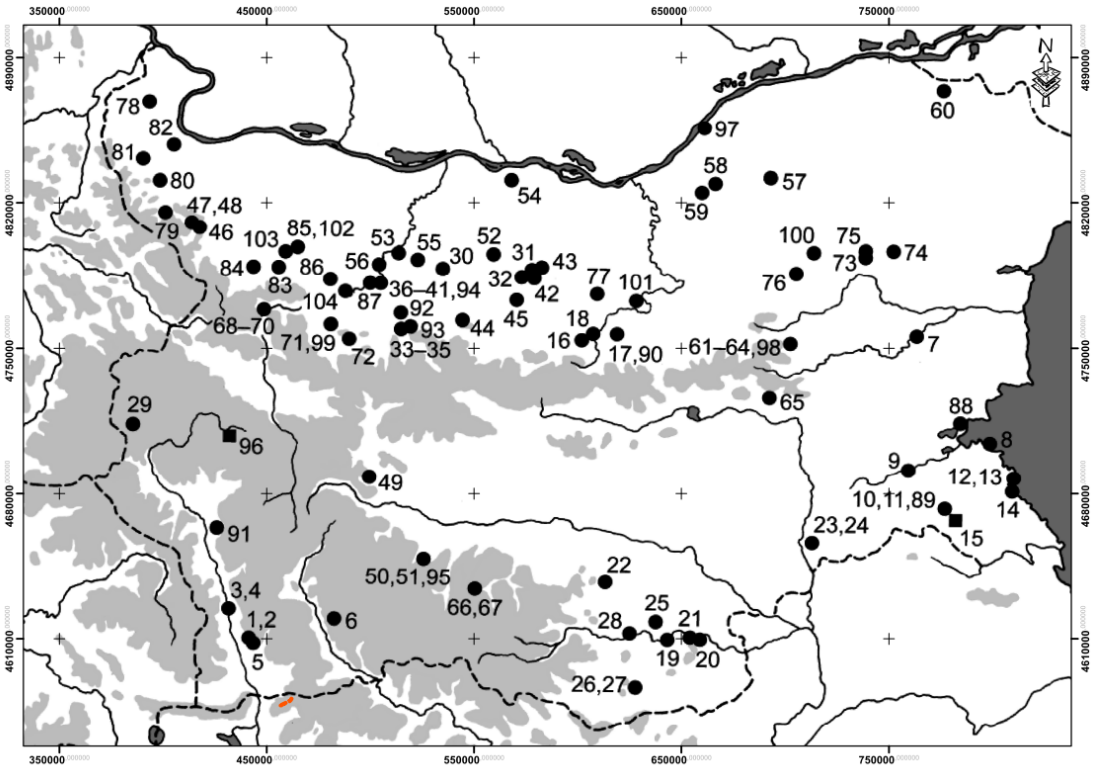
Subsequently, according to the same source (Benda et al. 2003), distribution maps of individual biogeographic sites in Bulgaria are presented, within which the 11 species of bats listed in the TED of the neighbouring Bulgarian Special Conservation Area BG0001028 were recorded, nine of which are species of interest in this Special Ecological Assessment. Within these maps, the production licence polygons of the project under study were also georeferenced.



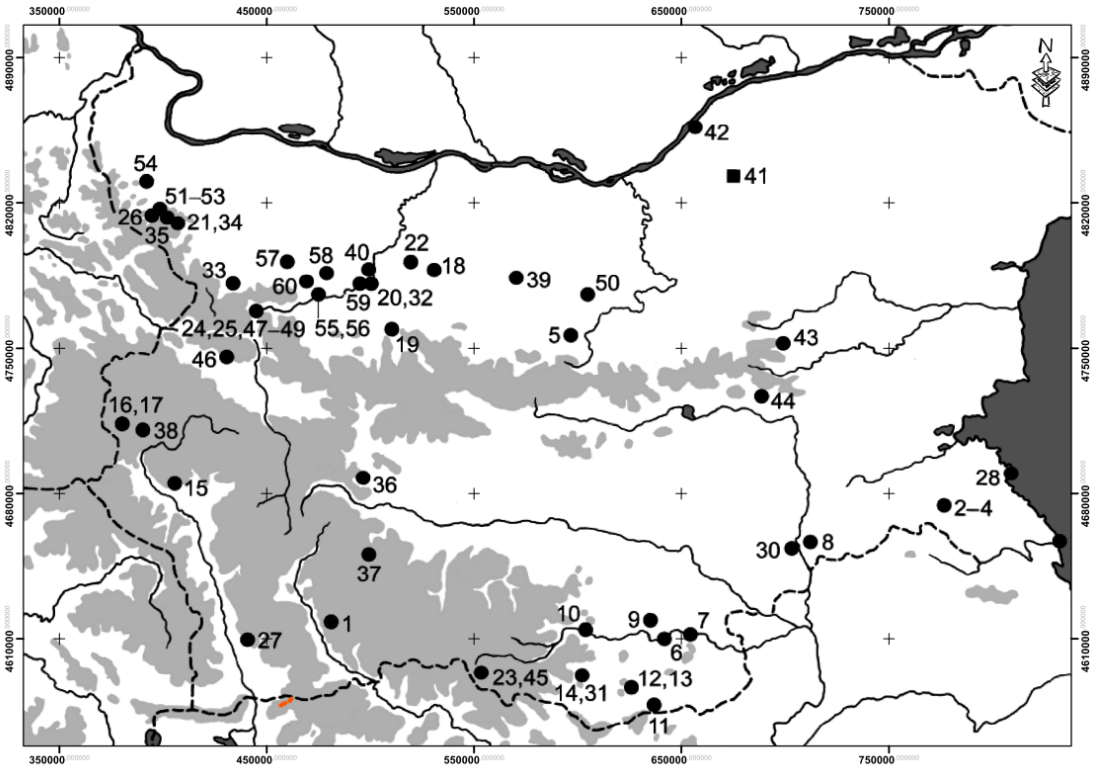
Map 149: Map of records of *Rhinolophus ferrumequinum* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the installation polygons of the project under study.



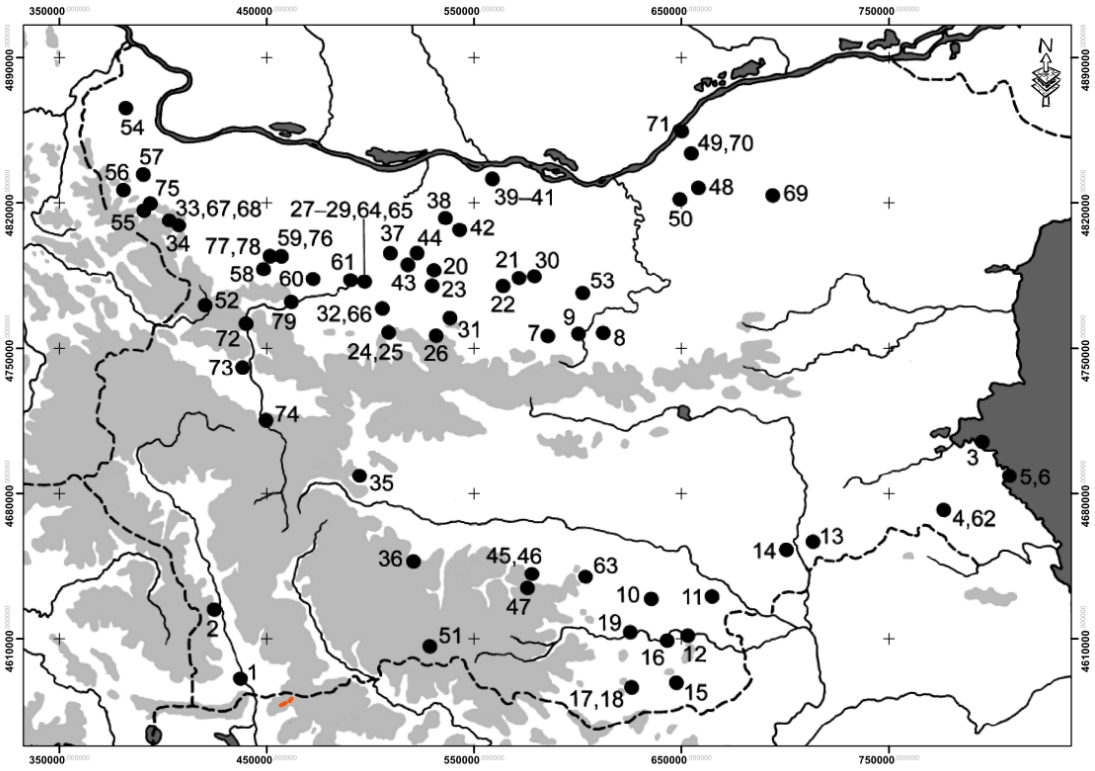
Map 150: Survey map of *Rhinolophus hipposideros* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the polygons of the installation of the project under study.



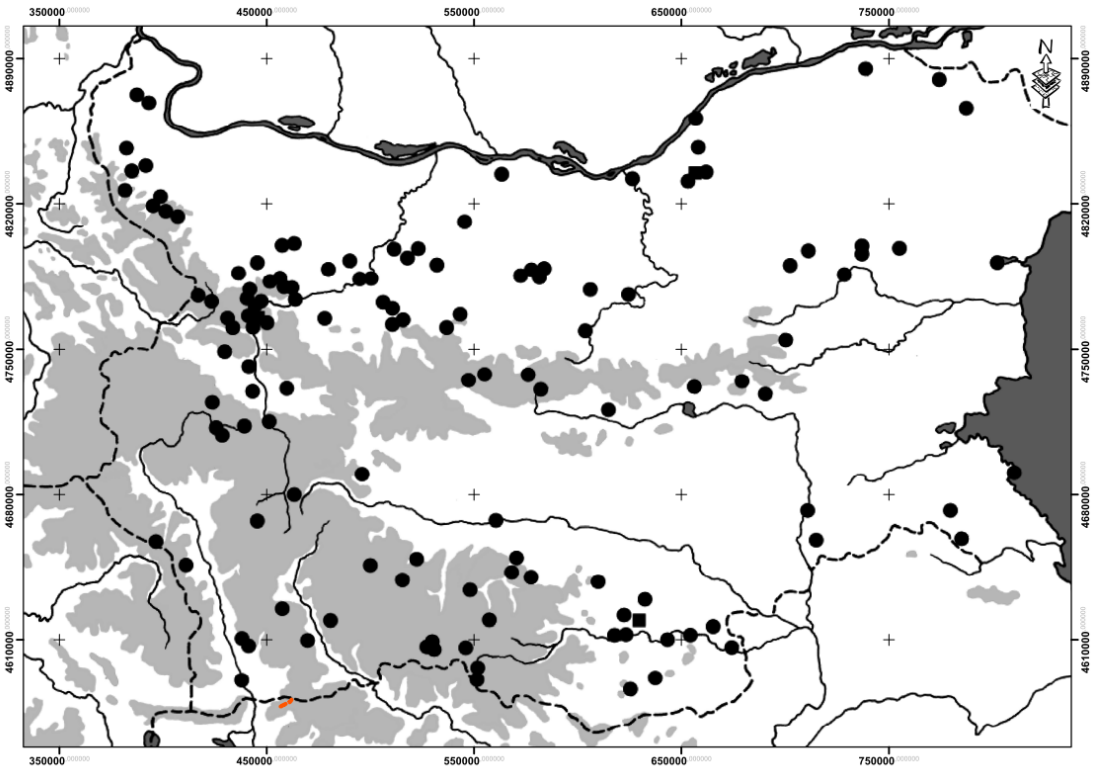
Map 151: Map of records of *Rhinolophus euryale* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the polygonal installation of the project under study.



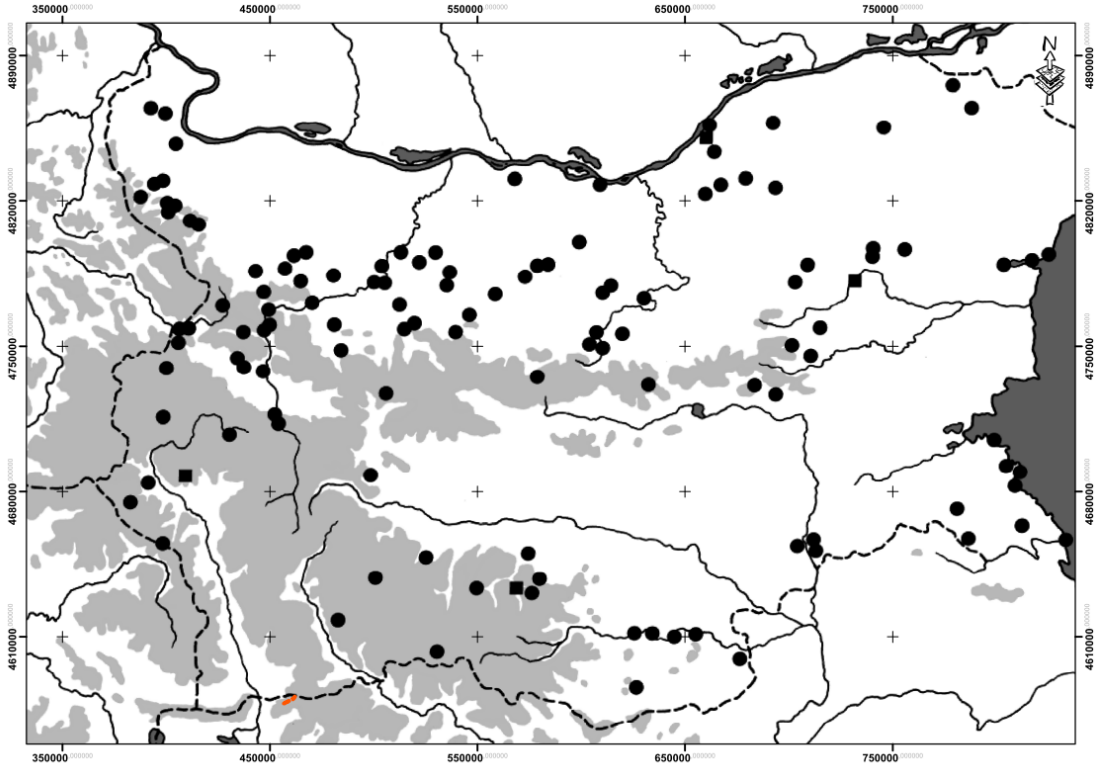
Map 152: Survey map of *Rhinolophus blasii* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the polygons of the installation of the project under study.



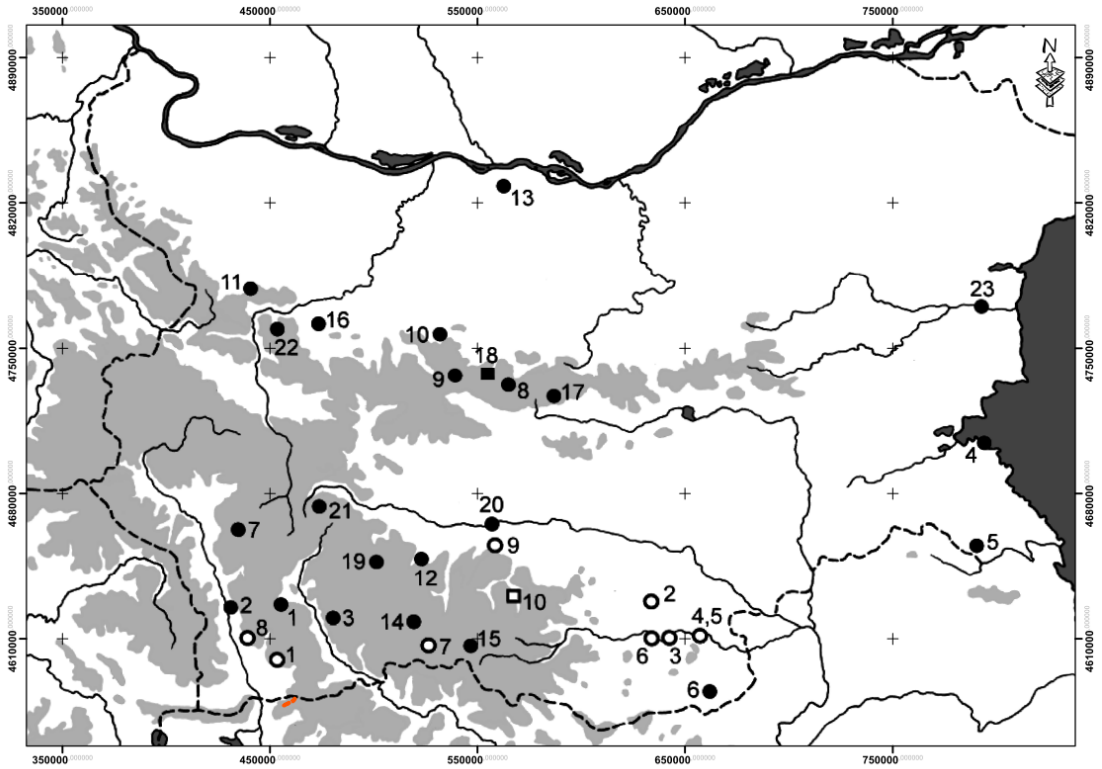
Map 153: Survey map of *Myotis capaccini* in Bulgaria. The black dot indicates the locations where the species is recorded, while the red dot indicates the area of the polygons where the project is to be installed.



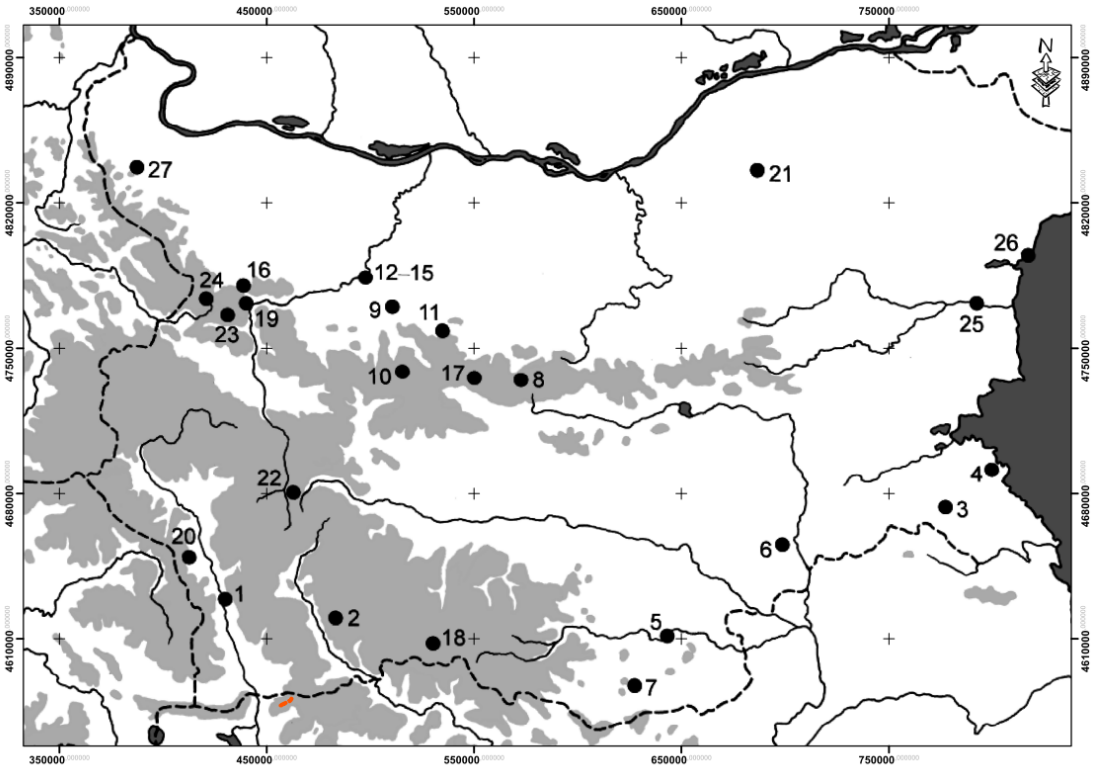
Map 154: Survey map of *Myotis myotis* in Bulgaria. The black dot indicates the locations where the species is recorded, while the red dot indicates the area of the polygons where the project is to be installed.



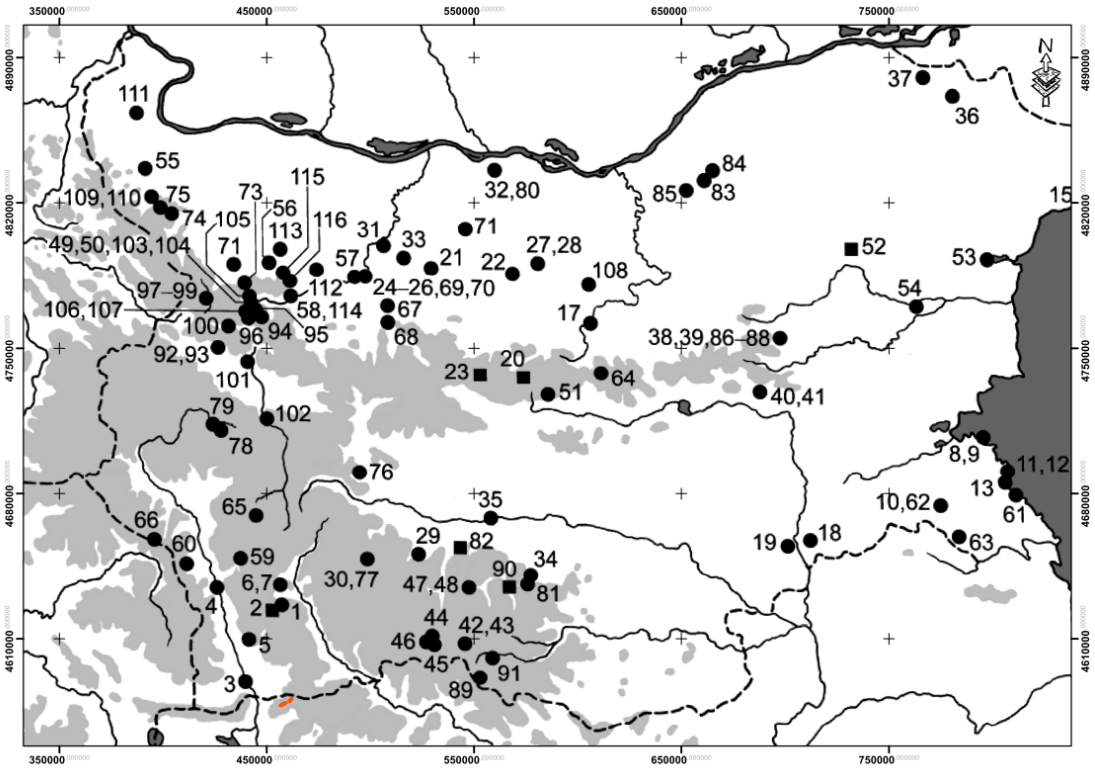
Map 155: Survey map of *Mioniopterus schreibersii* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the polygons of the installation of the project under study.



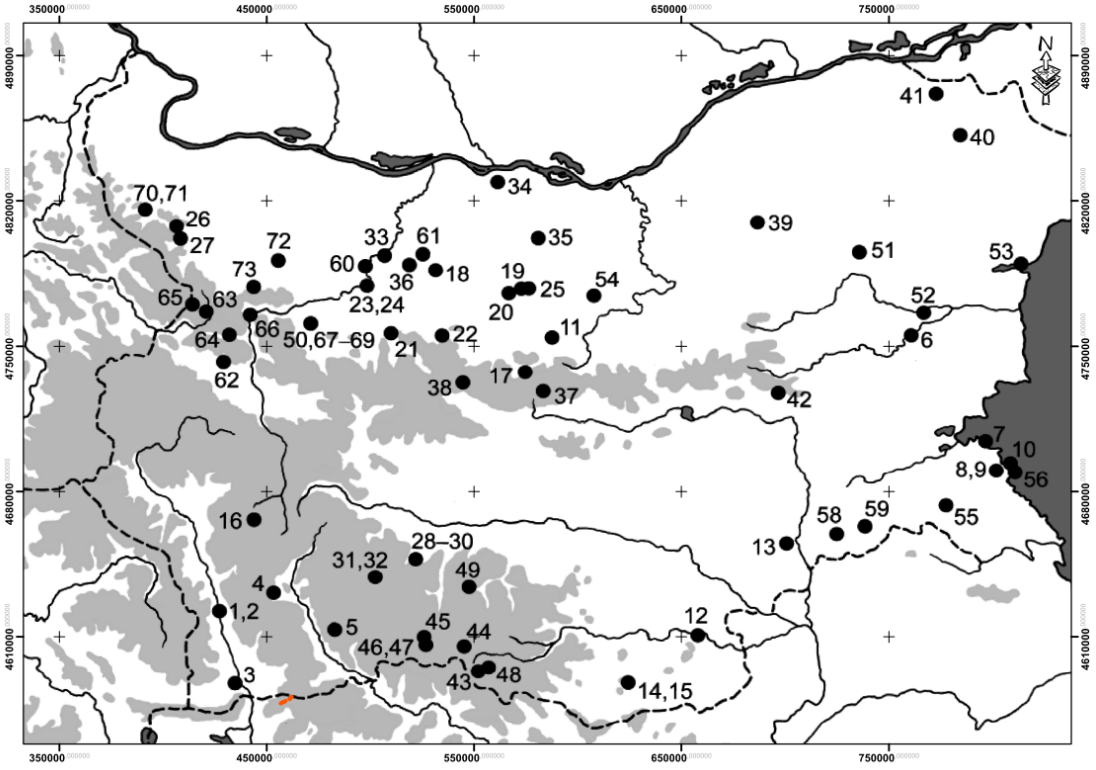
Map 156: Survey map of *Barbastella barbastellus* in Bulgaria. The black dot indicates the recording sites of the species and the red dot indicates the area of the polygons of the project site (*the white dots indicate the recording sites of Tadarida teniotis, which is not a species of interest here, as it is not a species listed in Annex II of Directive 92/43/EEC).*



Map 157: Map of records of *Myotis bechsteinii* in Bulgaria. The black dot indicates the recording sites of the species, while the red dot indicates the area of the polygons of the installation of the project under study.



Map 158: Survey map of *Myotis blythii* in Bulgaria. The black dot indicates the recording sites of the species, the red dot indicates the area of the polygons of the project under study.



Map 159: Survey map of *Myotis emarginatus* in Bulgaria. The black dot indicates the recording sites of the species, the red dot indicates the area of the polygons of the project under study.

From the above distribution maps of the 11 species of handicap species of interest in Bulgaria, it can be seen that the nearest individual recording sites of the above species in relation to the studied project are as follows:

- *Rhinolophus ferrumequinum*: the nearest recording site is located at a distance (in a straight line) of about 27 km from the area of the production licence blocks of the project under study.
- *Rhinolophus hipposideros*: the nearest recording location is approximately 6 km (in a straight line) from the production licence area of the project under consideration.
- *Rhinolophus euryale*: the nearest survey location is approximately 32 km (in a straight line) from the production licence area of the project under consideration.

- *Rhinolophus blasii*: the nearest survey location is approximately 34 km (in a straight line) from the production licence area of the project under consideration.
- *Myotis myotis*: the nearest survey location is approximately 22 km (in a straight line) from the area of the production licence blocks of the project under consideration.
- *Miniopterus schreibersii*: the nearest survey location is approximately 42 km (in a straight line) from the production licence area of the project site.
- *Myotis bechsteinii*: the nearest survey location is approximately 42 km (in a straight line) from the production licence area of the project site.
- *Barbastella barbastellus*: the nearest survey location is approximately 42 km (in a straight line) from the production licence area of the project under consideration.
- *Myotis blythii:* the nearest recording site is located at a distance (in a straight line) of approximately 19 km from the area of the production licence blocks of the project under study.
- *Myotis capaccinii*: the nearest survey location is approximately 21 km (in a straight line) from the production licence area of the project under consideration.
- *Myotis emarginatus*: the nearest survey location is approximately 22 km (in a straight line) from the production licence area of the project under consideration.

In conclusion, the only bat species that has a recorded presence at locations less than 10 km from the site is the bat of the same species. is the species *Rhinolophus hipposideros*, which is not classified as a threatened species according to both the IUCN red list and the Bulgarian and Greek Red Book (LC), and as mentioned above, the species (*together with Rhinolophus ferrumequinum*) is the most abundant in the country (273 sites).

Taking into account all of the above mentioned, it follows from the outset, as stated above, that given the correct siting of the study project site, and as evidenced by existing studies and scientific publications relating to the wider study area, that there

is no significant risk that the installation and operation of the project will result in negative impacts on the protected areas of the wider area, their conservation objectives and their protected objects. However, due to the sensitivity and significance of the wider study area, the intention of the study team to further assess the project site to evaluate whether, notwithstanding the above, mitigation measures are required to address any potential impacts caused and to propose a proper monitoring programme during the construction and operation phase of the project, it is considered that further investigation should be undertaken with the preparation of the next step of the Special Ecological Assessment (and the examination of

FIELD SURVEY AREA (FAR)

Detailed description of the Field Investigation Area (FIRA)

The survey area was defined as an area of 2,000 m radius from the boundaries of the production polygons of the project under study, much larger than the area defined as acceptable (specifically twice as large as this) in the specifications for the preparation of Special Ecological Assessments in the 170225/20-01-2014 Decree (Government Gazette 135/B/27-01-2014) for Category A1 projects and activities implemented within Special Conservation Zones, Special Protection Areas, Site of Community Importance. The definition of the Field Survey Area is reflected in the map "Study Area and Field Survey Area of the Project" in the Documentation Maps section. In practice, observations and records were made at a greater radius than that defined in the specifications for the preparation of the Special Ecological Assessments, since from the viewpoints the observation of raptors could be made at a distance of even more than 5,000 metres (using a telescope). The total number of sampling points for avifauna, habitat types - flora, and other fauna as well as the handicap species are depicted on the map "Distribution of field data collection sites within the Project Field Survey Area" which is also presented on a satellite image background in the documentation maps section (Maps 161, 162, 163, 164, 166 and 167).

The wind farm under study, Oxila, is proposed to be installed at the location 'Oxila', in the Municipality of Sintiki, in the Regional Unit of Serres. The project has been granted a production licence and includes 14 wind turbines with a total installed

capacity of 58,80 MW (individual capacity of each wind turbine 4,2 MW), type E115, with a rotor diameter of 115,70 m and a hub height of 149,0 m.

6 FIELD INVENTORIES AND IMPACT ASSESSMENT

Prior to the field survey, the available published literature for the area and any available unpublished reports were collected. The information presented in these sources was then assessed, and in conjunction with data collected, priorities were set in terms of field survey priorities in relation to the species and sections of the survey area.

For the identification and recording of the priority species of interest, the nomenclature reported in the IUCN and the classifications of the Red Book of Threatened Animals of Greece, the IUCN Red List and the annexes of the International Conventions were followed.

Given the large number of species of fauna - avifauna, of different orders, families, different seasonal presence, distribution, habitat preference and diverse ecological requirements, which are likely to be active in the wider study area of the project, it was considered necessary to group them into sets that can be treated scientifically as a group and to compile corresponding recording forms for the field.

Organisation of sampling sites by groups of bird and other fauna species, according to ecological requirements and habitat suitability

Given the grouping of bird species and their recording protocols, the selection of sampling sites within the boundaries of the survey area was made taking into account:

- The ecology of the species within these habitats
- The historical occurrence data of the species
- The accessibility of the sites and the time of approach
- The establishment of a permanent sampling network to allow for comparable data in the future
- The location of wind turbines
- The habitat types occurring within the field survey area and the stratified selection of sampling plots (excluding point survey stations from monitoring sites - see sampling methods)

Timing of measurements and analysis of methodology

A total of 45 field days were conducted within the year 2024 to achieve the observing schedule. Specifically, observation visits were made by team observers for

three days in the month of January, three days in the month of February, four days in the month of March, five days in the month of April, five days in the month of May, five days in the month of June, four days in the month of July, two days in the month of August, five days in the month of September, four days in the month of October, two days in the month of November, and three days in the month of December. On the above field days all the field work was carried out, which involved recording of fauna, avifauna (diurnal and nocturnal) and flora - habitat types. The above field days also included hours spent observing behavior and finding possible nesting sites of raptors and other important fauna species, and critical habitats by the study team researchers.

The organization of the field survey took into account: the number and populations of species hosted by the area; the degree of adequacy of available ornithological and other fauna data from the literature reports as well as previous relevant studies preceding the area, complete or reconnaissance in previous years, which enriched the knowledge and experience of the scientific research team about the area in question; the size, topography and accessibility of the area; the homogeneity, extent and diversity of the

For the needs of the field survey, data recording and visualisation, appropriate equipment was used, consisting of:

- Four-wheel drive vehicles
- Maps of the area
- 10 x 50 mirrors
- Telescopes 20 x 60
- Positioning devices (GPS)
- Laptop and Tablet computers
- Suitable GIS software
- High brightness lenses
- Digital cameras
- Portable CD players with speakers, etc.
- Digital trail cameras
- Batlogger C digital ultrasound recorder (Elecon AG) and use of special software program BatExplorer (v.2.1.4.0).

- Song Meter Micro Wildlife Recorder and use of the special software AviaNZ (v3.2.3).
- Digital rangefinders

Bird fauna

In accordance with the international literature and as defined by the YPEKA study "Monitoring and assessment of the conservation status of avifauna species in Greece" (Vlachos et al. 2014), and the extent and nature of the study area, the proposed fieldwork for the recording of avifauna species was carried out using a combination of the methods listed below, per bird group:

GROUP A: Raptors (suitable methods also for recording waterfowl, waders, great crested grebes and seabirds likely to pass through the area)

1. Recording by the method of point recording stations from observation points

2. Recording of nocturnal birds of prey using the method of point recording stations and the reproduction of sound recordings

3. Recording of Yiddish by the method of linear car routes (synergy of sampling during movement between point recording stations of nocturnal predators).

GROUP B: Oystercatchers, Woodpeckers, Crows, Crows, Cuckoos, Cockatiels, Doves, Hornbills, Pterodactyls, etc.

1. Recording by the method of point recording stations by direct observation and by ear,

2. Recording by the method of linear paths with wetting

Additional care was taken to find nesting sites of birds of prey in suitable habitats in the study area and if a nest is found, the site is recorded and the recording is evaluated accordingly. For the above work, field hours were dedicated on all days of the months within the breeding season by the study team, with scanning of the area to find nests, observation from view sites to detect behaviour indicative of breeding-nesting by raptors (in-flight transport of nesting materials, food, etc.etc.), gradual

movement of the investigator to the nearest point in the direction of the path of the raptor exhibiting breeding behaviour until the nest is found, etc.

In addition, during the night surveys of nocturnal birds of prey, during the migration periods, the field stay was extended at each selected location for the purpose of night observation and possible recording of birds migrating at night, when the lighting conditions (moon phase - cloud phase) allowed it. Finally, in addition to the above, a Song Meter Micro Wildlife Recorder type bioacoustic station was placed in the field during the study area visits to record sounds in mp3 format during the night in order to record nocturnal raptors and migratory birds (during migration periods). The bioacoustic station was placed in a fixed point (tree or rock) with no fixed obstacles around it, in order to cover as much of the study area as possible. We avoided placing the bioacoustic station in close proximity to continuous sources of sound production such as livestock pens, high frequency roads, running water, etc. The placement in the installation area was also carefully done to stabilize the device in order to avoid recording sounds from wind-borne creaking and turbulence. The sound files were then transferred to a computer and using AviaNZ software (v3.2.3) the recordings were analysed. On average in the region recordings of 8 hours duration required a working time of 45 minutes for computer identification.

The above methodologies applied are the most appropriate for the reported bird groups based on international literature and according to the study of the Ministry of Environment and Energy "Monitoring and assessment of the conservation status of avifauna species in Greece" (Vlachos et al. 2014).

In more detail:

Birds of prey (suitable methods also for recording waterfowl, waders, great crested grebes and seabirds likely to pass through the area)

- **Vantage Point-count Stations (VPCS)**

Counting from fixed vantage points of good surveillance altitude, by scanning through macroscopic observation (binoculars and telescope) a large part of the study area, preferably 360^{o}circumferentially. The four most suitable sites were selected for the area, as indicated on the relevant documentation maps (documentation maps section) with a yellow triangle. The sites were selected to provide the best coverage around the

perimeter of the site of the project under consideration. The recordings were implemented mainly in the morning and at midday (always at least one hour after sunrise). The observer used binoculars and a 20x60 spotting-field scope. In this method the recording is made using both means of macroscopic observation. He also carried a GPS device for precise positioning and several sheets of paper with the appropriate recording forms in a special binder, on which the basic station data for each sampling area, such as altitude, coordinates, place name, code of the sampling area, number of visits to the sampling area and the observer's full name, had been filled in beforehand. The observer also carried a temperature measuring device, a clock-timer, and a bird identification guide. To conduct the recordings, the observer took position at the station by placing the ground telescope at a fixed point that allowed it to rotate fully at an angle of 360^{o}. He scanned the area with both binoculars and the telescope and recorded the raptors he spotted over a period of three hours. The observer scanned the entire area around him at an angle of 360^{o}for 30 consecutive minutes, followed by a rest stop for a few minutes and then the same procedure again. All species detected were recorded on the corresponding recording form

- **Playback point-count stations with audio call playback and recording of the species Yiddish**

Counting from fixed points by playing back an audio call and recording the call-response. It is especially applicable to nocturnal predators.
In the study area, three point-counting stations with sound call reproduction were selected, as indicated on the relevant maps (documentation map section) by blue circles (and white circle on the corresponding map with satellite image background). At each station, sound records of calls of nocturnal predators were played back in a specific way (in ascending order according to the size of nocturnal predators) and then their responses were recorded accordingly The above method has been effective both in closed habitats with dense vegetation and in open habitats with low vegetation. The method involves recording a set of species of nocturnal birds of prey belonging to the order *Strigiformes* and the families *Tytonidae* and Strigidae. From the sound record breeding stations for the recording of nocturnal raptors, individuals of the species Yiddlebird shall be recorded by ear, as well as at any point where they are visually confirmed on the linear routes and especially when moving between the above stations

during the night. The main equipment of the observer in this case was an audio file on a CD, written in a specific way to ensure that there was proper sequencing between audio files and proper time gaps between playbacks. The observer also carried a hand-held GPS device, a binder with several sheets with the appropriate recording forms, a temperature measuring device, a clock-timer, and a voice guide for bird identification. To conduct the recordings, the observer turned off the car engine and, after preparing the recording form, waited silently for 2 minutes. He then reproduced the call of a species of nocturnal raptor for 20 seconds, followed by a one-minute pause, and repeated the procedure for 2 more times. In this way, for each nocturnal predator species, there was 1 minute of total playback call playback and 3 minutes of pause, while recording responses (responsive listening). The playback of the sound files started with the smallest species and continued until the largest species.

Methods for Oystercatchers**, Oak-shaped, Crows, Raven-shaped, Decapods, Cockatiels, Pigeon-shaped, Hornbills, Pterocleidomorphs, etc.**

- **Point-count Stations (Point-count Station)**

Counting from fixed points, within a specified radius around them, using both macroscopic observation (mainly with binoculars where required) and species identification by ear. Eight corresponding locations were selected in the field survey area, as shown on the relevant maps (documentation map section) drawn with green circles per station. The method is effective both in closed forest ecosystems of dense vegetation and in open habitats of lower vegetation. Recordings were started, on a case-by-case basis, from 15 minutes before sunrise and the study team attempted to finish with them before noon. The observer was equipped with binoculars and a 20x60 telescope (binoculars were mainly used). In this method the recording relied heavily on hearing as well. Each observer also carried a handheld GPS device, in a special binder several sheets with the appropriate recording forms, a temperature measuring device, a clock-timer, and a bird identification guide. To conduct the recordings, the observer calmly approached the PCS and took a position in the center of the imaginary circle of 100-m radius. Initially he waited quietly for 2 to 3 minutes, so that in case his arrival affected some species of ostriches, they would return to their previous condition. Then a recording of the species of ostriches was carried out as described below for a total of 7 minutes. A total of 3 minutes of stopping and 7 minutes of recording was required at

each station, for a total of 10 minutes of total stay. Species that flew at a height greater than that of the tree crown were recorded as "fly over". If species were observed flying above the sampling area during the observation time, when they did not stop they were recorded as independent "fly over", while if they stopped within the observation habitat the cross-section was recorded as dependent "fly over".

- **Foot Line-transects**

Counting during the implementation of identified terrestrial routes of a specific length, using both macroscopic observation (binoculars) and species identification by ear. The transects cross parts of the species' habitats in the study area sampling plots and are implemented on foot. Two corresponding linear transects were installed in the study field survey area and are depicted in blue on the relevant maps [documentation map section]. Recordings were started, on a case-by-case basis, from 15 minutes before sunrise and the study team attempted to finish with them before noon. The observer used binoculars while identification was also done by hearing. Each observer also carried a handheld GPS device, a special binder with several sheets of paper with the appropriate recording forms, a temperature measuring device, a clock-timer, and a bird identification guide. Each installed transect was 500m long. To carry out the recordings, the observer took position at the beginning of each transect and initially was silent for 2 to 3 minutes, so that in case his arrival had affected some species of ostriches they would return to their previous condition. He then carried out a census of the stratiform species as described below until the end of the transect wetting. The observer slowly wetted the entire 500m transect, and recorded all species of stratiforms identified visually or audibly. He also recorded the number of individuals of each species and the azimuth of the direction of detection. He also filled in whether the individuals he observed were within 100 m of each side of the transect, or at a distance of more than 100 m. If species of oystercatchers were observed flying over the sampling area during the wetting period, when they did not stop they were recorded as an independent "fly over", and if they stopped within the habitat crossed by the transect they were recorded as a dependent "fly over".

In all the above cases, except for the recording of nocturnal predators, some evidence of the behaviour of the species observed in each case was recorded according to the following symbols and their interpretations: Flight - PT, Courtship - KN,

Searching - finding food and foraging - TR, Defining - defending territory - HP, Pair formation - ZE, Locating nesting sites - FL, Laying and incubating eggs - AW and Transferring food to young - TRM. The above decoding of the behaviour of the recorded species is an indication of the likelihood of breeding of these species in the area.

Regarding the other fauna (excluding avifauna) of the floodplain, records of reptiles, amphibians and mammals were carried out for a comprehensive assessment of the study area based on the following methodology.

Methods of recording arthropods

The field survey, in the areas proposed for wind turbine installation, was conducted using the most appropriate techniques and equipment with respect to habitat, using an automated ultrasonic recording system. More specifically, monitoring and identification of handbats was carried out using ultrasonic bat detectors (bat detectors) with recordings of ultrasonic sounds of bats during their nocturnal activity (foraging, movements etc.). The ultrasound recordings were digitally recorded using the Batlogger C device (Elecon AG) and the recordings were analysed using the BatExplorer software (v.2.1.4.0). Before selecting the recording method, frequency of recordings and the final draft methodology followed, a survey was conducted to identify potential species refugia from literature data. According to the LIFE GRECABATS project, the 230 most important bat refuges in Greece (caves, mines, buildings, etc.) and caves as habitats of Directive 92/43/EEC (8310: Caves which are not exploited for tourism) were selected to be proposed as protection sites by the specific Environmental Studies under preparation and the following Management Plans. The main criteria for their selection were the number of species and colony sizes of cephalopods and the number of typical species and narrowly endemic species of invertebrates for the 8310 habitat. The proper management of most of the Annex II species of bats of the Habitats Directive, but also of cave colonies and their other typical and important species, requires proper management of the surrounding area. This area feeds the bats, but also determines the availability and quality of organic matter and water inside the bedrock and caves and plays a key role in their microclimate. Based on the above, **protection areas around each important cave site or wider feeding areas have** been designed and proposed by the above programme. Of the above designated important caves and protection areas

(cairns and wider foraging area) within a radius of 5 km, it was found that none are located both within the production license blocks of the project under study and within the field survey area, with the nearest wider foraging area being the location of "Kataraktes, Tristomo and Warm Waters Cave". More specifically, this wider protection area (kurnia and wider feeding area) is, as mentioned above, approximately 5.40 km south of the production polygons of the project (Map 165). The study area, specifically the production polygons of the project under study, is not located within a mature broadleaf forest that would from the outset negatively predict potential negative impacts of project installation on bats due to high mortality (Dürr 2007, Kelm et al. 2014) and the severe habitat impacts that such placements can cause to all species of bats. Also, no other habitats that are particularly important to bats, such as tree lines, hedgerow networks, wetlands, water bodies and streams (e.g. Limpens et al. 1989; Limpens and Kapteyn 1991; de Jong 1995; Verboom and Huitema 1997; Walsh and Harris 1996a, b; Kelm et al. 2014). Based on the above, no significant impacts are initially expected from the project installation on bats in the study area.

Based on all of the above data, the area was not initially classified as an area of high probability for the presence of large numbers of species and individuals of ungulates. In order to monitor and record chimpanzees in the study area, recordings were made throughout the fieldwork (January 2024 - December 2024 - 24 nights in total). Throughout the fieldwork period, recordings were made for one evening in January, February, August, November and December (total of 5 evenings), for two consecutive evenings in July and October (total of 4 evenings) and for three consecutive evenings in March, April, May, June and September (total of 15 evenings) at a total of four selected sites (Maps 162 and 164). Species with a record quality > 15% were included in the analyses, so that their identification could be considered reliable. In cases where more species were proposed, those with a reliable record quality > 45% were selected from the list (Brabant et al. 2018).

Method for recording reptile and amphibian species

- **Linear routes**

When applying this method, paths were taken to and from specific points within the survey area, and the species of amphibians and reptiles detected by the observer were recorded. Two linear transects (coinciding with the corresponding linear transects

installed for avifauna) were installed in the surveyed field survey area, which are depicted in blue on the relevant maps (documentation map section).

- **Random routes**

The observer moves through an area with as uniform a habitat as possible and records the species observed. The method is highly efficient and allows more species to be recorded, while not giving an idea of relative density. The advantages of the method include the ability of the observer to visit suitable microhabitats and to survey with a view to identifying specific species present in them, always in accordance with his experience. Recording on random routes was carried out throughout the study area during the observer's movement to the recording sites on the various visits made for fauna observations (light trap placement), and additionally on the visits made for avifauna observations (sampling sites for avifauna).

- **Routes by vehicle**

To make the most of the researchers' travel time between the remaining sampling sites for all fauna species and habitat and flora types, and to gather as much data as possible on the presence of species in the study area, an attempt was made to check and record live and dead individuals present on the road network near the study area. In this way, and given the constant movements of the study team to and from the various sampling locations by vehicle and the developed road network in the area, a check was made on the road network for possible recording of individuals of the above species, dead or alive. The vehicle was driven at low speed for the above recording. Also in this method, it was possible to record dead mammals or birds on the road network as an auxiliary measure.

Method for recording mammals (except hand-held mammals)

- **Indirect observation using bioluminescent signs on linear routes**

During the hiking movements of the researchers between the sampling sites and during the movement on the linear transects installed for avifauna, during the return of the researcher and after the end of these measurements, biotic evidence of the presence of mammals (droppings, hair, tracks, etc.) was recorded. The routes are depicted in blue on the relevant maps in the documentation maps section. Recordings were made

throughout the study area during access to the recording sites on the various visits that were made to observe both fauna and avifauna.

- **Direct observation using light sources at night**

Vehicle journeys were made at a consistently low speed during the night-time movements to and from the nocturnal raptor recording sites. The driver, using the vehicle's light sources, recorded any mammal presence during the drive. The driver recorded any mammal that was crossing the road or was on the roadway or on either side of the roadway and within a short distance of the roadway.

- **Installation of a network of light traps in the area**

To record the mammals in the study area, 10 automatic recording light traps were also chosen to be placed which covered a total of 15 recording sites in the wider area (field survey area and wider area) during the period January 2024 - December 2024, with a total field stay of 32 days ensuring a total of 252 days and nights of recording (10 x 33 = 320) (Maps 163 and 164). Specifically, light traps remained in the field for four consecutive days in April, May, June and September (total 16 days), for three consecutive days in March and October (total 6 days), for two consecutive nights in January, February, July and December (total 8 days) and for one night in August and November (total 2 days).

- **Auxiliary use of a bio-acoustic station**

In addition to the above, as already mentioned, a Song Meter Micro Wildlife Recorder type bioacoustic station was placed in the field during the visits to the study area to record sounds in mp3 format during the night, mainly for the purpose of recording nocturnal birds of prey and migratory birds (during migration periods). However, the use of the bioacoustic can also assist in the recording of spatial mammals (e.g. species such as wolf and jackal). The bioacoustic station was placed in a fixed location (tree or rock) with no fixed obstacles around it, in order to cover as much of the study area as possible. We avoided placing the bioacoustic station in close proximity to continuous sources of sound production such as livestock pens, high frequency roads, running water, etc. The placement of the installation site was also carefully done in order to stabilize the device to avoid recording of sounds from airborne creaking and turbulence. The sound files were then transferred to a computer and using AviaNZ

software (v3.2.3) the recordings were analysed. On average in the region, recordings of 8 hours duration required 45 minutes of work time for computer identification.

Work on the recording of Annex II flora species and Annex I habitat types of Joint Ministerial Decision H.P. 14849/853/E103/4.4.2008

Description of Fieldwork

Five (5) field visits were carried out between April and early September to record the habitat types, define the sampling plots and carry out the flora survey. The centres of the sampling plots were recorded using a GPS device.

Work to record habitat types

Vegetation is dynamic, does not remain unchanged and evolves according to environmental conditions. Vegetation analysis began with the identification of physiognomically distinct vegetation types and the selection of sample plots for floristic analysis, with a field visit to in late April 2024. Spring season species are shown in photos 5-7, given in a later section of this report (see photos documenting fieldwork).

The study area, can be divided into two sections. The part outside the protected area 'Peaks of Mount Orvilos', where the proposed locations for the installation of wind turbines No. 1 to 10 are located (photo 65), and, the part within or near the protected area 'Peaks of Mount Orvilos', where the proposed locations for the installation of wind turbines No. 11 to 14 are located (photo 66).

Photo 65: The first part of the study area

Photo 66: The second part of the study area

In the study area, the introduction of woody species in the open places of the meadows and the restriction of herbaceous vegetation (photo 67) is evident in the process of ecological succession, leading to the development of the climax plant community that is in balance with the corresponding ecological conditions of the area (Pyrenees 2011).

In the first part of the area (proposed locations for the installation of wind turbines 1 to 10) the vegetation types were recorded based on field observations and measurements. For this work, a combination of criteria such as: dominant plant species, vegetation physiognomy, percentage of vegetation land cover, land use or the particular ecological characteristics were used (Butcher et al., 2013). The vegetation type of an area is determined by its structure and floral composition, i.e. the qualitative and quantitative combination of plant species involved in it (van der Maarel, 2005).

Photo 67: Establishment of woody species on the open stony dry slopes of the south-southeastern part of the area (towards Achladochori).

In contrast, the determination of vegetation types within or near the protected area (proposed locations for installation of wind turbines 11, 12, 13 and 14) was not based on field observations and measurements but followed the mapping results for the terrestrial areas of the Special Conservation Areas of the Natura 2000 network. The polygon boundaries do not appear to have been drawn with sufficient accuracy, even in cases where the physiognomy between adjacent vegetation types differs significantly (e.g. ostrich forest in contact with grassland) although the difference was evident in the aerial photography used. Note that, the habitat type on the sampled vegetation plot does not match for all four proposed locations for wind turbine installation (11, 12, 13,and 14) with the corresponding habitat type code on the mapped polygon (photos 68 and 69) resulting in grassland areas being mapped as ostrich, eastern anchor and mixed thermophilic forest.

Photograph 68: Type 62A0: Eastern Sub-Mediterranean Dry Grassland (Scorzoneratalia villosae) in sampling location 11 of the study area, located less than 20 m from the boundary of the protected area "Peaks of Mount Orvilos". **Photo 69**: Type 62A0: Eastern Sub-Mediterranean Dry Grasslands (Scorzoneratalia villosae) at sampling sites 12, 13 (either side of the tree belt in the middle of the image) and 14 of the study area within the boundaries of the protected area. In both cases in the mapping for the terrestrial areas of the Natura 2000 Special Areas of Conservation are designated areas of habitat type 925A (ostrich, eastern anchovy and mixed thermophilous forests). The present study has followed this existing designation (925A).

Twelve (12) sampling plots (SS) were established for field data collection at the proposed wind turbine locations from Wind Turbine 3 to Wind Turbine 14. Due to the long distance between the proposed wind turbine installation locations 8 and 9, two additional sampling plots (sampling locations 07 and 08) were selected (see Photo 343, provided in a later section of this report - *see fieldwork documentation photos*).

With successive taxa recording visits within the sampling plots, the individual sites and vegetation types of the study area were explored floristically. Criteria for the selection of each sampling plot were:

- The proposed locations for wind farm installation.
- The homogeneity of its floral composition and ecological conditions.

The minimum area and size of the sampling area was then determined. Although the sample plots can have different shapes each time, as long as they belong to a floristically and ecologically uniform vegetation unit, however, in this study, following Kent and Coker (1992), rectangular-shaped quadrats were chosen to facilitate the calculation of the area of the plot. The minimum sample area of a vegetation unit is taken as the smallest representative area that has all those characteristic species of the plant community to which it belongs.

The method used for vegetation inventory is surface sampling, which is a widely used method and is appropriate for achieving the objectives of Directive 92/43/EEC (Dimopoulos, et al., 2005).

The recommended sample area size (m^2) for the type "Ostrias, eastern anchovy forests and mixed thermophilic forests" with code 925A, according to the "Methodology for monitoring and assessing the conservation status of habitats in Greece" (Dimopoulos et al, 2018), is 200-400m^2in the study area, 400m^2plots were selected , regardless of their agglomeration or stage of development (Sample plots: 01, 09, 10, 11, 12, 13, 14). The sample plots for the type 'Eastern sub-mediterranean dry grassy interspersed dry grasslands (Scorzoneratalia villosae)', code 62A0, although proposed to be 25m^2, were selected to be larger (200 m^2) (Sample plots: 02, 03, 04, 05, 06, 07, 08). The sample plots are shown in Figures 329, 330-333, 335-342, 343, 344-353, 355-356, 357-362, 364-371.

The vegetation sampling adopted the aforementioned surface dimensions suggested for each Habitat Type. In the case of this study, although the whole site is not included in the Natura 2000 network, the vegetation data were recorded and assessed following an assessment protocol similar to that of the Habitat Types of Directive 92/43/EEC. The protocol was based on the need to record in the field those features that can be completed in the field and record monitoring parameters of Directive 92/43/EEC habitat types:

- Typical species, structures and functions of the habitat type.
- Negative effects (pressures and threats).
- Habitat types are recorded in terms of their representativeness, area and conservation status.

The coordinates of the sampling sites and their characteristics are given below.

Table 31: Characteristics of sampling sites from the study area.

A/N	STATION NAME	COORDINATES		NUMBER OF CORRESPONDING SITE OF INTEREST FOR WIND TURBINE INSTALLATION	HABITAT CODE	POLLUTION
		LATITUDE	LENGTH			
1	01	41°21'26.88 "B	23°29'40.29 "A	Wind turbine 3	925A	Ostrich, eastern anchovy and mixed thermophilic forests
2	02	41°21'35.48 "B	23°29'46.55 "A	Wind turbine 4	62A0	Eastern sub-Mediterranean dry grassy interspersions (Scorzoneratalia villosae)
3	03	41°21'40.47 "B	23°30'3.13 "A	Wind turbine 5	62A0	Eastern sub-Mediterranean dry grassy interspersions (Scorzoneratalia villosae)

A/N	STATION NAME	COORDINATES		NUMBER OF CORRESPONDING SITE OF INTEREST FOR WIND TURBINE INSTALLATION	HABITAT CODE	POLLUTION
		LATITUDE	LENGTH			
4	04	41°21'43.83 "B	23°30'22.33 "A	Wind turbine 6	62A0	Eastern sub-Mediterranean dry grassy interspersions (Scorzoneratalia villosae)
5	05	41°21'52.47 "B	23°30'34.60 "A	Wind turbine 7	62A0	Eastern sub-Mediterranean dry grassy interspersions (Scorzoneratalia villosae)
6	06	41°21'59.91 "B	23°30'49.03 "A	Wind turbine 8	62A0	Eastern sub-Mediterranean dry grassy interspersions (Scorzoneratalia villosae)
7	07	41°22'17.22 "B	23°31'45.71 "A	METAXY Wind Turbine 8 & Wind turbine 9	62A0	Eastern sub-Mediterranean dry grassy interspersions (Scorzoneratalia villosae)
8	08	41°22'18.05 "B	23°31'53.78 "A	BETWEEN Wind Turbine 8 & Wind Turbine 9	62A0	Eastern Sub-Mediterranean dry grassy interspersions (Scorzoneratalia villosae)
9	09	41°22'22.84 "B	23°32'3.96 "A	Wind turbine 9	925A	Ostrich, eastern anchovy and mixed thermophilic forests
10	10	41°22'27.32 "B	23°32'15.98 "A	Wind turbine 10	925A	Ostrich, eastern anchovy and mixed thermophilic forests
11	11	41°22'33.93 "B	23°32'26.63 "A	Wind turbine 11	925A	Ostrich, eastern anchovy and mixed thermophilic forests
12	12	41°22'42.77 "B	23°32'33.06 "A	Wind turbine 12	925A	Ostrich, eastern anchovy and mixed thermophilic forests
13	13	41°22'51.97 "B	23°32'36.49 "A	Wind turbine 13	925A	Ostrich, eastern anchovy and mixed thermophilic forests
14	14	41°22'59.61 "B	23°32'44.37 "A	Wind turbine 14	925A	Ostrich, eastern anchovy and mixed thermophilic forests

List of habitat types of Annex I of the Joint Ministerial Decision H.P.14849/853/E103/4.4.2008 (Government Gazette B΄ 645) (if they are Special Conservation Areas, Sites of Community Importance).

In the northern part of the study area, the slopes (with steep gradients) are covered by deciduous broadleaf forests dominated by oak (photo 372 - see *photos documenting the fieldwork*).

In the southern part, the stony slopes (steep slopes) are mainly covered by shrubby woodland dominated by sturgeon juniper, foxtail and rush (photo 373). In contrast, the ridge (from the east to the west of the study area) is dominated by herbaceous species with little presence of woody species.

In the easternmost part of the study area, which has the highest altitude, discontinuous structures of calcareous beech forests occur in gullies

As regards the vegetation cover, the following vegetation layers are observed, with their approximate altitudinal limits:

- Trans-Mediterranean vegetation floor, 850-1,000 m,
- Upper-Mediterranean vegetation floor, 1 000-1 650 m.

According to Balafoutis (1977:113) the climatic type of the area can be described as transitional between Mediterranean and continental climate. The bioclimate of the area shows a transition from sub-Mediterranean character ($0<\chi<40$) at low altitudes to arid temperate ($\chi=0$) at high peaks and the study area belongs to the humid bioclimatic floor, with severe winter ($m<0°C$) (Mavrommatis 1980).

The sites of interest for wind turbine installation are located near the old outpost "KALI" and follow the ridge towards the peaks of Orvilos where grassy and herbaceous species dominate. Small tree or shrubby structures are found in a few places along the ridge (photos 374, 375 and 376).

In the last decades, after the reduction of human activities, the presence of woody structures (mostly shrubs) is the result of secondary succession and coincides with the expansion of the forest of oak and other deciduous broad-leaved species, which covers the part north of the ridge. The expansion of the dominant vegetation type in the area (925A oak, eastern anchor and mixed thermophilous forest) occurs over pre-existing grassland type.

The past grasslands on the northern and eastern sides of the Achladochori plain, as their origin is anthropogenic, i.e. they originated from forests or other ecosystems

that were modified by human impacts over the centuries, were not climactic (climax associations) but successional plant communities. In recent decades, with the reduction of grazing, a progressive evolution of vegetation has begun, leading to the benefit of shrublands and forests. Vegetation changes over time, changing through several stages to reach a final, climax association, which is determined by the climate of the specific area.

Only in two places in the study area, between sites of interest 13 and 14, located to the east of the study area, are there two narrow strips of forest (less than one hundred meters wide) that continue south of the ridge (Photo 377).

Inventory of characteristics of the Habitat Types located within or near the study area

925A: oak, eastern anchovy and mixed thermophilous forests

The majority of the study area falls within habitat type 925A, which is widespread in sub-Mediterranean Europe and occurs frequently in the northern part of Greece, usually in stoloniferous stands on a variety of substrates. In the study area they occur throughout at altitudes from 715 to 1,350 m. They are a typical habitat of the sub-Mediterranean vegetation zone characterized by a variety of thermophilic deciduous species. In the study area typical species of the T.O. occur in tree and shrub form (typical species have the role of biomarkers and are considered species that can reflect the degree/status of conservation of habitat types and their structures and functions (Evans and Arvela 2011 in Dimopoulos et al. 2018). Among them are *Ostrya carpinifolia, Carpinus orientalis, Fraxinus ornus, Quercus pubescens, Cornus mas, Rosa canina.* In the understory among others the following species appear: *Aremonia agrimonoides, Silene italica, Veronica chamaedrys, Dactylis glomerata.*

62A0: Eastern sub-Mediterranean dry grassy interspaces (Scorzoneratalia villosae)

Habitat type 62A0 comprises sub-continental, dry to semi-dry grasslands. This habitat is composed of steppe or subcontinental grasslands on one side and oceanic and sub-oceanic grasslands on the other side. It occurs in a variety of exposures, altitudes, slopes and geological substrates. The understorey is dominated by herbaceous plants, especially grasses. These include *Alyssum murale, Astragalus onobrychis,*

Chrysopogon gryllus, Draba lasiocarpa, Eryngium campestre, Festuca valesiaca, Satureja pilosa, Thymus sibthorpii, Asperula aristata, Carduus kerneri, Dianthus gracilis, Euphorbia myrsinites, Paronychia rechingeri, Potentilla detommasii, Potentilla recta, Thymus thracicus.

9150: Meso-European calcareous beech forests of the Cephalanthero-Fagion.

These are dry thermophilous forests of Fagus sylvatica on calcareous, often shallow soils usually on high gradient slopes in Meso-Europe and western Europe influenced by the Atlantic and north-central Europe with generally abundant pore- and shrub-rich vegetation, characterised by Carex, agroforestry, orchids and thermophilous species transitional from *Quercetalia pubescentis.* The type occurs on substrates that are predominantly carbonate and occasionally may be limestone, marble, porphyritic volcanic and rarely shale. The existence of a calcareous substrate is not a prohibitive factor for the occurrence of beech forests, as the necessary moisture is ensured in most places of occurrence in the Orbán. The relatively strong presence of *Quercetalia pubescentis* species indicates the prevalence of relatively warm conditions. In the protected area (GR1260005), as this species does not occur at the sampling sites. Typical species occurring include: *Fagus sylvatica, Fraxinus ornus, Ostrya carpinifolia, Viburnum lantana, Aremonia agrimonoides, Cephalanthera damasonium, Epipactis helleborine, Neottia nidus-avis, Physospermum cornubiense, Mercurialis perennis, Fragaria vesca, Calamagrostis arundinacea, Carex digitata, Cephalanthera rubra, Epipactis microphylla, Euphorbia amygdaloides, Melica uniflora, Monotropa hypopitys*.

Work to record flora species

A total of 283 species and subspecies were recorded from sampling at the sites of interest for the installation of wind turbines. A large proportion of those recorded occur in almost all sampled forest vegetation plots. Variation was mainly found in the percentage of coverage of each taxon on the sampling plot. This difference is attributed to the interaction of several ecological and biotic factors. Of these, site geomorphology, rock and soil type, and sedimentation are considered similar at all points on the sampling plots and do not significantly affect the cover. The most important of the factors that influenced the variation in cover rates of some of the taxa recorded are

attributed to exposure, slope, and especially the degree of past anthropogenic and natural disturbance.

Tables 32-45 present the records made at each sample plot (consecutive visits). The aggregated floral list with the results of the survey results outside and within the boundaries of the protected area 'Peaks of Mount Orvilos' with code is presented in Table 46. A total of five (5) visits were made to the area to record the flora.

Table 32: Sampling area 01. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea coarctata			+		
Aethionema saxatile	+				
Allium cyrilli	+				
Alyssum murale		+			
Alyssum sibiricum			+		
Anacamptis pyramidalis		+			
Anchusella cretica		+			
Anthemis pindicola		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Anthyllis vulneraria subsp. *pulchella*			+		
Aremonia agrimonoides		+			
Arenaria serpyllifolia			+		
Asphodeline lutea	+				
Astragalus onobrychis			+		
Bromus squarrosus			+		
Buglossoides purpurocaerulea		+			
Carduus nutans			+		
Carum graecum			+		
Centaurea stoebe subsp. *serbica*			+		
Centaurea salonitana			+		
Cerastium brachypetalum		+			
Cerastium decalvans			+		
Clinopodium vulgare		+			
Cornus mas	+				
Convolvulus boissieri subsp. *suendermannii*			+		
Cotoneaster tomentosus	+				
Crocus olivieri	+				
Crepis viscidula			+		
Crupina vulgaris			+		
Chrysopogon gryllus			+		
Cytisus procumbens			+		
Dianthus gracilis subsp. *drenowskianus*				+	

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Echinops sphaerocephalus subsp. *albidus*					+
Eryngium campestre				+	
Euphorbia myrsinites	+				
Festuca koritnicensis				+	
Filago germanica		+			
Frangula rupestris	+				
Fraxinus ornus	+				
Galium aegeum			+		
Galium verum					+
Genista subcapitata		+			
Geranium sanguineum				+	
Globularia cordifolia		+			
Goniolimon tataricum			+		
Helianthemum oelandicum subsp. *canum*		+			
Hypericum rumeliacum subsp. *rumeliacum*			+		
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha		+			
Lactuca perennis			+		
Lathyrus cicera	+				
Leontodon crispus subsp. *asper*			+		
Linaria dalmatica			+		
Lonicera etrusca	+				
Melampyrum arvense		+			
Minuartia glomerata			+		
Minuartia setacea				+	
Onobrychis aequidentata		+			
Onobrychis alba			+		
Orlaya daucoides			+		
Orobanche sp.		+			
Ostrya carpinifolia	+				
Petrorhagia prolifera		+			
Polygala nicaeensis subsp. *mediterranea*			+		
Potentilla recta			+		
Prangos ferulacea		+			
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Rosa agrestis		+			
Rosa canina		+			
Rosa spinosissima		+			
Satureja pilosa					+
Saxifraga sempervivum					+

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Scorzonera hispanica		+			
Securigera varia			+		
Sedum sediforme				+	
Sedum urvillei				+	
Senecio macedonicus			+		
Sideritis montana			+		
Silene conica		+			
Silene sendtneri subsp. *balcanica*		+			
Stachys recta			+		
Stipa pulcherrima			+		
Syringa vulgaris	+				
Thalictrum minus			+		
Tragopogon dubius			+		
Tragopogon pterodes			+		
Teucrium capitatum			+		
Thymus sibthorpii				+	
Verbascum nobile			+		
Veronica jacquinii		+			
Vicia villosa		+			
Viola kitaibeliana	+				
Xeranthemum annuum			+		

Table 33: Sampling area 02. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Acinos suaveolens			+		
Aethionema saxatile	+				
Alyssum murale		+			
Alyssum sibiricum			+		
Anchusella cretica		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Anthemis pindicola		+			
Anthemis ruthenica			+		
Asperula purpurea				+	
Asphodel lutea	+				
Astragalus angustifolius			+		
Astragalus onobrychis			+		
Berteroa incana				+	
Bromus squarrosus			+		
Cardamine graeca	+				
Carduus kerneri subsp. *scardicus*				+	
Carduus nutans			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Carum graecum			+		
Centaurea salonitana			+		
Comandra umbellata subsp. *elegans*		+			
Cornus mas	+				
Cerastium decalvans			+		
Convolvulus boissieri subsp. *suendermannii*			+		
Crocus chrysanthus	+				
Crocus olivieri	+				
Crupina vulgaris			+		
Cynoglossum creticum		+			
Dianthus gracilis subsp.				+	
Eryngium campestre				+	
Euphorbia baselicis			+		
Euphorbia myrsinites	+				
Festuca sp.			+		
Fraxinus ornus	+				
Galium aegeum			+		
Genista carinalis				+	
Genista subcapitata		+			
Gladiolus palustris			+		
Helianthemum oelandicum subsp.		+			
Helianthemum salicifolium	+				
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Lathyrus cicera	+				
Leontodon crispus subsp. *asper*			+		
Linaria dalmatica			+		
Lomelosia argentea				+	
Muscari neglectum	+				
Neotinea tridentata	+				
Onobrychis aequidentata	+				
Onobrychis alba			+		
onosma heterophylla		+			
Orlaya daucoides			+		
Ostrya carpinifolia	+				
Ranunculus arvensis	+				
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Satureja pilosa					+
Sedum acre			+		
Sedum sediforme				+	
Sedum urvillei				+	

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Silene sendtneri subsp. *balcanica*		+			
Silene tenuiflora	+				
Stachys recta			+		
Stipa pulcherrima			+		
Syringa vulgaris	+				
Taraxacum sp.	+				
Thymus sibthorpii				+	
Veronica grisebachii	+				
Vicia villosa		+			
Vincetoxicum hirundinaria				+	
Viola kitaibeliana	+				

Table 34: Sampling area 03. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea clypeolata				+	
Allium cyrilli	+				
Alyssum montanum		+			
Alyssum murale		+			
Alyssum sibiricum			+		
Anacamptis morio	+				
Anchusella cretica		+			
Anthemis pindicola		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Arenaria serpyllifolia			+		
Armeria canescens			+		
Asperula purpurea				+	
Asphodelina lutea	+				
Astragalus angustifolius			+		
Asyneuma limonifolium			+		
Berteroa incana				+	
Bromus squarrosus			+		
Cardamine graeca	+				
Carduus kerneri subsp. scardicus				+	
Carduus nutans			+		
Carum graecum			+		
Centaurea parilica				+	
Centaurea salonitana			+		
Centaurea stoebe subsp. *serbica*			+		
Cerastium decalvans			+		
Chamaecytisus albus		+			
Chrysopogon gryllus			+		
Comandra umbellata subsp. *elegans*		+			

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Convolvulus boissieri subsp. *suendermannii*			+		
Crepis viscidula			+		
Crocus chrysanthus	+				
Dianthus gracilis subsp. *drenowskianus*			+		
Dianthus petraeus subsp. *orbelicus*				+	
Eryngium campestre				+	
Euphorbia baselicis			+		
Euphorbia myrsinites	+				
Festuca sp.			+		
Galium aegeum			+		
Geocaryum capillifolium			+		
Genista carinalis				+	
Genista subcapitata		+			
Gladiolus palustris			+		
Hieracium pannosum				+	
Helianthemum oelandicum subsp. *canum*		+			
Helianthemum salicifolium	+				
Hypericum olympicum			+		
Hypericum rumeliacum			+		
Iris reichenbachii	+				
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Lactuca perennis			+		
Lathyrus cicera	+				
Leontodon crispus subsp. *asper*			+		
Linaria dalmatica			+		
Lomelosia rhodopensis				+	
Minuartia setacea subsp. *bannatica*			+		
Muscari neglectum		+			
Neotinea tridentata		+			
Onobrychis aequidentata	+				
Onobrychis alba			+		
Orobanche sp.		+			
Paronychia macedonica			+		
Pilosella cymosa subsp. *sabina*			+		
Pimpinella tragium				+	
Pistacia terebinthus	+				
Polygala nicaeensis subsp. *mediterranea*			+		
Potentilla detommasii				+	
Prangos ferulacea		+			
Reseda lutea			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Saponaria bellidifolia			+		
Scabiosa triniifolia				+	
Securigera varia			+		
sedum acre			+		
Sedum ochroleucum				+	
Sedum urvillei				+	
Silene sendtneri subsp. *balcanica*		+			
Stachys recta			+		
Stipa pulcherrima			+		
Syringa vulgaris	+				
Thalictrum minus			+		
Thymus sibthorpii				+	
Tragopogon pterodes			+		
Trifolium cherleri	+				
Verbascum densiflorum				+	
Veronica jacquinii		+			
Viola kitaibeliana	+				

Table 35: Sampling area 04. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea coarctata			+		
Acinos suaveolens			+		
Aethionema saxatile	+				
Alyssum murale		+			
Alyssum sibiricum			+		
Anthemis pindicola		+			
Anthericum liliago		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Anthyllis vulneraria subsp. *pulchella*			+		
Arceuthobium oxycedri	+				
Arenaria serpyllifolia			+		
Armeria canescens			+		
Asphodeline lutea	+				
Astragalus onobrychis			+		
Bromus squarrosus			+		
Campanula lingulata				+	
Carduus nutans			+		
Carduus kerneri subsp. *scardicus*				+	
Carex kitaibeliana subsp. *capillata*				+	
Carum graecum			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Centaurea stoebe subsp. *serbica*			+		
Centaurea salonitana			+		
Cerastium brachypetalum		+			
Cerastium decalvans			+		
Comandra umbellata subsp. *elegans*		+			
Cornus mas	+				
Crepis viscidula			+		
Dianthus gracilis subsp. *drenowskianus*					+
Echinops sphaerocephalus subsp. *albidus*					+
Eryngium campestre				+	
Euphorbia baselicis			+		
Euphorbia myrsinites	+				
Festuca koritnicensis			+		
Festuca valesiaca		+			
Festucopsis sancta			+		
Frangula rupestris	+				
Fraxinus ornus	+				
Galium hellenicum					+
Genista carinalis				+	
Genista subcapitata		+			
Helianthemum salicifolium	+				
Hieracium pannosum				+	
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Leontodon crispus subsp. *asper*			+		
Linaria dalmatica			+		
Lomelosia rhodopensis				+	
Minuartia glomerata			+		
Muscari neglectum		+			
Onobrychis aequidentata	+				
Onobrychis alba			+		
Orlaya daucoides			+		
Ostrya carpinifolia	+				
Pimpinella tragium				+	
Poa molinerii			+		
Polygala nicaeensis subsp. *mediterranea*			+		
Potentilla detommasii				+	
Potentilla recta			+		
Quercus pubescens	+				
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Rosa spinosissima		+			

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Rumex acetosella			+		
Saponaria bellidifolia			+		
Securigera varia				+	
Sedum hispanicum				+	
Sedum sediforme				+	
Sedum urvillei				+	
Silene sendtneri subsp. *balcanica*		+			
Stachys recta			+		
Stipa pulcherrima			+		
Syringa vulgaris	+				
Tragopogon dubius			+		
Tragopogon pterodes			+		
Teucrium capitatum			+		
Veronica jacquinii		+			
Vicia villosa		+			

Table 36: Sampling area 05. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea clypeolata				+	
Aethionema saxatile	+				
Agrostis stolonifera	+				
Alyssum montanum		+			
Alyssum murale		+			
Anthemis pindicola		+			
Anthericum liliago			+		
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Armeria canescens			+		
Asphodelina lutea	+				
Astragalus onobrychis			+		
Asyneuma limonifolium			+		
Bromus squarrosus			+		
Bupleurum flavicans				+	
Carduus nutans			+		
Carex kitaibeliana subsp. *capillata*				+	
Carum graecum			+		
Centaurea salonitana			+		
Centaurea stoebe subsp. *serbica*			+		
Crepis viscidula			+		
Dianthus gracilis subsp. *drenowskianus*				+	
Eryngium campestre				+	
Festuca koritnicensis			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Festuca valesiaca		+			
Festucopsis sancta			+		
Fraxinus ornus	+				
Galium aegeum			+		
Galium hellenicum					+
Genista carinalis				+	
Hieracium pannosum				+	
Helianthemum salicifolium	+				
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Knautia ambigua			+		
Leontodon crispus			+		
Lomelosia rhodopensis				+	
Muscari neglectum		+			
Neotinea ustulata		+			
Onobrychis alba			+		
Onobrychis montana subsp. *scardica*				+	
Orlaya daucoides			+		
Orobanche sp.		+			
Ostrya carpinifolia	+				
Pimpinella tragium				+	
Polygala nicaeensis subsp. *mediterranea*			+		
Potentilla recta			+		
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Scorzonera mollis			+		
sedum sediforme				+	
Sempervivum leucanthum				+	
Silene sendtneri subsp. *balcanica*		+			
Stachys recta			+		
Stipa pulcherrima			+		
Syringa vulgaris	+				
Teucrium capitatum			+		
Thymus thracicus			+		
Thymus sibthorpii				+	
Tragopogon dubius			+		
Tragopogon pterodes			+		
Trinia glauca		+			
Verbascum densiflorum				+	
Veronica grisebachii	+				
Veronica jacquinii		+			
Viola kitaibeliana	+				
Xeranthemum annuum			+		

Table 37: Sampling area 06. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea ageratifolia			+		
Aethionema saxatile	+				
Allium cyrilli	+				
Alyssum montanum		+			
Anchusella cretica		+			
Anthemis pindicola		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Asphodel lutea	+				
Asyneuma limonifolium			+		
Bromus squarrosus			+		
Carex halleriana	+				
Carex kitaibeliana subsp. *capillata*				+	
Centaurea salonitana			+		
Centaurea stoebe subsp. *serbica*			+		
Cerastium banaticum			+		
Cerastium decalvans			+		
Comandra umbellata subsp. *elegans*		+			
Dianthus gracilis subsp. *drenowskianus*					+
Eryngium campestre				+	
Euphorbia myrsinites	+				
Festuca koritnicensis			+		
Festuca sp.		+			
Festucopsis sancta			+		
Fraxinus ornus	+				
Genista carinalis				+	
Genista subcapitata		+			
Gladiolus palustris			+		
Helianthemum salicifolium	+				
Iris reichenbachii	+				
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Leontodon crispus			+		
Linum tenuifolium				+	
Lomelosia rhodopensis				+	
Melampyrum arvense		+			
Muscari neglectum	+				
Neotinea tridentata		+			
Neotinea ustulata		+			
Onobrychis alba			+		
Onobrychis aequidentata	+				
Onobrychis montana subsp. *scardica*				+	
Onosma heterophylla		+			

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Orlaya daucoides			+		
Ostrya carpinifolia	+				
Pilosella bauhini			+		
Pimpinella tragium				+	
Polygala nicaeensis subsp. *mediterranea*		+			
Potentilla detommasii				+	
Potentilla recta			+		
Prangos ferulacea		+			
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Sanguisorba minor			+		
Securigera varia			+		
Sedum sediforme				+	
Sesleria robusta			+		
Sideritis montana			+		
Silene conica		+			
Silene sendtneri subsp. *balcanica*		+			
Silene tenuiflora	+				
Stachys recta			+		
Stipa pulcherrima			+		
Syringa vulgaris	+				
Tilia tomentosa	+				
Trifolium alpestre			+		
Trinia glauca		+			
Veronica grisebachii	+				
Veronica jacquinii		+			

Table 38: Sampling area 07. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea pannonica				+	
Aethionema saxatile	+				
Ajuga laxmannii		+			
Alyssum montanum		+			
Alyssum murale		+			
Anacamptis morio	+				
Anthemis pindicola		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Anthyllis vulneraria subsp. *pulchella*			+		
Asphodel lutea	+				
Bromus squarrosus			+		
Carex kitaibeliana subsp. *capillata*				+	

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Centaurea salonitana			+		
Centaurea stoebe subsp. *serbica*			+		
Cerastium decalvans			+		
Clinopodium vulgare		+			
Dianthus gracilis subsp. *drenowskianus*				+	
Eryngium campestre				+	
Festuca koritnicensis			+		
Festuca sp			+		
Festucopsis sancta			+		
Fraxinus ornus	+				
Galium aegeum			+		
Genista subcapitata		+			
Globularia cordifolia		+			
Helianthemum salicifolium	+				
Iris reichenbachii	+				
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Lamium maculatum		+			
Leontodon crispus			+		
Linaria dalmatica			+		
Matthiola fruticulosa subsp. *valesiaca*			+		
Muscari neglectum		+			
Neotinea tridentata		+			
Ostrya carpinifolia	+				
Paronychia macedonica			+		
Phleum pratense			+		
Polygala nicaeensis subsp. *mediterranea*		+			
Potentilla recta			+		
Primula veris	+				
Rhamnus saxatilis	+				
sanguisorba minor			+		
Saponaria bellidifolia			+		
Securigera varia			+		
Sedum acre			+		
Sedum urvillei			+		
Sedum sediforme				+	
Silene sendtneri subsp. *balcanica*		+			
Silene tenuiflora	+				
Stipa pulcherrima			+		
Syringa vulgaris	+				
Thymus thracicus			+		

Table 39: Sampling area 08. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Acinos suaveolens			+		
Alyssum montanum		+			
Alyssum murale		+			
Anacamptis morio	+				
Anthemis pindicola		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Arenaria serpyllifolia			+		
Asperula purpurea				+	
Asphodelina lutea	+				
Carex kitaibeliana subsp. *capillata*				+	
Centaurea parilica				+	
Centaurea salonitana			+		
Cerastium brachypetalum		+			
Cerastium decalvans			+		
Crocus chrysanthus	+				
Dianthus gracilis subsp. *drenowskianus*				+	
Euphorbia baselicis			+		
Festuca koritnicensis			+		
Frangula rupestris	+				
Fraxinus ornus	+				
Galium hellenicum					+
Genista carinalis				+	
Genista subcapitata		+			
Gymnadenia conopsea			+		
Helianthemum salicifolium	+				
Iris reichenbachii	+				
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Lomelosia rhodopensis				+	
Onobrychis aequidentata	+				
Onobrychis alba			+		
Pinus nigra	+				
Plantago argentea		+			
Poa molinerii			+		
Polygala nicaeensis subsp. *mediterranea*			+		
Potentilla recta			+		
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Rosa spinosissima		+			
Saponaria bellidifolia			+		
Sempervivum heuffelii				+	

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Sempervivum leucanthum				+	
Stachys recta			+		
Stipa pulcherrima			+		
Thalictrum minus			+		
Trifolium pratense			+		
Trinia glauca		+			
Viola kitaibeliana	+				

Table 40: Sampling area 09. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Acer hyrcanum	+				
Achillea ageratifolia			+		
Achillea pseudopectinata			+		
Aethionema saxatile	+				
Alyssum murale		+			
Anthemis pindicola		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Aremonia agrimonoides		+			
Arenaria leptoclados			+		
Asperula purpurea				+	
Asphodelina lutea	+				
Asyneuma limonifolium			+		
Brachypodium sylvaticum			+		
Briza media			+		
Campanula persicifolia				+	
Carex kitaibeliana subsp. *capillata*				+	
Comandra umbellata subsp. *elegans*		+			
Centaurea parilica				+	
Centaurea salonitana			+		
Cerastium banaticum			+		
Cerastium brachypetalum		+			
Cerastium decalvans			+		
Cerastium glomeratum	+				
Clinopodium vulgare		+			
Crocus chrysanthus	+				
Dactylis glomerata			+		
Dianthus simulans				+	
Digitalis lanata				+	
Echinops sphaerocephalus subsp. *albidus*					+
Festuca koritnicensis			+		
Festuca sp.			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Festucopsis sancta			+		
Filago germanica		+			
Frangula rupestris	+				
Fraxinus ornus	+				
Fumana procumbens		+			
Galium verum				+	
Genista carinalis				+	
Genista subcapitata		+			
Geranium robertianum		+			
Gladiolus palustris			+		
Globularia cordifolia		+			
Helianthemum oelandicum subsp. *canum*		+			
Helianthemum salicifolium	+				
Hypericum rumeliacum			+		
Inula verbascifolia subsp. *aschersoniana*			+		
Juniperus oxycedrus	+				
Koeleria macrantha			+		
Lathyrus cicera	+				
Leontodon crispus			+		
Ligustrum vulgare	+				
Lolium perenne			+		
Muscari neglectum		+			
Orlaya daucoides			+		
Ostrya carpinifolia	+				
Paronychia macedonica			+		
Polygala nicaeensis subsp. *mediterranea*			+		
Phleum pratense			+		
Rhamnus saxatilis	+				
Rubus canescens		+			
Sanguisorba minor			+		
Saponaria bellidifolia			+		
Saxifraga stribrnyi		+			
Sedum sediforme				+	
Sempervivum heuffelii				+	
Sesleria robusta			+		
Silene italica		+			
Silene latifolia			+		
Sorbus aria	+				
Sorbus torminalis	+				
Stipa pulcherrima			+		
Thymus sibthorpii				+	
Tragopogon dubius			+		
Trifolium campestre		+			

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Trifolium pratense				+	
Trinia glauca		+			
Ulmus minor	+				
Verbascum densiflorum				+	
Veronica chamaedrys		+			

Table 41: Sampling area 10. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Acer campestre	+				
Acer hyrcanum	+				
Acinos suaveolens			+		
Aethionema saxatile	+				
Ajuga laxmannii		+			
Alyssum montanum		+			
Anacamptis pyramidalis		+			
Anthoxanthum odoratum		+			
Anthyllis aurea			+		
Aremonia agrimonoides		+			
Arrhenatherum elatius			+		
Asphodelina lutea	+				
Asyneuma limonifolium			+		
Berteroa incana				+	
Brachypodium sylvaticum			+		
Briza media			+		
Calamagrostis arundinacea				+	
Campanula persicifolia				+	
Carex distachya	+				
Carlina vulgaris					+
Carpinus orientalis	+				
Centaurea salonitana			+		
Centaurea stoebe subsp. *serbica*			+		
Cerastium glomeratum	+				
Clinopodium vulgare		+			
Cornus mas	+				
Crocus chrysanthus	+				
Dactylis glomerata			+		
Danthoniastrum compactum				+	
Dianthus gracilis subsp. *drenowskianus*				+	
Digitalis lanata				+	
Festuca heterophylla			+		
Festuca sp.			+		
Festucopsis sancta			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Frangula rupestris	+				
Fraxinus ornus	+				
Galium aegeum			+		
Galium hellenicum					+
Genista carinalis				+	
Genista subcapitata		+			
Geranium robertianum		+			
Gladiolus palustris			+		
Globularia cordifolia		+			
Gymnadenia conopsea			+		
Helianthemum salicifolium	+				
Hieracium pannosum				+	
Hypericum rumeliacum			+		
Inula verbascifolia subsp. *aschersoniana*				+	
Juniperus communis	+				
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Lamium maculatum		+			
Leontodon crispus			+		
Ligustrum vulgare	+				
Linum hirsutum			+		
Lolium perenne			+		
Melittis melissophyllum			+		
Muscari neglectum		+			
Neotinea tridentata		+			
Onobrychis aequidentata	+				
Ostrya carpinifolia	+				
Paronychia macedonica			+		
Pinus nigra	+				
Plantago argentea		+			
Poa molinerii			+		
Polygala nicaeensis subsp. *mediterranea*			+		
Populus tremula	+				
Potentilla recta			+		
Primula veris	+				
Quercus pubescens	+				
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Rosa canina		+			
Rosa spinosissima		+			
Sanguisorba minor			+		
Saponaria bellidifolia			+		
Saxifraga stribrnyi		+			

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Sedum acre			+		
Sedum sediforme				+	
Sedum urvillei				+	
Sesleria robusta			+		
Silene italica		+			
Silene latifolia		+			
Sorbus aria	+				
Sorbus torminalis	+				
Stipa pulcherrima			+		
Teucrium capitatum			+		
Tilia tomentosa	+				
Trifolium campestre		+			
Trifolium medium subsp. *balcanicum*				+	
Trifolium pratense				+	
Verbascum densiflorum				+	
Veronica chamaedrys		+			
Veronica jacquinii		+			
Viburnum lantana		+			
Vicia villosa		+			
Vincetoxicum hirundinaria				+	

Table 42: Sampling area 11. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Acer campestre	+				
Achillea clypeolata				+	
Achillea millefolium				+	
Achillea pannonica				+	
Acinos alpinus			+		
Aethionema saxatile	+				
Alyssoides utriculata		+			
Alyssum montanum		+			
Alyssum murale		+			
anacamptis morio	+				
Anacamptis pyramidalis		+			
Anthemis pindicola		+			
Anthoxanthum odoratum		+			
Anthyllis montana subsp. *jacquinii*			+		
Arabis glabra		+			
Aremonia agrimonoides		+			
Asperula purpurea				+	
Asphodelina lutea	+				
Brachypodium sylvaticum			+		
Campanula persicifolia				+	

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Carduus nutans			+		
Carex halleriana	+				
Carlina vulgaris					+
Centaurea cuneifolia subsp. *pallida*			+		
Centaurea napulifera		+			
Centaurea salonitana			+		
Cerastium banaticum		+			
Cerastium decalvans			+		
Clematis vitalba	+				
Dianthus gracilis subsp. *drenowskianus*				+	
Festuca koritnicensis			+		
Festucopsis sancta			+		
Fragaria vesca			+		
Frangula rupestris	+				
Fraxinus ornus	+				
Galium hellenicum					+
Galium verum				+	
Genista carinalis				+	
Genista subcapitata		+			
Geranium robertianum			+		
Gladiolus palustris			+		
Globularia cordifolia		+			
Helianthemum oelandicum		+			
Hippocrepis emerus subsp. *emeroides*	+				
Juniperus oxycedrus	+				
Jurinea mollis			+		
Lathyrus cicera	+				
Leontodon crispus			+		
Linum hirsutum			+		
Muscari neglectum		+			
Ornithogalum sp.		+			
Ostrya carpinifolia	+				
Pinus nigra	+				
Pimpinella tragium				+	
Plantago argentea		+			
Poa bulbosa			+		
Polygala nicaeensis subsp. *mediterranea*			+		
Potentilla recta			+		
Quercus pubescens	+				
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
rose agrestis		+			
sanguisorba minor			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Saponaria bellidifolia			+		
Sedum sediforme				+	
Sempervivum leucanthum				+	
Seseli rigidum				+	
Silene italica		+			
Sorbus aria	+				
Stipa pulcherrima			+		
Syringa vulgaris	+				
Teucrium chamaedrys			+		
Thymus sibthorpii				+	
Trifolium heldreichianum			+		
Verbascum densiflorum				+	
Valeriana officinalis			+		
Valerianella coronata		+			
Veronica chamaedrys		+			
Veronica jacquinii		+			

Table 43: Sampling area 12. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea clypeolata				+	
Alyssum montanum		+			
Anthemis pindicola		+			
Anthoxanthum odoratum		+			
Aremonia agrimonoides		+			
Arenaria serpyllifolia			+		
Armeria canescens			+		
Asperula purpurea				+	
Asphodelina lutea	+				
Brachypodium sylvaticum			+		
Buglossoides purpurocaerulea		+			
Campanula bononiensis				+	
Carpinus orientalis	+				
Centaurea affinis			+		
Centaurea cuneifolia subsp. *pallida*				+	
Centaurea stoebe subsp. *serbica*			+		
Centaurea salonitana			+		
Cerastium holosteoides subsp. *vulgare*		+			
Clematis vitalba	+				
Clinopodium vulgare		+			
Corylus avellana	+				
Crocus chrysanthus	+				
Dactylis glomerata			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Dianthus gracilis subsp. *drenowskianus*				+	
Festucopsis sancta			+		
Fragaria vesca			+		
Frangula rupestris	+				
Fraxinus ornus	+				
Galium hellenicum					+
Galium verum				+	
Genista carinalis				+	
Genista januensis subsp. *lydia*		+			
Helianthemum salicifolium	+				
Hypericum perforatum			+		
Hypericum rumeliacum			+		
Inula ensifolia				+	
Juniperus oxycedrus	+				
Jurinea mollis			+		
Linaria genistifolia			+		
Linum capitatum			+		
Lomelosia argentea			+		
Melittis melissophyllum			+		
Muscari neglectum		+			
Neotinea tridentata		+			
Neotinea ustulata		+			
Ornithogalum sp.	+				
Ostrya carpinifolia	+				
Pinus nigra	+				
Pinus sylvestris	+				
Plantago holosteum			+		
Poa nemoralis			+		
Polygala nicaeensis subsp. *mediterranea*			+		
Potentilla recta			+		
Quercus pubescens	+				
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Rosa agrestis		+			
sanguisorba minor			+		
Saponaria bellidifolia			+		
Satureja pilosa					+
Securigera varia			+		
Sedum sediforme				+	
Sempervivum heuffelii				+	
Sempervivum leucanthum				+	
Sesleria robusta			+		
Silene gigantea subsp. *rhodopea*	+				
Silene italica		+			

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Sorbus aria	+				
Stipa pulcherrima			+		
Syringa vulgaris	+				
Tanacetum vulgare				+	
Teucrium chamaedrys			+		
Tilia tomentosa	+				
Trifolium campestre		+			
Trifolium diffusum			+		
Trinia glauca		+			
Verbascum densiflorum				+	
Veronica chamaedrys		+			

Table 44: Sampling area 13. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea ageratifolia			+		
Achillea millefolium				+	
Acinos alpinus			+		
Aethionema saxatile	+				
Allium flavum				+	
Anacamptis morio	+				
Anthemis pindicola			+		
Anthyllis aurea			+		
Anthyllis vulneraria subsp. *pulchella*			+		
Asperula aristata subsp. *nestia*				+	
Asperula purpurea				+	
Asphodel lutea	+				
Astragalus monspessulanus		+			
Asyneuma limonifolium			+		
Aubrieta deltoidea		+			
Bromus squarrosus			+		
Campanula lingulata				+	
Campanula orphanidea				+	
Carex kitaibeliana				+	
Centaurea cuneifolia subsp. *pallida*				+	
Centaurea napulifera		+			
Centaurea salonitana			+		
Cerastium banaticum		+			
Cerastium brachypetalum		+			
Cerastium holosteoides subsp. *vulgare*		+			
Cotoneaster tomentosus	+				
Crocus chrysanthus	+				
Crupina vulgaris			+		

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Dactylorhiza sambucina	+				
Dianthus gracilis subsp. *drenowskianus*				+	
Dianthus petraeus subsp. *orbelicus*				+	
Draba lasiocarpa	+				
Echinops sphaerocephalus subsp. *albidus*					+
Eryngium campestre				+	
Euphorbia myrsinites	+				
Festuca koritnicensis			+		
Festuca valesiaca		+			
Festucopsis sancta			+		
Frangula rupestris	+				
Fraxinus ornus	+				
Fritillaria drenovskii	+				
Genista carinalis				+	
Globularia bisnagarica		+			
Goniolimon tataricum			+		
Gymnadenia conopsea			+		
Helianthemum nummularium		+			
Helianthemum salicifolium	+				
Hieracium pannosum				+	
Hippocrepis comosa			+		
Hypericum rumeliacum			+		
Inula ensifolia				+	
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Leontodon crispus			+		
Linum hirsutum			+		
Medicago lupulina			+		
melica ciliata			+		
Muscari neglectum		+			
Onosma heterophylla		+			
Onobrychis alba			+		
Onobrychis montana subsp. *scardica*				+	
Orlaya daucoides			+		
Ostrya carpinifolia	+				
Paronychia macedonica			+		
Petrorhagia prolifera			+		
Pilosella leucopsilon				+	
Pinus nigra	+				
Plantago holosteum			+		
Platanthera chlorantha			+		
Poa bulbosa		+			

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Polygala nicaeensis subsp. *mediterranea*			+		
Potentilla recta			+		
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Rosa canina		+			
Sanguisorba minor			+		
Saponaria bellidifolia			+		
Satureja pilosa					+
Saxifraga sempervivum			+		
Securigera varia			+		
Sedum acre			+		
Sedum sediforme				+	
Sempervivum heuffelii				+	
Sesleria robusta			+		
Sideritis montana			+		
Stipa pulcherrima			+		
Teucrium chamaedrys			+		
Teucrium montanum			+		
Thymus atticus			+		
Thymus thracicus			+		
Trifolium alpestre			+		
Trifolium heldreichianum			+		
Trifolium scabrum		+			
Trinia glauca		+			
Verbascum densiflorum				+	
Viola perinensis		+			
Vincetoxicum hirundinaria				+	

Table 45: Sampling area 14. Date of first recording of species and subspecies.

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Achillea ageratifolia			+		
Acinos alpinus			+		
Aethionema saxatile	+				
Allium moschatum				+	
Anthyllis aurea			+		
Anthyllis vulneraria subsp. *pulchella*			+		
Anthemis pindicola		+			
Asperula aristata subsp. *nestia*				+	
Asyneuma limonifolium			+		
Aubrieta deltoidea		+			
Campanula orphanidea				+	
Campanula rumeliana				+	

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Carex kitaibeliana				+	
Centaurea affinis			+		
Centaurea napulifera		+			
Cerastium banaticum			+		
Cerastium brachypetalum		+			
Corylus avellana	+				
Cotoneaster tomentosus	+				
Crocus chrysanthus	+				
Dactylorhiza sambucina	+				
Dianthus gracilis subsp. *drenowskianus*				+	
Draba lasiocarpa	+				
Euphorbia myrsinites	+				
Festuca koritnicensis			+		
Festuca valesiaca			+		
Festucopsis sancta			+		
Fraxinus ornus	+				
Fritillaria drenovskii	+				
Gentiana verna subsp. *balcanica*			+		
Globularia bisnagarica		+			
Globularia cordifolia		+			
Gymnadenia conopsea				+	
Helianthemum nummularium		+			
Helianthemum salicifolium	+				
Hippocrepis comosa			+		
Hypericum rumeliacum			+		
Iberis saxatilis		+			
Inula verbascifolia subsp. *aschersoniana*				+	
Juniperus oxycedrus	+				
Jurinea mollis			+		
Koeleria macrantha			+		
Leontodon crispus			+		
Linum capitatum			+		
Linum elegans			+		
Lomelosia rhodopensis				+	
Matthiola fruticulosa subsp. *valesiaca*			+		
Melica ciliata			+		
Muscari neglectum		+			
Neotinea ustulata		+			
Onosma heterophylla		+			
Onobrychis alba			+		
Onobrychis montana subsp. *scardica*				+	
Orlaya daucoides			+		
Ostrya carpinifolia	+				

TAXON	1η 04/2024	2η 05/2024	3η 06/2024	4η 07/2024	5η 09/2024
Paronychia macedonica			+		
Petrorhagia prolifera			+		
Pinus nigra	+				
Plantago holosteum			+		
Poa bulbosa		+			
Polygala nicaeensis subsp. *mediterranea*			+		
Rhamnus saxatilis	+				
Rhinanthus rumelicus		+			
Rosa turcica			+		
Sanguisorba minor			+		
Saponaria bellidifolia			+		
Saxifraga sempervivum			+		
Scrophularia laciniata				+	
Sedum sediforme				+	
Sempervivum heuffelii				+	
Sesleria robusta			+		
Sideritis montana			+		
Stipa pulcherrima			+		
Teucrium chamaedrys			+		
Thymus thracicus			+		
Trifolium alpestre			+		
Trifolium heldreichianum			+		
Trinia glauca		+			
Verbascum densiflorum				+	
Viola perinensis		+			
Vincetoxicum hirundinaria				+	

Table 46: Flora list from the study area. The species and subspecies in the table were recorded from successive visits (May-September 2024) to plots 01-14 in the study area.

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
	1	2	3	4	5	6	7	8	9
1.	***ACERACEAE***	*Acer campestre*	*10/11*						
2.		*Acer hyrcanum*	*09/10*					+	

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
3.	***ALLIACEAE***	*Allium cyrilli*	*03*						
4.		*Allium flavum*	*13*						
5.		*Allium melanogyne*	*01/06*						+
6.		*Allium moschatum*	*14*						
7.	***ANACARDIACEAE***	*Pistachio terebinthus*	*03*						
8.	***ANTHERICACEAE***	*Anthericum liliago*	*04/05*				**LC** (Low risk)		
9.	***APIACEAE***	*Bupleurum flavicans*	*05*				**LC** (Low risk)		
10.		*Carum graecum*	*01/02/03/04/ 05*				**LC** (Low risk)		
11.		*Eryngium campestre*	*01/02/03/04/ 05 /06/07/13*						
12.		*Geocaryum capillifolium*	*03*						
13.		*Orlaya daucoides*	*01/02/04/05/ 06/09/13/14*						
14.		*Pimpinella tragium*	*03/04/05/06/ 11*						
15.		*Prangos ferulacea*	*01/03/06*						
16.		*Seseli rigidum*	*11*						
17.		*Trinia glauca*	*05/06/08/09/ 12/13/14*						
18.	***ASCLEPIADACEAE***	*Vincetoxicum hirundinaria*	*02/10/13/14*				**LC** (Low risk)		
19.	***ASPHODELACEAE***	*Asphodeline lutea*	*01/02/03/04/ 05/06/07/08/ 09/10/11/12/ 13*				**LC** (Low risk)		
20.	***ASTERACEAE***	*Achillea ageratifolia*	*06/09/13/14*					+	

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
21.		*Achillea clypeolata*	*03/05/11/12*				**LC** (Low risk)		
22.		*Achillea coarctata*	*01/04*						
23.		*Achillea millefolium*	*11/13*				**LC** (Low risk)		
24.		*Achillea pannonica*	*07/11*						
25.		*Achillea pseudopectinata*	*09*						
26.		*Anthemis ruthenica*					**LC** (Low risk)		
27.		*Anthemis pindicola*	*01/02/03/04/ 05/06/07/08/ 09/11/12/13/ 14*		**(+)**		**LC** (Low risk)	**+**	
28.		*Carduus kerneri* subsp. *scardicus*	*02/03/04*					**+**	
29.		*Carduus nutans*	*01/02/03/04/ 05/11*						
30.		*Carlina vulgaris*	*10/11*						
31.		*Centaurea affinis*	*12/14*						
32.		*Centaurea cuneifolia* subsp. *pallida*	*11/12/13*						
33.		*Centaurea napulifera*	*11/13/14*					**+**	
34.		*Centaurea parilica*	*03/08/09*					**(+)**	
35.		*Centaurea salonitana*	*01/02/03/04/ 05/06/07/08 /09/10/11/12 /13*				**LC** (Low risk)		
36.		*Centaurea stoebe* subsp. *serbica*	*01/03/04/05/ 06/07/10/12*					**(+)**	
37.		*Crepis viscidula*	*01/03/04/05*					**+**	

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
38.		*Crupina vulgaris*	*01/02/13*						
39.		*Echinops sphaerocephalus* subsp. *albidus*	*01/04/09/13*						
40.		*Filago germanica*	*01/09*						
41.		*Hieracium pannosum*	*03/04/05/10/13*						
42.		*Inula ensifolia*	*12/13*						
43.		*Inula verbascifolia* subsp. *aschersoniana*	*09/10/14*						
44.		*Jurinea mollis*	*01/02/03/04/05/06/07/08/10/11/12/13/14*				**LC** (Low risk)		
45.		*Lactuca perennis*	*01/03*						
46.		*Leontodon crispus* subsp. *asper*	*01/02/03/04/05/06/07/09/10/11/13/14*						
47.		*Pilosella bauhini*	*06*						
48.		*Pilosella cymosa* subsp. *sabina*	*03*						
49.		*Pilosella leucopsilon*	*13*						
50.		*Scorzonera mollis*	*05*						
51.		*Senecio macedonicus*	*01*						
52.		*Tanacetum vulgare*	*12*				**LC** (Low risk)		
53.		*Taraxacum* sp.	*02*						
54.		*Tragopogon dubius*	*09*				**LC** (Low risk)		
55.		*Tragopogon pterodes*	*01/03/04/05*						

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
56.		*Xeranthemum annuum*	*01/05*						
57.	***BETULACEAE***	*Carpinus orientalis*	*10/12*						
58.		*Corylus avellana*	*12/14*						
59.		*Ostrya carpinifolia*	*01/02/04/05/ 06/07/09/10/ 11/12/13/14*						
60.	***BORAGINACEAE***	*Anchusella cretica*	*01/02/03/06*						
61.		*Buglossoides purpurocaerulea*	*01/12*						
62.		*Cynoglossum creticum*	*02*						
63.		*Onosma heterophylla*	*02/06/13/14*		+		**LC** (Low risk)		
64.	***BRASSICACEAE***	*Aethionema saxatile*	*01/02/04/05/ 06/07/09/10/ 11/13/14*						
65.		*Alyssoides utriculata*	*11*						
66.		*Alyssum montanum*	*03/05/06/07/ 08/10/11/12*						
67.		*Alyssum murale*	*01/02/03/04/ 05/07/08/09/ 11*						
68.		*Alyssum sibiricum*	*01/02/03/04*					+	
69.		*Arabis glabra*	*11*						
70.		*Aubrieta deltoidea*	*13/14*				**LC** (Low risk)		
71.		*Berteroa incana*	*02/03/10*				**LC** (Low risk)		
72.		*Draba lasiocarpa*	*13/14*				**LC** (Low risk)		

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
73.		*Iberis saxatilis*	*14*				**LC** (Low risk)		
74.		*Matthiola fruticulosa* subsp. *valesiaca*	*07/14*				**LC** (Low risk)		
75.	***CAMPANULACEAE***	*Asyneuma limonifolium*	*03/05/06/09/10/13/14*				**LC** (Low risk)		
76.		*Campanula bononiensis*	*12*				**LC** (Low risk)		
77.		*Campanula lingulata*	*04/13*				**LC** (Low risk)		
78.		*Campanula orphanidea*	*13/14*		**(+)**		**LC** (Low risk)	**(+)**	
79.		*Campanula persicifolia*	*09/10/11*				**LC** (Low risk)		
80.		*Campanula rumeliana*	*14*				**LC** (Low risk)		
81.	***CAPRIFOLIACEAE***	*Lonicera etrusca*	*01*						
82.		*Viburnum lantana*	*10*						
83.	***CARYOPHYLLACEAE***	*Arenaria leptoclados*	*09*				**LC** (Low risk)		
84.		*Arenaria serpyllifolia*	*01/03/04/08/12*				**LC** (Low risk)		
85.		*Cerastium banaticum*	*06/09/11/13/14*						
86.		*Cerastium brachypetalum*	*01/04/08/09/13/14*						
87.		*Cerastium decalvans*	*01/02/03/04/06/07/08/09/11*					**(+)**	

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
88.		*Cerastium glomeratum*	*09/10*						
89.		*Cerastium holosteoides* subsp. *vulgare*	*12/13*						
90.		*Dianthus gracilis*	*01/02/03/04/ 05/06/07/08/ 10 /11/12/13/14*		**(+)**			**+**	
91.		*Dianthus petraeus subsp. orbelicus*	*03/13*		**(+)**			**(+)**	
92.		*Dianthus simulans*	*09*					**+**	
93.		*Minuartia glomerata*	*01/04*				**LC** (Low risk)	**+**	
94.		*Minuartia setacea*	*01/03*						
95.		*Paronychia macedonica*	*03/07/10/13/ 14*					**(+)**	
96.		*Petrorhagia prolifera*	*01/13*						
97.		*Saponaria bellidifolia*	*03/04/07/08/ 09/10/11/12/ 13/14*				**LC** (Low risk)		
98.		*Silene conica*	*01/06*						
99.		*Silene flavescens* subsp. *thessalonica*	*13/14*					**(+)**	
100.		*Silene gigantea* subsp. *rhodopea*					**LC** (Low risk)		
101.		*Silene latifolia*	*09/10*						
102.		*silene italica*	*09/10/11/12*						
103.		*Silene sendtneri* subsp. *balcanica*	*01/02/03/04/ 05/06/07*					**(+)**	
104.		*Silene tenuiflora*	*02/06/07*						

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
105.	***CISTACEAE***	*Fumana procumbens*	*09*						
106.		*Helianthemum nummularium*	*13/14*						
107.		*Helianthemum oelandicum* subsp. *canum*	*01/02/03/09/11*						
108.		*Helianthemum salicifolium*	*02/03/04/05/06/07/08/09/10/12/13/14*						
109.	***CONVOLVULACEAE***	*Convolvulus boissieri subsp. suendermannii*	*01/02/03*					**(+)**	
110.	***CORNACEAE***	*Cornus mas*	*01/02/04/10*						
111.	***CRASSULACEAE***	*Sedum acre*	*02/03/07/10/13*				**LC** (Low risk)		
112.		*Sedum hispanicum*	*04*						
113.		*Sedum ochroleucum*	*03*						
114.		*Sedum sediforme*	*01/02/04/05/06/07/09/10/11 /12/13/14*				**LC** (Low risk)		
115.		*Sedum urvillei*	*01/02/03/04/07/10*						
116.		*Sempervivum heuffelii*	*08/09/12/13/14*		**(+)**				
117.		*Sempervivum leucanthum*	*05/08/11/12*		**(+)**			**(+)**	
118.	***CUPRESSACEAE***	*Juniperus communis*	*10*						
119.		*Juniperus oxycedrus*	*01/02/03/04/05/06/07/08/09/10/11/12/13/14*						
120.	***CYPERACEAE***	*Carex distachya*	*10*						

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
121.		*Carex halleriana*	*06/11*						
122.		*Carex kitaibeliana* subsp. *capillata*	*04/05/06/07/ 08/09/13/14*					**(+)**	
123.	***DIPSACACEAE***	*Knautia ambigua*	*05*				**LC** (Low risk)		
124.		*Lomelosia argentea*	*02/12*						
125.		*Lomelosia rhodopensis*	*03/04/05/06/ 08/14*					**(+)**	
126.		*Scabiosa triniifolia*	*03*						
127.	***EUPHORBIACEAE***	*Euphorbia baselicis*	*02/03/04/08*						
128.		*Euphorbia myrsinites*	*01/02/03/04/ 06/13/14*				**LC** (Low risk)		
129.	***FABACEAE***	*Anthyllis aurea*	*01/02/03/04/ 05/06/07/08/ 09 /10/13/14*				**LC** (Low risk)	**+**	
130.		*Anthyllis montana* subsp. *jacquinii*	*11*				**LC** (Low risk)		
131.		*Anthyllis vulneraria* subsp. *pulchella*	*01/04/07/13/ 14*				**LC** (Low risk)	**+**	
132.		*Astragalus angustifolius* subsp. *balcanicus*	*02/03*				**LC** (Low risk)	**(+)**	
133.		*Astragalus monspessulanus*	*13*						
134.		*Astragalus onobrychis*	*01/02/04*				**LC** (Low risk)		
135.		*Chamaecytisus albus*	*03*						
136.		*Cytisus procumbens*	*01*						
137.		*Genista carinalis*	*02/03/04/05/ 06/08/09/10/ 11/12/13*						

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
138.		*Genista januensis* subsp. *lydia*	*12*						
139.		*Genista subcapitata*	*01/02/03/04/ 06/07/08/09/ 10/11*					**( )+**	
140.		*Hippocrepis comosa*	*13/14*						
141.		*Hippocrepis emerus* subsp. *emeroides*	*11*						
142.		*Lathyrus cicera*	*01/02/03/09/ 11*						
143.		*Medicago lupulina*	*13*						
144.		*Onobrychis aequidentata*	*01/02/03/04/ 06/08/10*						
145.		*Onobrychis alba*	*01/02/03/04/ 05/06/08/13/ 14*				**NT** (Near Threatened)		
146.		*Onobrychis montana* subsp. *scardica*	*05/06/13/14*				**NT** (Near Threatened)	**+**	
147.		*Securigera varia*	*01/03/04/06/ 07/12/13*						
148.		*Trifolium alpestre*	*06/13/14*						
149.		*Trifolium campestre*	*09/10/12*						
150.		*Trifolium cherleri*	*04*				**LC** (Low risk)		
151.		*Trifolium diffusum*	*12*				**LC** (Low risk)		
152.		*Trifolium heldreichianum*	*11/13/14*						
153.		*Trifolium medium* subsp. *balcanicum*	*10*				**LC** (Low risk)		

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
154.		*Trifolium pratense*	*08/09/10*				**LC** (Low risk)		
155.		*Trifolium scabrum*	*13*				**LC** (Low risk)		
156.		*Vicia villosa*	*01/02/04/10*						
157.	***FAGACEAE***	*Fagus sylvatica*	*11*						
158.		*Quercus pubescens*	*04/10/11/12*						
159.	***GENTIANACEAE***	*Gentiana verna* subsp. *balcanica*	*14*						
160.	***GERANIACEAE***	*Geranium robertianum*	*09/10/11*						
161.		*Geranium sanguineum*	*01/06*						
162.	***GLOBULARIACEAE***	*Globularia bisnagarica*	*13/14*						
163.		*Globularia cordifolia*	*01/07/09/10/ 11/14*						
164.	***HYACINTHACEAE***	*Muscari neglectum*	*02/03/04/05/ 06/07/09/10/ 11/12/13/14*				**LC** (Low risk)		
165.		*Ornithogalum sp.*	*11/12*						
166.	***HYPERICACEAE***	*Hypericum olympicum*	*03*						
167.		*Hypericum perforatum*	*12*						
168.		*Hypericum rumeliacum*	*01/03/09/10/ 12/13/14*					+	
169.	***IRIDACEAE***	*Crocus chrysanthus*	*02/03/08/09/ 10/12/13/14*				**LC** (Low risk)		
170.		*Crocus olivieri*	*01/02*				**LC** (Low risk)		

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
171.		*Gladiolus palustris (code 4096)*	*02/03/09/10/ 11*	+					
172.		*Iris reichenbachii*	*03/06/07/08*					+	
173.	***LAMIACEAE***	*Acinos alpinus*	*11/13/14*				**LC** (Low risk)		
174.		*Acinos suaveolens*	*02/04/08/10*				**LC** (Low risk)		
175.		*Ajuga laxmannii*	*07/10*				**NT** (Near Threatened)		
176.		*Clinopodium vulgare*	*01/07/09/10/ 12*				**LC** (Low risk)		
177.		*Lamium maculatum*	*07/10*				**LC** (Low risk)		
178.		*Melittis melissophyllum*	*10/12*				**LC** (Low risk)		
179.		*Satureja pilosa*	*01/02/12/13*				**LC** (Low risk)		
180.		*Sideritis montana*	*01/06/13/14*				**LC** (Low risk)		
181.		*Stachys recta*	*01/02/03/04/ 05/06/08*				**LC** (Low risk)		
182.		*Teucrium capitatum*	*01/04/05/10*				**LC** (Low risk)		
183.		*Teucrium chamaedrys*	*11/12/13/14*				**LC** (Low risk)		
184.		*Teucrium montanum*	*13*				**LC** (Low risk)		
185.		*Thymus atticus*	*13*				**LC** (Low risk)		

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
186.		*Thymus sibthorpii*	*01/02/03/05/09/11*				**LC** (Low risk)		
187.		*Thymus thracicus*	*05/07/13/14*				**LC** (Low risk)		
188.	***LILIACEAE***	*Fritillaria drenovskii*	*13/14*	**+**				**(+)**	
189.	***LINACEAE***	*Linum capitatum*	*12/14*				**LC** (Low risk)		
190.		*Linum elegans*	*14*					**+**	
191.		*Linum hirsutum*	*10/11/13*				**LC** (Low risk)		
192.		*Linum tenuifolium*	*06*				**LC** (Low risk)		
193.	***OLEACEAE***	*Fraxinus ornus*	*01/04/05/06/07/08/09/10/11/12/13/14*						
194.		*Ligustrum vulgare*	*09/10*						
195.		*Syringa vulgaris*	*01/02/03/04/05/06/07/11/12*						
196.	***ORCHIDACEAE***	*Anacamptis morio*	*03/07/08/11/13*			II, B	**LC** (Low risk)		
197.		*Anacamptis pyramidalis*	*01/10/11*			II, B	**LC** (Low risk)		
198.		*Dactylorhiza sambucina*	*13/14*			II, B	**LC** (Low risk)		
199.		*Gymnadenia conopsea*	*08/10/13/14*			II, B	**LC** (Low risk)		
200.		*Neotinea tridentata*	*02/03/06/07/10/12*			II, B	**LC** (Low risk)		

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
201.		*Neotinea ustulata*	*05/06/12/14*			II, B	**LC** (Low risk)		
202.		*Platanthera chlorantha*	*13*			II, B	**LC** (Low risk)		
203.	***OROBANCHACEAE***	*Melampyrum arvense*	*01/06*						
204.		*Orobanche sp.*	*01/03/05*						
205.		*Rhinanthus rumelicus*	*01/02/03/04/ 05/06/08/10 /11/12/13/14*						
206.	***PINACEAE***	*Pinus nigra*	*08/10/11/12/ 13/14*						
207.		*Pinus sylvestris*	*12*						
208.	***PLANTAGINACEAE***	*Plantago argentea*	*08/10/11*				**LC** (Low risk)		
209.		*Plantago holosteum*	*12/13/14*						
210.	***PLUMBAGINACEAE***	*Armeria canescens*	*03/04/05/12*						
211.		*Goniolimon tataricum*	*01/13*						
212.	***POACEAE***	*Anthoxanthum odoratum*	*01/02/03/04/ 05/06/07/08/ 09 /10/11/12*				**LC** (Low risk)		
213.		*Arrhenatherum elatius*	*10*				**LC** (Low risk)		
214.		*Agrostis stolonifera*	*05*						
215.		*Brachypodium sylvaticum*	*09/10/11/12*						
216.		*Briza media*	*09/10*						
217.		*Bromus squarrosus*	*01/02/03/04/ 05/06/07/13*						

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
218.		*Calamagrostis arundinacea*	*10*				**LC** (Low risk)		
219.		*Chrysopogon gryllus*	*01/03*						
220.		*Dactylis glomerata*	*09/12*						
221.		*Danthoniastrum compactum*	*10*						
222.		*Festuca heterophylla*	*10*						
223.		*Festuca koritnicensis*	*01/04/05/06/ 07/08/09/11/ 13/14*					+	
224.		*Festuca* sp.	*02/03/06/07/ 09/10*						
225.		*Festuca valesiaca*	*04/05/13/14*						
226.		*Festucopsis sancta*	*04/05/06/07/ 09/10/11/12/ 13/14*					+	
227.		*Koeleria macrantha*	*01/02/03/04/ 05/06/07/08/ 09 /10/13/14*						
228.		*Lolium perenne*	09/10						
229.		*Melica ciliata*	*13/14*						
230.		*Phleum pratense*	*07/09*				**LC** (Low risk)		
231.		*Poa bulbosa*	*11/13/14*						
232.		*Poa molinerii*	*04/08/10*						
233.		*Poa nemoralis*	*12*						
234.		*Sesleria robusta*	*06/09/10/12/ 13/14*					+	
235.		*Stipa pulcherrima*	*01/02/04/05/ 06/07/08/09/ 10/11/12/13/ 14*						

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
236.	***POLYGALACEAE***	*Polygala nicaeensis subsp. mediterranea*	*01/03/04/05/ 06/07/09/10 /11/12/13/14*				**LC** (Low risk)		
237.	***POLYGONACEAE***	*Rumex acetosella*	*04*						
238.	***PRIMULACEAE***	*Primula veris*	*07/10*						
239.	***RANUNCULACEAE***	*Clematis vitalba*	*11/12*				**LC** (Low risk)		
240.		*Ranunculus arvensis*	*02*				**LC** (Low risk)		
241.		*Thalictrum minus*	*01/03/08*				**LC** (Low risk)		
242.	***RESEDACEAE***	*Reseda lutea*	*03*				**LC** (Low risk)		
243.	***RHAMNACEAE***	*Frangula rupestris*	*01/04/08/09/ 10/11/12/13*				**LC** (Low risk)		
244.		*Rhamnus saxatilis*	*01/02/03/04/ 05/06/07/08 /09/10/11/12 /13/14*						
245.	***ROSACEAE***	*Aremonia agrimonoides*	*01/09/10/11/ 12*				**LC** (Low risk)		
246.		*Cotoneaster tomentosus*	*01/13/14*						
247.		*Fragaria vesca*	*11/12*				**LC** (Low risk)		
248.		*Potentilla detommasii*	*03/04/06*				**LC** (Low risk)		
249.		*Potentilla recta*	*01/04/05/06/ 07/08/10/11/ 12/13*				**LC** (Low risk)		
250.		*Rosa agrestis*	*01/11/12*				**LC**		

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
							(Low risk)		
251.		*Rosa canina*	*01/10/13*				**LC** (Low risk)		
252.		*Rosa spinosissima*	*01/04/08/10*				**LC** (Low risk)		
253.		*Rosa turcica*	*14*				**LC** (Low risk)		
254.		*Rubus canescens*	*09*				**LC** (Low risk		
255.		*Sanguisorba minor*	*06/07/09/10/ 11/12/13/14*				**LC** (Low risk)		
256.		*Sorbus aria*	*09/10/11/12*				**LC** (Low risk)		
257.		*Sorbus torminalis*	*09/10*				**LC** (Low risk)		
258.	***RUBIACEAE***	*Asperula aristata subsp. nestia*	*13/14*					**(+)**	
259.		*Asperula purpurea*	*03/08/09/11/ 12/13*						
260.		*Galium aegeum*	*01/02/03/05/ 07/10*					**+**	
261.		*Galium hellenicum*	*04/05/08/10/ 11/12*					**+**	
262.		*Galium verum*	*11/12*				**LC** (Low risk)		
263.		*Galium verum*	*01/09*						
264.	***SALICACEAE***	*Populus tremula*	*10/11/12*						
265.	***SANTALACEAE***	*Arceuthobium oxycedri*	*04*						

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
266.		*Comandra umbellata* subsp. *elegans*	*02/ 03/04/06/09*						
267.	***SAXIFRAGACEAE***	*Saxifraga sempervivum*	*01/13/14*				**LC** (Low risk)		
268.		*Saxifraga stribrnyi*	*09/10*				**LC** (Low risk)	**(+)**	
269.	***SCROPHULARIACEAE***	*Scrophularia laciniata*	*14*					**+**	
270.		*Verbascum densiflorum*	*03/05/09/10/ 11/12/13/14*						
271.		*Verbascum nobile*	*01*					**(+)**	
272.	***TILIACEAE***	*Tilia tomentosa*	*06/10/12*						
273.	***ULMACEAE***	*Ulmus minor*	*09*				**LC** (Low risk)		
274.	***VALERIANACEAE***	*Valeriana officinalis*	*11*						
275.		*Valerianella coronata*	*11*				**LC** (Low risk)		
276.	***VERONICACEAE***	*Digitalis lanata*	*09/10*						
277.		*Linaria dalmatica*	*01/02/03/04/ 07*				**LC** (Low risk)		
278.		*Linaria genistifolia*	*12*				**LC** (Low risk)		
279.		*Veronica chamaedrys*	*10/11/12*				**LC** (Low risk)		
280.		*Veronica grisebachii*	*02/05/06*				**LC** (Low risk)		
281.		*Veronica jacquinii*	*01/03/04/05/ 06/09/10/11*						
282.	***VIOLACEAE***	*Viola kitaibeliana*	*01/02/03/05/ 08*				**LC**		

A/N	FAMILY	TAXON	FYTOL STATION	DIRECTIVE 92/43/EC	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	RED LIST OF GREECE *	BALKAN ENDEMIC + / RARE (+)	RARE GREEK ENDEMIC
							(Low risk)		
283.		*Viola perinensis*	*13/14*					**(+)**	

* Natural Environment and Climate Change Agency (NECCA) (2024) The Greek Red List of Threatened Species.Athens, Greece. Available at redlist.necca.gov.gr, accessed (05/09/2024)

The Red List of threatened species of plants, animals and fungi is provided for by the provisions of Law 3937/2011 "Conservation of Biodiversity and other provisions". All the species of the Red List of Greece were evaluated according to the criteria of the International Union for Conservation of Nature (IUCN).

RESULTS

In the study area, none of the habitat types present in the study area are classified as Priority Habitat Types.

From the 283 species and subspecies recorded in the flora sampling from plots 01-14, the following results are obtained (Table 47):

- Two (2) are "species of Community interest" as they are species of Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Annex II: *Gladiolus palustris* and Annex IV: *Fritillaria drenovskii*).
- Seven (7) are included in the list of species of Decree 67/81 'On the protection of wild flora and fauna and on the establishment of a procedure for the coordination and control of research on them'.
- Seven (7) taxa of the ornithological family are covered by an international convention (CITES).
- One (1) (*Allium melanogyne*) is a Greek endemic, occurring exclusively in the phytogeographic region of northeastern Greece (NE).
- Forty-one (41) taxa are endemic to the Balkan Peninsula of which nineteen (19) are classified as rare.

Table 47. Important species recorded in the study area.

A/N	TAXON	DIRECTIVE 92/43/EC DIRECTIVE	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	BALKANIKO ENDEMIC + RARE BALKAN ENDEMIC (+)	RARE GREEK ENDEMIC
	2	3	4	5	8	9
1.	*Acer hyrcanum*				+	
2.	*Achillea ageratifolia*				+	
3.	*Allium melanogyne*					+
4.	*Alyssum sibiricum*				+	
5.	*Anacamptis morio*			II, B		

A/N	TAXON	DIRECTIVE 92/43/EC DIRECTIVE	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	BALKANIKO ENDEMIC + RARE BALKAN ENDEMIC (+)	RARE GREEK ENDEMIC
6.	*Anacamptis pyramidalis*			II, B		
7.	*Anthemis pindicola*		**(+)**		**+**	
8.	*Anthyllis aurea*				**+**	
9.	*Anthyllis vulneraria* subsp. *pulchella*				**+**	
10.	*Asperula aristata subsp. nestia*				**(+)**	
11.	*Astragalus angustifolius* subsp. *balcanicus*				**(+)**	
12.	*Campanula orphanidea*		**(+)**		**(+)**	
13.	*Carduus kerneri* subsp. *scardicus*				**+**	
14.	*Carex kitaibeliana* subsp. *capillata*				**(+)**	
15.	*Centaurea napulifera*				**+**	
16.	*Centaurea parilica*				**(+)**	
17.	*Centaurea stoebe* subsp. *serbica*				**(+)**	
18.	*Cerastium decalvans*				**(+)**	
19.	*Convolvulus boissieri subsp. suendermannii*				**(+)**	
20.	*Crepis viscidula*				**+**	
21.	*Dactylorhiza sambucina*			II, B		
22.	*Dianthus gracilis*		**(+)**		**+**	
23.	*Dianthus petraeus subsp. orbelicus*		**(+)**		**(+)**	
24.	*Dianthus simulans*				**+**	
25.	*Festuca koritnicensis*				**+**	
26.	*Festucopsis sancta*				**+**	
27.	*Fritillaria drenovskii*	**IV**			**(+)**	
28.	*Galium aegeum*				**+**	
29.	*Galium hellenicum*				**+**	
30.	*Genista subcapitata*				**( )+**	

A/N	TAXON	DIRECTIVE 92/43/EC DIRECTIVE	LIST OF PLANT SPECIES OF DECREE 67/81 [SYMBOL (+)]	CITES	BALKANIKO ENDEMIC + RARE BALKAN ENDEMIC (+)	RARE GREEK ENDEMIC
31.	*Gladiolus palustris (code 4096)*	**II**				
32.	*Gymnadenia conopsea*			II, B		
33.	*Hypericum rumeliacum*				+	
34.	*Iris reichenbachii*				+	
35.	*Linum elegans*				+	
36.	*Lomelosia rhodopensis*				**(+)**	
37.	*Minuartia glomerata*				+	
38.	*Neotinea tridentata*			II, B		
39.	*Neotinea ustulata*			II, B		
40.	*Onobrychis montana* subsp. *scardica*				+	
41.	*Onosma heterophylla*		**(+)**			
42.	*Paronychia macedonica*				**(+)**	
43.	*Platanthera chlorantha*			II, B		
44.	*Saxifraga stribrnyi*				**(+)**	
45.	*Scrophularia laciniata*				+	
46.	*Sempervivum heuffelii*		**(+)**			
47.	*Sempervivum leucanthum*		**(+)**		**(+)**	
48.	*Sesleria robusta*				+	
49.	*Silene flavescens subsp. thessalonica*				**(+)**	
50.	*Silene sendtneri* subsp. *balcanica*				**(+)**	
51.	*Verbascum nobile*				**(+)**	
52.	*Viola perinensis*				**(+)**	

It should also be noted that:

- 106 of the species recorded are included in the National Red Data Book (RDB) of 2023, while none are included in the two previous Red Data Books of Rare and Threatened Plants of Greece (1995, 2009). Of the 107 taxa, 97% (104 taxa) were assessed as Least Concern (LC) species according to the International Union for Conservation of Nature (IUCN) criteria i.e. species that do not meet any of the criteria to be considered threatened or near threatened. A small percentage (3%) of the species assessed, *Onobrychis alba, Onobrychis montana* subsp. *scardica and Ajuga laxmannii*, were classified as Near Threatened (NT) as they do not meet any of the criteria to be considered threatened, but are not far from meeting or likely to meet the criteria in the near future (Table 48).

Table 48. National Red List Species (RDB).

A/N	TAXON	GREECE RED LIST
1.	*Achillea clypeolata*	****LC** (Low risk)
2.	*Achillea millefolium*	**LC** (Low risk)
3.	*Acinos alpinus*	**LC** (Low risk)
4.	*Acinos suaveolens*	**LC** (Low risk)
5.	*Ajuga laxmannii*	***NT** (Near Threatened)
6.	*Anacamptis morio*	**LC** (Low risk)
7.	*Anacamptis pyramidalis*	**LC** (Low risk)
8.	*Anthemis ruthenica*	**LC** (Low risk)
9.	*Anthemis pindicola*	**LC** (Low risk)
10.	*Anthericum liliago*	**LC** (Low risk)
11.	*Anthoxanthum odoratum*	**LC** (Low risk)
12.	*Anthyllis aurea*	**LC** (Low risk)
13.	*Anthyllis montana* subsp. *jacquinii*	**LC** (Low risk)
14.	*Anthyllis vulneraria* subsp. *pulchella*	**LC** (Low risk)
15.	*Aremonia agrimonoides*	**LC** (Low risk)
16.	*Arenaria leptoclados*	**LC** (Low risk)
17.	*Arenaria serpyllifolia*	**LC** (Low risk)
18.	*Arrhenatherum elatius*	**LC** (Low risk)

A/N	TAXON	GREECE RED LIST
19.	*Asphodeline lutea*	**LC** (Low risk)
20.	*Astragalus angustifolius*	**LC** (Low risk)
21.	*Astragalus onobrychis*	**LC** (Low risk)
22.	*Asyneuma limonifolium*	**LC** (Low risk)
23.	*Aubrieta deltoidea*	**LC** (Low risk)
24.	*Berteroa incana*	**LC** (Low risk)
25.	*Bupleurum flavicans*	**LC** (Low risk)
26.	*Calamagrostis arundinacea*	**LC** (Low risk)
27.	*Campanula bononiensis*	**LC** (Low risk)
28.	*Campanula lingulata*	**LC** (Low risk)
29.	*Campanula orphanidea*	**LC** (Low risk)
30.	*Campanula persicifolia*	**LC** (Low risk)
31.	*Campanula rumeliana*	**LC** (Low risk)
32.	*Carum graecum*	**LC** (Low risk)
33.	*Centaurea salonitana*	**LC** (Low risk)
34.	*Clinopodium vulgare*	**LC** (Low risk)
35.	*Clematis vitalba*	**LC** (Low risk)
36.	*Crocus chrysanthus*	**LC** (Low risk)
37.	*Crocus olivieri*	**LC** (Low risk)
38.	*Dactylorhiza sambucina*	**LC** (Low risk)
39.	*Draba lasiocarpa*	**LC** (Low risk)
40.	*Euphorbia myrsinites*	**LC** (Low risk)
41.	*Fragaria vesca*	**LC** (Low risk)
42.	*Frangula rupestris*	**LC** (Low risk)
43.	*Gymnadenia conopsea*	**LC** (Low risk)
44.	*Iberis saxatilis*	**LC** (Low risk)
45.	*Jurinea mollis*	**LC** (Low risk)
46.	*Knautia ambigua*	**LC** (Low risk)
47.	*Lamium maculatum*	**LC** (Low risk)
48.	*Linaria dalmatica*	**LC** (Low risk)

A/N	TAXON	GREECE RED LIST
49.	*Linaria genistifolia*	**LC** (Low risk)
50.	*Linum capitatum*	**LC** (Low risk)
51.	*Linum hirsutum*	**LC** (Low risk)
52.	*Linum tenuifolium*	**LC** (Low risk)
53.	*Matthiola fruticulosa* subsp. *valesiaca*	**LC** (Low risk)
54.	*Melittis melissophyllum*	**LC** (Low risk)
55.	*Minuartia glomerata*	**LC** (Low risk)
56.	*Muscari neglectum*	**LC** (Low risk)
57.	*Neotinea tridentata*	**LC** (Low risk)
58.	*Neotinea ustulata*	**LC** (Low risk)
59.	*Onobrychis alba*	**NT** (Near Threatened)
60.	*Onobrychis montana* subsp. *scardica*	**NT** (Near Threatened)
61.	*Onosma heterophylla*	**LC** (Low risk)
62.	*Phleum pratense*	**LC** (Low risk)
63.	*Plantago argentea*	**LC** (Low risk)
64.	*Platanthera chlorantha*	**LC** (Low risk)
65.	*Polygala nicaeensis subsp. mediterranea*	**LC** (Low risk)
66.	*Potentilla detommasii*	**LC** (Low risk)
67.	*Potentilla recta*	**LC** (Low risk)
68.	*Ranunculus arvensis*	**LC** (Low risk)
69.	*Reseda lutea*	**LC** (Low risk)
70.	*Rosa agrestis*	**LC** (Low risk)
71.	*Rosa canina*	**LC** (Low risk)
72.	*Rosa spinosissima*	**LC** (Low risk)
73.	*Rosa turcica*	**LC** (Low risk)
74.	*Rubus canescens*	**LC** (Low risk)
75.	*Sanguisorba minor*	**LC** (Low risk)
76.	*Saponaria bellidifolia*	**LC** (Low risk)
77.	*Satureja pilosa*	**LC** (Low risk)
78.	*Saxifraga sempervivum*	**LC** (Low risk)

A/N	TAXON	GREECE RED LIST
79.	*Saxifraga stribrnyi*	**LC** (Low risk)
80.	*Silene gigantea* subsp. *rhodopea*	**LC** (Low risk)
81.	*Sedum acre*	**LC** (Low risk)
82.	*Sedum sediforme*	**LC** (Low risk)
83.	*Sideritis montana*	**LC** (Low risk)
84.	*Sorbus aria*	**LC** (Low risk)
85.	*Sorbus torminalis*	**LC** (Low risk)
86.	*Stachys recta*	**LC** (Low risk)
87.	*Tanacetum vulgare*	**LC** (Low risk)
88.	*Teucrium capitatum*	**LC** (Low risk)
89.	*Teucrium chamaedrys*	**LC** (Low risk)
90.	*Teucrium montanum*	**LC** (Low risk)
91.	*Thalictrum minus*	**LC** (Low risk)
92.	*Thymus atticus*	**LC** (Low risk)
93.	*Thymus sibthorpii*	**LC** (Low risk)
94.	*Thymus thracicus*	**LC** (Low risk)
95.	*Tragopogon dubius*	**LC** (Low risk)
96.	*Trifolium cherleri*	**LC** (Low risk)
97.	*Trifolium diffusum*	**LC** (Low risk)
98.	*Trifolium medium* subsp. *balcanicum*	**LC** (Low risk)
99.	*Trifolium pratense*	**LC** (Low risk)
100.	*Trifolium scabrum*	**LC** (Low risk)
101.	*Ulmus minor*	**LC** (Low risk)
102.	*Valerianella coronata*	**LC** (Low risk)
103.	*Veronica chamaedrys*	**LC** (Low risk)
104.	*Veronica grisebachii*	**LC** (Low risk)
105.	*Vincetoxicum hirundinaria*	**LC** (Low risk)
106.	*Viola kitaibeliana*	**LC** (Low risk)

One species is considered:
***Near Threatened (NT)** when it has been assessed according to the IUCN Red List criteria, and does not meet any of the criteria to be considered threatened. However, it is not far from meeting or likely to meet them in the near future.

**Least Concern (LC) when it has been assessed according to the IUCN Red List criteria, and does not meet any of the criteria to be considered threatened or near threatened.

Of the total number of 283 taxa recorded in the study area, 14.5% of them occur exclusively in the Balkan Peninsula (mainly in Greece and Bulgaria). All the Balkan endemic species recorded are found in limestone cliffs, rocky soils, rocky slopes, rock crevices - fissures, in habitats similar to those described at the sampling sites. Some of these taxa also inhabit subalpine meadows, forest clearings and places with anthropogenic pressure - roadsides.

The current status of the study area was included in the *work on the habitat type inventory.* The area shows a tendency of shrinking of open places on the slopes of northern exposure, while on the stony, steeply sloping slopes south of the ridge, woody species of bushy form have been established. The presence of the protected species listed in Table 46 in the study area is rare with occurrence limited to some sample plots. Their occurrence is also limited to small numbers of individuals (<5-10) mainly due to limited open space within the study area, species competition, the prevalence of perennial grasses mainly, and, the gradual establishment of woody species with further reduction of existing open space.

The species recorded in most of the 14 sample plots occur - according to the literature sources - both in numerous sites on Mount Orvilos and in different regions of Greece and countries of the Balkan Peninsula. Their presence is therefore not uncommon. In particular, these species are:

Anthyllis aurea. Anthyllis aurea is a species of North-Eastern Greece, North-Central Greece and North Pindos. In the region it occurs on stony slopes, subalpine meadows and stony shrublands, rocky peaks and cliff tops, in forest clearings of Orvilos, Menoikiou, Falakros and Paggaio.

Centaurea stoebe subsp. *serbica.* Subspecies of north-eastern Greece. In the region it occurs on stony slopes, forest clearings, uncultivated fields, dry meadows and in places of anthropogenic disturbance of Orvilos and Falakros.

Anthemis pindicola. Species from the Balkan peninsula (Greece, Bulgaria). In Greece it occurs in most of the mainland (North-Eastern Greece, North-Central Greece, East-Central Greece, Sterea Greece, North and South Pindos). It occurs on

stony slopes, topsoil, subalpine meadows and limestone cliffs. In the area on all mountains (Belles, Orvilos, Falakro, Menoikio, Pangeo, Rodopi).

Genista subcapitata. Species from the Balkan Peninsula (Greece, Albania, North Macedonia, Bulgaria, Serbia, Montenegro, Kosovo, Croatia, Bosnia and Herzegovina, Slovenia, Serbia, Montenegro). In Greece, it occurs in most of the mainland (north-eastern Greece, north-central Greece, east-central Greece, Sterea Greece and southern Pindos). It occurs in cultivated fields, on slopes and roadsides. In the area it is recorded in Orvilos.

Cerastium decalvans subsp. *orbelicum.* Subspecies of the Balkan Peninsula (Greece, Bulgaria). In Greece it occurs in north-eastern Greece on stony slopes, topsoils, subalpine meadows, rocky slopes and stony hillsides. In the region in Belles, Orvilos, Falakro, Menoikio, Pangeo).

Dianthus gracilis subsp. *drenowskianus.* Subspecies of the Balkan Peninsula (Greece, Bulgaria). In Greece it occurs in north-eastern Greece on stony slopes. In the region in Orvilos, Pangeo, Rodopi).

Some Balkan endemics were recorded in the study area exclusively on plots 13 and 14. The understorey at these sites was destroyed by the fire that occurred on 18 July 2024. Post-fire succession of plots is a process of self-succession in which the burned community maintains its floral identity over time. The occurrence or non-occurrence of specific important taxa, as well as the timing of their occurrence on currently burned lands will be determined by numerous factors and is expected to be determined in the future. These species are:

Campanula orphanidea. Balkan endemic species (Greece, Bulgaria). In Greece, it occurs in the mountains of Eastern Macedonia. It occurs in limestone areas, in cracks and crevices of rocks, as well as in stony meadows in subalpine areas. In all the limestone mountains of the region (Orvilos, Pangeo, Falakro, Menoikio).

Fritillaria drenovskii. Balkan endemic species (Greece, Bulgaria). In Greece it occurs in the mountains of Eastern Macedonia. It occurs in dry, stony places in mountainous or subalpine meadows, on slate or limestone. In all the limestone mountains of the region (Orvilos, Pangeo, Falakro, Menoikio).

Linum elegans. Species of the Balkan and Italian peninsula (Greece, Albania, North Macedonia, Bulgaria, Serbia, Montenegro, Kosovo, Croatia, Bosnia-Herzegovina, Slovenia, Italy, Bosnia-Herzegovina). It is found throughout mainland Greece and the western Aegean, on stony slopes, rocky soils and limestone cliffs. In all the limestone mountains of the region (Orvilos, Pangeo, Falakro, Menoikio).

Scrophularia laciniata. Species of the Balkan Peninsula (Greece, Albania, North Macedonia, Bulgaria, Serbia, Montenegro, Kosovo, Croatia, Bosnia and Herzegovina, Slovenia, Romania, Serbia, Montenegro, Kosovo, Bosnia and Herzegovina). Throughout Greece except in the flora areas of the Cyclades and Crete, Kasos, Karpathos, on stony slopes, rocky soils and on limestone cliffs, peaks and ophiolites. On all the limestone mountains of the area (Orvilos, Pangeo, Falakro, Menoikio).

Asperula aristata subsp. nestia. Balkan endemic subspecies (Greece, Bulgaria). In Greece it occurs in the mountains of North Pindos, Central Greece, North-Eastern Greece, North-Central Greece and North Aegean on stony slopes, rocky soils and in forest clearings. In all the mountains of the region (Orvilos, Pangeo, Falakro, Menoikio, Rodopi).

Silene flavescens subsp. *thessalonica.* Balkan endemic subspecies (Greece, Bulgaria, Albania). In Greece it occurs in the mountains of South Pindos, Central Greece, East-Central Greece, North-Central Greece, North-Eastern Greece, North and East Aegean in limestone rocks, rocky soils and forest clearings, spurs, crevices and cracks in rocks, cliffs.

Viola perinensis. Balkan endemic species (Greece, Bulgaria). In Greece it occurs in the mountains of north-eastern Greece, on stony slopes, subalpine meadows and forest clearings. In the mountains of the region (Orvilos, Pangeo, Falakro).

Centaurea napulifera. Species from the Balkan Peninsula (Greece, Albania, North Macedonia, Bulgaria, Serbia, Montenegro, Kosovo, Croatia, Bosnia-Herzegovina, Bosnia-Herzegovina, Slovenia). In Greece, it occurs in the mountains of north-central Greece and north-eastern Greece, on stony slopes, stony scrubland and meadows. In all the limestone mountains of the region (Orvilos, Pangeo, Falakro, Menoikio).

Platanthera chlorantha. Species of the orheoid family of Europe and Asia. Throughout Greece except in the flora of the Cyclades and Crete, Kasos, Karpathos. Species which is classified as one of the most widespread species among the orchids of eastern Macedonia. It is found in low-altitude meadows, scrub, coniferous and broad-leaved forests, as well as in subalpine meadows. In all the mountains of the region.

Table 46, in addition to *Platanthera chlorantha*, includes six other species of orchids (*Anacamptis morio, Anacamptis pyramidalis, Dactylorhiza sambucina, Gymnadenia conopsea, Neotinea tridentata, Neotinea ustulata)*, which also have a wide geographical distribution. In particular:

Anacamptis morio is widely distributed in central and northern Greece. Anacamorum morio is a species of Europe, Asia and Northwest Africa.

Anacamptis pyramidalis is a European species, which is widely distributed throughout Greece.

Dactylorhiza sambucina has a wide geographical distribution throughout Europe. In Greece it is common in Greece, mainly in mountainous areas.

Gymnadenia conopsea is common throughout Eurasia, which in Greece is found in the mountainous areas of mainland Greece.

Neotinea tridentata is a species of the central and eastern Mediterranean, with a wide distribution in Greece.

Neotinea ustulata is distributed in the central and western regions of Europe. In Greece it spreads in the northern and western regions.

The Greek endemic *Allium melanogyne* was recorded in small numbers in 2 sampling plots (5 individuals in plot 01 and 7 individuals in plot 06). Similarly small numbers of individuals were recorded for *Gladiolus palustris* and *Iris reichenbachii.* The other species in Table 46 that have not been reported also occur in a few plots and in small numbers of individuals. Their numbers are small and their occurrence within the surface was rare. The only exception reported is *Gymnadenia conopsea*, where 14 individuals were counted on 1 of the 4 plots recorded (Sample plot 08).

The results and the analysis of the floral records as a whole show a region of the mountain with a flora rich in taxa, of which several are Balkan endemics, but not

restricted to this region or to Mount Orvilos. Most of the 52 important species recorded in the study area have a wide distribution in the Balkan area and a small, fragmented presence in the study area in small numbers. In addition, the trend of shrinking habitats from deforestation of open sites poses a further risk of their shrinkage or extinction from these sites. The presence of most of them on the stony slopes south of the ridge requires, when opening the road connecting the wind turbine plazas, avoiding the dumping of embankments south of the ridge. Bear in mind that the mildest disturbance to vegetation can be achieved by raising the road to around sampling location 10.

SPECIES IN THE STUDY AREA INCLUDED IN THE IUCN LIST OF ENDANGERED SPECIES AND/OR INCLUDED IN THE REVISED LIST OF DECREE 67/81 AND/OR COVERED BY AN INTERNATIONAL CONVENTION

From the flora species inventory work, some of the most important flora species of the study area are presented (photos 379 - 397), for which their morphological characteristics, preferred habitat and protection status are described. Then 12 taxa of the study area are presented which are endemic or under protection (photos 396- 397).

Anacamptis pyramidalis

Slender plant, up to 50 cm tall (photo 379) Distinguished by its short and conical inflorescence at first, which later becomes oval elongated and consists of numerous, small-sized flowers. The sepals are acuminate, the lateral ones diverging, while the dorsal one forms a dome with the petals. The lip is trilobed, with lateral lobes spatulate, while the central one is longer and narrower. The base of the rim consists of two prominent projections, and the back of the rim bears a very long and slender key. The species is variable in terms of leaf shape and flower colour (white, pink to red). Widely spread throughout Greece. It is a species that occurs in meadows, topsoil, scrub, forest margins and light woods, in a wide altitudinal range, as it can be found from the lower altitudinal zone to high altitudes in subalpine meadows. It is usually found in the form of single individuals, and rarely one may see groups of a few plants. It is included in the list of plant species in the Presidential Decree 67/81 (Journal of Laws 23/A/30-01-1981) "On the protection of native flora and wildlife and the establishment of a procedure for the coordination and control of their research", and is also subject to the provisions of the CITES Convention on International Trade in Endangered Species of

Wild Fauna and Flora. According to the IUCN, it is classified as a 'Least Concern' (LC-Least Concern) plant, which does not imply that the species is safe or that it should not be protected, but that 'it is not in imminent danger of extinction if current conditions are maintained'.

Dactylorhiza sambucina

Species growing in dry habitats, mainly in subalpine meadows, upland forest gaps and pine forests (photo 380). Characterised by broad lanceolate leaves at the base of the stem and dense and ovate inflorescence. Its flowers show color dimorphism and may be yellow or reddish-violet. Lateral sepals divergent to erect, ovate, with convex margins. Rim almost entire to trilobed, ellipsoidal, slightly convex, with red spots in the centre, often with crinkled margins. Keel robust, almost cylindrical to conical, convex, sloping downwards, parallel to ovary. Grows in dry habitats, mainly in subalpine meadows, upland forest gaps and pine forests. It usually forms large colonies which are impressive due to the dichromatic nature of its plants. It flowers from May to June. It is included in the list of plant species of Presidential Decree 67/81 (Official Gazette 23/A/30-01-1981) 'On the protection of native flora and wild fauna and the determination of the procedure for the coordination and control of their research', as well as in the list of Other Important Plant Species of Greece accompanying the European Directive 92/43/EEC, and is also subject to the provisions of the CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora. According to the IUCN, it is included in the "Least Concern" (LC-Least Concern) category, which does not imply that the species is safe or that it should not be protected, but that it is "not in imminent danger of extinction if present conditions are maintained".

Gymnadenia conopsea

Occurs in grasslands and pine forests at relatively high altitudes. It is a plant 20-60 cm tall, with 5-12 linear-lanceolate leaves on the lower part of the stem (photo 381). It is usually distinguished by its relatively very dense inflorescence with its relatively numerous flowers. Within forests its inflorescence is usually looser with a smaller number of flowers. The colour of the flowers varies strongly from bright violet or violet to, less frequently, pale pink or even white. The sepals are oval, blunt-tipped, while the

petals are shorter, more asymmetrical, and with the dorsal sepal form a dome. The lip is trilobate with the lateral lobes approximately equidistant from the central lobe. On the posterior side there is a slender key about twice the size of the ovary. Common. In Greece it is found in the mountainous areas of the mainland. It is included in the list of plant species of Presidential Decree 67/81 (Official Gazette 23/A/30-01-1981) "On the protection of native flora and wild fauna and the determination of the procedure for the coordination and control of their research", and is also subject to the provisions of the CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora. According to the IUCN, it is classified as a 'Least Concern' (LC-Least Concern) plant, which does not imply that the species is safe or that it should not be protected, but that 'it is not in imminent danger of extinction if current conditions are maintained'.

Anacamptis morio

Occurs in forest gaps and scrubland where it usually forms highly populous colonies, as well as in seasonally wet meadows and mainly pine forests. It is generally a slender plant up to 40 cm high, with rosette-shaped leaves at the bottom (Photo 382). The inflorescence is relatively sparse with 5-20 flowers of relatively small size. It is a highly diverse taxon as in typical forms the flowers are pink to deep violet, and individuals with whitish or intermediate coloration of the perianth parts are not uncommon. It is distinguished by the trilobed lip, the centre of which is pale with strong reddish-violet spots, and the middle lobe, which is longer than the lateral lobes. Its hub is robust, curved upwards and slightly shorter than the ovary. It is included in the list of plant species of Presidential Decree 67/81 (Journal of Laws 23/A/30-01-1981) "On the protection of native flora and wild fauna and establishing the procedure for coordinating and controlling their research", and is also subject to the provisions of the CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora. According to the IUCN, it is classified as a 'Least Concern' (LC-Least Concern) plant, which does not imply that the species is safe or that it should not be protected, but that 'it is not in imminent danger of extinction if present conditions are maintained'.

Neotinea tridentata

This is a slender plant (up to 45 cm) with bluish-green, lanceolate to ovate leaves, which appear at the base of the stem as a rosette (photo 383). The inflorescence is

dense, short and consists of 10-50 small flowers. The sepals and petals are lance-shaped, with a sharp apex, rose-colored, reddish, rarely white with reddish nerves, and form a dome. The rim is trilobed, uniform or somewhat lighter than the dome, with violet or reddish-violet spots. On the back of the lip is a cylindrical, downward-sloping key. It occurs mainly in light habitats (bare land, scrub, forest gaps, subalpine meadows) and less so in pine forests, and may be one of the wild orchid species with the greatest altitudinal range of growth, from sea level to the tops of high mountains. It is included in the list of plant species of the Presidential Decree 67/81 (Journal of Laws 23/A/30-01-1981) "On the protection of native flora and wild fauna and the determination of the procedure for the coordination and control of their research", as well as in the list of Other Important Plant Species of Greece accompanying the European Directive 92/43/EEC, and is also subject to the provisions of the CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora. According to the IUCN, it is included in the "Least Concern" (LC-Least Concern) category, which does not imply that the species is safe or that it should not be protected, but that it is "not in imminent danger of extinction if present conditions are maintained".

Neotinea ustulata

Relatively small species, with leaves elongated and acute to broadly lanceolate. The inflorescence is dense, short and oval at first, later sparse at the base, almost cylindrical, with up to 80 small flowers (photo 384). The petalled sepals form a dome, which is pinkish to greenish with reddish-violet tints inside, reddish-violet to deep blackish-brown outside. The rim is strongly trilobed, white, sometimes with pinkish tints and a few reddish-violet spots. At the back of the lip is a key, which is greenish to reddish, cylindrical, sloping downwards. It prefers subalpine meadows and upland forest gaps, and rarely occurs in pine forests or low elevation areas. It is a species with a wide distribution in Europe, but in the past it has suffered a very large reduction in the area in which it is distributed. It is considered to be one of the species that will largely suffer the devastating effects of climate change. It flowers from April to July, depending on altitude. It is included in the list of plant species in Presidential Decree 67/81 (Official Gazette 23/A/30-01-1981) 'On the protection of native flora and wild fauna and the establishment of a procedure for the coordination and control of their research', as well

as in the list of Other Important Plant Species of Greece accompanying European Directive 92/43/EEC, and is also subject to the provisions of the CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora. According to the IUCN, it is included in the "Least Concern" (LC-Least Concern) category, which does not imply that the species is safe or that it should not be protected, but that it is "not in imminent danger of extinction if present conditions are maintained".

Onosma heterophylla

Perennial herbaceous plant with many erect hairy stems, up to 30 cm tall (photo 385). The leaves on the lower part of the stem are linear, lanceolate and hairy. The flowers are broad tubular, pale yellow in colour, and hang from very small pedicels (you may have heard them called stems, which is the part of the flower that connects it to the stem). It flowers from June to July. It occurs in dry and limestone rocky sites, in meadows, rocky slopes and rocky outcrops. It is included in the list of plant species in Decree 67/81 (on the protection of native flora and wild fauna and establishing the procedure for coordinating and controlling research on them), under the former synonym Onosma psammophila. It is included in the 2023 National Red List (RDB) species in the "Least Concern" (LC-Least Concern) category, which does not imply that the species is safe or that it should not be protected, but that it is "not at risk

Achillea ageratifolia

Herbaceous plant with several erect or ascending stems, up to 25 cm tall (photo 386). Each shoot ends in a 'compound' white flower that resembles a daisy flower. In fact, these are numerous, small flowers densely arranged on a broad disc (head). Those on the periphery are called glumes, while the smaller inner flowers on the disc are called tubular. It is a species exclusive to the Balkan Peninsula (endemic) that blooms from early May to August, depending on altitude.

Campanula orphanidea

A species with a relatively limited distribution, which locally may have a significant number of plants. A biennial herbaceous plant with short stems (photo 387). Characterized by the green and hairy-pressed leaves at the base of the stem, and the stem that is noticeably longer than the leaf blade. The leaves are oblong, with wavy

margins and a relatively blunt apex. The violet corolla of the flower resembles a bell, 2.5 cm. long, and at the bottom, the sepal-formed calyx is characterized by lanceolate projections (teeth), and hairs around the nerves. It flowers during the summer (mainly in July). It is a Balkan endemic species that spreads in the mountains of Eastern Macedonia and Southern Bulgaria. It occurs in limestone areas, in cracks and crevices of rocks, as well as in stony meadows in subalpine areas. It is not subject to any international protection status. However, as a Balkan endemic it is included in the Other Important Plant Species of the NATURE 2000 network. It is included in the 2023 National Red List (RDB) species in the "Least Concern" (LC-Least Concern) plant category, which does not imply that the species is safe nor that it should not be protected but that it is "not in imminent danger of extinction if present conditions are maintained".

Dianthus petraeus subsp. orbelicus

Perennial plant, with numerous shoots that do not always result in a flower (photo 388). It is characterised by the small leaves at the base of the shoots (up to 2 cm), which are pointed. The flowering shoots are erect, and the flowers are similar in form and shape to those of the common carnation but are noticeably smaller in size and white in colour. It grows in dry, grass-rich meadows and forest openings, especially in limestone sites. It flowers from June to mid-August. It is included in the list of plant species in Presidential Decree 67/81 (Official Gazette 23/A/30-01-1981) 'On the protection of native flora and wild fauna and the determination of the procedure for coordinating and controlling research on them' under the earlier (synonymous) name of Dianthus stefanoffii. It is also included in the list of Other Important Plant Species of Greece accompanying European Directive 92/43/EEC.

Astragalus angustifolius subsp. balcanicus

Perennial cushion-shaped low shrub, with shoots up to 20 cm high (photo 389). The leaves are compound (with 6-10 pairs of leaflets) and terminate in a strong thorn. The flowers are white in herbaceous racemes. The fruit is a cheddar. It flowers from June to July. The subspecies is found from mid to high elevations, mostly at high altitudes, in sites with little soil. Balkan endemic. Not subject to any national or international protection status. It is included in the 2023 National Red List (RDB) species in the

"Least Concern" (LC-Least Concern) plant category, which does not imply that the species is safe nor that it should not be protected but that it is "not in imminent danger of extinction if present conditions are maintained".

Fritillaria drenovskii

This is a perennial plant with a bulbous root system that allows it to live for several years (photo 390). Its leaves are glaucous green, lance-like, coming mainly from the base of the stem, with fewer along it. The flowers are characteristic, coming out in 1-3 (marginally up to 6) at the edge of the stem and drooping downwards. These are conical or bell-shaped, deep reddish to brownish-red, and unlike several other species of the genus the flowers are not spotted. Often the margins on the outer surface of the petals (here called tepals) are yellow, while these are yellow or orange inside. It is a species of the mountains of eastern Macedonia and southern Bulgaria. It is one of the few species of the genus in Northern Greece, and for this reason its importance is great. It occurs in dry, stony places in mountainous or subalpine meadows at altitudes from 1,300-1,850 m (it can be found marginally from 1,000 m), on shale or limestone. It is protected by the Bern Convention on the Conservation of Wildlife and Natural Environment, included in Annex IV of Directive 92/43/EEC and classified as Vulnerable (VU), based on the IUCN classification, with a high risk of extinction in the medium term. It is also included in the UN World List of Plants in Need of Protection and in the list of Other Important Plant Species of Greece accompanying the European Directive 92/43/EEC.

Gentiana verna subsp. balcanica

Perennial herbaceous plant, described as 'dwarf' because of its low height of only 12 cm (photo 391). It usually forms groups of several shoots, as it is able to reproduce and expand by developing underground sections (stolons). At the base of the stem it has rosette of leaves with only the central nerve visible. In contrast, the stem leaves are narrower, with the upper ones being linear or lanceolate. The flowers do not form clusters but are in clusters one at a time at the top of each stem. They consist of an elongated tube and five spreading lobes of a bright blue colour, and their size is relatively large compared to the size of the whole plant. It is found in high altitude areas (1,800-2,800 m) and can be seen in flower from May to July, depending on the altitude.

It is also included in the list of Other Important Species of Plants of Greece accompanying the European Directive 92/43/EEC.

Crocus chrysanthus

A genus of small size, i.e. a plant whose aboveground part dies during the unfavourable season and whose survival organs are in the form of small shoots and bulbs in the ground, protected below the soil surface (photo 392). The leaves, 3-5(-6), are fuzzy and present during flowering. The flowers are golden yellow, with yellow anthers and a yellow to orange-red stalk, divided into three parts. It is one of the first plants to flower (February-April). It is not subject to any national or international protection status. It is included in the 2023 National Red List (RDB) species in the "Least Concern" (LC-Least Concern) plant category, which does not imply that the species is safe or that it should not be protected but that it is "not in imminent danger of extinction if present conditions are maintained".

Onobrychis montana subsp. scardica

Perennial herbaceous plant up to 50 cm high and slightly woody at the base (photo 393). The leaves are compound, consisting of a moderate number of small leaflets (5-8 pairs), which are elliptic or ovate to oblong in shape. The inflorescence is dense, 1-3 cm long, with numerous flowers. The latter are rose-coloured with darker coloured ribs. The fruit resembles a bean (cheddar) and is small in size (up to 7 mm). It is a Balkan native that prefers dry and grass-rich grasslands in the subalpine and alpine zones. It occurs at high altitudes, on a variety of geological substrates but most often on limestone. It flowers during the summer, in particular from the end of June to mid-August. It is not subject to any national or international protection status but is included in the list of Other Important Species of Plants of Greece accompanying the European Directive 92/43/EEC. It is included in the 2023 National Red Data List (RDB) species with the designation Near Threatened (NT) as it does not meet any of the criteria for being considered threatened, but is not far from meeting or likely to meet the criteria in the near future.

Onobrychis alba

Perennial, dense herbaceous plant with shoots up to 50 cm tall (photo 394). Leaves simple pinnate with 15-19 leaflets, elliptic or linear, smooth on the upper surface and with layered hairs on the lower. Flowers in dense, straw-shaped, initially oval botryos, later cylindrical with long pedicels. Calyx tendons lanceolate, hairy, twice as long as the tube. Corolla white with pink streaks, twice the calyx, with petal equal to the trope and wings equal to the calyx. Flowers from May to June. According to the IUCN, it is classified as a 'Least Concern' (LC-Least Concern) plant, which does not imply that the species is safe or that it should not be protected, but that 'it is not in imminent danger of extinction if present conditions are maintained'.

Ajuga laxmannii

A perennial herbaceous plant with an erect, simple stem, pilose-ribbed up to 50 cm high (photo 395). The leaves are oblong, with a rounded base, semi-double, epipinnate, entire or slightly toothed at the apex. Flowers every 2 -4 in the axils of the leaves, along the entire length of the stem. Calyx with teeth shorter than the tube. Corolla yellow with purple veins. Species occurring in interspaces of shrubs and forests, mainly of medium altitude. According to the IUCN, it is classified as a 'Least Concern' (LC-Least Concern) plant, which does not imply that the species is safe or that it should not be protected, but that 'it is not in imminent danger of extinction if present conditions are maintained'.

Recording of the fauna species of Annex II of the Joint Ministerial Decision H.P.14849/853/E103/4.4.2008 (B΄ 645) in terms of the size and density of populations and their conservation status (if they are Special Conservation Areas, Sites of Community Importance).

The fauna (excluding avifauna) in the wider survey area recorded during the fieldwork is presented in Table 49 below.

Table 49. Fauna recorded in the field survey area

STATUS AND STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA			
Latin name	Common name	Status	
		IUCN EU	ELΛΛ(KB)
MUSHROOMS			
Order Carnivora			
Canidae (Canidae)			
Vulpes vulpes		LC	NE
Canis lupus		LC	VU
Ursidae (Ursidae)			
Ursus arctos		LC	EN
Ictidae (Mustelidae)			
Martes foina		LC	NE
Meles meles		LC	NE
Felidae (Felidae)			
Felis silvestris		LC	NE
Order Artiodactyla (Cetartiodactyla)			
Lice (Suidae)			
Sus scrofa		LC	NE
Cervidae (Cervidae)			
Capreolus capreolus		LC	VU
Order Lagomorphs (Lagomorpha)			
Lagomorphs (Leporidae)			
Lepus europaeus		LC	NE
Class Rodents (Rodentia)			
Squirrels (Sciuridae)			
Sciurus vulgaris		LC	NE

STATUS AND STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA			
Latin name	Common name	Status	
		IUCN EU	ELΛΛ(KB)
Order Eullipotyphla			
Porcupines (Erinaceidae)			
Erinaceus roumanicus		LC	NE
Bats (Vespertilionidae)			
Barbastella barbastellus		VU	EN
Hypsugo savii		LC	LC
Myotis bechsteinii		VU	NT
Myotis emarginatus		LC	NT
Myotis myotis		LC	NT
Nyctalus leisleri		LC	LC
Nyctalus noctula		LC	LC
Pipistrellus kuhlii		LC	LC
Pipistrellus nathusii		LC	DD
Pipistrellus pipistrellus		LC	DD
Vespertilio murinus		LC	DD
Minopteridae (Miniopteridae)			
Miniopterus schreibersii		VU	NT
Rhinolophidae (Rhinolophidae)			
Rhinolophus ferrumequinum		LC	LC
Rhinolophus hipposideros		LC	LC
EPPETA			
Class Squamata (Squamata)			
Suborder Lizards			
Lizards (Lacertidae)			
Lacerta viridis		LC	LC
Podarcis tauricus		LC	LC
Anguidae			
Pseudopus apodus		LC	LC
Suborder offidia			
Psammophiidae			
Malpolon insignitus		LC	LC
Colubridae			
Zamenis longissimus		LC	LC
Dolichophis caspius		LC	LC

STATUS AND STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA			
Latin name	Common name	Status	
		IUCN EU	ELΛΛ(KB)
Class Turtles (Testudines)			
Turtles (Testudinidae)			
Testudo hermanni		VU	VU
Testudo graeca		NT	LC
AMPHIBIA			
Class Anura (Anura)			
Frynids (Bufonidae)			
Bufotes viridis		LC	LC

SUBMISSION

Evaluation
EX : Extinct
EW : Extinct from their natural environment
CR : Critically endangered
EN : Endangered
VU : Vulnerable
NT : Near Threatened
LC : Of limited concern
DD : Not sufficiently known

Table 50 lists the fauna species (mammals, reptiles, amphibians) observed in the survey area and their threatened status according to pan-European Directives and Conventions, while Table 51 lists the fauna species observed and the months in which they were observed.

Table 50: Fauna species in the survey area and threat status classifications

THREAT STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA						
		Threat status IUCN (EU)	Directive 92/43/EEC	Bern Convention	Bonn Convention	CITES
MUSCLES						
Order Carnivora						
Canidae (Canidae)						
Vulpes vulpes		LC				III
Canis lupus		LC	V	II		II

THREAT STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA						
		Threat status IUCN (EU)	Directive 92/43/EEC	Bern Convention	Bonn Convention	CITES
Ursidae (Ursidae)						
Ursus arctos		LC	II, IV	II		I, II
Ictidae (Mustelidae)						
Martes foina		LC		III		III
Meles meles		LC		III		
Felidae (Felidae)						
Felis silvestris		LC	IV	II		II
Class Lagomorphs (Lagomorpha)						
Lagomorphs (Leporidae)						
Lepus europaeus		LC		III		
Order Artiodactyla (Cetartiodactyla)						
Sylids (Suidae)						
Sus scrofa		LC				
Cervidae (Cervidae)						
Capreolus capreolus		LC		III		
Class Rodents (Rodentia)						
Squirrels (Sciuridae)						
Sciurus vulgaris		LC		III		
Order Eullipotyphla (Eullipotyphla)						
Porcupines (Erinaceidae)						
Erinaceus roumanicus		LC				
Order Chiroptera (Chiroptera)						
Bats (Vespertilionidae)						
Barbastella barbastellus		VU	II, IV	II	II	
Hypsugo savii		LC	IV	II	II	
Myotis bechsteinii		VU	II, IV	II	II	
Myotis emarginatus		LC	II, IV	II	II	
Myotis myotis		LC	II, IV	II	II	
Nyctalus leisleri		LC	IV	II	II	
Nyctalus noctula		LC	IV	II	II	
Pipistrellus kuhlii		LC	IV	II	II	
Pipistrellus nathusii		LC	IV	II	II	
Pipistrellus pipistrellus		LC	IV	III	II	
Vespertilio murinus		LC	IV	II	II	
Minopteridae (Miniopteridae)						
Miniopterus schreibersii		VU	II, IV	II	II	
Miniopteridae (Miniopteridae)						
Rhinolophus ferrumequinum		LC	II, IV	II	II	

THREAT STATUS OF FAUNA SPECIES OBSERVED IN THE SURVEY AREA						
		Threat status IUCN (EU)	Directive 92/43/EEC	Bern Convention	Bonn Convention	CITES
Rhinolophus hipposideros		LC	II, IV	II	II	
HEPETA						
Lizards (Lacertidae)						
Lacerta viridis		LC	IV	II		
Podarcis tauricus		LC	IV	II		
Anguidae						
Pseudopus apodus		LC		II		
Subclass Offidae						
Psammophiidae						
Malpolon insignitus		LC		III		
Colubridae						
Zamenis longissimus		LC	IV	II		
Dolichophis caspius		LC	IV	II		
Class Turtles (Testudines)						
Turtles (Testudinidae)						
Testudo hermanni		VU	II, IV	II		II
Testudo graeca		NT	II, IV	II		II
AMPHIBIA						
Class Anura (Anura)						
Frynids (Bufonidae)						
Bufotes viridis		LC	IV	II		

Legend

Threatened status IUCN
EX: Extinct, EW: Extinct from their natural habitat, CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Least Concern, DD: Not well known, NE: Not assessed

Directive 92/43/EEC
I: belongs to Annex I of the Directive (types of natural habitats of Community interest whose conservation requires the designation of sites as Special Areas of Conservation)
II: included in Annex II to the Directive (animal and plant species of Community interest whose conservation requires the designation of Special Areas of Conservation)
III: included in Annex III to the Directive (criteria for the selection of sites that may be recognised as sites of Community interest and designated as Special Areas of Conservation)
IV: included in Annex IV to the Directive (animal and plant species of Community interest requiring strict protection)
V: included in Annex V to the Directive (animal and plant species of Community interest whose capture in the wild and exploitation may be subject to management measures)

Berne Convention
II: included in Annex II of the Treaty (fully protected species and their capture, possession and killing, damage or destruction of their breeding or resting places, disturbance during the breeding, dependence and hibernation period, destruction, collection or possession of their eggs and the possession or trade in these species, whether alive or dead, are prohibited)

III: belongs to Annex III of the Treaty (protected species and establishes periods of prohibition of hunting, temporarily or locally prohibits exploitation, and regulates the sale, possession, transport or offering for sale of these species, whether alive or dead)

Bonn Convention

I: included in Annex I to the Treaty (migratory species in danger of extinction)

II: included in Appendix II to the Treaty (migratory species benefiting from international cooperation on conservation and management measures)

International Convention CITES

I: included in Appendix I to the Convention (endangered species threatened with extinction and affected or likely to be affected by trade)

II: included in Appendix II to the Convention (species which, although not currently threatened with extinction, may become threatened in the future if trade in them is not strictly regulated)

III: included in Appendix III to the Convention (species for which a Contracting State declares that they are subject, within the limits of its competence, to regulation aimed at preventing or restricting the exploitation of these species and requiring the cooperation of the other Contracting States)

Table 51. Fauna species of the field survey area by month of observation

Scientific name	Greek name	January	February	March	April	May	June	July	July	September	October	November	December
Barbastella barbastellus	Barbastelle									*			
Bufotes viridis	Green toad	*		*									
Canis lupus	Wolf		*								*		
Capreolus capreolus	Roe deer	*	*	*	*	*	*		*	*	*	*	*
Dolichophis caspius	Astrapod				*		*						
Erinaceus roumanicus	Hedgehog				*								
Felis silvestris	Wildcat		*		*		*				*		
Hypsugo savii	Mountain Bat			*	*	*	*	*	*	*	*		
Lacerta viridis	Greenosaurus					*							
Lepus europaeus	Hare	*	*	*	*	*	*	*	*	*	*	*	*
Malpolon insignitus	Sapitis					*							
Martes foina	Stone Coon	*	*	*	*	*	*		*	*	*	*	
Meles meles	Badger			*	*						*		
Miniopterus schreibersii	Winged Bat				*		*						
Myotis bechsteinii	Bechstein's myotid muscle									*			
Myotis emarginatus	Myotis myotis							*					
Myotis myotis	Ternomyotis				*	*	*	*					

Scientific name	Greek name	January	February	March	April	May	June	July	July	September	October	November	December
Nyctalus leisleri	Micronektobat			*	*	*	*	*	*	*	*		
Nyctalus noctula	Nightjar									*			
Pipistrellus kuhlii	White bat			*	*	*	*	*	*	*	*		
Pipistrellus nathusii	Nathusius bat						*	*	*	*			
Pipistrellus pipistrellus	Nanobat			*	*	*	*	*	*				
Podarcis tauricus	Balkanosaurus				*								
Pseudopus apodus	Serpents							*					
Rhinolophus ferrumequinum	Rhinoceros					*	*	*					
Rhinolophus hipposideros	Rhinoceros hippopotamus						*	*					
Sciurus vulgaris	Squirrel		*									*	
Sus scrofa	Wild boar		*	*		*					*		
Testudo graeca	Gray turtle	*			*	*	*						
Testudo hermanni	Mediterranean turtle				*								
Ursus arctos	Bear									*	*		
Vespertilio murinus	Parallax bat			*	*	*	*	*	*	*	*		
vulpes vulpes	Fox	*	*	*	*	*	*		*	*	*	*	
Zamenis longissimus	Yatrofid					*							

For the fauna population data of the wider study area, which is partly within the Natura Special Conservation Area GR1260005, species belonging to both Annex II of Directive 92/43/EEC and Annex IV (and other important species - section SDF, *3.2 other important species*), population estimates from the Standard Data Forms of the above mentioned area, and of the neighbouring Bulgarian Special Conservation Area BG0001028, have been provided in earlier tables (see Tables 15 and 16) . As already mentioned, the site of the project under consideration is not located within a conservation area around a reserve of one of the 230 most important bat reserves in Greece according to the LIFE GRECABATS project. The nearest wider foraging area

is the site 'Kataraktes, Tristomo and the cave Zestas Nera'. More specifically, this wider protection area (roost and wider feeding area) is, as mentioned above, approximately 5.40 km south of the production licence blocks of the project (Map 165). The field surveys revealed the presence of 14 species of bats in the area, seven of which belong to Annex II (also belonging to Annex IV) of Directive 92/43/EEC (*Barbastella barbastellus, Myotis bechsteinii, Myotis emarginatus, Myotis myotis, Miniopterus schreibersii, Rhinolophus ferrumequinum, Rhinolophus hipposideros*), while the remaining seven species belong to Annex IV of the Directive. The majority of the other mammals (except for cryptids) are not species of any of the Annexes of the above Directive, except for Ursus arctos which is a species of Annex II (priority species - it is also a species of Annex IV), the wolf being a species of Annex V and the bobcat being a species of Annex IV. Of all reptile species, two turtle species (*Testudo hermanni, Testudo graeca*) are Annex II species (belonging to Annex IV at the same time) of the Directive, while two lizard species and two snake species observed belong to Annex IV of the Directive (*Lacerta viridis*, *Podarcis tauricus, Zamenis longissimus, Dolichophis caspius*). One lizard species and one snake species observed (*Malpolon insignitus, Pseudopus apodus*) do not belong to any of the above Annexes. Finally, the only amphibian recorded (*Bufotes viridis*) is not a species listed in Annex II of the Directive (it belongs to Annex IV of the Directive).

Inventory of Annex I avifauna species of Joint Ministerial Decision H.P. 37338/1807/E.103 (B. 1495), as well as other migratory avifauna species with a significant presence in the Natura 2000 site, with regard to their conservation status and their isolation (if they are Special Protection Areas).

As already mentioned, the site of the project under consideration is not located within protected areas of the Natura 2000 network, which are designated as Special Protection Areas. The avifauna in the study area, recorded during the field survey, is presented in Table 52 below:

Table 52. Bird fauna recorded in the survey area

STATUS AND PRESENCE STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA				
Latin name		**Status**		**Presence in Greece**
		IUCN EU	**ELΛΛ(KB)**	
Order Aetomorphs *(Accipiteriformes)*				
Aetidae *(Accipitridae)*				
Circaetus gallicus		LC	NT	sv, pm
Hieraaetus pennatus		LC	EN	sv, pm
Circus pygargus		LC	CR	PM, sv
Buteo buteo		LC	NE	R, WV
Accipiter nisus		LC	NE	WV, r
Circus cyaneus		LC	NE	wv. pm
Circus aeruginosus		LC	VU	WV, PM, r
Aquila chrysaetos		LC	EN	r
Order *Falconiformes (Falconiformes)*				
Ieracidae *(Falconidae)*				
Falco tinnunculus		LC	NE	R
Falco naumanni		LC	VU	sv, pm
Falco peregrinus		LC	LC	r, wv
Falco subbuteo		LC	NE	SV, PM
Order *Pelecaniformes (Pelecaniformes)*				
Pelecanidae *(Pelecanidae)*				
Pelecanus onocrotalus		LC	VU	sv, pm
Order Glucomorphs *(Strigiformes)*				
Glaucidae *(Strigidae)*				
Athene noctua		LC	NE	R
Otus scops		LC	NE	PLM

STATUS AND PRESENCE STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA				
Latin name		Status		Presence in Greece
		IUCN EU	ELΛΛ(KB)	
Order *Galliformes (Galliformes)*				
Pheasants *(Phasianidae)*				
Alectoris graeca		NT	VU	R
Coturnix coturnix		NT	NE	SV, PM
Order Coraciiformes *(Coraciiformes)*				
Meropidae *(Meropidae)*				
Merops apiaster		LC	NE	SV, PM
Order Bucerotiformes *(Bucerotiformes)*				
Epopods *(Upopidae)*				
Upupa epops		LC	NE	SV, PM
Order Cuculiformes *(Cuculiformes)*				
Coccygiids *(Cuculidae)*				
Cuculus canorus		LC	NE	sv, PM
Class *Caprimulgiformes (Caprimulgiformes)*				
Haemophilidae *(Caprimulgidae)*				
Caprimulgus europaeus		LC	LC	SV
Apodidae *(Apodidae)*				
Apus apus		LC	NE	SV
Class *Columbiformes (Columbiformes)*				
Pigeons *(Columbidae)*				
Streptopelia turtur		VU	NE	SV, PM
Columba palumbus		LC	NE	R
Order *Piciformes (Piciformes)*				
Drucoptera *(Picidae)*				
Dryobates minor		LC	NE	r
Leiopicus medius		LC	LC	R
Dendrocopos major		LC	LC	r
Picus viridis		LC	NE	r
Order *Passerine (Passeriformes)*				
Corydalis *(Alaudidae)*				
Lullula arborea		LC	LC	R
Galerida cristata		LC	NE	R
Melanocorypha calandra		LC	VU	R
Aegithalidae *(Aegithalidae)*				
Aegithalos caudatus		LC	NE	R
Phylloscopids *(Phylloscopidae)*				

STATUS AND PRESENCE STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA				
Latin name		Status		Presence in Greece
		IUCN EU	ΕΛΛ(KB)	
Phylloscopus collybita		LC	NE	WV, sv?
Phylloscopus orientalis		LC	NE	sv
Passeridae *(Passeridae)*				
Passer domesticus		LC	NE	R
Orioles *(Oriolidae)*				
Oriolus oriolus		LC	NE	SV, PM
Flycatchers *(Muscicapidae)*				
Oenanthe oenanthe		LC	NE	SV, PM
Phoenicurus ochruros		LC	NE	WV, r
Luscinia megarhynchos		LC	NE	SV
Muscicapa striata		LC	NE	PM, sv
Erithacus rubecula		LC	NE	WV, r
Phoenicurus phoenicurus		LC	NE	PM, sv
Saxicola torquatus		LC	NE	R, wv
Cichlids *(Turdidae)*				
Turdus merula		LC	NE	R, WV
Turdus viscivorus		LC	NE	R, wv
Turdus philomelos		LC	NE	WV, r
Turdus pilaris		LC	NE	WV, r?
Swallows *(Delichon)*				
Delichon urbicum		LC	NE	SV, PM
Cecropis daurica		LC	NE	SV, pm
Hirundo rustica		LC	NE	SV, PM
Paridae (Paridae)				
Cyanistes caeruleus		LC	NE	R
Parus major		LC	NE	R
Poecile palustris		LC	NE	R
Poecile lugubris		LC	NE	r
Periparus ater		LC	NE	R
Eagle rays *(Laniidae)*				
Lanius collurio		LC	NE	SV, PM
Lanius senator		NT	NE	SV, PM
Sturnidae (Sturnidae)				
Sturnus vulgaris		LC	NE	WV, R
Regulids (Regulidae)				
Regulus ignicapilla		LC	NE	R

STATUS AND PRESENCE STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA				
Latin name		Status		Presence in Greece
		IUCN EU	ELΛΛ(KB)	
Regulus regulus		LC	NE	WV
Crows *(Corvidae)*				
Corvus corax		LC	NE	R
Corvus cornix		LC	NE	R
Garrulus glandarius		LC	NE	R
Sylviiidae (Sylviiidae)				
Curruca cantillans		LC	NE	SV, PM
Curruca melanocephala		LC	NE	R
Curruca curruca		LC	NE	SV, PM
Sylvia atricapilla		LC	NE	R, WV
Troglodytes *(Troglodytidae)*				
Troglodytes troglodytes		LC	NE	R
Fringillidae (Fringillidae)				
Carduelis carduelis		LC	NE	R, wv
Fringilla coelebs		LC	NE	R, WV
Coccothraustes coccotraustes		LC	NE	WV, r
Chloris chloris		LC	NE	R, wv
Serinus serinus		LC	NE	R, wv
Spinus spinus		LC	NE	WV, r
Linaria cannabina		LC	NE	R, wv
Pyrrhula pyrrhula		LC	NE	r
Emberizidae *(Emberizidae)*				
Emberiza cirlus		LC	NE	R
Emberiza melanocephala		LC	NE	SV
Emberiza cia		LC	NE	r
Emberiza calandra		LC	NE	R

MEMO TO THE TABLE
Evaluation
EX : Deceased
EW : Extinct from their natural environment
CR : Critically Endangered
EN : Endangered
VU : Vulnerable
NT : Near Threatened
LC : Of limited concern
DD : Not sufficiently known
NE : Not assessed
Status of presence
R: Epidemic - Resident

PM : Passage Migrant
SV : Summer visitor (breeding)
PLM: Partial migrant (breeding)
NBV: Non breeding visitor
WV :Winter visitor
Capital letters indicate that the species is common in this category and lower case indicates that it is rare.
Acc : Accidental visitor - Accidental
Ext : Extinct
Int : Introduced
FBr : Formerly breeding

Table 53 lists the bird species observed in the study area and their threatened status according to pan-European Directives and Conventions, while Table 54 lists the bird species observed and the months in which they were observed.

Table 53. Species of avifauna in the study area and threat status classifications

THREAT STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)		**SPEC category**	**Threatened status IUCN (EU)**	**Birds Directive**	**Bern Convention**	**Bonn Convention**	**CITES**
Class *Accipiteriformes*							
Eagles *(Accipitridae)*							
Circaetus gallicus		n	LC	I	II	II	II
Hieraetus pennatus		n	LC	I	II	II	II
Circus pygargus		n	LC	I	II	II	II
Buteo buteo		n	LC		II	II	II
Accipiter nisus		n	LC		II	II	II
Circus cyaneus		3	LC	I	II	II	II
Circus aeruginosus		n	LC	I	II	II	II
Aquila chrysaetos		n	LC	I	II	II	II
Class Ieracomorphs *(Falconiformes)*							
Hieracids *(Falconidae)*							
Falco tinnunculus		3	LC		II	II	II
Falco naumanni		3	LC	I	II	I/II	II
Falco peregrinus		n	LC	I	II	II	II
Falco subbuteo		n	LC		II	II	II
Order *Pelecaniformes (Pelecaniformes)*							

THREAT STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)		**SPEC category**	**Threatened status IUCN (EU)**	**Birds Directive**	**Bern Convention**	**Bonn Convention**	**CITES**
Pelecanidae *(Pelecanidae)*							
Pelecanus onocrotalus		3	LC	I	II	I/II	
Order Glaucomorphs *(Strigiformes)*							
Glaucidae *(Strigidae)*							
Athene noctua		3	LC		II		II
Otus scops		2	LC		II		II
Order *Galliformes (Galliformes)*							
Pheasants *(Phasianidae)*							
Alectoris graeca		1	NT	I/II	III		
Coturnix coturnix		3	NT	II	III	II	
Order *Coraciiformes (Coraciiformes)*							
Meropidae *(Meropidae)*							
Merops apiaster		n	LC		II	II	
Order Bucerotiformes *(Bucerotiformes)*							
Epopods *(Upopidae)*							
Upupa epops		n	LC		II		
Order Cuculiformes *(Cuculiformes)*							
Coccygiids *(Cuculidae)*							
Cuculus canorus		n	LC		III		
Class *Caprimulgiformes (Caprimulgiformes)*							
Haemophilidae *(Caprimulgidae)*							
Caprimulgus europaeus		3	LC	I	II		
Apodidae *(Apodidae)*							
Apus apus		3	LC		III		
Class *Columbiformes (Columbiformes)*							
Pigeons *(Columbidae)*							
Streptopelia turtur		1	VU	II	III	II	
Columba palumbus		n	LC	II/III			
Order *Piciformes (Piciformes)*							
Dioeocoptera *(Picidae)*							
Leiopicus medius		n	LC	I	II		
Dendrocopos major		n	LC		II		
Picus viridis		n	LC		II		
Dryobates minor		n	LC		II		

THREAT STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)		**SPEC category**	**Threatened status IUCN (EU)**	**Birds Directive**	**Bern Convention**	**Bonn Convention**	**CITES**
Order *Passerine (Passeriformes)*							
Corydalis (Alaudidae)							
Lullula arborea		2	LC	I	III		
Galerida cristata		3	LC		III		
Melanocorypha calandra		3	LC	I	II		
Aegithalidae *(Aegithalidae)*							
Aegithalos caudatus		n	LC		III		
Phylloscopids (Phylloscopidae)							
Phylloscopus collybita		n	LC		II	II	
Phylloscopus orientalis		n	LC		II	II	
Passerines *(Passeridae)*							
Passer domesticus		3	LC				
Orioles *(Oriolidae)*							
Oriolus oriolus		n	LC		II	II	
Flycatchers *(Muscicapidae)*							
Oenanthe oenanthe		3	LC		II	II	
Phoenicurus ochruros		n	LC		II	II	
Luscinia megarhynchos		n	LC		II	II	
Muscicapa striata		n	LC		II	II	
Erithacus rubecula		n	LC		II	II	
Phoenicurus phoenicurus		n	LC		II	II	
Saxicola torquatus		n	LC		II	II	
Cichlids *(Turdidae)*							
Turdus merula		n	LC	II	III	II	
Turdus viscivorus		n	LC	II	III	II	
Turdus philomelos		n	LC	II	III	II	
Turdus pilaris		n	LC	II	III	II	
Swallows *(Delichon)*							
Delichon urbicum		2	LC		II		
Cecropis daurica		n	LC		II		
Hirundo rustica		3	LC		II		
Shrimps *(Paridae)*							
Cyanistes caeruleus		n	LC		II		
Parus major		n	LC		II		

THREAT STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)		**SPEC category**	**Threatened status IUCN (EU)**	**Birds Directive**	**Bern Convention**	**Bonn Convention**	**CITES**
Poecile palustris		n	LC		II		
Poecile lugubris		n	LC		II		
Periparus ater		n	LC		II		
Eagle rays *(Laniidae)*							
Lanius collurio		2	LC	I	II		
Lanius senator		2	NT		II		
Sturnidae (Sturnidae)							
Sturnus vulgaris		3	LC	II			
Regulids (Regulidae)							
Regulus ignicapilla		n	LC		II	II	
Regulus regulus		2	LC		II	II	
Crows *(Corvidae)*							
Corvus corax		n	LC		III		
Corvus cornix		n	LC	II			
Garrulus glandarius		n	LC	II			
Sylviiidae (Sylviiidae)							
Curruca cantillans		n	LC		II	II	
Curruca melanocephala		n	LC		II	II	
Curruca curruca		n	LC		II	II	
Sylvia atricapilla		n	LC		II	II	
Troglodytes *(Troglodytidae)*							
Troglodytes troglodytes		n	LC		II		
Fringillidae (Fringillidae)							
Carduelis carduelis		n	LC		II		
Fringilla coelebs		n	LC		III		
Coccothraustes coccotraustes		n	LC		II		
Chloris chloris		n	LC		II		
Serinus serinus		2	LC		II		
Spinus spinus		n	LC		II		
Linaria cannabina		2	LC		II		
Pyrrhula pyrrhula		n	LC		III		
Emberizidae *(Emberizidae)*							
Emberiza cirlus		n	LC		II		
Emberiza melanocephala		n	LC		II		

THREAT STATUS OF BIRD SPECIES OBSERVED IN THE SURVEY AREA							
Species (Latin name)		SPEC category	Threatened status IUCN (EU)	Birds Directive	Bern Convention	Bonn Convention	CITES
Emberiza cia		n	LC		II		
Emberiza calandra		2	LC		III		

Legend table

Threatened status IUCN
EX: Extinct, EW: Extinct from their natural habitat, CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Least Concern, DD: Not Well Known, NE: Not Assessed.

Κατηγορία SPEC
1: SPEC category 1. European species of global conservation concern, e.g. species classified as Critically Endangered, Endangered, Vulnerable, Vulnerable, or Near Threatened at global level.
2: SPEC 2 category. Species whose global populations are concentrated in Europe are classified as locally extinct, critically endangered, endangered, vulnerable, vulnerable, near threatened, depleted or rare at European level.
3: SPEC 3 category. Species whose global population is not concentrated in Europe, but which are classified as locally extinct, critically endangered, endangered, vulnerable, near threatened, depleted or rare at European level.
n: Non-SPEC^{E}or Non- SPEC category: Species whose global population is concentrated in Europe but whose European population level is currently considered safe, or species whose global population is not concentrated in Europe and whose European population level is currently considered safe.

Directive 2009/147/EC
I: included in Appendix I of the Directive (species classified as vulnerable, rare or endangered and subject to special conservation measures)
II: belongs to Appendix II of the Directive (II/1 species that may be hunted in all States, and II/2 species that may be hunted in some States)
III: included in Appendix III to the Directive (species which may be traded under certain conditions)

Berne Convention
II: belongs to Annex II of the Treaty (fully protected species and their capture, possession and killing, damage or destruction of their breeding or resting places, disturbance during the breeding, dependence and hibernation period, destruction, collection or possession of their eggs and possession or trade in these species, whether alive or dead, are prohibited)
III: belongs to Annex III of the Treaty (protected species and establishes periods of prohibition of hunting, temporarily or locally prohibits exploitation, and regulates the sale, possession, transport or offering for sale of these species, whether alive or dead)

Bonn Convention
I: included in Annex I to the Treaty (migratory species in danger of extinction)
II: included in Appendix II to the Treaty (migratory species benefiting from international cooperation on conservation and management measures)

International Convention CITES
I: included in Appendix I to the Convention (species threatened with extinction and affected or likely to be affected by trade)
II: included in Appendix II of the Convention (species which, although not currently threatened with extinction, may become threatened in the future if trade is not strictly regulated)
III: included in Appendix III to the Convention (species for which a Contracting State declares that they are subject, within the limits of its competence, to regulation aimed at preventing or restricting the exploitation of these species and requiring the cooperation of the other Contracting States)

Table 54. Species of avifauna in the field survey area by month of observation

Scientific name	January	February	March	April	May	June	July	July	September	October	November	December
Accipiter nisus	*	*	*	*				*		*	*	*
Aegithalos caudatus						*			*	*	*	*
Alectoris graeca	*	*	*	*	*	*			*	*		*
Apus apus						*	*					
Aquila chrysaetos										*		
Athena noctua				*	*		*		*	*		
Buteo buteo	*	*	*	*	*	*	*	*	*	*	*	*
Caprimulgus europaeus					*	*	*		*			
Carduelis carduelis	*	*	*		*	*				*		
cecropis daurica				*	*	*						
chloris chloris	*		*	*	*			*		*	*	
Circaetus gallicus					*	*	*	*	*			
Circus aeruginosus				*	*		*					
Circus cyaneus											*	*
Circus pygargus						*	*		*	*		
Coccothraustes coccothraustes	*	*	*	*	*	*			*	*	*	
Columba palumbus			*	*	*	*			*	*	*	*
corvus corax	*	*	*	*	*	*	*	*	*	*	*	*
corvus cornix	*	*	*	*	*					*	*	*
Coturnix coturnix				*	*	*						
Cuculus canorus				*	*	*						
Curruca cantillans				*	*	*	*					
Curruca curruca						*						
Curruca melanocephala			*	*	*	*	*		*			
Cyanistes caeruleus	*		*	*	*	*		*	*	*		*
Delichon urbicum				*	*	*	*		*			

Scientific name	January	February	March	April	May	June	July	July	September	October	November	December
Dendrocopos major			*			*		*	*			
Dryobates minor											*	
Emberiza calandra		*	*	*	*	*	*	*				
Emberiza cia								*	*			
Emberiza cirlus	*	*	*	*	*	*	*	*	*	*	*	
Emberiza melanocephala						*						
Erithacus rubecula	*		*	*	*	*		*		*	*	*
Falco naumanni				*								
Falco peregrinus									*			
Falco subbuteo						*						
Falco tinnunculus		*	*	*	*	*	*	*	*			
fringilla coelebs	*	*	*	*	*	*	*			*	*	*
Galerida cristata	*	*	*	*	*	*			*	*	*	
Garrulus glandarius	*	*	*	*	*	*		*	*	*	*	*
Hieraetus pennatus									*			
Hirundo rustica					*	*	*	*	*			
Lanius collurio					*	*	*	*	*			
Lanius senator				*	*	*						
Leiopicus medius					*							
Linaria cannabina			*		*	*			*			
Lullula arborea	*	*	*	*	*	*	*	*	*	*	*	*
Luscinia megarhynchos				*	*	*						
Melanocorypha calandra		*		*	*	*						
Merops apiaster					*			*	*			
Muscicapa striata					*			*	*			
Oenanthe oenanthe					*	*	*	*				

Scientific name	January	February	March	April	May	June	July	July	September	October	November	December
Oriolus oriolus					*	*						
Otus scops									*			
Parus major	*	*	*	*	*	*			*	*	*	*
Passer domesticus				*								
Pelecanus onocrotalus				*						*		
Periparus ater	*	*	*	*	*					*		
Phoenicurus ochruros			*	*	*	*			*	*	*	*
Phoenicurus phoenicurus								*				
Phylloscopus collybita			*	*	*	*		*		*	*	
Phylloscopus orientalis								*				
Picus viridis			*	*	*			*		*	*	*
Poecile lugubris	*		*			*		*			*	
Poecile palustris			*									
Pyrrhula pyrrhula			*			*						
Regulus ignicapilla				*				*	*	*		
Regulus regulus	*	*	*									
Saxicola torquatus			*	*	*	*						
serinus serinus		*										
Spinus spinus		*										
Streptopelia turtur					*	*	*					
Sturnus vulgaris		*	*	*							*	*
Sylvia atricapilla									*			
Troglodytes troglodytes			*	*	*					*	*	
Turdus merula	*	*	*	*	*	*	*	*	*	*	*	*
Turdus philomelos			*	*						*	*	*
Turdus pilaris		*										

Scientific name	January	February	March	April	May	June	July	July	September	October	November	December
Turdus viscivorus	*	*	*	*						*	*	*
Upupa epops			*	*	*	*		*				

For the population data of the avifauna of the study area, given that it is not located within Natura 2000 areas that are classified as Special Protection Areas, nor within non-statutory areas with the designation of Important Bird Areas of Greece, the SDFs of the nearest Special Protection Areas under study BG0002078, GR1260010, BG0002098 and BG0002072 are listed. These data have already been presented in Tables 17, 18, 19 and 20.

A table (Table 55) is provided below which shows the records of raptor species, as well as species considered to be 'important' for the study area, the frequency with which these species were observed in the study area and the months in which they were recorded. The table is derived from the daily and monthly field survey logs. Species of importance for the area are recorded in the table below as species that were observed in the field survey area and are species of interest (as selected, from all the protected areas under study, in a previous section of this Special Ecological Assessment), or included in Annex I of Directive 79/409/EEC, as codified by Directive 2009/147/EC.

The field surveys show that 15 species included in Annex I of Directive 2009/147/EC were identified in the area. Of these species, nine (*Aquila chrysaetos, Circaetus gallicus, Circus aeruginosus, Circus cyaneus, Circus cyaneus, Circus pygargus, Falco naumanni, Falco peregrinus, Hieraaetus pennatus, Pelecanus onocrotalus)* are species of interest here.

Table 55. Important species of avifauna that meet the criteria for further analysis.

Scientific name	Total number of records of species	Months within the year 2023 (numeric: e.g. 1=January)
Aquila chrysaetos	1	10
Circaetus gallicus	13	5, 6, 7, 8, 9
Circus aeruginosus	4	4, 5, 7
Circus cyaneus	3	11, 12

Scientific name	Total number of records of species	Months within the year 2023 (numeric: e.g. 1=January)
Circus pygargus	5	6, 7, 9, 10
Falco naumanni	1	4
Falco peregrinus	1	9
Hieraetus pennatus	1	9
Pelecanus onocrotalus	2	4, 10
Alectoris graeca	20	1, 2, 3, 4, 5, 6, 9, 10, 12
Caprimulgus europaeus	7	5, 6, 7, 9
Lanius collurio	10	5, 6, 7, 8, 9
Leiopicus medius	1	5
Lullula arborea	39	Throughout the fieldwork (January 2024 - December 2024)
Melanocorypha calandra	4	2, 4, 5, 6

The following comments are provided on the recorded flights and sightings of the raptor species (including *Pelecanus onocrotalus*) shown in the table above, as well as the other important species listed in Annex I of Directive 2009/147/EC.

Aquila chrysaetos was recorded once (one individual) in the study area during the month of October, with this individual passage taking place within Zone A (distance less than 250 m from the installation site of the nearest wind turbine of the project under study).

Circaetus gallicus was recorded 13 times (a total of 18 individuals) in the study area during the months of May, June, July, August and September, with one of these records being a passage of three individuals and taking place within the Direct Effect Zone (distance less than 100 m from the installation site of the nearest wind turbine of the project under study, and flight height greater than 90 m and less than 210 m). Also, of the total number of records, three involved the passage of two persons per flight/record. Of these three recordings involving two persons per flight/recording, one took place within Zone A, the second took place within Zone B (distance between 250 and 1,000 metres from the location of the nearest wind turbine of the project under study) and the third took place within Zone C (distance between 1,000 and 2,000 metres from the location of the nearest wind turbine of the project under study). Finally, of the remaining nine single records (one person crossing per flight/record), one occurred within the Direct Impact Zone, three occurred within Zone A, two occurred within Zone B, and three occurred within Zone C.

Circus aeruginosus was recorded four times (four individuals) in the study area during observations in April, May and July, with three individual crossings of the species occurring within Zone C and the fourth individual crossing occurring within Zone B.

Circus cyaneus was recorded three times (three individuals) in the study area during observations in November and December, with one individual crossing taking place within Zone A and two individual crossings taking place within Zone C.

Circus pygargus was recorded five times (five individuals) in the study area during observations in June, July, September and October, with two individual crossings occurring within Zone B and three individual crossings occurring within Zone C.

Falco peregrinus was recorded twice (two individuals) in the study area during observations in September, with one individual crossing taking place within Zone B and the second individual crossing taking place within Zone C.

Falco naumanni was recorded once (a total of two individuals) in the study area during observations in April, with the record of two individuals passing within Zone C.

Hieraaetus pennatus was recorded once (one individual) in the study area during observations in September, with the individual passage taking place within Zone C.

Pelecanus onocrotalus was recorded twice (a total of 152 individuals) in the study area during the observations in April and October, with one of the two records being a crossing of 150 individuals and taking place outside the impact zones with the wind turbines of the wind farm under study (distance of more than 2 km). from the location of the nearest wind turbine of the project under study), on 11/4/2024, south of and outside the Field Survey Area (Regional Zone 2 km from the boundaries of the project production polygons). The flight altitude of this particular log exceeded approximately 400 meters. Finally, the second record of the species involved the passage of two individuals and occurred within Zone C.

In summary, for all of the above species, no active nesting sites were detected within the project's production polygons, but neither the presence of a nest within the

field survey area (an area within a 2 km radius of the boundaries of the production polygons of the project under study) was detected by their movements.

Apart from the above species, which, based on their protection status and other criteria met and analysed in the previous sections, require further analysis, three species of raptors were observed in the area, which are not species of Annex I of Directive 2009/147/EC (***Buteo buteo***, ***Falco tinnunculus***, ***Accipiter nisus***). *Buteo buteo* was recorded throughout the fieldwork (31 records with a total of 36 individual crossings). The specific records of this species are obviously not in their entirety records of different individuals, but rather of individuals for which the field survey area and the wider region in general form part of the species' endemic area. *Falco* tinnunculus was recorded in 18 individual crossings during the fieldwork. *Accipiter nisus* was recorded in a total of 12 individual crossings, with some of the flights being low altitude flights (characteristic of the species). *Falco subbuteo* (also not an Annex I species of the Birds Directive) was also observed once (two individuals) during the fieldwork.

In addition to the raptor species (and *Pelecanus onocrotalus*), whose flights were summarised above, a description of the species identified in the area that are Annex I species of the 2009/147/EC Directive follows below.

Caprimulgus europaeus was recorded seven times (nine individuals in total) in the study area during the observations in May, June, July and September.

Lanius collurio was recorded ten times (22 individuals in total) in the study area during observations in May, June, July, August and September.

Leiopicus medius was recorded once (one individual) in the study area during observations in May.

Lullula arborea was recorded 39 times (a total of 159 individuals) in the study area, throughout the fieldwork (January 2024 - December 2024), and can be classified as abundant in the study area.

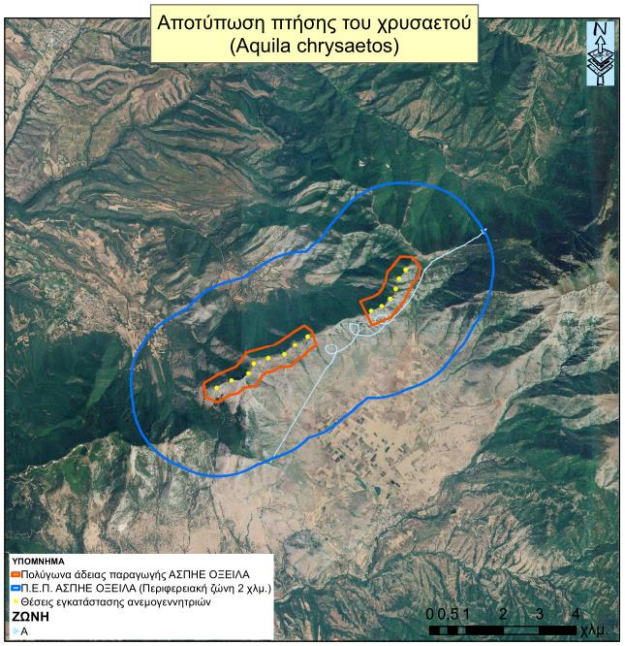
Alectoris graeca was recorded 20 times (total of 70 individuals) in the study area during the course of fieldwork, during the months of January, February, March, April, May, June, September, October and December.

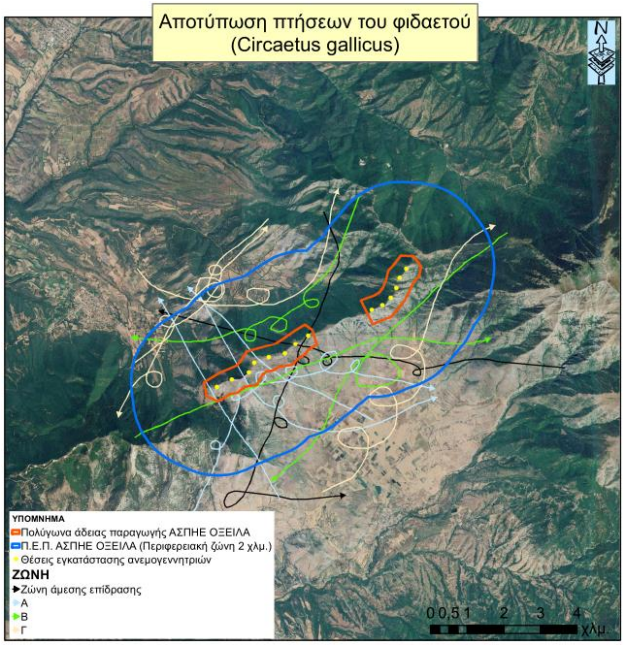
Melanocorypha calandra was recorded four times (26 individuals in total) in the study area during observations in February, April, May and June.

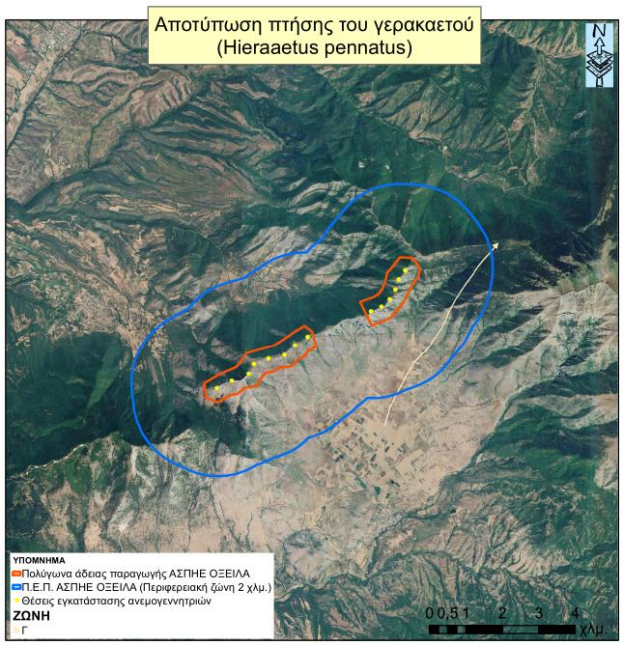
Mapping of the above information on Documentation Maps

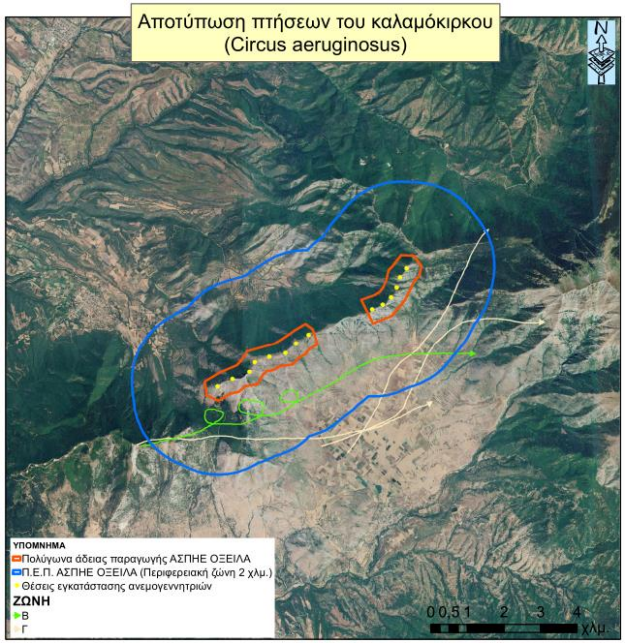
The field survey area and the field sampling locations of the flora - habitat types, avifauna and other fauna within it (and with satellite image background), as analysed in the previous section (location of handler recording, locations of light trap placement, etc.), are then captured on documentation maps. In addition, maps and land use and habitat types of the field survey area according to the Corine land cover 2018 baseline, and maps with satellite image background show all flights of raptors and other important species (as well as common raptor species) recorded during the field survey along with the locations of the wind turbine installation sites of the study project. Finally, a documentation map also shows the locations of the nearest major bat roosts and their spatial location relative to the location of the field survey area.

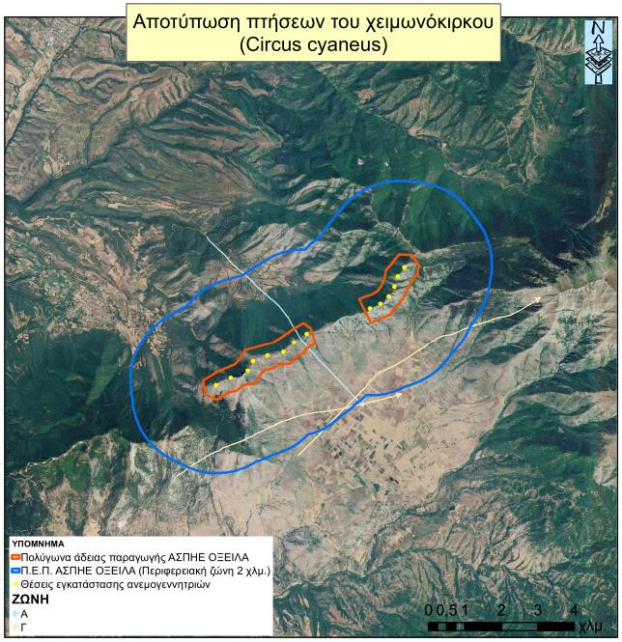
Mapping of flights of important raptor species and other important species (as well as common raptor species) recorded during the field survey conducted between January 2024 and December 2024

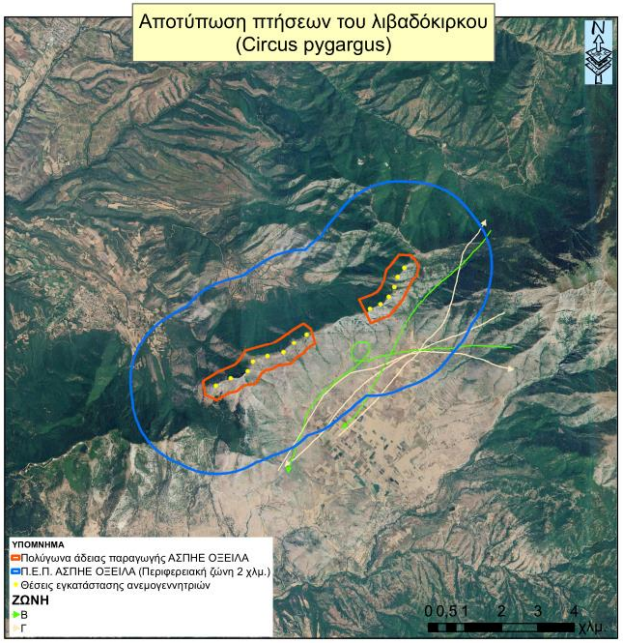




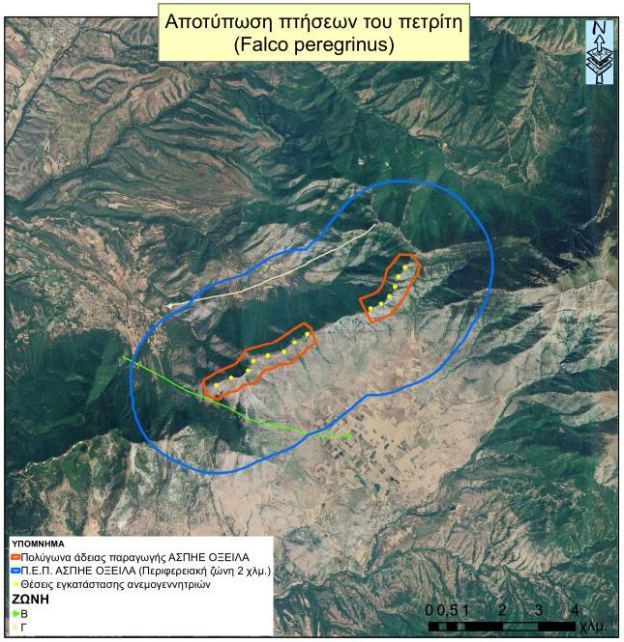




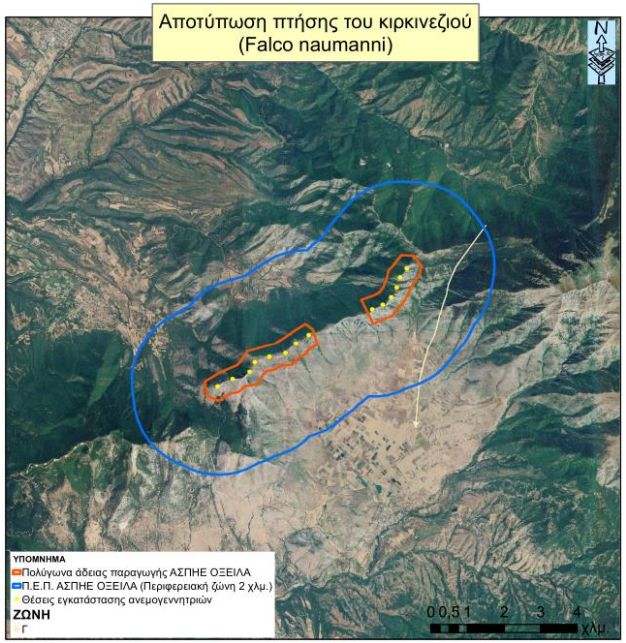




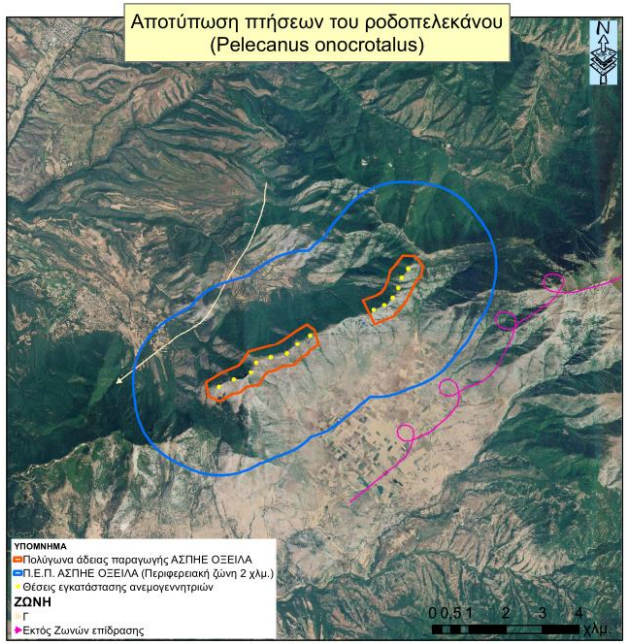
Αποτύπωση πτήσεων του πετρίτη
(Falco peregrinus)



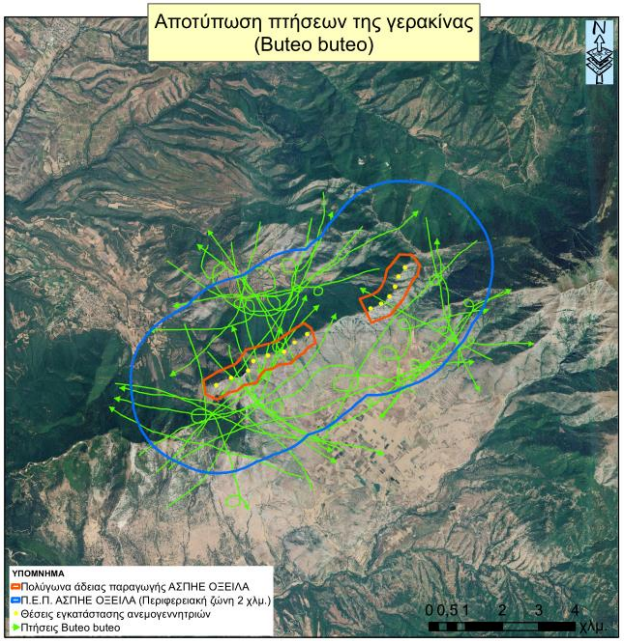
Αποτύπωση πτήσης του κιρκινεζιού
(Falco naumanni)



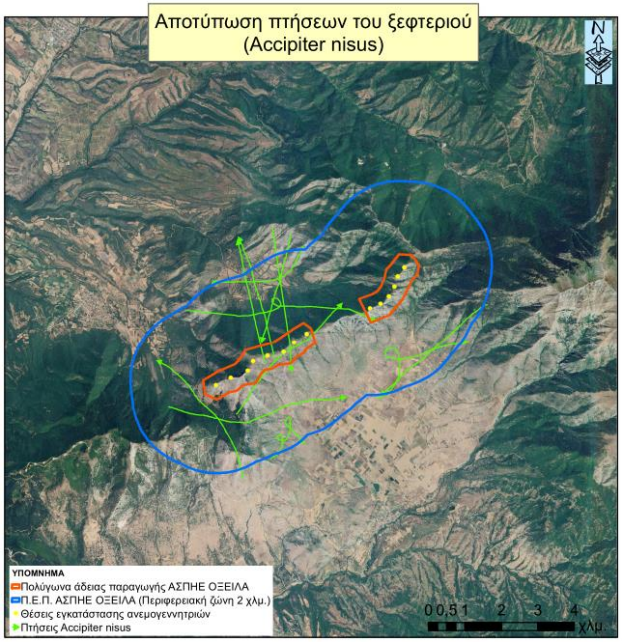
Αποτύπωση πτήσεων του ροδοπελεκάνου
(Pelecanus onocrotalus)



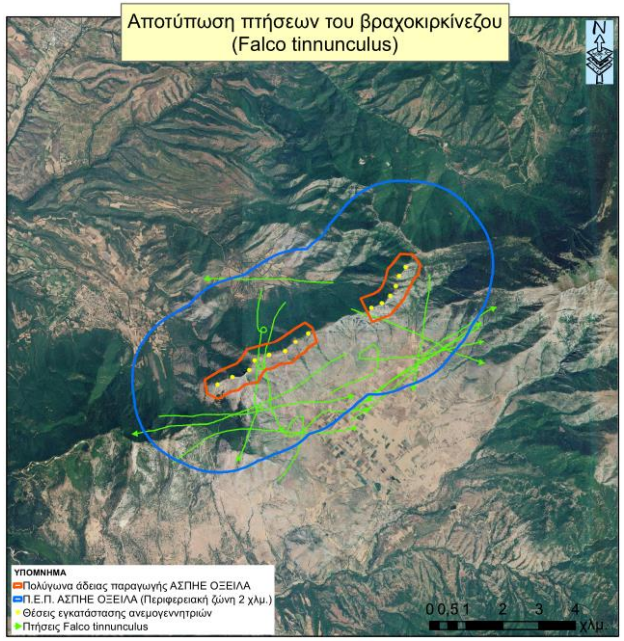
Αποτύπωση πτήσεων της γερακίνας
(Buteo buteo)

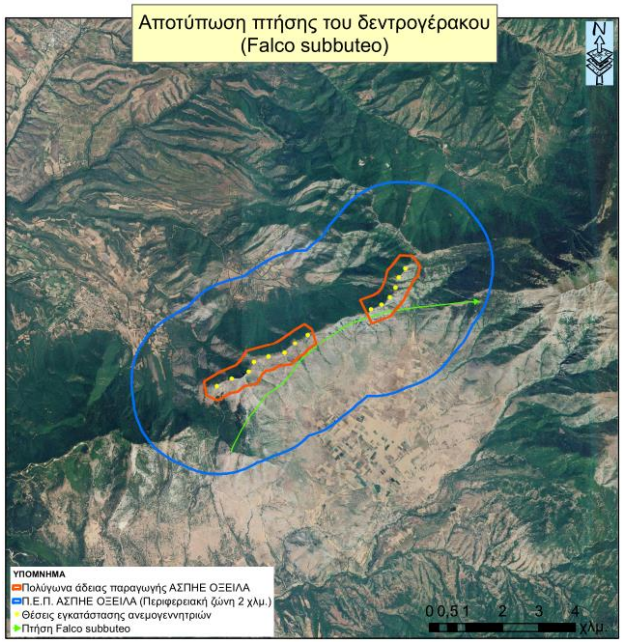


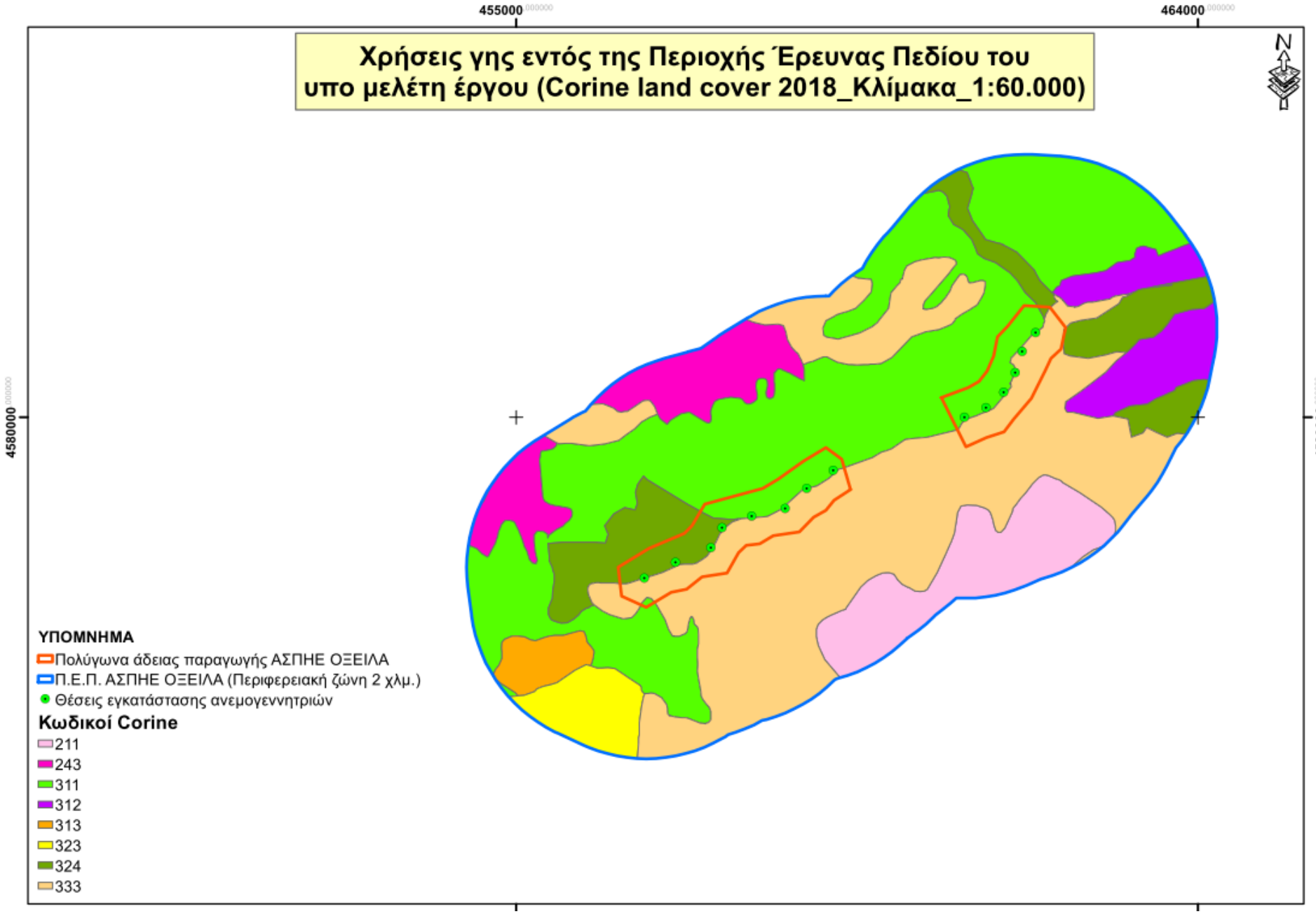
Αποτύπωση πτήσεων του ξεφτεριού
(Accipiter nisus)



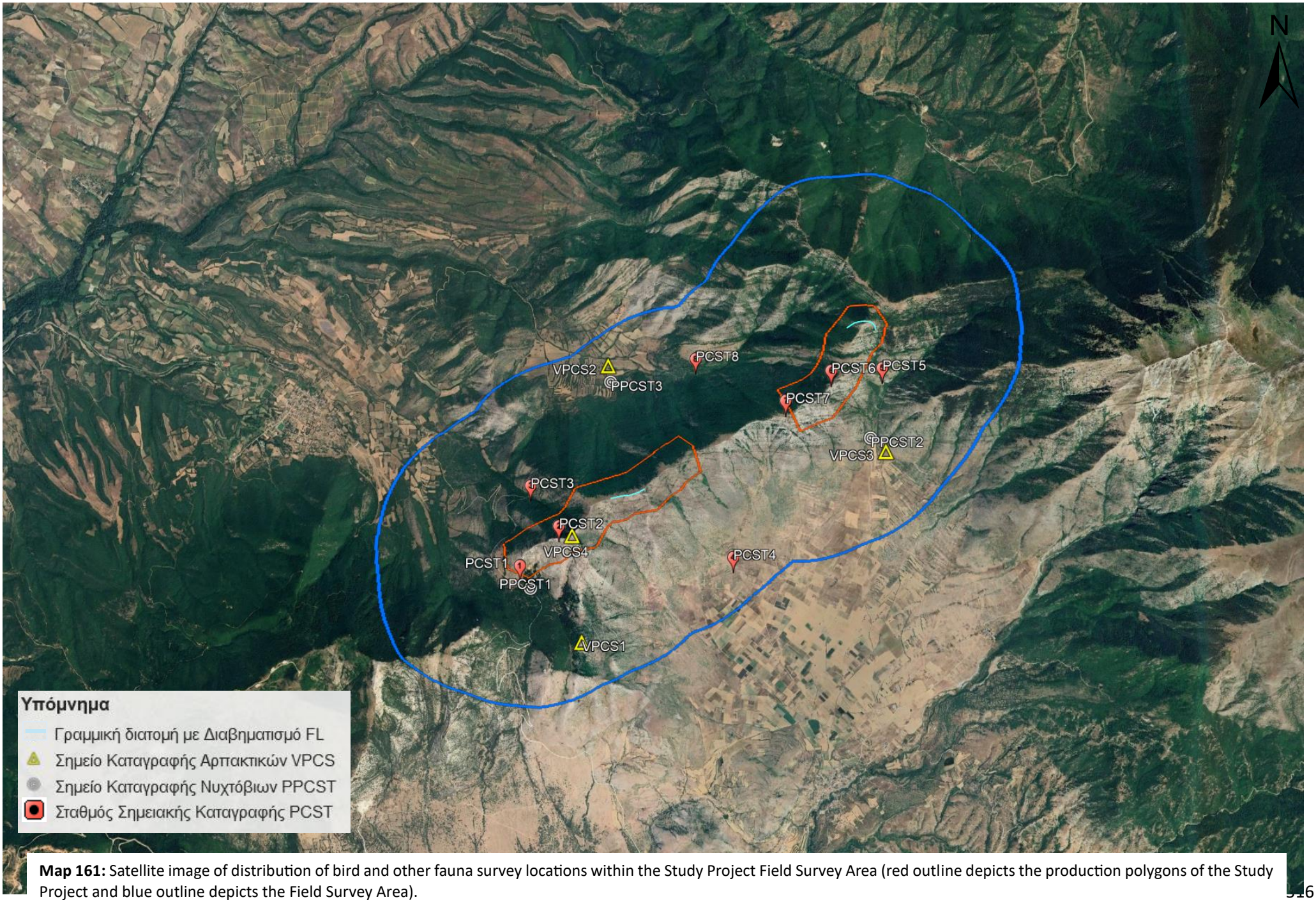
Αποτύπωση πτήσεων του βραχοκιρκίνεζου
(Falco tinnunculus)



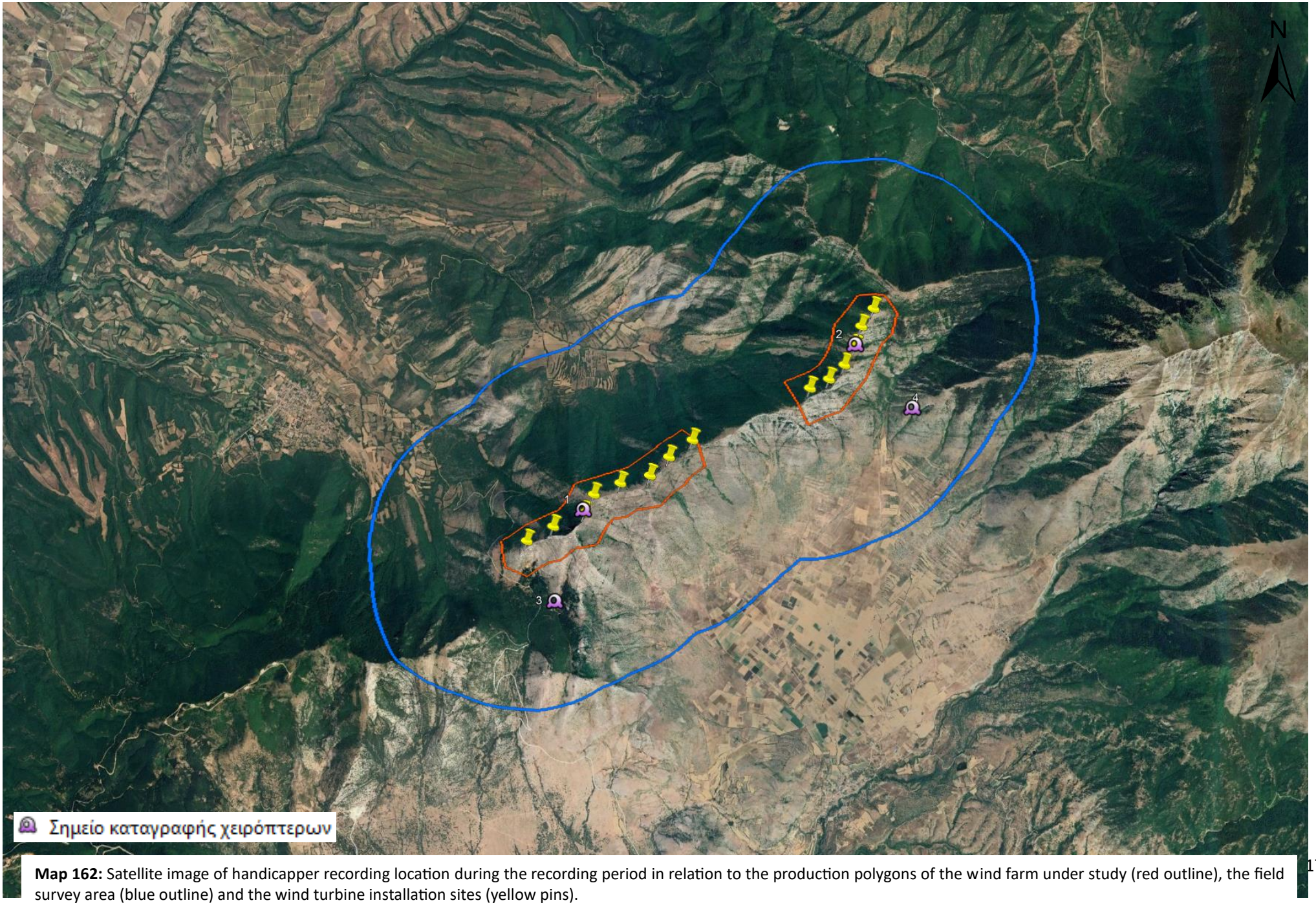

Αποτύπωση πτήσης του δεντρογέρακου
(Falco subbuteo)
N
ΥΠΟΜΝΗΜΑ
Πολύγωνα άδειας παραγωγής ΑΣΠΗΕ ΟΞΕΙΛΑ
Π.Ε.Π. ΑΣΠΗΕ ΟΞΕΙΛΑ (Περιφερειακή ζώνη 2 χλμ.)
Θέσεις εγκατάστασης ανεμογεννητριών
Πτήση Falco subbuteo
0 0,5 1 2 3 4
χλμ



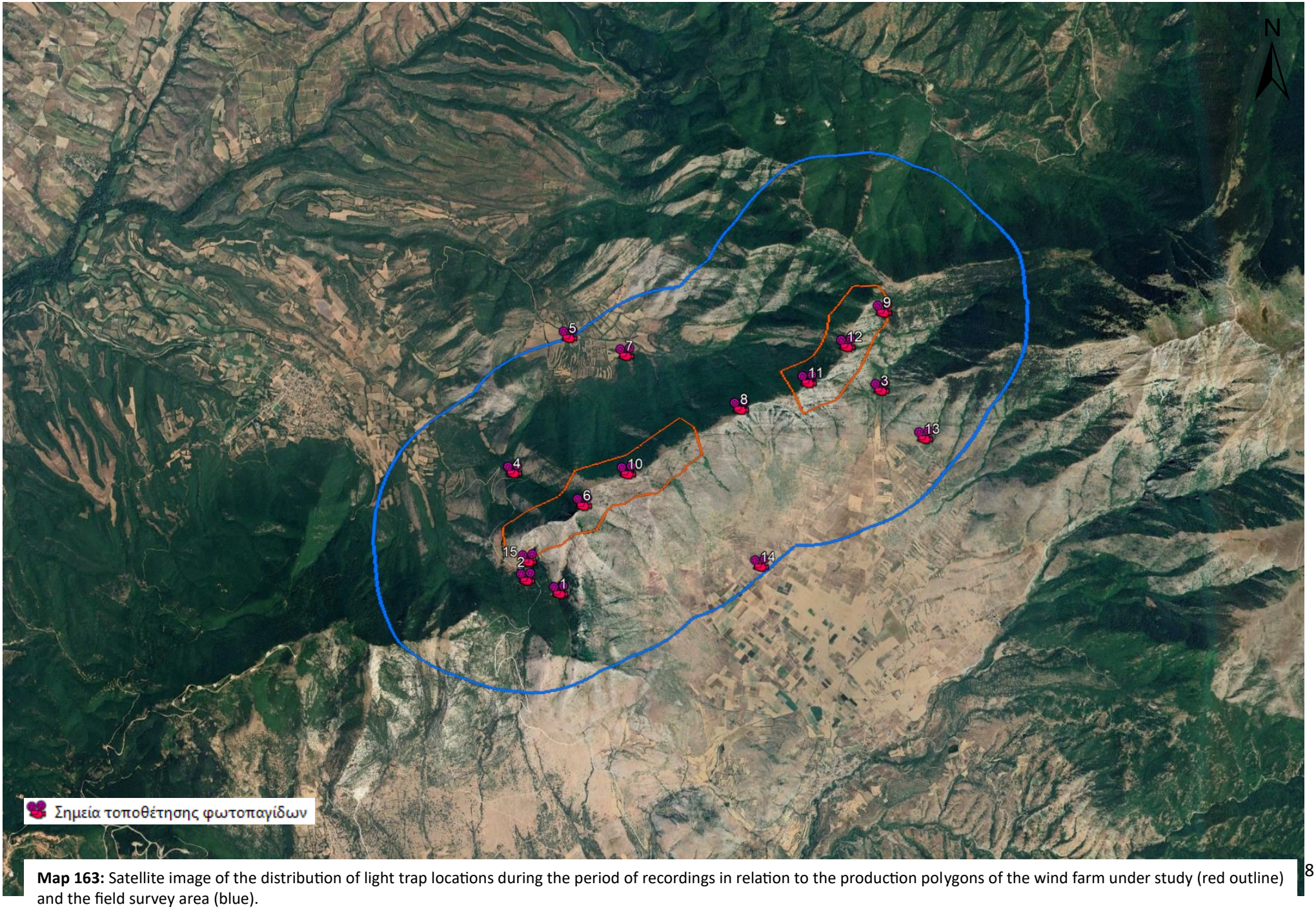
Map 160: Land use within the Field Survey Area of the Study Project, as per the land cover database and mapping (Corine land cover 2018).



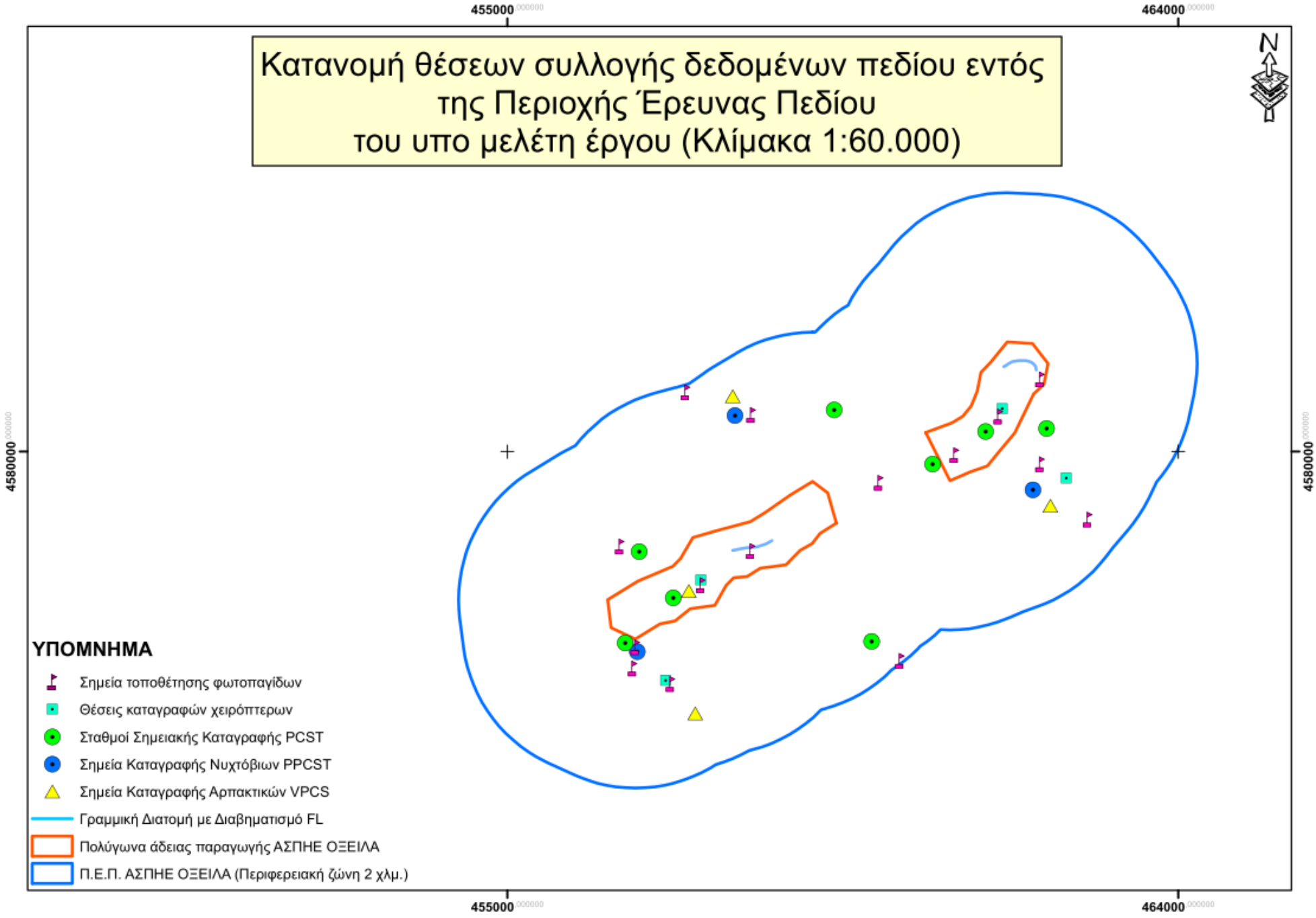
Map 161: Satellite image of distribution of bird and other fauna survey locations within the Study Project Field Survey Area (red outline depicts the production polygons of the Study Project and blue outline depicts the Field Survey Area).



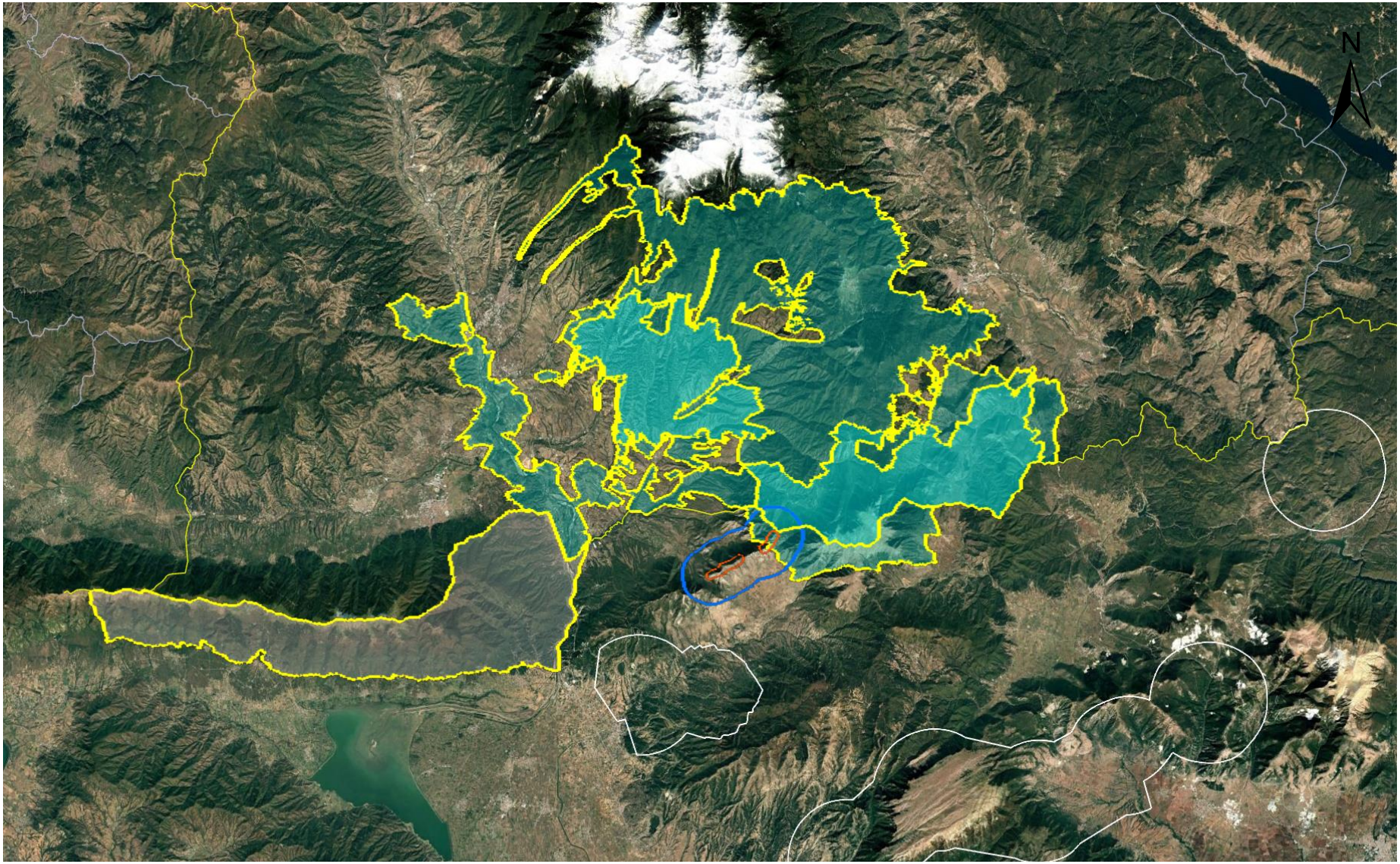
Map 162: Satellite image of handicapper recording location during the recording period in relation to the production polygons of the wind farm under study (red outline), the field survey area (blue outline) and the wind turbine installation sites (yellow pins).



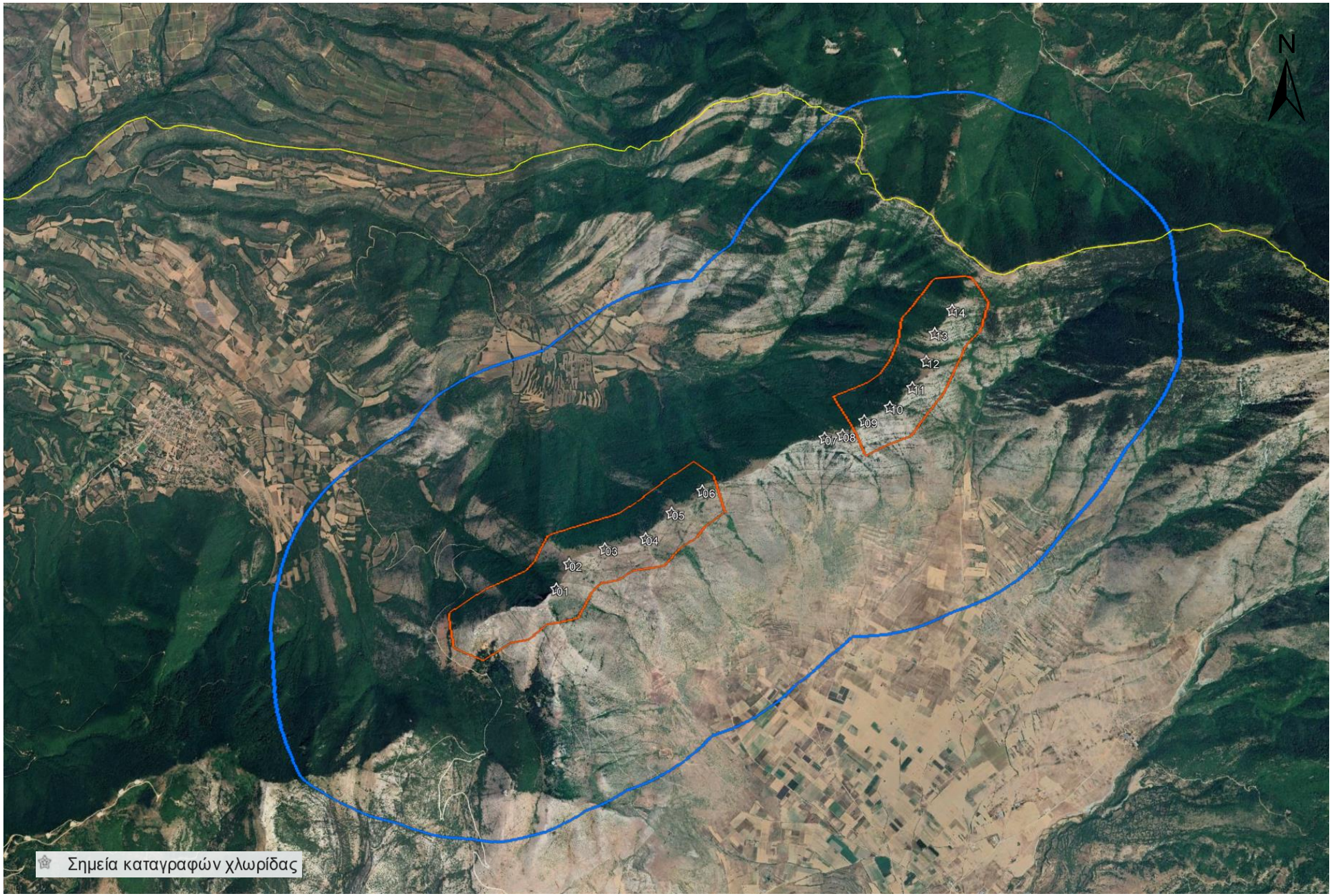
Map 163: Satellite image of the distribution of light trap locations during the period of recordings in relation to the production polygons of the wind farm under study (red outline) and the field survey area (blue).



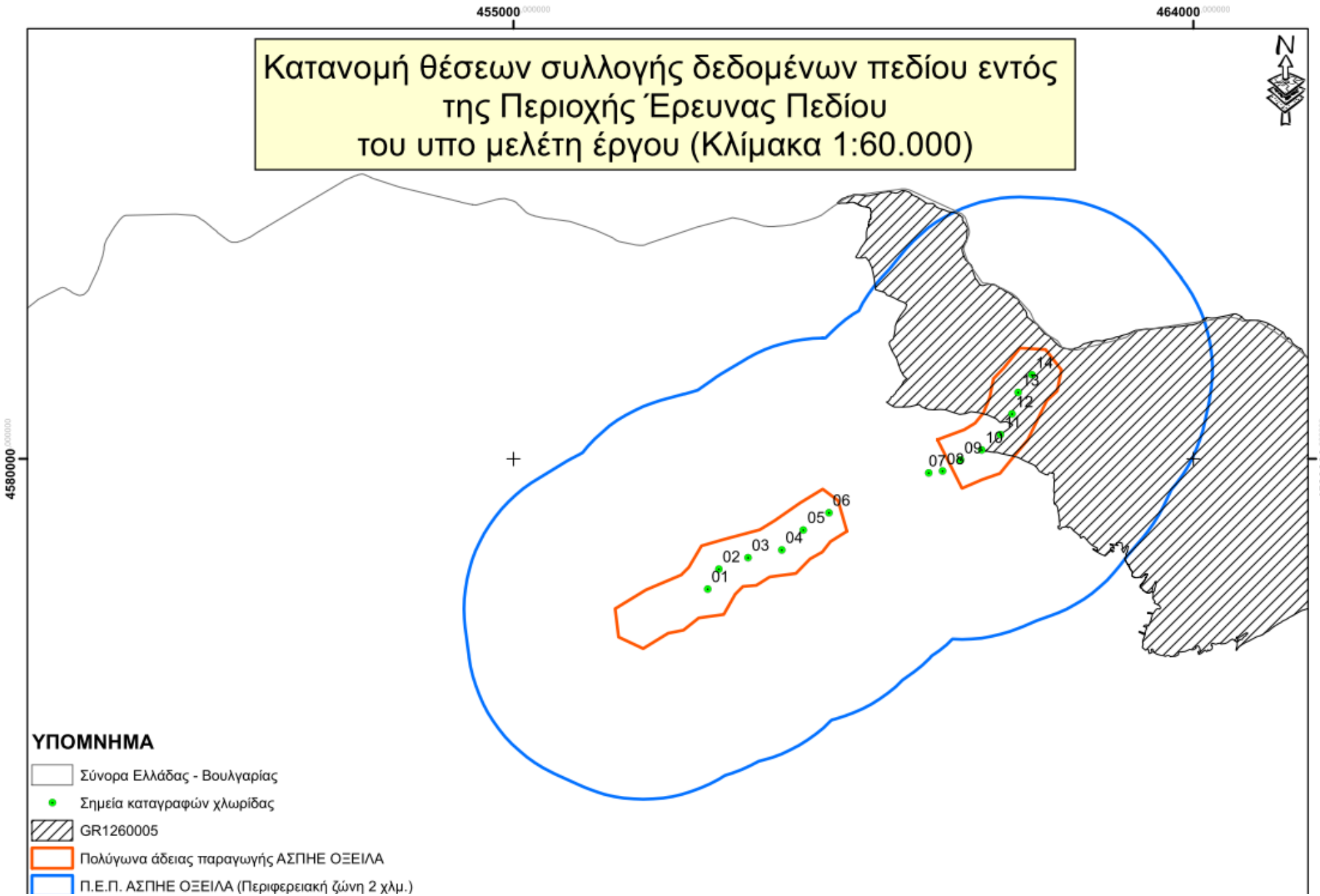
Map 164: Map of distribution of field data collection locations for avian and other fauna within the Field Survey Area of the project under study.



Map 165: Location of the most important caves and their proposed protection areas (white outline) near the study areas GR1260005 and BG0001028, and BG0002098, GR1260010, BG0002078 and BG0002072 (yellow outline), and in relation to the location of the field survey area (blue outline) and the project production polygons (red outline). Of the designated important caves and areas around them, as depicted on the map, the production licence polygons are located outside such an area (and consequently the turbine sites). The nearest wider feeding area is the location of 'Katarachtes, Tristomo and Warm Waters Cave'. More specifically, this wider protection area (5 km radius) (the wind farm and the wider feeding area) is, as mentioned above, approximately 5.40 km south of the production blocks of the projected project.



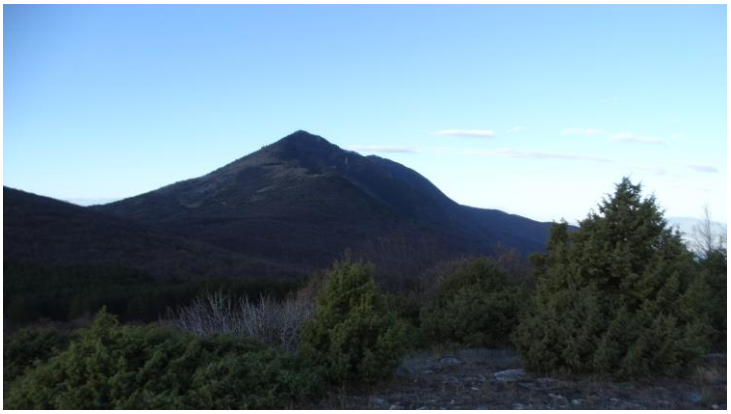
Map 166: Satellite image of the distribution of field flora data collection sites within the Field Survey Area of the projected project

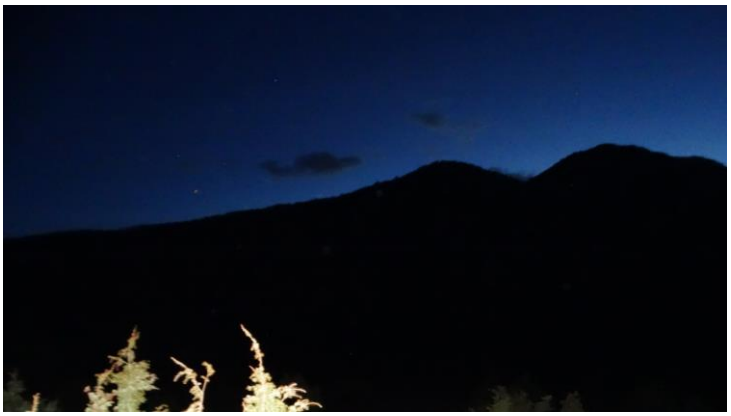


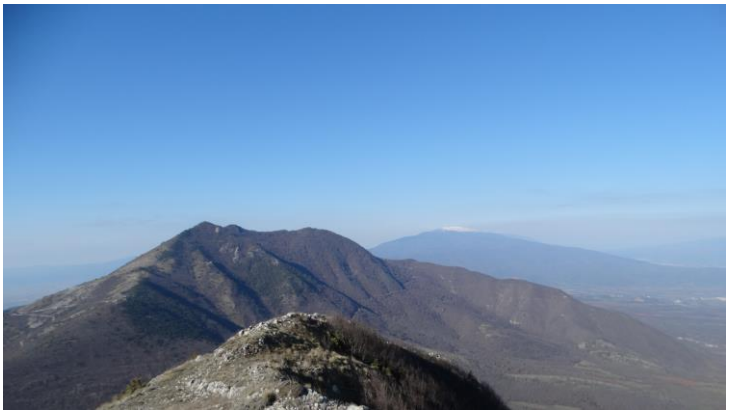
Map 167: Map of the distribution of field data collection sites for flora within the Field Survey Area of the project under study.

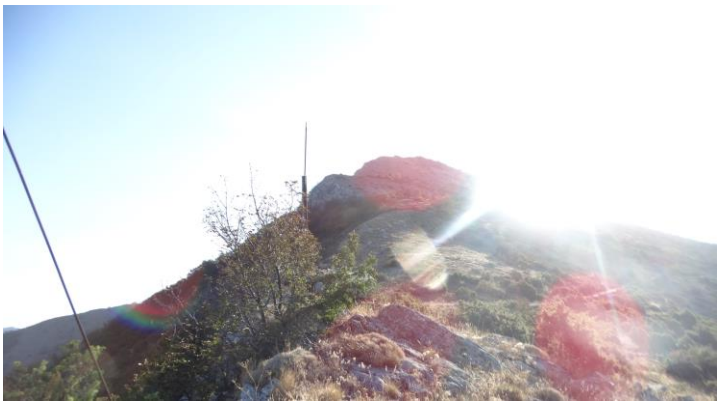
Photographic documentation

Photographic documentation of the study area: Ground photographs from different viewpoints of the field survey area







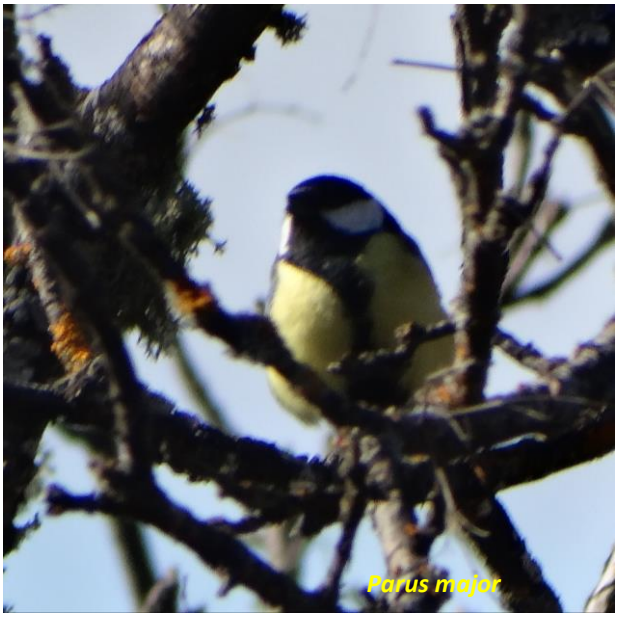


Photographs 69 to 239: Photographs of the broader survey area from different viewpoints, different times of the year, different recording days, and in different directions of the horizon to better capture the broader study area.

Photographic documentation of the study area: Indicative photographs of wildlife species from the field survey

Emberiza cirlus

Buteo buteo



Parus major

Phoenicurus ochruros

Galerida cristata

Poecile lugubris

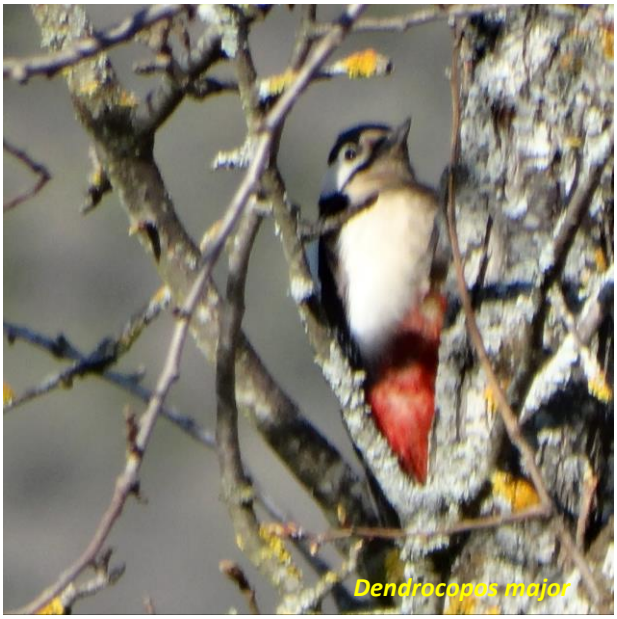
Lanius senator

Erithacus rubecula

Turdus merula

Saxicola torquatus

Cecropis daurica


Dendrocopos major

Picus viridis

Pyrrhula pyrrhyla

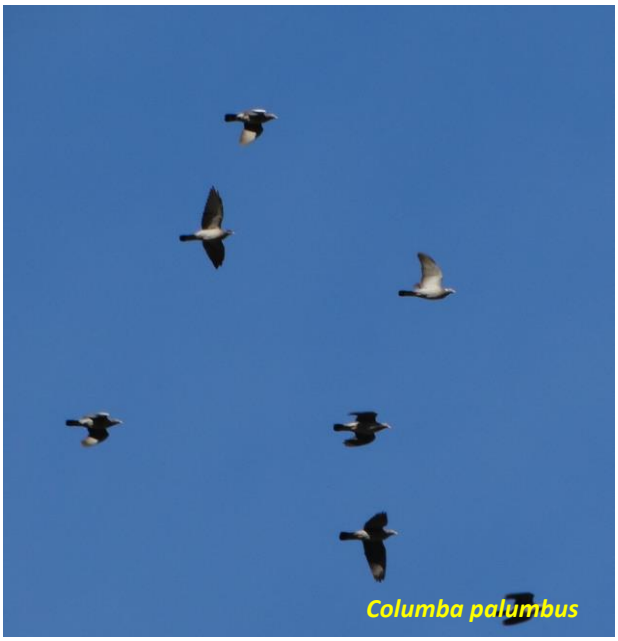
Pelecanus onocrotalus

Fringilla coelebs

Corvus cornix

Upupa epops

Emberiza calandra



Columba palumbus

Chloris chloris

Cuculus canorus

Lanius collurio

Curruca curruca

Buteo buteo

Falco subbuteo

Merops apiaster

Hirundo rustica

Muscicapa striata

Streptopelia turtur

Emberiza calandra

Linaria cannabina

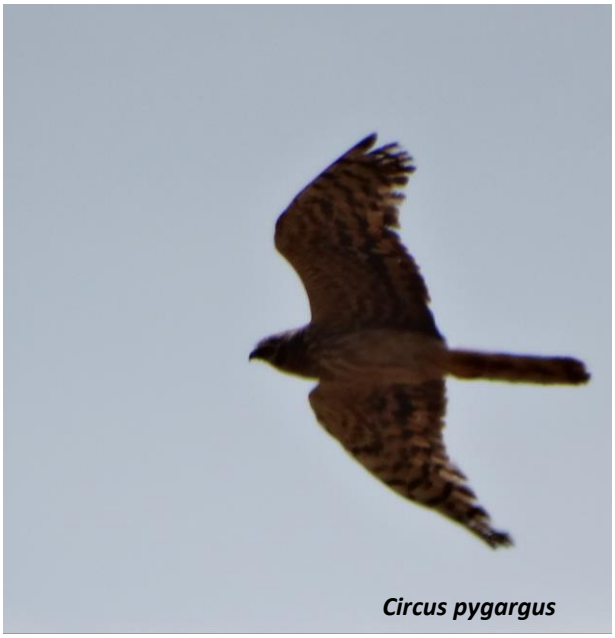
Circaetus gallicus

Chloris chloris

Cyanistes caeruleus

Hieraaetus pennatus

Garrulus glandarius



Circus pygargus

Circaetus gallicus

Dryobates minor

Accipiter nisus

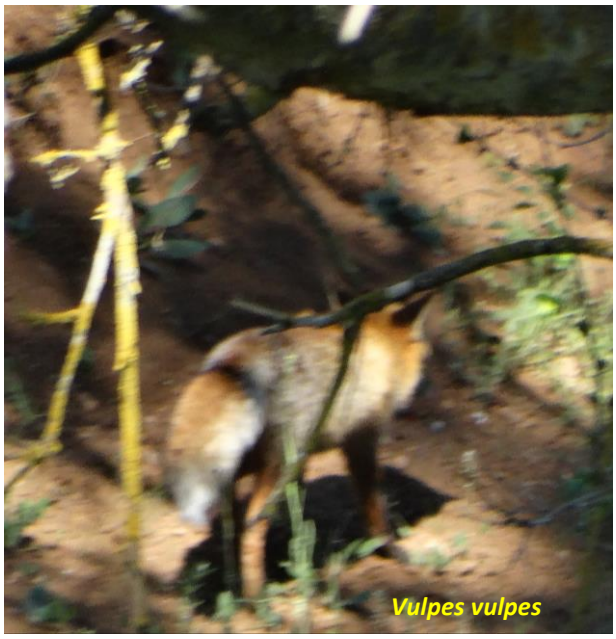
Troglodytes troglodytes

Aquila chrysaetos

Capreolus capreolus

Podarcis tauricus

Testudo graeca


Vulpes vulpes

Photographs 240 to 294: Indicative photographs of wildlife species from the field survey

Photographic documentation of the study area: Indicative photographs from the survey of biotic evidence, tracks and killed fauna individuals on the road network

Trace Ursus arctos

Βιοδηλωτικές ενδείξεις Ursus arctos

Vulpes vulpes

Ιχνη Sus scrofa

Βιοδηλωτκές ενδείξεις Capreolus capreolus

Βιοδηλωτικές ενδείξεις Lepus europaeus

Photographs 295 to 302: Indicative photographs of wildlife in the field survey area (biotic evidence, tracks, road-killed individuals).

Photographic documentation of the study area: Indicative photographs of photo trap placement sites and of locations for recording hand-recorded

Photographs 303 to 318: Indicative photographs of equipment placement locations in the field survey area

Photographic documentation of the study area: Indicative photographs of wildlife species from the operation of the light traps

Capreolus capreolus

Capreolus capreolus

Vulpes vulpes

Vulpes vulpes

Lepus europaeus

Capreolus capreolus

Photographs 319 to 328: Indicative photographs of wildlife species from the operation of the light traps

Photographic documentation of the study area: Indicative photographs from sampling of habitat and flora types

Photo 329: Sampling site 01 in the study area. Identical to the proposed location of wind turbine 3.

Photo 330: Woody species are established up to the ridge on the north side of sampling site 01, while on the south side, the woody species coalescence is less than 50%.

Photos 331, 332 and 333: Sampling site 02 in the study area. Identical to the proposed location of wind turbine 4.

Photo 334: Route from sampling location 02 to location 03 in the study area.

Photos 335 and 336: Sampling site 03 in the study area. Identical to the proposed wind turbine installation location 5

Photos 337 and 338: Sampling location 04 in the study area. Identical to the proposed wind turbine location 6.

Photos 339 and 340: Sampling location 05 in the study area. Identical to the proposed location of wind turbine 7.

Photos 341 and 342: Sampling location 06 in the study area**.** Identical to the proposed location of wind turbine 8.

Photo 343: Route from the proposed location of wind turbines 8 and 9.

Photo 344: The vegetation of the study area on either side of the ridge at a width of 20-50 m is dominated by the vegetation type of "Eastern sub-Mediterranean dry grassy interspersed dry grassland (Scorzoneratalia villosae) 62A0". The reduction in the pressure of yew and other disturbances, combined with climatological conditions, has resulted in the gradual establishment of woody species which gradually cover the open areas. View of the north-northwestern part of the study area.

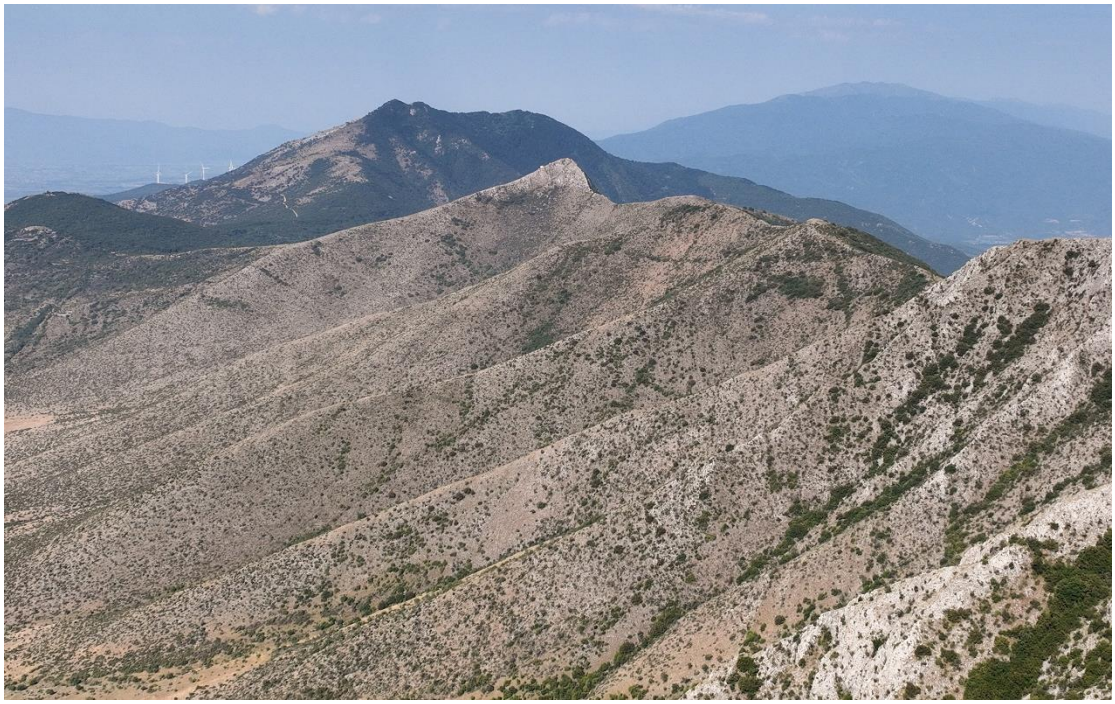


Photo 345: The intense pressure of past disturbance is evident physiognomically in much of the study area.

Photos 346 and 347: Sampling location 07 in the study area.

Photos 348 and 349: Sampling location 08 in the study area.

Photos 350 and 351: Sampling location 09 in the study area**.** Identical to the proposed location of wind turbine 9.

Photos 352 and 353: Sampling location 10 in the study area. Identical to the proposed location of wind turbine 10.

Photo 354: The area from sampling location 11 to location 12 in the study area.

Photos 355 and 356: Sampling location 11 in the study area. Identical to the proposed wind turbine 11 location.

Photos 357 and 358: Sampling location 12 in the study area. Identical to the proposed wind turbine 12 installation location.

Photo 359: North of sampling location 11.

Photo 360: North-northeast from sampling location 11 to location 14.

Photos 361 and 362: Sampling location 13 in the study area, which is identical to the proposed location of wind turbine 13. Left on 10/7/2024 and right on 8/29/2024, showing the results of the fire that occurred on July 18^{h}, 2024.

Photo 363: Sampling site 13 in the study area with the results of the fire that occurred on July 18^{h}, 2024 visible.

Photos 364, 365, 366 and 367: Sampling location 13 in the study area, identical to the proposed location of Wind Turbine 13 with the results of the fire that occurred on July 18^{h}, 2024 visible.

Photos 368 and 369: Sampling location 14 in the study area, identical to the proposed wind turbine 14 installation location. Left on 10/7/2024 and right on 8/29/2024, showing the results of the fire that occurred on July 18^{h}, 2024.

Photos 370 and 371: Sampling location 14 in the study area, identical to the proposed wind turbine 14 installation location, with the results of the fire that occurred on July 18$^{(h),}$2024 visible.

Photo 372: The northern part of the ridge (towards the Greek-Bulgarian border

Photo 373: The southern part of the ridge (towards the Achladochori plain)

Photo 374: The location of interest wind turbine installation 1

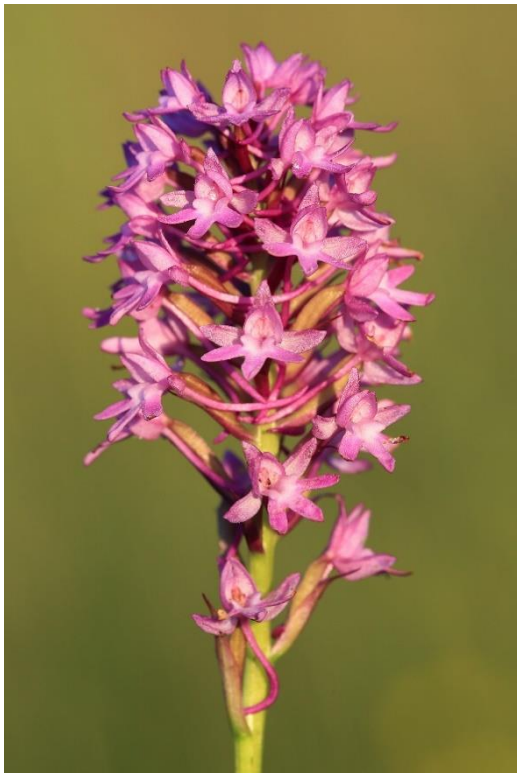
Photo 375: Wind turbine installation location of interest 2

Photo 376: *Juniperus oxycedrus* and *Rhamnus saxatilis* bushes have been established on the ridge between the sites of interest for the installation of wind turbines 3 and 4.

Photo 377: The two narrow strips of forest at sampling locations 11 to 13.

Photo 378: The southern part of the ridge (towards the Achladochori plain) presents a different vegetation physiognomy with the presence of young tree species and mainly shrubby species from the northern part (towards the Greek-Bulgarian border) which is mostly covered by deciduous broadleaf forest.

Photographic documentation of the study area: Important flora species of the study area

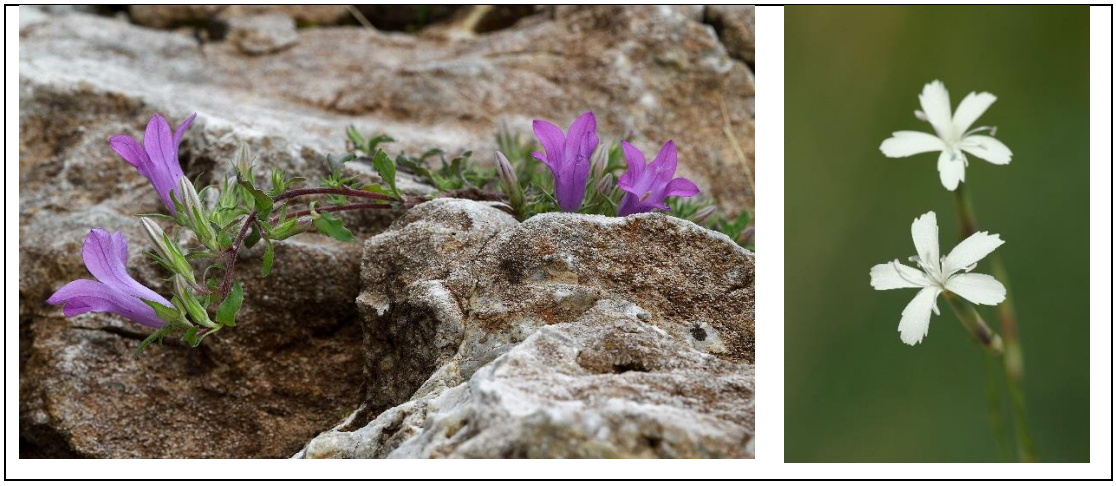


Photographs 379 and 380. *Anacamptis pyramidalis* (L.) Rich. and *Dactylorhiza sambucina* (L.) Soó species recorded in the study area.

Photos 381 and 382. The species *Gymnadenia conopsea* (L.) R. Br. in W.T. Aiton and *Anacamptis morio* (L.) R.M. Bateman, Pridgeon & M.W. Chase recorded in the study area.

Photos 383 and 384. *Neotinea tridentata* (Scop.) R.M. Bateman, Pridgeon & M.W. Chase and *Neotinea ustulata* (L.) R.M. Bateman, Pridgeon & M.W. Chase recorded in the study area.

Photos 385 and 386. The species *Achillea ageratifolia* (Sm.) Benth. & Hook. f. and *Onosma heterophylla* Griseb. recorded in the study area.



Photos 387 and 388. *Campanula orphanidea* Boiss. and *Dianthus petraeus* Waldst. & Kit. subsp. *orbelicus* (Velen.) Greuter & Burdet in Greuter & Raus were recorded in the study area.

Photo 389. *Astragalus angustifolius* Lam..subsp. *balcanicus* Brullo, Giusso & Musarella recorded in the study area.

Photos 390 and 391. *Fritillaria drenovskii* Degen & Stoj. and *Gentiana verna* L. subsp. *balcanica* N.M. Pritch. species recorded in the study area.

Photo 392. *Crocus chrysanthus* (Herb.) Herb. recorded in the study area.

Photo 393. *Onobrychis montana* DC. in Lam. & DC. subsp. *scardica* (Griseb.) P.W. Ball recorded in the study area.

Photos 394 and 395. *Onobrychis alba* (Waldst. & Kit.) Desv. and *Ajuga laxmannii* (L.) Benth. species recorded in the study area.

Viola perinensis

Centaurea stoebe subsp. serbica

Alyssum sibiricum

Genista subcapitata

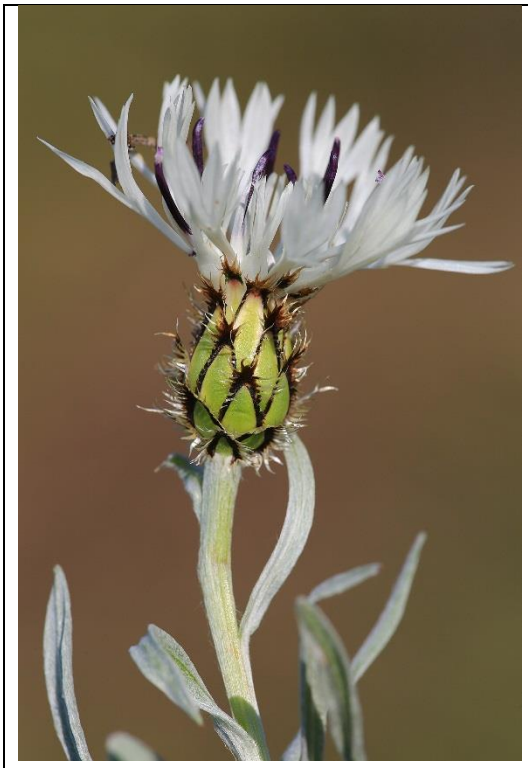
Convolvulus boissieri subsp. suendermannii

Sempervivum leucanthum

Centaurea parilica

Lomelosia rhodopensis

Photo 396. Species in the study area that are endemic or under protection.



Centaurea napulifera

Iris reichenbachii

Verbascum nobile

Hypericum rumeliacum

Photo 397. Species of the study area that are endemic or under protection.

INVENTORY OF THE STATE OF THE NATURAL ENVIRONMENT IN THE NATURA 2000 NETWORK AREA

The production licence polygons of the wind farm under study, as has been mentioned in previous sections of this Special Ecological Assessment, are partially located within the Natura 2000 network area of Special Conservation Area GR1260005. In addition to the above protected area, the nearest Special Protection Areas and the neighbouring Bulgarian Special Conservation Area BG0001028 have been taken into account in the preparation of this assessment.

Conservation objectives of the Natura 2000 site concerned and parameters contributing to the conservation value of the site

For the Greek protected areas of the Natura 2000 network under study (GR1260005 and GR1260010), no Management Plan has been prepared and is in force. The objective of this Specific Ecological Assessment is to assess the potential impacts of the project location on the important species, conservation objectives and integrity of the Natura 2000 sites.

On the basis of No. Oik. ΥΡΕΝ/ΔΦΠΒ/50146/1786 Definition and approval of conservation objectives for bird species of par. 1 and 2 of Article 4 of Directive 2009/147/EC in the Special Protection Areas of the national ecological network Natura 2000 (Government Gazette 3118/B/10-05-2023), the conservation objectives for the species of avifauna included in the Directive (ref. 37338/1807/E.103/1.9.2010 of the Ministers of Finance, Economy, Competitiveness and Shipping, and Environment, Energy and Climate Change (Β΄1495) in the Special Protection Areas of the national ecological network NATURA 2000, pursuant to paragraph b' of par. 3 of Article 21 of Law No. 21 of the National Nature Conservation Plan of Greece. 1650/1986 (Α΄ 160). The general conservation objective of each Special Protection Area is to maintain (or achieve) a favourable conservation status for all species of avifauna in the area covered by the above Decision, in order to maintain the importance and integrity of the Special Protection Area, in the objectives of the Decision 373338/1807/E.103/1.9.2010. The target value established for a bird species in a Special Protection Area is considered to be the minimum desirable value for maintaining or achieving Satisfactory Conservation Status. The conservation objectives for the bird species listed in par. 1 and 4 of Article 4 of Joint Ministerial Decision No 37338/1807/E.103/1.9.2010 in Special Protection Areas shall be defined and approved in terms of the population parameter, expressed

either a) as a breeding population (size, pairs or individuals in special cases) or b) as a wintering/traveling population (size: individuals). For each parameter the quantitative target value with the corresponding unit of measurement shall be defined, and the idealised target which indicates the existing value of the corresponding parameter according to the Standard Data Form for the area. Finally, always in accordance with the above decision, when one of the parameters under evaluation has a value that is considered satisfactory for the conservation of a species in a Special Protection Area, then the specific objective proposed is 'conservation'. Where the parameter has a value that is considered unsatisfactory for the conservation prospects of a species in a Special Protection Area, then the proposed specific target is 'Achieve', and in those cases where the target value and/or the specific target cannot be determined in one of the Special Protection Areas due to insufficient data on the existing situation, then the target value and/or the specific target is referred to as 'Insufficient data'.

Therefore, the following table, given in an annex at the end of the above Decision (Government Gazette 3118/B/10-05-2023), which forms an integral part of it, lists the Conservation Targets for the species referred to in paras. 1 and 4 of Article 4 of Joint Ministerial Decision No. 37338/1807/E.103/1.9.2010, for the Greek Special Protection Area under study (Table 56).

Table 56. Table of Conservation Objectives for the species of interest of the studied Natura 2000 network area GR1260010 (Source: Government Gazette 3118/B/10-05-2023).

Στόχοι διατήρησης για την ΖΕΠ Όρος Μπέλες (GR1260010)

Είδη που αναφέρονται στις παρ. 1 και 4 του άρθρου 4 της 2 υπό στοιχεία 37338/1807/E.103/01.09.2010 κοινής υπουργικής απόφασης

Κωδικός	Ονομασία	Τύπος	Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
A402	*Accipiter brevipes*	r	Πληθυσμός	Ζευγάρια	5	Διατήρηση	
A229	*Alcedo atthis*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A878	*Alectoris graeca all others*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A091	*Aquila chrysaetos*	r	Πληθυσμός	Ζευγάρια	5	Επίτευξη	
A404	*Aquila heliaca*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A221	*Asio otus*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A215	*Bubo bubo*	p	Πληθυσμός	Ζευγάρια	2	Διατήρηση	

Κωδικός	Ονομασία	Τύπος	Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
A087	*Buteo buteo*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A403	*Buteo rufinus*	r	Πληθυσμός	Ζευγάρια	2	Διατήρηση	
A224	*Caprimulgus europaeus*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A030	*Ciconia nigra*	r	Πληθυσμός	Ζευγάρια	2	Διατήρηση	
A080	*Circaetus gallicus*	r	Πληθυσμός	Ζευγάρια	4	Διατήρηση	
A080	*Circaetus gallicus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A081	*Circus aeruginosus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A082	*Circus cyaneus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A083	*Circus macrourus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A859	*Clanga clanga*	w	Πληθυσμός	Άτομα	1	Διατήρηση	
A858	*Clanga pomarina*	r	Πληθυσμός	Ζευγάρια	7	Επίτευξη	
A231	*Coracias garrulus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A239	*Dendrocopos leucotos*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A429	*Dendrocopos syriacus*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A236	*Dryocopus martius*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A447	*Emberiza caesia*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A446	*Emberiza cineracea*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A379	*Emberiza hortulana*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A101	*Falco biarmicus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A511	*Falco cherrug*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Κωδικός	Ονομασία	Τύπος	Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
A098	*Falco columbarius*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A100	*Falco eleonorae*	c	Πληθυσμός	Άτομα	15	Διατήρηση	
A095	*Falco naumanni*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A103	*Falco peregrinus*	r	Πληθυσμός	Ζευγάρια	3	Διατήρηση	
A103	*Falco peregrinus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A097	*Falco vespertinus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A321	*Ficedula albicollis*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A320	*Ficedula parva*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A442	*Ficedula semitorquata*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A078	*Gyps fulvus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A075	*Haliaeetus albicilla*	p	Πληθυσμός	Άτομα	1	Διατήρηση	
A092	*Hieraaetus pennatus (Aquila pennata)*	r	Πληθυσμός	Ζευγάρια	3	Επίτευξη	
A092	*Hieraaetus pennatus (Aquila pennata)*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A251	*Hirundo rustica*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A338	*Lanius collurio*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A433	*Lanius nubicus*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A868	*Leiopicus medius*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A246	*Lullula arborea*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A073	*Milvus migrans*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A073	*Milvus migrans*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Κωδικός	Ονομασία	Τύπος	Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
A280	*Monticola saxatilis*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A077	*Neophron percnopterus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A072	*Pernis apivorus*	r	Πληθυσμός	Ζευγάρια	3	Διατήρηση	
A234	*Picus canus*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Memo

Code: The code of the species as reported in the Natura 2000 network database
Name: The scientific name of the species
Type: The population type under which the species occurs in the Special Protection Area

- Permanent (p): the species occurs in the site throughout the year (non-migratory species, resident population of a migratory species)
- Reproductive (r): the species uses the site for rearing chicks (e.g. breeding, nest building).
- Concentrative (c): the species uses the site for staging or roosting or stopping during migration or for changing wing outside its breeding site and excluding overwintering.
- Overwintering (w): the species uses the site during winter.

Parameter: The parameter against which the Conservation Objective is defined.
Parameter unit of measurement: The unit of measurement by which the parameter against which the Conservation Target is defined is specified.
Target value: The reference value of the Conservation Target for each species, which is the same as the Satisfactory Reference Value (Desirable Reference Value, NRV) for the species in the relevant Special Protection Area.
Specific target: The action required to meet the Conservation Objective.

With regard to the main study area GR1260005, partially within which the project is located, this is a Special Area of Conservation, with Annex I habitat types and Annex II fauna and flora species of Directive 92/43/EEC being protected.

On the basis of No. Oik. ΥΡΕΝ/ΔΔΦΠΒ/24776/985 Definition of conservation objectives for natural habitat types of Annex I and species of Annex II of Directive 92/43/EEC in Special Conservation Areas and Sites of Community Importance of the national ecological network Natura 2000 (Government Gazette 1807/B/22-03-2023), the conservation objectives for natural habitat types and species of EU interest in Special Conservation Areas and Sites of Community Importance of the national ecological network Natura 2000 (Annexes I and II of Directive 92/43/EEC No. 33318/3028/11.12.1998 of the Ministers of Interior, Public Administration and Decentralization, National Economy and Finance, Development, Environment, Spatial Planning and Public Works, Agriculture, Merchant Shipping and Culture (B'1289)),

pursuant to the provisions of paragraph 1 of Article 8 of Law No. 3937/2011 "Conservation of biodiversity and other provisions" (A'60). 33318/3028/11.12.1998 (B' 1289). The conservation objectives at the level of a Natura 2000 national ecological network site are a set of specific objectives to be achieved in the site in order to ensure that the site makes the best possible contribution to the conservation or achievement of the IUCN at national, biogeographical or European level. The conservation objectives for the habitat types in Annex I and species in Annex II of Annex I and Annex II of the Habitats Directive are set out in Annex I to the Directive. 33318/3028/11.12.1998 (B'1289), as currently in force at the level of Special Conservation Areas and Sites of Community Importance of the Natura 2000 national ecological network, are defined in terms of specific parameters, taking into account their ecological requirements, their conservation status at national and European level, the threats and risks of their degradation, destruction or disturbance, their national and European importance for the conservation of biodiversity and the overall coherence of the Natura 2000 network.

For each parameter, a quantitative target value with its corresponding unit of measurement and a specific objective indicating the 'achievement' or 'maintenance' of the target value are defined. Where one of the parameters under assessment has a target value that is considered satisfactory for the conservation of a species in a Natura 2000 national ecological network site, it is proposed to 'maintain' the target value. Where the target value of the parameter is judged to be unsatisfactory for the conservation prospects of a species in a Natura 2000 national ecological network site, then it is proposed to 'attain' the target value. The target value established for a natural habitat type or a species in a particular Natura 2000 national ecological network site is considered to be the minimum desirable value. In some cases the term 'at least' is used in the target value due to constraints in setting a desirable value, and in those cases where the target value and/or the specific target cannot be determined in a particular Natura 2000 national network site due to insufficient existing data, then the target value and/or the specific target is referred to as 'Insufficient data'.

Therefore, the following is a part of the table given in an annex at the end of the above mentioned decision (Government Gazette 1807/B/22-03-2023), which is an integral part of it, and in which the Conservation Objectives of Annex II species and Annex I habitat types of Annex I of Decree no. 33318/3028/11.12.1998 (B'1289), for the Special Conservation Area under study (Tables 57 and 58).

Table 57. Table of Conservation Objectives of the habitat types of Annex I of the Natura 2000 network study area GR1260005 (Source: Government Gazette 1807/B/22-03-2023).

Στόχοι διατήρησης για την Ειδική Ζώνη Διατήρησης (ΕΖΔ) «ΚΟΡΥΦΕΣ ΟΡΟΥΣ ΟΡΒΗΛΟΣ» (GR1260005)

Πίνακας GR1260005_1. Τύποι οικοτόπων του Παραρτήματος I της Οδηγίας 92/43/ΕΟΚ

Πίνακας GR1260005_1.1. Αλπικά και βόρεια χέρσα εδάφη (4060)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	21,9	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	Χαρακτηριστικά είδη: *Juniperus communis* subsp. *nana* στον θαμνώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.

Πίνακας GR1260005_1.2. Δενδροειδή *Juniperus* spp. (5210)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	333,4	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>40%	Διατήρηση	Χαρακτηριστικά είδη: *Juniperus* spp. στον θαμνώδη όροφο. Σημειώνεται ότι ο στόχος αφορά κυριαρχία ή συγκυριαρχία των χαρακτηριστικών ειδών στον θαμνώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.

Πίνακας GR1260005_1.3. Ξηρές χλοώδεις διαπλάσεις της ανατολικής Μεσογείου (Scorzoneratalia villosae) (62A0)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	1.124,4	Διατήρηση	
Κάλυψη μη τυπικών ειδών (πλην ξενικών & χωροκατακτητικών)	% κάλυψη	<10%	Ανεπαρκή δεδομένα	Μη τυπικά είδη: φανερόφυτα (δέντρα & θάμνοι) και τα φρυγανικά είδη.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.4. Ασβεστολιθικά βραχώδη πρανή με χασμοφυτική βλάστηση (8210)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	8,8	Διατήρηση	
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.5. Μεσοευρωπαϊκά ασβεστόφιλα δάση οξιάς Cephalanthero-Fagion (9150)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	268,5	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>75%	Διατήρηση	Χαρακτηριστικά είδη: *Fagus* spp. στον δενδρώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.
Παρουσία δέντρων μεγάλης ηλικίας/διαμέτρου	Αριθμός ατόμων ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία νεκρού ξύλου	Κυβ. μ. ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.6. Πευκοδάση (*Pinus sylvestris*) Ροδόπης και Οροσειράς του Αίμου (91CA)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	31,9	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>50%	Ανεπαρκή δεδομένα	Χαρακτηριστικά είδη: *Pinus sylvestris* στον δενδρώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.
Παρουσία δέντρων μεγάλης ηλικίας/διαμέτρου	Αριθμός ατόμων ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία νεκρού ξύλου	Κυβ. μ. ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.7. (Υπο)μεσογειακά πευκοδάση με ενδημικά μαυρόπευκα (9530)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	667,7	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>50%	Διατήρηση	Χαρακτηριστικά είδη: *Pinus nigra* στον δενδρώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.
Παρουσία δέντρων μεγάλης ηλικίας/διαμέτρου	Αριθμός ατόμων ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία νεκρού ξύλου	Κυβ. μ. ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.8. Μεσογειακά πευκοδάση με ενδημικά είδη πεύκων της Μεσογείου (9540)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία δέντρων μεγάλης ηλικίας/διαμέτρου	Αριθμός ατόμων ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία νεκρού ξύλου	Κυβ. μ. ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.9. Υπερορεινά μεσογειακά πευκοδάση (95A0)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	387,2	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>50%	Διατήρηση	Χαρακτηριστικά είδη: *Pinus heldreichii* στον δενδρώδη όροφο
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.
Παρουσία δέντρων μεγάλης ηλικίας/διαμέτρου	Αριθμός ατόμων ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία νεκρού ξύλου	Κυβ. μ. ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Table 58. Table of Conservation Objectives for Annex II species of the Natura 2000 network study area GR1260006 (Source: Government Gazette 1807/B/22-03-2023).

Πίνακας GR1260005_2. Είδη του Παραρτήματος ΙΙ της Οδηγίας 92/43/ΕΟΚ

Πίνακας GR1260005_2.1. *Dactylorhiza kalopissii* subsp. *kalopissii* (6996)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Εξάπλωση	Εκτάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Βόσκηση	% βοσκημένων ατόμων	<20%	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.2. *Gladiolus palustris* (4096)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Εξάπλωση	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.3. *Viola delphinantha* (1590)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Εξάπλωση	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.4. *Polyommatus eroides* (4042)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός ατόμων ανά τ.μ. ενδιαιτήματος	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Ενδιαίτημα	τ.χλμ.	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία φυτών-ξενιστών	Αριθμός ατόμων ανά τ.μ.	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	Οι προνύμφες τρέφονται με φυτά *Genista depressa*.
Μέσο ύψος ποώδους βλάστησης στο ενδιαίτημα	εκ.	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Θαμνώδης και δενδρώδης βλάστηση στο ενδιαίτημα	% κάλυψη	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.5. *Bombina variegata* (1193)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	500	Διατήρηση	
Εξάπλωση	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	35	Διατήρηση	
Ενδιαίτημα αναπαραγωγής	Αριθμός αναπαραγωγικών θέσεων	4	Διατήρηση	

Πίνακας GR1260005_2.6. *Elaphe quatuorlineata* (1279)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	200	Διατήρηση	
Εξάπλωση	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	24	Διατήρηση	
Ενδιαίτημα	Εκτάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.7. *Testudo graeca* (1219)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	1.500	Διατήρηση	
Εξάπλωση	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	20	Διατήρηση	
Ενδιαίτημα	Εκτάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.8. *Lutra lutra* (1355)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Εξάπλωση	τ.χλμ.	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Ενδιαίτημα	τ.χλμ.	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.9. *Ursus arctos* (1354)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός ατόμων	5	Επίτευξη	
Αναπαραγωγική ικανότητα πληθυσμού	Αριθμός χωροκρατειών θηλυκών με μικρά	1-2	Επίτευξη	
Εξάπλωση	τ. χλμ.	45	Διατήρηση	
Ενδιαίτημα	τ. χλμ.	39	Διατήρηση	Το ενδιαίτημα του είδους χαρακτηρίζεται από έντονη δασοκάλυψη (δάση φυλλοβόλων και κωνοφόρων) έως ανοιχτές περιοχές με χαμηλότερη δασοκάλυψη και θαμνώδη βλάστηση.
Τομείς διαχείμασης	τ. χλμ.	13,7	Διατήρηση	

Πίνακας GR1260005_2.10. *Vormela peregusna* (2635)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός ατόμων	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Memorandum to Tables 57 and 58

Code: The code of the species or habitat type as indicated in the Natura 2000 network database
Name: The scientific name of the species, or habitat type.
Parameter: The parameter against which the Conservation Objective is defined.
Parameter measurement unit: The unit of measurement by which the parameter against which the Conservation Target is defined is specified.
Target value: The reference value of the Conservation Target for each species or habitat type, which is the same as the Satisfactory Reference Value (Desirable Reference Value, RAR) for the species or habitat type in the relevant Special Conservation Area.
Specific objective: The action required to meet the Conservation Target.

With regard to the Bulgarian Special Protection Areas under study BG0002098, BG0002078, BG0002072 and the Bulgarian Special Conservation Area BG0001028, as indicated in the SDFs of the sites, no Management Plan has been prepared and no conservation objectives have been set under the above Management Plan. The objective of this Specific Ecological Assessment is to assess the potential impacts of the project location on important species, conservation objectives and the integrity of Natura 2000 sites. Since no Management Plan has been prepared and the conservation objectives and satisfactory reference values for the species have not been defined for the Bulgarian study area, the general conservation objective for the Natura 2000 sites is to maintain or restore the sites to a satisfactory conservation status for the important species of Community interest, which are the main conservation objective of the sites, based on the content of the Standard Data for

The ecological requirements of the species and habitat types for which the Natura 2000 sites concerned have been designated

With regard to the closest Natura 2000 Special Protection Areas (BG0002078, GR1260010, BG0002098, BG0002072) under study, the ecological requirements of the species of interest of the avifauna (as selected in a previous section of this SEA) have been fully analysed in a previous corresponding sub-chapter, in order to provide the reader with a more complete picture of the avifauna of the area under study, In the following, the ecological requirements of the species of interest are analysed in accordance with the "*Deliverable 8 Guide to ecological requirements, threats and appropriate measures for the species of* interest" of the identification of compatible activities in relation to the species of interest of the Special Protection Areas for avifauna (Dimalexis 2009), prepared by the Ministry of Agriculture and Forestry of the Republic of Cyprus.Environmental Planning Department - Environmental Planning Division, Natural Environment Management Department.

Gyps fulvus

Two conditions are necessary for the presence of the species in an area: a) the existence of rocky sites for nesting and b) the presence of extensive livestock farming in the area. Open areas such as extensive grasslands and pastures are also important parameters for locating the foraging habitat.

In more detail:

Breeding habitat: The vulture nests in groups of 2-18 pairs always on rocky crags, mainly of calcareous substratum (Cramp and Simmons 1980, Donázar 1993), while on the islands several colonies are found on coastal rocks (Xirouchakis and Mylonas 2004, 2005).

Trophic ecology: Species of open areas, found in semi-mountainous and mountainous areas. (Donázar 1993, Handrinos and Akriotis 1997, Xirouchakis and Andreou 2009). It feeds exclusively on carcasses of large or medium-sized animals, selecting the soft body parts (Tucker and Heath 1994, Xirouchakis 2005). Almost throughout its range in the western Palaearctic, the species follows nomadic herds in their seasonal movements, resulting in winter occurrence in semi-mountainous areas close to crops, toast or bare ground or any type of habitat as long as it is used as pasture, while in summer it is found in regulars, mountainous crops and mainly in mountain and subalpine pastures with livestock activity (Handrinos and Akriotis 1997; Xirouchakis and Mylonas 2004). Also, the presence of rocks and hilly areas with low vegetation facilitates the flight of the species using thermal currents.

Main habitats supporting the species:

- Hardwood scrub, garrigue and maquis
- Alpine, sub-alpine and northern temperate grasslands
- Bare ground
- Inland foothills

Aquila chrysaetos

The presence of rocky outcrops is essential for the species as well as open areas for foraging.

More details

Reproduction interest: The species nests mainly on rocks (800 - 2000 m, Handrinos 1987) although nesting has also been recorded in trees in areas with abundant food (Evros: 30%, Hallmann 1989).

Trophic ecology: The species is restricted to mountainous areas with rocky outcrops (Handrinos and Akriotis 1997). It prefers open areas with low vegetation and avoids forests, although it may be endemic to woodlands using gaps for foraging (Adamakopoulos et al. 1995). It is mainly found in mountainous and semi-mountainous areas and is often observed in the alpine zone in summer (Xirouchakis 2001). Its diet

consists mainly of small and medium-sized birds and mammals (e.g. partridges, hares, rabbits, pigeons, pheasants, rabbits, but also skunks, squirrels or foxes) and dead animals, especially in winter (Vaglianos 1981, Handrinos 1987, Hallmann 1989, Watson et al. 1993, Handrinos and Akriotis 1997).

Main habitats supporting the species:

- Hardwood shrubs, garrigue and maquis
- Alpine, sub-alpine and northern temperate grasslands
- Steppes and dry calcareous grasslands
- Barren soils
- Inland shelves

Hieraaetus pennatus

The species needs mature trees, in dense stands of deciduous forests with gaps, in scrub or grassland.

In more detail:

Breeding habitat: The species usually nests in trees, in lowland and semi-mountainous forests, but also in more open areas with stands of mainly deciduous trees (Tucker and Heath 1994; Ferguson Lee and Christie 2001; Bosch 2003; Bosch et al. 2005; Poirazidis et al. 2007; Gensbol and Thiede 2008).

Trophic ecology: The species forages in intra-forest interspaces and in open areas such as grasslands, Mediterranean scrub and agricultural systems. It feeds mainly on birds but also on reptiles or mammals (Handrinos and Akriotis 1997; Garcia-Dios 2006; Palomino and Carrascal 2007).

Predation: The buffalo is a key predator of chicks and adults.

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Mixed forests
- Forest boundary habitat
- Hardwood shrubs, garrigue and maquis
- Shrubs and bushes
- Mesophilic grasslands

Circaetus gallicus

The species requires mature trees in intact stands of deciduous or coniferous forest for nesting and extensive open, dry areas for foraging.

In more detail:

Breeding habitat: The species nests in large trees in mature deciduous and coniferous forests (*Pinus spp. Quercus spp. Fagus spp.)* in semi-mountainous and mountainous areas (Cramp and Simmons 1980; Tucker and Heath 1994; Bakaloudis et al. 2001; Bakaloudis et al. 2005; Gensbol and Thiede 2008).

Food ecology: It feeds almost exclusively on reptiles (snakes, lizards) and to a much lesser extent on birds and small mammals. Its foraging habitat includes open, dry areas with low vegetation, pastures and rock formations, but also crops alternating with bare fields and dry grasslands where reptiles abound (Bakaloudis et al. 1998).

Predation: The bufflehead is reported as an important predator of the species.

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Broad-leaved evergreen forests
- Mixed forests
- Native coniferous forests
- Hardwood shrubs, gorges and macaws
- Alpine, sub-alpine and northern temperate grasslands
- Dry, siliceous grasslands
- Steppes and dry calcareous grasslands
- Barren soils
- Inland plains
- Stone and boulders

Bubo bubo

A very important factor for the species' well-being is the availability of rocks for nesting and open areas rich in food reserves.

In more detail:

Breeding habitat: The species nests in large rock cavities, preferring canyons, cliffs, rock formations and outcrops, with an abundance of habitat as long as there are

abundant food resources in the area (Tucker and Heath 1994; Handrinos and Akriotis 1997).

Trophic ecology: It is a species of mainly open areas with rocks, grasslands, crops and fallow fields. However, it is also found in shrublands and deciduous, coniferous or mixed forest ecosystems but also in areas where there are many clearings and rocks. It is also found close to populated areas with high food supplies. Its diet includes a variety of species, but mainly rodents (rats), hedgehogs, wild rabbits and medium-sized birds, while it is considered to be a super-feeder, capturing other species (hawks, hawk eagles, peregrines, snake eagles, etc.).etc.) by surprising them at dusk when they roost, but also carnivorous mammals (e.g. foxes) (Cramp and Simmons 1980, Mikkola 1983, Papageorgiou, et al. 1993, Alivizatos et al. 2005).

Main habitats supporting the species:

- Hardwood scrub, garrigue and maquis
- Dry, siliceous grasslands
- Mesophilic grasslands, dry and fertile grasslands, dry and fertile meadows, rocky outcrops, dry and siliceous grasslands, rocky outcrops, rocky outcrops, siliceous bryophytes and rocky outcrops
- Steppes and dry calcareous grasslands
- Bare ground
- Inland flaps

Circus aeruginosus

The existence of reedbeds and wetland ecosystems with abundant food (reptiles, amphibians and birds) is a key ecological factor for the species.

In more detail:

Breeding habitat: T the species nests on the ground, preferring extensive reedbeds (Cramp and Simmons 1980, Ferguson-Lee and Christie 2001, Nemeckova et al. 2008).

Food ecology: Feeds on small mammals and birds as well as reptiles, amphibians and fish. Its foraging habitat includes wetland systems for almost all species (Tucker and Heath 1994, Gensbol and Thiede 2008).

Main habitats supporting the species:

- Wet grasslands
- Alkaline peatlands and marshes, transitional marshes and springs
- Stagnant brackish and saline waters

- Stagnant freshwater
- Freshwater, brackish, brackish and saline water
- Lagoons
- Salt marshes

Circus cyaneus

The main ecological factor for the species is the existence of marshes and open areas.

In more detail:

Breeding habitat: The habitat of the species is marshes with low vegetation, grasslands, and generally open areas. It is also found in frying ecosystems even at high altitude (in winter and during autumn migration). It feeds on small birds, small mammals, reptiles and insects (Cramp and Simmons 1980, Ferguson-Lee and Christie 2001, Leckie et al. 2008, Arroyo et al. 2009).

Main habitats supporting the species:

- Hardwood scrub, garrigue and macaws
- Alpine, sub-alpine and northern temperate grasslands
- Mesophilic grasslands
- Alkaline peat bogs and swamps, transitional marshes and springs
- Cultivated land

Circus pygargus

Cereal crops are the most important nesting habitat for this species.

In more detail:

Breeding habitat: The species always nests (often in loose colonies) on the ground in mainly cereal crops, but is very likely to nest in subalpine grasslands (Cramp and Simmons 1980, Ferguson-Lee and Christie 2001, Gensbol and Thiede 2008, Wiacek 2008).

Trophic ecology: The species feeds on small birds, rodents but also reptiles and insects. Foraging habitat includes crops and grasslands although it is also observed in wetlands and coastal areas with sand dunes, especially during migration (Johnson and Igl 2001, Gensbol and Thiede 2008, Trierweiler et al. 2008).

Main habitats supporting the species:

- Cultivated land

Circus macrourus

The main ecological factor for the species is open dry land.

In more detail:

Migration habitat: The habitat includes open lowland areas with low vegetation and is not so dependent on the availability of water. It feeds on small birds, small mammals, reptiles and insects (Cramp and Simmons 1980; Ferguson-Lee and Christie 2001; Leckie et al. 2008; Arroyo et al. 2009).

Main habitats supporting the species:

- Hardwood bushes, garrigue and maquis
- Alpine, sub-alpine and northern temperate grasslands
- Mesophilic grasslands
- Alkaline peatlands and swamps, transitional marshes and springs
- Cultivated land

Accipiter brevipes

The presence of tall trees or shrubs in deciduous forests and forest gaps with grasslands or rivers and streams rich in riparian and aquatic vegetation are key ecological factors for the species.

In more detail:

Breeding habitat: Typical woodland species. It nests in trees, preferring mainly deciduous forests with many clearings and river valleys with tall trees or shrubs (Gensbol and Thiede 2008). It often breeds singly in trees near crops or rivers and even in forest plantations (e.g. whitewood plantations) (Tucker and Heath 1994).

Trophic ecology: The species feeds mainly on small mammals, birds, reptiles and large flying insects (e.g. grasshoppers, cicadas, etc.) which it preys in forest clearings, or in nearby fields and meadows, and near riverbeds in riparian vegetation (Gensbol and Thiede 2008).

Main habitats supporting the species:

- Alluvial and hydrophytic forests
- Broad-leaved deciduous forests
- Wet meadows
- Mesophilic grasslands
- Rivers and streams

- Parks and streams

Pernis apivorus

The maintenance of mature trees and forest clearings is vital for the conservation of the species.

In more detail:

Breeding habitats: Typically a forest-dwelling species, nesting in mature trees in mainly deciduous forests (Cramp and Simmons 1980; Amcoff et al. 1994; Tucker and Heath 1994).

Trophic ecology: Hunting habitat includes a variety of forest ecosystems (deciduous, coniferous, e.g*., Quercus spp., Pinus spp., Fagus spp.*) but with the basic requirement of clear and open stands and extensive plots where it hunts for food. Its diet consists mainly of insects (bees and wasps) but also reptiles, mammals, birds and fruits (Voskamp 2000, Ferguson-Lee and Christie 2001, Gensbol and thiede 2008).

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Broad-leaved evergreen forests
- Mixed forests
- Native coniferous forests
- Forest boundary habitat

Milvus migrans

The main conditions for the presence of this species are the existence of mature trees for foraging and an abundance of food.

In more detail:

Breeding habitats: The species nests in trees in stands of deciduous and coniferous forests (Cramp and Simmons 1980; Ferguson-Lee and Christie 2001).

Τροφική οικολογία: The species feeds on a wide variety of species such as small mammals , birds, reptiles, fish, insects and also carrion or garbage. A cowbird species that frequents dumpsites and near paddocks where it feeds on garbage or copepod insects (e.g. beetles). Hunting habitat includes open areas such as wetlands, crops, meadows and grasslands as well as bare ground usually in lowlands and valleys (Sergio and Boto 1999, Sergio et al. 2002,

Palomino and Carrascal 2007, Gensbol and Thiede 2008).

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Native coniferous forests
- Hardwood bushes, garrigue and maquis
- Shrubs and bushes
- Dry, siliceous grasslands
- Steppes and dry calcareous grasslands
- Standing fresh water
- Cultivated land
- Other urban and industrial areas
- Dumps

Buteo rufinus

The species needs a mosaic of habitats, such as steep cliffs and bare ground or dry steppe meadows.

In more detail:

Breeding habitat: The species always nests on rocks in forest clearings or at the edges of forest stands but mainly in open areas with rocky formations (Cramp and Simmons 1980; Alivizatos 1996; Alivizatos and Goutner 1997).

Trophic ecology: The species is a predator of open areas with bare ground and low vegetation. Foraging habitat includes steppe, semi-arid areas with woody vegetation where it feeds primarily on reptiles and less so on birds (Cramp and Simmons 1980, Alivizatos 1996, Alivizatos and Goutner 1997).

Predation: Predation pressure from Bubo bubo (*Bubo bubo*) is reported in some territories.

Main habitats supporting the species:

- Steppes and dry calcareous grasslands
- steep and rocky coasts
- Bare ground
- Inland cliffs

Aquila fasciata

The presence of rocks and open areas of bare ground and topsoil with medium sized mammals and birds are very important nesting and feeding habitats.

In more detail:

Breeding habitat: It always nests on rocks either on inland cliffs or in coastal areas over the sea (Cramp and Simmons 1980; Ferguson-Lee and Christie 2001; Gensbol and Thiede 2008; Bourdakis and Xirouchakis 2009).

Trophic ecology: The species in Greece is found in Mediterranean, island ecosystems. The foraging habitat of the species includes mainly toast and scrubland with long vegetation and young sparse forests near cultivated areas or wetlands. It feeds on medium-sized mammals and birds and less on reptiles, and lizards (Handrinos Akriotis 1997; Alivizatos and Bourdakis 2002; Carrete et al. 2002; Sanz et al. 2005; Bourdakis and Xirouchakis 2009).

Main habitats supporting the species:

- Hardwood shrubs, garrigue and maki
- Shrubs
- Rocky columns and islands
- Steep and rocky coasts
- Bare ground
- Inland shelves

Falco naumanni

The species requires the presence of rocky outcrops and old houses and open areas with low vegetation or bare ground and unirrigated crops.

In more detail:

Breeding habitat: The species is purely colonial and nests in villages and settlements in old houses and rubble in rural areas in cracks or under roofs (Vlachos et al. 2004).

Trophic ecology: The species prefers open areas with low vegetation and bare ground, as well as grasslands, and hunts almost exclusively in rural areas with dry insect crops (Vlachos et al. 2003; Ursúa et al. 2005; Gensbol and Thiede 2008).

Predation: crows are considered predators of the eggs and chicks of the common sandhill crane.

Main habitats supporting the species:

- Dry siliceous grasslands
- Cultivated land
- Other urban and industrial areas
- Bare land

Falco peregrinus

The species requires the presence of suitable rocks for nesting and good populations of specific species for foraging.

In more detail:

Breeding habitat: The species nests on steep vertical cliffs in canyons and also in coastal cliffs. The nest is located in small cavities or terraces usually with a rock roof (Newton 1979; Tucker and Heath 1994; Rizzolli et al. 2005).

Trophic ecology: The species feeds on a wide variety of species the majority of which are birds (Ratcliffe 1993, Gensbol and Thiede 2008). However, it feeds mainly on species that are abundant in its range (Jenkins and Avery 1999). For example, inland, partridges and small to medium sized birds are the species' diet, while on islands, wild pigeons are its main food item. In contrast, in cities it mainly hunts pigeons and decoys (Sielicki and Mizera 2009).

Competition: theoretically the species competes with the golden egret for nesting sites and does not occur on adjacent rocks.

Main habitats supporting the species:

- Hardwood scrub, garrigue and macaws
- Dry, siliceous grasslands
- Steppes and dry calcareous grasslands
- Rocky columns and islands
- Steep and rocky coasts
- Inland shelves

Falco eleonorae

The species requires rocky islets with vertical, steep cliffs and strong migratory activity of young birds in the area during the autumn period. Good wind conditions are an essential prerequisite for the breeding success of the species.

In more detail:

Breeding and feeding habitat: The species nests on isolated Aegean islands with steep coastal cliffs in crevices and cavities, but also on the ground under large rocks or bushes (Walter 1979, Handrinos and Akriotis 1997). The largest colonies of the species coincide with the main migration routes in the Aegean Sea and are found on inhabited islands (Dimalexis et al. 2007).

Competition: predation of eggs by rats present on Aegean rocky islets is a major problem. On uninhabited islands it has been estimated that 30% of eggs are predated (Ristow and Wink 1985).

Main habitats supporting the species:

- Open sea
- Open sea; open water; rocky shores and islets
- Rocky shores and cliffs

Ciconia ciconia

The species breeds mainly in Northern Greece, in the countryside and in urban areas close to feeding areas or at distances of up to 2-3 km. It feeds in shallow standing water in lagoons, ponds, gullies, marshes, and in flooded areas, wet meadows and dry fields where it is found during migration. The species migrates via Thrace - Central Asia, while a smaller part of the population is concentrated as far as Attica from where they cross the Aegean Sea to reach the Asia Minor coast. A third, even smaller part of the species' population ends up, mainly via the western coastline, in the southern Peloponnese - Kythera - Antikythera - Crete and then in Africa.

In more detail:

Breeding habitat: The nest is constructed in the countryside and in urban areas on a platform with branches and is usually placed up to 30 m above ground on trees, roofs, pillars, posts and other man-made structures and specially constructed artificial nests. The species nests solitarily or in loose colonies, in traditional locations and often in the same nests. Nests are made near feeding areas, or at distances of up to 2-3 km.

Foraging ecology: Feeds solitarily or in flocks when food is abundant, during the day, in shallow standing water in ponds, gullies, marshes, with aquatic organisms (fish, amphibians, molluscs, crustaceans) and in flooded areas, wet meadows and crops with insects or mice. In some areas (Thessaly, Central Macedonia) it feeds largely on cereal crops, pastures and other areas away from water.

Migration habitat and resting and refuelling stations: During migration, the species is found in open areas with shallow standing water, lagoons, ponds, reservoirs, gullies, swamps, flooded areas, wet grasslands, and crops. During most of their migration within the country, the species does not stopover in large numbers. More significant concentrations are observed in eastern Thrace and in some parts of Attica, where flocks congregate in bare fields before moving on.

Migration corridors: the species migrates by taking advantage of upward currents over the continents, therefore avoiding open sea areas and limiting itself to narrow passages. In Greece, most storks migrate via Thrace - Central Asia. A smaller part of the population is concentrated as far as Attica from where they cross the Aegean Sea to reach the Asia Minor coast. A third, even smaller part of the population of the species ends up, mainly via the western coastline, in the southern Peloponnese - Kythera - Antikythera - Crete and then in Africa.

Main habitats that support the species:

- Wet meadows
- Mesophilic grasslands
- Standing freshwater
- Cultivated land
- Other urban and industrial areas
- Urban parks and gardens
- Artificial landscapes (aquatic)

Falco biarmicus

The species requires the presence of suitable rocks for nesting and good populations of specific species for foraging.

In more detail:

Breeding habitat: The species nests on steep vertical cliffs, in canyons and coastal cliffs. The nest is located in small cavities or terraces usually with a rock roof (Newton 1979, Tucker and Heath 1994, Rizzolli et al. 2005).

Trophic ecology: The species feeds on medium-sized birds as well as small mammals, reptiles, large insects (Goodman and Haynes 1992, Morimando 1997) and primarily on species that are abundant in their range (Jenkins and Avery 1999).

Competition: in theory, the species competes with peregrine for nesting sites and does not occur on adjacent rocks.

Main habitats supporting the species:

- Hardwood scrub, garrigue and macaws
- Dry, siliceous grasslands
- Steppes and dry calcareous grasslands
- Steep and rocky coasts
- Inland cliffs

Falco vespertinus

Migration habitat: the Black-crowned Curlew prefers open areas with crops, grasslands and Mediterranean topsoil and maquis, where it feeds mainly on insects, and also captures reptiles and, less frequently, small worms (Cramp and Simmosn 1980; Hölzinger 1987; Gensbol and Thiede 2008).

Main habitats supporting the species:

- Hardwood scrub, garrigue and macaws
- Shrublands
- Μεσόφιλα λιβάδια
- Cultivated land
- Perennial crops, tree crops
- Bare land

Neophron percnopterus

The species needs rocky formations for foraging, traditional land uses and extensive forms of livestock farming. Control of the use of poison baits is also a key factor in its presence.

In more detail:

Breeding habitat: The species nests in rock cavities or crevices although the wider nesting habitat may include wooded areas, rivers or open areas with low vegetation or crops. Nests in single pairs or forms loose colonies (Cramp and Simmons 1980, Tucker and Heath 1994).

Foraging ecology: The species is nearly omnivorous. It feeds on the carcasses of small animals and is very often seen in rubbish dumps or livestock farms where it forages for

carcass remains and sheep and goat droppings (Donázar 1993; Handrinos and Akriotis 1997). Also in the Evros region, turtles are a major food source, which it captures alive. The foraging habitat includes open dry plains with topsoil or hilly semi-steppe areas (Adamakopoulos et al. 1995).

Migration: The main migratory route is the Bosphorus straits, although several observations suggest that the species also moves through the Aegean Sea and Crete (Handrinos and Akriotis 1997).

Main habitats supporting the species:

- Steppes and dry calcareous grasslands
- Hardwoods and dry grasslands, asphalt and hardwood forests, as well as dry grasslands, asphalt and hard woodlands.
- Inland shelves, dry and hard clayey soils, hard rocky areas, and hard rocky shores.

Microcarbo pygmaeus

Breeding habitat: An epidemic species, with an almost similar distribution, both during the breeding season and in winter. The breeding and wintering population of the species in Greece has shown great fluctuations and negative trends in recent years. The species breeds and winters in both inland and coastal wetlands, nesting in colonies in trees, often together with various species of heronry, in stands of water-loving trees (willows, poplars, tamarisk, etc.) (Cramp 1998; Handrinos and Akriotis 1997).

Food ecology: The species' diet consists of fish, and it often feeds on arthropods and small molluscs (Cramp 1998; Handrinos and Akriotis 1997).

Competition: the large increase in the breeding population of cormorants is already causing serious problems of competition with the langoustine for nesting sites, especially in Kerkini (Handrinos and Akriotis 1997, Kazanzidis and Koutrakis 2007).

Wintering habitat: In winter the species occurs in many types of wetlands, inland and coastal, natural or artificial (showing a clear preference for wetlands with dense vegetation, especially reedbeds) (Cramp 1998, Handrinos and Akriotis 1997)

Main habitats supporting the species:

- Rivers and streams
- Rivers and streams, streams and rivers
- Freshwater, brackish water, brackish water, brackish and salt water

Ciconia nigra

The species nests in small numbers in Thrace, Macedonia, Epirus, Epirus, Northern Thessaly and Lesvos, in mature and undisturbed forests or on rocks and feeds in shallow rivers and streams, ponds, marshes and wet meadows.

In more detail:

Breeding habitat: Nests solitarily in mature, undisturbed forest, mixed or unmixed, deciduous or coniferous woodland with clearings. The nest is a large platform constructed on trees with a flat top and a wide enough cone to hold the structure. It also nests in rocks and canyons.

Trophic ecology: Feeds in shallow rivers and streams, ponds, marshes and wet meadows mainly on fish, amphibians, crustaceans and aquatic insects and less on reptiles and small mammals for this reason it is more dependent on water than the white-tailed godwit.

Migration habitat: the species migrates through the Bosphorus alone or in small groups and during this period may also be seen in coastal wetlands. A part of the population also migrates through the western coastline of Greece towards the southern Peloponnese - Kythera - Antikythera - Crete. Usually, the species does not stop during migration, except for a short period in coastal wetlands. In such locations some individuals overwinter.

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Native coniferous forests
- Rivers and streams
- Standing freshwater forests
- Inland watercourses

Falco columbarius

Overwintering habitat: species of open areas, frequenting dry crops (mainly cereals), toast and grasslands and wetlands. It feeds mainly on small mammals and insects (Fergusoin Lees and Christie 2001; Gensbol and Thiede 2008).

Main habitats supporting the species:

- Hardwood scrub, garrigue and maquis
- Shrublands

- Dry, siliceous grasslands
- Semiarid grasslands, dry and dry meadows
- Steppes and dry calcareous grasslands
- Cultivated land

Clanga clanga

A key ecological parameter for the species is large wetlands with high food availability. The species is a winter visitor in Greece. The species is distributed in Thrace - Central and Eastern Macedonia, Epirus and Central Greece, with the largest wintering populations of the species being counted in the Evros Delta, Lake Kerkini, Nestos Delta and Amvrakikos Gulf (Handrinos and Akriotis 1997).

In more detail:

Wintering habitat: the species uses lowland and riparian forests and eucalyptus stands near wetlands for roosting and nesting. It feeds in large wetlands and sporadically in adjacent wetland crops on waterfowl, large insects and carrion (Alivizatos et al. 2004, Alivizatos et al. 2006).

Main habitats supporting the species:

- Stagnant brackish and salt water
- Lagoons

Clanga pomarina

The species requires mature trees in lowland stands of deciduous or coniferous species and aquatic ecosystems with aquatic vegetation and wet meadows where it feeds mainly on reptiles and amphibians.

In more detail:

Breeding habitat: The nesting habitat of the crake includes low to mid-elevation forest stands with deciduous and coniferous species (Svehlik and Meyburg 1979; Cramp and Simmons 1980; Adamakolpoulos et al. 1995).

Trophic ecology: The species feeds mainly in freshwater wetlands, rivers and streams with aquatic vegetation but also in crops, grasslands and shrublands mainly with reptiles and amphibians but also micro-mammals and birds. Large insects and more rarely carrion are also part of its diet (Vlachos 1989, Zogaris et al. 2003).

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Native coniferous forests
- Wet meadows
- Rivers and streams
- Standing brackish and salt water
- Terrestrial vegetation
- Lagoons

Ardea alba

The species maintains 2-3 breeding colonies in Prespa and Kerkini (31-42 pairs), while it is a common and widespread winter visitor in Greece. Typical habitats in all seasons are swamps, wet meadows, marshes, river and lake banks and lagoons. Feeding areas also include shallow bays, agricultural crops and irrigation/drainage ditches. Islands in western Greece are important for wintering (Sfakteria, Kalamas estuary islands, island in Korissia lagoon).

In more detail:

Breeding habitat: Nests in mixed colonies with other herons in reedbeds or trees and shrubs, isolated or on islands (Kazantzidis 2005).

Foraging ecology: Typical habitat includes swamps, wet meadows, marshes, river and lake banks. It can be found in coastal habitats, shallow bays and lagoons, agricultural crops mainly in rice paddies and irrigation ditches (for foraging) (Hancock and Kushlan 1984). The species feeds alone and rarely in small groups, is mainly fish-eating, but also feeds on amphibians, reptiles and occasionally small rodents and even birds (Kazantzidis 2005).

Competition: Interspecific competition between heron species has been recorded mainly in foraging areas, especially in freshwater habitats, but this is mitigated by the different biology and behaviour of different species (Kazantzidis and Goutner 2008).

Wintering habitat: In winter it occurs in small groups. It is found in shallow estuarine waters and in coastal waters in general. It feeds in wet or dry meadows, marshes, swamps, bogs, seasonal small ponds and on the banks of rivers and canals. It rarely roosts in trees. The islands in western Greece are important for the overwintering of the species.

Main habitats supporting the species:

- Wet meadows

- Mesophilic meadows
- Freshwater marshes, salt marshes and saltwater marshes
- Standing freshwater
- Artificial landscapes (aquatic)
- Lagoons

Egretta garzetta

The species breeds in at least 17 colonies mainly in Amvrakikos, Axios Delta and Kerkini, maintains permanent non-breeding populations in several wetlands of the country, and is a numerous transient visitor. It nests in riparian forests and rarely in reedbeds, while its feeding and staging habitats vary, including shallow lakes and lagoons, brackish estuaries and saline coastal waters, salt marshes, mudflats and irrigated areas.

In more detail:

Breeding habitat: Nests on small platforms in riparian forests and rarely in reeds in mixed colonies that it aggressively defends (Kazantzidis 2005). The islands in western Greece are quite important for the breeding of the species (Amvrakikos, Messolonghi, Kalamas).

Trophic ecology: It feeds in shallow lakes, lagoons and smoothly flowing rivers or streams. Also in brackish estuaries and salty coastal waters. It is also found in flooded areas and ephemeral or fluctuating water bodies such as salt marshes and irrigated areas. It prefers open waters without any vegetation or with low or floating aquatic vegetation. It feeds on a wide variety of aquatic organisms, depending on seasonal availability, mainly small fish, amphibians, insects and their larvae, but also crustaceans, lizards, worms, snails, small mammals and snakes.

Competition: Intraspecific competition between heron species has been recorded mainly in foraging areas, especially in freshwater habitats, but this is mitigated by the different biology and behaviour of different species (Kazantzidis and Goutner 2008).

Wintering habitat: In winter it occurs in small groups. It is found in shallow waters of estuaries and rivers. It feeds in wet or dry meadows, marshes, bogs, swamps, seasonal small ponds and on the banks of rivers and canals. It rarely roosts in trees. Wintering areas in western Greece (Amvrakikos, Messolonghi, Kalamas) are quite important for the species.

Migration habitat: uses a variety of habitats, river banks, shallow lakes and lagoons, irrigation canals, flooded meadows, marshes, mudflats, sandy shores, rocky shores or stream banks (Hancock and Kushlan 1984).

Refueling and resting stations: In spring, from April to May, the species arrives from Africa and disperses initially throughout the major wetlands and is gradually restricted to those where it will nest. After breeding is complete, in August and September, juveniles and adults gather in large flocks and from there begin to disperse to neighbouring wetlands (Kazantzidis 2005).

Migration corridors: During the two migration periods the species migrates over a wide front over the entire mainland and islands.

Main habitats supporting the species:

- Alluvial and hydrophytic forests
- Wet meadows
- Alkaline and alkaline forests and alkaline forests
- Freshwater and brackish and brackish water
- Cultivated land
- Forest plantations
- Artificial landscapes (aquatic)
- Lagoons
- Salt marshes

Nycticorax nycticorax

The species maintains eleven breeding colonies, with the largest in the Axios Delta and Kerkini, and is a common and widespread migrant. It nests in riparian and lakeside forests and feeds in wetlands with dense vegetation, but during migration it can be found in meadows and dry habitats, reservoirs, canal banks and along coasts.

In more detail:

Breeding habitat: The species nests in lakeside woodland in tamarisk, willow, alder and poplar and less frequently in reedbeds. Because it reaches breeding colonies earlier than other heron species, it places its nest in higher positions in trees (Kazantzidis 2005).

Food ecology: The species feeds at night or dusk, usually solitary, and maintains extensive foraging territories. It prefers areas with dense vegetation. Its diet consists of fish, amphibians, crustaceans, amphibians, spiders, small mammals and birds. It feeds on at least 46 species of organisms, mainly insects and fish (Kazantzides 2005).

Competition: Interspecific competition between heron species has been recorded mainly in foraging areas, especially in freshwater habitats, but this is mitigated by the different biology and behaviour of different species (Kazantzidis and Goutner 2008).
Migration habitat: prefers freshwater wetlands, riverbanks, lakes and marshes but in migration can also be found in grasslands and dry habitats, reservoirs and channel banks and along coasts. It roosts in trees that provide good cover in close proximity to foraging areas, whether fresh, brackish or saline (Hancock and Kushlan 1984).
Refueling and resting stations and migration corridors: the species migrates in flocks (up to 100 individuals) (Handrinos and Akriotis 1997) over a wide front and can be seen, in suitable habitats, throughout the mainland and islands.
Main habitats supporting the species:

- Alluvial and hydrophytic forests
- Wet meadows
- Mesophilic grasslands
- Freshwater forests
- Cultivated land

Aquila heliaca

The species needs mature trees in sparse lowland forest stands and a mosaic of habitats with open areas or crops where it forages.

In more detail:

Breeding habitat: The species nests in trees, mainly pine (*Pinus brutia*) but also oak (*Quercus spp.)* in sparse lowland forests of relatively low altitude (<500 m). However, nests of the species in Europe have been recorded at altitudes of 200-1000 m. (Tucker and Heath 1994, Ferguson - Lees and Christie 2001).
Trophic ecology: The species feeds on a variety of birds and mammals as well as reptiles such as lizards and turtles. However, its main food species are those that are usually abundant in its territory. For example, in the Evros region, rabbits (*Spermophilus citellus*) are its main prey as well as domestic species such as chickens. The species also feeds on dead animals, especially in winter. Its foraging habitat consists mainly of lowland forests with clearings and crops or bare rocky areas and riparian ecosystems (Handrinos and Akriotis 1997; Katzner et al. 2006; Gensbol and Thiede 2008).

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Native coniferous forests
- Native habitat of forest boundaries
- Shrubs and bushes
- Mesophilous grasslands
- Parsnip vegetation
- Cultivated land

Haliaeetus albicilla

This species requires mature trees in riparian forests near large wetlands for food (i.e. aquatic populations).

In more detail:

Breeding habitat: The species nests in trees, primarily in lowland and riparian forests and broadleaf deciduous forests (Cramp and Simmons 1980; Ferguson-Lees and Christie 2001).

Food Ecology: Feeds on aquatic and wading birds, fish and to a lesser extent mammals. In winter part of its diet consists of carrion (Selva et al. 2005). Its foraging habitat is large wetland systems such as lakes, deltas and riparian forests (Tucker and Heath 1994; Zawadzka 1999; Sulkava et al. 1997; Gensbol and Thiede 2008; Radovic and Mikuska 2009).

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Native coniferous forests
- Standing brackish and saltwater forests
- Standing freshwater
- Lagoons
- Salt marshes
- Tidal zone of rivers and tidal flats

Ardeola ralloides

The species maintains nine breeding colonies in Central and Northern Greece in riparian and lakeside forests with dense vegetation. During migration it can also be found in brackish or saline habitats as long as there is sufficient vegetation cover.

In more detail:

Breeding habitat: The species nests in riparian or lakeside forests of tamarisk, willow, alder and poplar, less frequently in reedbeds. It nests in mixed colonies at lower elevations than other heron species (Kazantzides 2005).

Foraging ecology: Feeds in solitary cover or in small flocks in stagnant freshwater, especially small lakes, canals, ditches, etc., with heavy aquatic vegetation. It feeds on insects, amphibians (frogs), spiders, grasshoppers, butterflies, snails and fish (Hancock and Kushlan 1984).

Competition: Interspecific competition between heron species has been recorded mainly in foraging areas, especially in freshwater habitats, but this is mitigated by the different biology and behaviour of different species (Kazantzidis and Goutner 2008). As the species is the last to arrive in Greece in May, it faces a lack of available nesting sites and is forced to nest very low in the vegetation. This results in the risk of flooding of nests due to rising water levels (Kazantzidis 2005).

Predation.

Migratory habitat: During migration it can be found in brackish or saline habitats as long as there is sufficient vegetation cover in reeds or scattered shrubs and trees. Flooded areas are also used (Hancock and Kushlan 1984).

Refuelling and resting stations and migratory corridors: the species migrates in small flocks over a wide front and can be seen, in suitable habitats, throughout the mainland and on islands, especially in the coastal zone.

Main habitats supporting the species:

- Alluvial and hydrophytic forests
- Wet meadows
- Mesophilic grasslands
- Freshwater forests
- Freshwater wetlands
- Artificial landscapes (aquatic)

Tetrastes bonasia

Typically a terrestrial species of dense mature forests (coniferous, deciduous or mixed). An endemic species in Greece with a very limited distribution. Found mainly in Rhodope but also in some places in Western Macedonia. It feeds, on the ground or in trees, on plant food (fruit fruits, shoots, etc.) (Cramp 1980; Handrinos and Akriotis, 1997). Their chicks often become prey for birds of prey and carnivorous mammals.

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Broad-leaved evergreen forests
- Mixed forests
- Native coniferous forests

Tetrao urogallus

Reproduction interest: Typical terrestrial species of mature forests, at elevations between 1,100 - 1,650 meters. It is found mainly in dense, mature coniferous, deciduous or mixed (spruce, black pine, beech, etc.) forests with a rich understory of fruiting shrubs (Cramp 1980; Handrinos and Akriotis 1997).

Trophic ecology: The species feeds on a variety of foods, especially shrub fruits (blueberries, etc.), tender shoots, leaves, etc., both on the ground and on trees. The wild cuckoo often feeds also on pine needles (Cramp 1980, Handrinos and Akriotis 1997).

Prey: Chicks of the species often become prey for birds of prey and carnivorous mammals.

Main habitats supporting the species:

- Broad-leaved deciduous forests
- Broad-leaved evergreen forests
- Mixed forests
- Native coniferous forests

Ardea purpurea

The species maintains at least seven breeding colonies in Greece in dense extensive reedbeds. During migration it can also be found in other wading sites, such as shallow marshes and riverbeds.

In more detail:

Breeding habitats: Nests mainly in dense extensive reedbeds with shallow water and high vegetation, in loose colonies with other heron species, rarely in trees or shrubs where reedbeds are not present, such as in Kerkini (Kazantzidis 2005). Feeds solitarily on fish, insects and amphibians in marshes with dense vegetation. The nest is made with reeds and fishponds on platforms on the reed beds.

Trophic ecology: Usually feeds early in the morning and evening, and usually roosts in groups during the day and night. Usually feeds solitarily hidden in dense vegetation in shallow waters with floating vegetation. Relatively omnivorous with fish and insects dominating its diet, mice, frogs, lizards, small mammals and mammals (Hancock and Kushlan 1984).

Competition: Interspecific competition between heron species has been documented mainly in foraging areas, especially in freshwater habitats, but this is mitigated by different biology and behaviour of different species (Kazantzidis and Goutner 2008).

Migration habitat: the species during migration is observed outside reedbeds, in brackish marshes or lagoons, but also in open riverbeds, coastal dunes, or other wading sites.

Resting and resting stations: the species migrates in small flocks over a wide front and can be seen, in suitable habitats, throughout the mainland and islands.

Main habitats supporting the species:

- Wet grasslands
- Freshwater wetlands

Botaurus stellaris

Breeding of the species has been confirmed until 2009 only in the Amvrakikos Gulf (2-3 pairs), while it is an uncommon winter visitor and transient migrant in the wetlands of northern and western Greece.

In more detail:

Reproductive habitat: Recent research has shown that the species is more adaptable than previously thought in terms of breeding and foraging habitat (White et al. 2006). Optimal habitat for the species remains wetlands with extensive dense reedbeds (Phragmites) with gaps between them (Hancock and Kushlan 1984). However, it appears that any habitat that includes tall vegetation within water of a constant level can be used for foraging as long as it provides favourable foraging conditions. This

includes even fragmented habitats as long as there is a short distance between the nest and foraging areas (White et al. 2006).

Foraging habitat: The species feeds solitarily on a variety of prey, including fish, amphibians, small mammals and birds, reptiles and insects, worms and crustaceans, and eels. and tadpoles (Hancock and Kushlan 1984). The abundance of food and accessibility to it appears to be the most important factor in determining the reproductive success of the species (White et al. 2006). Water 10-20 cm deep appears to provide ideal conditions for the capture of small fish (Newbery 1999).

Competition: Interspecific competition between heron species has been recorded mainly in feeding areas, especially in freshwater habitats, but this is mitigated by the different biology and behaviour of different species (Kazantzidis and Goutner 2008).

Predation: Predation of eggs and chicks by terrestrial predators (e.g. foxes) and birds of prey is assessed as a significant limiting factor under some habitat conditions, but there are no relevant data for Greece (White et al. 2006).

Wintering habitat: In winter the species can be found anywhere near freshwater and often in open areas, and can tolerate brackish water. (Hancock and Kushlan 1984). The only necessary criterion for selecting wintering sites appears to be the presence of feeding sites with sufficient aquatic vegetation (White et al. 2006).

Migratory habitat: During migration the species can be found in any place, it has been recorded even in the centre of Athens (Handrinos and Akriotis 1997). Usually solitary or in small flocks, it is recorded more in spring than in autumn migration. During migration it has a wide distribution in several wetlands of northern and western Greece.

Main habitats supporting the species:

- Stagnant freshwater

Ixobrychus minutus

The species is a common nesting species in Thrace, Macedonia and Epirus and the Peloponnese, also in Lesvos, Lemnos, Samos, Kos and Corfu, in fresh water, swamps, lakes with tall reeds and water-loving trees, habitats that are also used for feeding. Numerous during migration it is found in all kinds of wetland systems with high, dense vegetation.

In more detail:

Breeding habitat: The species prefers freshwater wetlands, marshes, ponds always with dense vegetation of tall reeds and trees such as willows. It nests solitarily but in optimal areas several nests may be present together. The nest is attached to the reeds and the same nest or area is reused in successive years (Hancock and Kushlan 1984).

Trophic ecology: Prefers freshwater marshes and swamps with dense vegetation of reeds, shrubs, and trees. Feeds solitary, usually at dusk under cover. Its diet consists of fish, frogs, frogs, shrimp, spiders and insects, but its most common prey is the cauliflower fish *Gambusia affinis* (Hancock and Kushlan 1984).

Competition: Interspecific competition between heron species has been documented mainly in foraging areas, especially in freshwater habitats, but this is mitigated by the different biology and behaviour of different species (Kazantzidis and Goutner 2008).

Migration habitat: it is found in all types of hydrotropic systems, marshes, riparian areas, lakes, drainage ditches and generally wherever there are tall, dense plants such as reeds and shrubs or trees and even olive groves during autumn migration.

Refuelling and resting stations and migration corridors.

Main habitats supporting the species:

- Standing freshwater
- Artificial landscapes (aquatic)

Pelecanus crispus

The bulk of the breeding population of this species in Greece nests in the Little Prespa River. It is an epidemic species. It is found in all types of wetland habitats, both inland (lakes, marshes, etc.) and coastal (lagoons, river deltas, coastal areas, etc.) (Cramp 1977; Handrinos and Akriotis 1997; Grivelli et al. 1997a, b).

In more detail:

Breeding habitat: With the exception of the silver pelicans in Amvrakikos Gulf, the species breeds in inland freshwater wetlands (L. Mikri Prespa and L. Kerkini). In L. Mikri Prespa it forms mixed colonies on floating or other islands, among dense vegetation (reed beds, etc.). In Amvrakikos Gulf it nests on islands in lagoons, while in the colony of L. Kerkini it nests on artificial islands (Handrinos and Akriotis 1997).

Trophic ecology: The species is fish-eating and feeds mainly in freshwater wetlands (lakes), but also in coastal wetlands with lagoons etc.

Competition: the large population increase of the species in L. Mikri Prespa is already causing problems of competition with roseate pelicans for nesting sites, which arrive later in the area.

Wintering habitat: Silver pelicans winter in all types of wetland habitats, both inland (lakes, etc.) and coastal (lagoons, river deltas, etc.), sometimes even at sea. (Cramp 1977; Handrinos and Akriotis 1997; Crivelli et al., 1997a,b).

Main habitats supporting the species:

- Stagnant brackish and salt water
- Freshwater, brackish and brackish brackish water
- Freshwater, brackish and brackish salt water, brackish and sandy water
- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Salt marshes

Pelecanus onocrotalus

Roseate pelicans nest in Lake Mikri Prespa and are summer visitors and migrants passing through Greece. The species is fish-eating and occurs in all types of wetland habitats, both inland (lakes, marshes, etc.) and coastal (lagoons, river deltas, coastal areas, etc.) (Cramp 1977; Handrinos and Akriotis 1997; Crivellis et al. 1997a, b).

In more detail:

Breeding habitat: The species breeds in inland freshwater wetlands (L. Mikri Prespa), where it forms mixed colonies on floating or other islands in dense vegetation (reedbeds, etc.).

Trophic ecology: The species is fish-eating and feeds mainly in freshwater wetlands (lakes), but also in coastal wetlands with lagoons, etc.

Competition: The large increase in the population of silver pelicans in Lake Mikri Prespa is already causing problems of competition with roseate pelicans for nesting sites, which arrive later in the area.

Main habitats supporting the species:

- stagnant brackish and salt water
- Freshwater, brackish and brackish water
- Freshwater and brackish and brackish water

- Artificial landscapes (aquatic)
- Lagoons
- Muddy and sandy fields in the tidal zone
- Salt marshes

Platalea leucorodia

The species breeds in Evros, Ismarida, Kerkini, Amvrakikos Gulf and Axios Delta, where it nests in dense reed beds or riparian forests. It is regularly present in winter and less so during migration, mainly in large wetlands of western and northern Greece.

In more detail:

Breeding habitat: The species nests in extensive shallow (up to 30 cm) wetlands with fresh brackish or salt water and muddy or sandy bottoms, lakes, rivers or swamps with dense vegetation. It nests preferably in dense reedbeds but also in trees or large shrubs, in mixed colonies with herons. The nest is a platform built with branches on the ground or on reeds or trees. The colonies are established at a distance of 10-15 km from the feeding areas.

Foraging ecology: Feeds solitarily or in small groups on invertebrates, (larvae, worms, molluscs) amphibians and small fish, often travelling long distances (35-40 km) from colonies.

Main habitats supporting the species:

- Alluvial and hydrophytic forests
- Wet meadows
- Alkaline and acidophilic forests and dormant freshwater forests
- Salt marsh vegetation
- Artificial landscapes (aquatic)
- Muddy and sandy fields in the tidal zone
- Tidal zone of rivers and tidal water enclosures

Recurvirostra avosetta

The species nests in Messolonghi, the coastal wetlands of Thermaikos, Porto Lagos, Amvrakikos Gulf, Keramoti and the wetlands of Lesvos and Lemnos. It is a species with strict habitat preferences, especially during the breeding and wintering period, and

is restricted to salt coastal wetlands, where it builds its nest on islands and dykes with little or no vegetation.

In more detail:

Breeding habitat: The species nests exclusively in coastal wetlands, mainly in saltwater lagoons and salt marshes, on islands and dikes with little or no vegetation.

Trophic ecology: Feeds mainly on aquatic invertebrates and insects, crustaceans, molluscs and worms, as well as small fish and plant material.

Competition: There is competition for nesting sites from the silver gull.

Prey: Preying on eggs and chicks by terrestrial mammals (rats, skunks, ferrets, weasels, grubs, dogs, cats), silver gulls, predators and crows.

Main habitats supporting the species:

- Artificial landscapes (aquatic)
- (artificial waterways (natural waterways))
- Salt marshes
- Tidal zone of rivers and enclosed tidal waters

Plegadis falcinellus

This species nests in some large wetlands of northern and western Greece in freshwater areas with dense aquatic vegetation and reed beds. A common and fairly widespread migrant passerine, it can be found in all types of wetlands but mainly in freshwater areas.

In more detail:

Breeding habitat: Nests in freshwater wetlands with dense aquatic vegetation and reedbeds. Forms small mixed colonies with herons. The nest is a platform built with branches, usually less than a metre above the water in reeds, bushes and small trees. It sometimes nests on small islands near the shore.

Trophic ecology: The species prefers freshwater habitats and feeds in marshes on the margins of lakes and rivers, flooded meadows, wet meadows, rootwads and irrigated crops, less often in estuarine waters, salt marshes and coastal lagoons. It feeds in very shallow water mainly on aquatic insects and larvae, leeches, worms, crustaceans and to a lesser extent on fish, reptiles and amphibians or even bird chicks.

Migration: The species is considered nomadic and is subject to post-breeding movements throughout its range. During the migration period it is found in flooded

freshwater areas. It roosts at night in large flocks, in trees often in locations distant from feeding areas.

Main habitats supporting the species:

- Alluvial and waterlogged forests
- Wet meadows
- Alkaline and acidophilous forests and dormant freshwater forests

Aegolius funereus, Glaucidium passerinum, Falco cherrug, Grus grus are not mentioned in the above deliverable. The main characteristics of these species, as well as their ecological requirements have been reported in Section 5, in the relevant subsection required.

In the following, the species of interest are grouped according to their ecological requirements according to "*Deliverable 2 Grouping of species of* interest *according to their ecological requirements*" of the identification of compatible activities in relation to the species of interest in relation to the designation of Special Protection Areas for avifauna (Dimalexis 2009) prepared by the Ministry of Environment - Directorate of Environmental Planning Department of Natural Environment Management . Table 59 below gives the grouping of the species of interest and then a more detailed description of each group according to the ecological requirements of the species.

Table 59. Categorisation of species of interest into groups according to their ecological requirements.

Category	Species
Large predators	*Buteo rufinus, Gyps fulvus, Hieraaetus pennatus, Aquila chrysaetos, Circaetus gallicus, Circus aeruginosus, Circus cyaneus, Circus macrourus, Circus pygargus, Milvus migrans, Accipiter brevipes, Pernis apivorus, Aquila fasciata, Aquila heliaca, Clanga clanga, Clanga pomarina, Neophron percnopterus, Haliaeetus albicilla*
Herons - Pelican	*Ciconia ciconia, Ciconia nigra, Microcarbo pygmaeus, Nycticorax nycticorax, Egretta garzetta, Ardea alba, Ardeola ralloides, Ixobrychus minutus, Botaurus stellaris, Ardea purpurea, Plegadis falcinellus, Platalea leucorodia, Pelecanus crispus, Pelecanus onocrotalus, Grus grus*
Peacocks	*Recurvirostra avosetta*
Intraforest	*Tetrao urogallus, Tetrastes bonasia*
Cranes	*Falco naumanni, Falco peregrinus, Falco peregrinus, Falco eleonorae, Falco biarmiucus, Falco vespertinus, Falco columbarius, Falco cherrug*
Nocturnal	*Bubo bubo, Aegolius funereus, Glaucidium passerinum*

Large predators

In this category, the habitats most used include both open and wooded areas. Deciduous and coniferous forests are nesting habitats for many species, but also foraging habitats

for many of them. Rocky slopes in the inland and coastal environment play an important role in the ecology of these species, as they are important nesting habitat for many species. Open areas, such as areas with long vegetation and cultivated land, are mainly the main habitats of large predators. In addition, some species such as Cirques feed in wetlands. The diet of large predators includes mainly mammals and birds, and some species are scavengers. Several species in this category are migratory

Herons and pelicans

This category includes herons, storks, pelicans, pelicans, etc. A common characteristic of the majority of these species, apart from their direct association with the aquatic element, is that they breed in colonies in trees close to their feeding areas, as a consequence of the above, in addition to wetland habitats (standing fresh and salt water, wet meadows, salt marshes, lagoons, reed beds), very important habitats are also alubic and hydrophytic forests, which are also the main breeding and nesting habitats.

Cranes

Hawks use open areas such as grasslands, scrubland and cultivated land for feeding. Rocky slopes are their main nesting habitat, with some species preferring coastal rock formations (*Falco eleonorae*, partly *Falco peregrinus*). A special case is the kestrel (*Falco naumanni*), which nests in colonies almost exclusively in old buildings. Falcons feed mainly on small birds and mammals, as well as on insects.

Nocturnal

This category includes species that breed and feed in open areas, but also in more wooded areas (e.g. *Strix aluco*). Also, some species, such as the owl, often breed in close proximity to human presence. Nocturnal predators feed on small mammals and birds, and are all epidemic.

Paridae

Waders are a large category of birds, most of which are stationed during migration or winter in Greece. Some of them, such as the reed bunting (*Himantopus himantopus*) and the oystercatcher (*Haematopus ostralegus*) breed in Greek wetlands. Foraging

waders use shallow water habitats such as wet meadows, salt marshes, stagnant water, mudflats, lagoons, salt marshes, etc. They feed on invertebrates, crustaceans, etc.

Forests

This category includes species whose main breeding and feeding habitats are broad-leaved deciduous or evergreen, coniferous and mixed forests. These species also use tree plantations or urban parks as habitats. They nest in trees and feed on insects, fruits and seeds. With the exception of the two species of flycatcher (*Ficedula sp.)* and mountain pine (*Phylloscopus bonelli*), the other species are epidemic.

With regard to Special Conservation Area GR1260005, partially within which the project is located, and the adjacent Bulgarian Special Conservation Area BG0001028, the ecological conditions of the habitat types listed in Annex I to Directive 92/43/EEC, as the ecological requirements of the important fauna and flora species of Annex II of the above Directive, have been fully analysed in a previous corresponding subsection of this document (*see section 5, in the relevant subsection requiring the description of the species of interest and habitat types*).

The conservation status of the above species and habitat types at national and European level

Have been reported in the relevant subchapters.

The threats and risks of their degradation, destruction or disturbance

With regard to the closest Natura 2000 Special Protection Areas (BG0002078, GR1260010, BG0002098 and BG0002072) under study, the threats to the species of interest (as selected in a previous section of this SEA) have been fully analysed in a previous corresponding sub-chapter, in order to provide the reader with a more complete picture of the avifauna of the study area, then the threats to the species of interest are analysed in accordance with the "*Deliverable 8 Guide to ecological requirements, threats and appropriate measures for the species of* interest" of the identification of compatible activities in relation to the species of interest of the Special Protection Areas for avifauna (Dimalexis 2009), prepared by the Ministry of

Environment - Environmental Planning Department, Natural Environment Management Division.

Gyps fulvus

The abandonment of mountain grazing systems and the decline of nomadic livestock farming combined with the use of poisoned baits to control the wolf population played a decisive role in the decline of the species in mainland Greece.

In more detail:

Threats to breeding habitat: Destruction or degradation of the species' nesting habitat occurs through development infrastructure (construction of roads, settlements, winter tourism facilities) and mining and quarrying activities (Tucker and Heath 1994; Slotta-Bachmayr et al. 2004).

Threats to foraging habitat: A key threat to the species is the abandonment of traditional livestock husbandry practices and grazing practices, mountain crops, and land use changes in natural agroecosystems (Slotta-Bachmayr et al. 2004).

Direct threats: A critical factor in the extinction of the species is secondary poisoning, the result of the illegal use of baits to control carnivorous mammals considered "noxious" in agriculture and livestock production, the main representative being the wolf (*Canis lupus*). Poaching and taxidermy are a problem but to a lesser extent and are found in some areas of mainland Greece and Crete. Other sources of mortality include drowning at sea, in irrigation reservoirs or in open sewage disposal tanks (e.g. olive oil waste), electrocution, collision with power lines and killing in wind turbine blades. The use of antibiotics or other veterinary drugs is a significant threat to vultures, but this needs to be investigated for Greece (Bourdakis et al. 2004, Xirouchakis 2004).

Circaetus gallicus

Habitat destruction and abandonment of traditional land uses are the main threats to the species.

In more detail:

Threats to breeding habitat: Destruction of mature forests, fires and disturbance due to the opening of forest roads as well as logging and recreation are the main threats to the species' breeding habitat.

Threats to foraging habitat: Afforestation of open lands, undergrazing, abandonment of traditional grazing systems and upland crops, and intensification of agriculture are the main threats to the species' foraging habitat. Also, the use of insecticides and pesticides reduce the availability of its food.
Immediate threats: Poaching is an additional threat, especially during the migration season.

Aquila chrysaetos

Disturbance to nesting sites, mining activities and changes in traditional land use, combined with the use of poisons and direct persecution are the most important threats to the species.
In more detail:
Threats to breeding habitat: Disturbance near nesting sites is the primary threat to the species' nesting habitat. Also, tourism development of mountainous areas (e.g. ski resorts) degrade many of the nesting sites due to extensive disturbance (Cramp and Simmosn 1980, Watson 1997, Kaisanlahti-jokimäki et al. 2008).
Threats to foraging habitat: Degradation of foraging habitat (e.g., abandonment of upland crops), and over-exploitation of some key food species such as partridge and hare (Xirouchakis 2001). Also, extensive reforestation and natural afforestation of abandoned lands have negative effects on the foraging habitat of the species (Watson 1997). In central Greece, quarries are also causing the total destruction of the species' habitat.
Immediate threats: The main threats to the species are poaching (especially in Crete where for this reason immature individuals are observed in 1/3 of pairs), and in mainland Greece the uncontrolled and illegal use of poisoned baits to control "harmful" carnivorous mammals.

Hieraaetus pennatus

The removal of mature trees and the degradation or destruction of lowland forests are the main threats to the species.
In more detail:
Threats to breeding habitat: Destruction of forests, especially lowland forests, is the main threat to the species' nesting habitat. Also, the use of agrochemicals has serious

impacts on breeding success (Suarez et al. 2000, Martinez-Lopez et al. 2007, Martinez-Lopez et al. 2009).

Threats to foraging habitat: Habitat degradation mainly due to forest destruction attributed to agriculture and residential development is the most serious threat to the species' foraging habitat (Martinez et al. 2006).

Bubo bubo

Disturbance near nesting sites and degradation of foraging areas through expansion and intensification of agriculture are the main threats to the species.

In more detail:

Threats to breeding habitat: The main threat to the species' nesting habitat is disturbance during the breeding season. Another threat is the destruction or degradation of the nesting habitat, especially in lowland areas with high urbanisation.

Threats to foraging habitat: Changes in land use such as the conversion of grassland to monoculture intensive monoculture. Also, the preservation of clearings and bare ground seem to favour the species. Finally, overcrowding of certain key food items such as wild rabbits and the use of agrochemicals for rodent control degrade foraging habitat and affect reproductive success.

Immediate threats: Poisoning due to the use of mycicides for rodents and rabbits and collision with high-voltage power lines, especially near nesting sites.

Aquila fasciata

Residential development on many Aegean islands, abandonment of traditional land uses and over-exploitation of key food species of the species (mainly the island partridge and wild rabbits) combined with direct killing are the main threats to the species.

In more detail:

Threats to breeding habitat: Disturbance near nesting sites and tourism development on the Aegean islands are key threats to the species' nesting habitat (Chandrinos 1992; Tucker and Heath 1994).

Threats to foraging habitat: Overfishing and poaching of key food species of the species and land use changes in its territories are the most important threats to the species' foraging habitat. (Chandrinos 1992; Lopez-Lopez et al. 2007).

Direct threats: The use of myocides to kill wild rabbits on some islands is a major threat, as is human killing or destruction of nests. In addition, the continued development of wind farms may have an impact on the species' populations.

Circus aeruginosus

Destruction of riparian vegetation, especially reedbeds, and infilling of wet meadows.
Threats to breeding habitat: Burning and clearing of reeds is the main threat to nesting habitat.
Threats to foraging habitat: Destruction and shrinkage of wetlands especially wet meadows and shallow water areas where amphibians and reptiles abound.

Circus cyaneus

Threats to breeding habitat: The destruction and shrinkage of wetlands, especially the drying of marshes. Also, deforestation and undergrazing of open areas e.g. subalpine grasslands degrade the foraging habitat of the species (Tucker and Heath 1994, Gensbol and Thiede 2008, Cormier et al. 2008).

Circus pygargus

Agricultural intensification and industrialisation is the most serious threat to the species.
Threats to breeding habitat: The main threat to the species is the destruction of its nests by agricultural (especially harvesting) machinery (Sanders and Maloney 2002).
Threats to foraging habitat: The species is threatened by agricultural intensification/industrialization and extensive use of agrochemicals (Sanders and Maloney 2002; Denker et al. 2003).

Circus macrourus

Threats to migration habitat: The species' habitat includes open lowland areas with low vegetation and is less dependent on water. It feeds on small mammals, small mammals, reptiles, and insects (Cramp and Simmons 1980; Ferguson-Lee and Christie 2001; Leckie et al. 2008; Arroyo et al. 2009).

Accipiter brevipes

Mature logging and destruction of riparian ecosystems, forest fires and agricultural intensification are negatively affecting the species.

In detail:

Threats to breeding habitat: Forest destruction and the absence of suitable trees for foraging are the main threats to the species' breeding (Newton 1979).

Threats to foraging habitat: Agricultural intensification with extensive use of insecticides, destruction of riparian ecosystems due to urban or tourist development, and disturbance due to recreational activities degrade foraging habitat. Also, since the species feeds on reptiles, climate changes with extreme events resulting in a decrease in their activity negatively affect the reproductive success of the species (Shamoun-Baranes et al. 2006, Gensbol and Thiede 2008).

Falco peregrinus

Direct killing due to competition with humans for prey species (wild pigeons, perches, thrushes, etc.) and the use of strong agrochemicals with high residual capacity are the main threats to the species.

In more detail:

Threats to breeding habitat: Destruction of nesting habitat and disturbance (e.g. climbing tracks) are the main threats to nesting habitat (Brambilla et al. 2004).

Threats to foraging habitat: Agricultural intensification and extensive pesticide use are the main threat because pesticide preparations highly toxic to birds accumulate in the body of higher predators such as peregrine falcon (Ratcliffe 1993; Movalli 2000). At the same time, illegal hunting of key food species (e.g. wild pigeons) degrades the hunting habitat of the species.

Threats of competition: Climate change favours the spread of the golden egret over the peregrine, as the former prefers drier, semi-arid areas compared to the peregrine.

Direct threats: Direct human killing is the main cause of the species' absence from areas with suitable nesting habitat and relatively clean environments such as canyons, coastal cliffs and river valleys.

Buteo rufinus

Residential and tourism development and land use changes in grassland and dry heathland are the main threats to the species.

In more detail:

Threats to breeding habitat: Island tourism development and disturbance are the most serious threats to the species' breeding habitat.

Threats to feeding habitat: Destruction of forest clearings, intensification of agriculture and land-use change of bare open areas attributed to agriculture or residential development are major causes of degradation of the species' foraging habitat. Also, the conversion of grasslands to arable crops or of dry dry dry grasslands to irrigated monocultures have significant impacts on the species' hunting areas (Chandrinos 1992).

Milvus migrans

Destruction of mature trees, landfilling of waste and dead animals, and the use of poisons are the main threats and causes of population decline of the species.

In more detail:

Threats to breeding habitat: Landfill closures and animal stalling are key threats to the species. Also, burial of dead animals and general abandonment of nomadic farming are equally important threats (Blanco 1997; Meunier et al. 2000).

Direct threats: Secondary poisoning due to bait use and, to a lesser extent, water pollution are major sources of mortality.

Pernis apivorus

Destruction of mature trees, inland forest interspaces and extensive use of insecticides are the main threats to the species. Also, direct killing by humans during migration is a threat to the species.

In more detail:

Threats to breeding habitat: Destruction of forests and removal of mature trees degrade the species' nesting habitat. In addition, disturbance during the breeding season from logging practices and recreational activities pose an additional threat to the species' breeding success (Cramp and Perrins 1980; Steiner 2000).

Threats to foraging habitat: The main threats to foraging habitat for this species are clearcut logging and destruction of key food items due to extensive use of insecticides.

Falco naumanni

Threats to the species include destruction of houses and intensification of agriculture.

In more detail:

Threats to breeding habitat: Urbanisation in synergy with the renovation of old buildings or the destruction of old houses is the most serious threat to the circinus (Handrinos and Akriotis 1997, Vlachos et al. 2004).

Threats to foraging habitat: Agricultural intensification and industrialization combined with extensive pesticide use threaten the species (Newton 1979; Village 1990; Tucker and Heath 1994). Also, abandonment of traditional agricultural and livestock practices and afforestation of grasslands result in the loss or degradation of the species' hunting habitat (Sánchez-Zapata et al. 2003). In particular, the conversion of dryland crops (mainly cereals) to irrigated monocultures has had devastating effects on the species (Tella and Forero 2000; Liven-Schulman et al. 2004).

Falco eleonorae

Tourist exploitation of breeding islands, disturbance due to visitor disturbance and predation by introduced species are the main threats to nesting habitat. In addition, the use of pesticides directly threatens the viability and reproduction of the species.

In more detail:

Threats to breeding habitat: Disturbance to breeding islands or the introduction of predators such as rats or cats are key threats to the species. Furthermore, hunting (especially of wild rabbits) on Aegean islands is an additional disturbance factor, as is egg collection (Tucker and Heath 1994). Finally, uncontrolled tourism and overbuilding on many Aegean islands is a potentially serious problem.

Threats to foraging habitat: As the species feeds on insects and micropoules it is prone to secondary poisoning due to accumulation of pesticides or other agrochemicals (Ristow et al. 1980). Already significant cases of poisoning were recorded at the beginning of the decade in Crete which were attributed to the use of a specific pesticide formulation (Ristow 2001). The species is also threatened by the use of baits aimed at controlling small worms and mice that damage vineyards (Ristow and Xirouchakis 2000, Tsatsakis et al. 2001).

Competition threats: Visitation of breeding islands induces predation by rats (Ristow et al 1991) or other small carnivores (e.g. cats).

Ciconia ciconia

Threats to the feeding habitat: The species is threatened by habitat alteration particularly the drainage of wet meadows and floodplains. It is also threatened by the use of agrochemicals on crops.
Direct threats: The species is often shot by poachers and is threatened by the placement of poisoned baits for "noxious" mammals and impact with power lines or telephone lines, particularly during the migration period.

Falco biarmicus

Direct killing due to competition with humans for prey species (wild pigeons, partridges, thrushes, etc.) and the use of strong agrochemicals with high residual capacity are the main threats to the species.
In more detail:
Threats to breeding habitat: Destruction of nesting habitat and disturbance (e.g. climbing tracks) are the main threats to nesting habitat (Brambilla et al. 2004).
Threats to foraging habitat: Agricultural intensification and extensive pesticide use are the main threats because pesticide formulations highly toxic to birds accumulate in the bodies of higher predators such as golden egrets (Ratcliffe 1993; Movalli 2000). At the same time, illegal hunting of key species (e.g. wild pigeons) degrades the hunting habitat of the species.
Immediate threats: Direct killing by humans is the main cause of the species' absence from areas with suitable nesting habitat and relatively clean environments such as canyons, coastal cliffs and river valleys.

Falco vespertinus

The destruction and degradation of the species' habitats (grasslands, wetlands, coasts) and the intensification of agriculture are threats to the species.
In more detail:
Threats to migration habitat: Agricultural intensification and extensive use of pesticides and insecticides are the main threats to the species (Tucker and Heath 1994).
Direct threats: Poaching is a threat to the species in several Mediterranean countries.

Neophron percnopterus

The abandonment of traditional livestock farming, the closure of landfills and the use of poisoned baits are the most critical factors in the decline of the species.

In more detail:

Threats to breeding habitat: The species shows considerable tolerance to human presence (Mundy et al. 1993). However, elevated levels of disturbance in nesting territory are a key requirement for reproductive success of pairs nesting on low cliffs (Ceballos and Donazar 1989; Tucker and Heath 1994).

Threats to foraging habitat: The intensification of livestock production and modern animal husbandry techniques deprive the species of important food sources. Also, disappearance of some large colonies and the abandonment of some territories in Central Greece coincided with the closure of nearby landfills and landfilling (Xirouchakis and Tsiakiris 2009).

Immediate threats: Direct killing by humans and the use of poisons to control pests are considered among the main causes of species decline. The latter threat is consistently present throughout its distribution range and is the first cause of mortality for the species. Livestock drugs, heavy metals and antibiotics have also been underestimated and appear to play a significant role in the species' population decline (Tucker and Heath 1994; Hernadez and Margalida 2008).

Nycticorax nycticorax

Threats to breeding and feeding habitat: The relative scarcity but also the continued loss, shrinkage and alteration of freshwater wetlands, seasonal or permanent, is a key threat to the species (Kazantzidis and Goutner 2008). Disturbance to breeding habitats caused by human presence or the presence of domestic animals is a major aggravating factor.

Direct threats: Herons as top predators in the wetland food chain are particularly vulnerable to agrochemical pollution (organochlorine insecticides, carbamides and DDE) and heavy metal pollution, mainly mercury and lead (Akriotis and Rigas 1999, Koliopoulos 1999). The species also belongs to the group of species vulnerable to entanglement in power lines that interfere with traditional waterfowl routes between adjacent wetlands (Zogaris et al. 2003, Rudolini et al. 2005). Herons are often the

victims of poaching in wetlands. The Night Heron may be persecuted in fish farms as a fish predator.

Egretta garzetta

The continued loss, shrinkage and degradation of seasonal/permanent freshwater wetlands is the main threat to the species. As top predators, herons are vulnerable to agrochemical pollution and heavy metals. Power lines over wetland areas are a mortality factor. The species is also vulnerable to disturbance from human presence, domestic livestock and poaching.

In more detail:

Threats to breeding and foraging habitat: The relative scarcity but also the continued loss, shrinkage and alteration of seasonal or permanent freshwater wetlands is a key threat to the species (BirdLife International 2008). Human disturbance of breeding habitats or the presence of domestic animals is another important stressor for the species.

Direct threats: As top predators in the wetland food chain, herons are particularly vulnerable to agrochemical pollution. Herons belong to the group of species that are vulnerable to entanglement in power lines that interfere with traditional waterfowl routes between neighbouring wetlands (Zogaris et. al. 2003, Rudolini et al. 2005). Finally, the species is often the victim of poaching in wetlands.

Microcarbo pygmaeus

Threats to breeding habitat**:** The species already shows negative trends, mainly during the breeding season precisely because of its competition with the cormorant for nesting sites. In winter or during migration the species faces the general problems of Greek wetlands (pollution, lack of water management, etc.). Several individuals are drowned by accidental entanglement in fishermen's nets.

Ciconia nigra

A critical factor is the degradation of forest nesting habitats of this species due to deforestation, the opening of forest roads in inaccessible forest areas and consequent disturbance, as well as the felling of large mature or dead trees in which it nests. With regard to feeding and staging habitats, critical factors include drainage of seasonal

freshwater ponds and marshes, use of agrochemicals, straightening, encapsulation of rivers and streams, pollution and general degradation of small streams in semi-mountainous areas. The species is probably the most directly threatened species of the Greek avifauna by the construction of dams and small hydroelectric projects. The Black Stork is recorded as a victim of poaching and collision with power lines.

In more detail:

Threats to breeding habitat: Threats to the species are recorded as degradation of forest nesting habitat due to deforestation, the opening of forest roads in inaccessible areas, and the felling of large mature or dead trees in which the species builds its nest.

Threats to foraging habitat: Drainage of seasonal freshwater ponds and marshes, small coastal wetlands and the use of agrochemicals (Birdlife International 2008).

Direct threats: Poaching and collision with power lines (Birdlife International 2008).

Clanga pomarina

The destruction of mature trees and the degradation and shrinkage of wetlands are the main causes of population decline of this species.

In more detail:

Threats to breeding habitat: The species is mainly threatened by deforestation and destruction of mature trees in lowland areas. Also, disturbance due to human activities in lowland forests has resulted in a reduction in the species' reproductive success (Tucker and Heath 1994; Lohmus 2005).

Threats to foraging habitat: Destruction of wading vegetation, conversion of wet grasslands to cropland, and use of agrochemicals are the main causes of degradation of the species' foraging habitat.

Clanga clanga

Threats to breeding habitat: The destruction, shrinkage and degradation of the country's large wetlands (Chandrinos 1992).

Direct threats: Poaching and possibly the use of poisoned baits.

Ardea alba

Threats to breeding, feeding and wintering habitat: The relative scarcity but also the continued loss, shrinkage and alteration of freshwater wetlands, seasonal or permanent,

is a key threat to the species (kazantzidis and Goutner 2008). Disturbance to breeding habitats caused by human presence or the presence of domestic animals is a major aggravating factor.

Direct threats: Herons as top predators in the wetland food chain are particularly vulnerable to agrochemical and heavy metal pollution, mainly mercury and lead (Akriotis and Rigas 1999, Koliopoulos 1999). Herons belong to the group of species vulnerable to entanglement in power lines that interfere with traditional waterfowl routes between adjacent wetlands (Zogaris et al. 2003, Rudolini et al. 2005). Herons are often the victims of poaching. The silver heron may be stalked in fish farms as a predator of fish.

Falco columbarius

Threats to wintering habitat: Residential and tourism development of coastal areas, degradation of wetland ecosystems and agricultural intensification are the main threats to the species.

Aquila heliaca

The destruction of mature trees and lowland stands of deciduous trees is the main threat to the species. In addition, intensification of agriculture and direct killing due to persecution or secondary poisoning are also important threats to the species.

In more detail:

Threats to breeding habitat: Destruction of mature trees and lowland forests attributed to agriculture is the main threat to the species' nesting habitat. Also, road building and increased disturbance in the species' territories are a major cause of breeding failure (Tucker and Heath 1994).

Threats to foraging habitat: Destruction of lowland forests, particularly of habitats between forest stands and crops. Also, the intensification of agriculture and the conversion of open lands to monoculture grain crops. Often the destruction of the grasslands of rabbit colonies due to the construction of dams in riparian areas or their return to agriculture has a direct impact on the productivity of the pairs.

Direct threats: Direct killing by humans is a major cause of the species' decline in the Balkans. Also the use of poisoned baits to kill carnivorous mammals threatens both the breeding population and the wintering individuals in Greece (Hallmann 1989).

Collision with power lines and electrocution are reported as serious causes of mortality but in Greece they are of minor importance due to the small population of the species (Hallmann 1996).

Haliaeetus albicilla

Threats to breeding habitat: The destruction of riparian forests with stands of mature trees deprives the species of valuable nesting habitat (Rosenvald and Lõhmus 2003). Also, the use of pesticides has negative effects on the reproductive success of the species, although the exact effect remains unknown. Also, disturbance is a serious threat especially at nesting sites, to individual trees in isolated lowland stands (Jerrentrup 1988; Chandrinos 1992; Tucker and Heath 1994).
Threats to foraging habitat: Wetland destruction and degradation has been the major cause of population decline (Tucker and Heath 1994).
Direct threats: Leads from consumption of injured or dead prey species are some of the major causes of additional mortality of the species.

Ardeola ralloides

Continued loss, shrinkage and alteration of seasonal/permanent freshwater wetlands is the main threat to the species. As top predators, herons are vulnerable to agrochemical pollution and heavy metals. Power lines over wetland areas are a mortality factor. The species is also vulnerable to disturbance from human presence, domestic livestock and poaching.

In more detail:

Threats to breeding and foraging habitat: The relative scarcity but also the continued loss, shrinkage and alteration of seasonal or permanent freshwater wetlands is a key threat to the species (BirdLife International 2008). Human disturbance of breeding habitats or the presence of domestic animals is another important stressor for the species.
Direct threats: As top predators in the wetland food chain, herons are particularly vulnerable to agrochemical pollution. Herons belong to the group of species that are vulnerable to entanglement in power lines that interfere with traditional waterfowl routes between neighbouring wetlands (Zogaris et. al. 2003, Rudolini et al. 2005). Finally, the species is often the victim of poaching in wetlands.

Tetrao urogallus

Threats to breeding habitat: The species is threatened by misapplication of forestry practices (road opening, clear-cutting, etc.). It is also threatened by general disturbance in breeding areas, but also by poaching during winter.

Tetrastes bonasia

The species is threatened by poor forestry practices (logging, opening of forest roads, etc.) and general disturbance. In winter it is also threatened by poaching (Handrinos and Akriotis 1997).

Ardea purpurea

Threats to breeding and foraging habitat: The relative scarcity but also the continued loss, shrinkage and alteration of freshwater wetlands, seasonal or permanent, is a major threat to the species (Kazatzidis and Goutner 2008). This is particularly true for reedbeds, which are the most valuable nesting habitat for the species, and whose alteration causes negative impacts on the density, structure and overall colony maintenance (Barbraud and Mathevet 2000). Disturbance to breeding habitats caused by human presence or the presence of domestic animals is a major aggravating factor (Chandrinos 1992).

Direct threats: As top predators in the food chain of wetlands, herons are particularly vulnerable to agrochemical pollution (organochlorine insecticides) and heavy metal pollution, mainly mercury and lead (Akriotis and Rigas 1999, Koliopoulos 1999). Herons belong to the group of species vulnerable to entanglement in power lines that interfere with traditional waterfowl routes between adjacent wetlands (Zogaris et al. 2008, Rudolini et al. 2005). Herons are often victims of poaching in wetlands.

Botaurus stellaris

Threats to breeding and foraging habitat: The relative scarcity but also the continued loss, shrinkage and alteration of freshwater wetlands, seasonal or permanent, is a key threat to the species (Kazantzidis and Goutner, 2008). The species is particularly threatened by the loss/reduction of large Phragmites reeds caused by drought or salinity changes. Abrupt changes in water levels cause flooding of the nest. Eutrophication of

freshwater habitats causes changes in the abundance and composition of prey fish populations. Disturbance to foraging habitat from human presence or the presence of domestic livestock is a significant stressor.

Direct threats: As top predators in the wetland food chain, herons are particularly vulnerable to agrochemical pollution (organochlorine insecticides) and heavy metal pollution, especially mercury and lead (Akriotis and Rigas 1999; Koliopoulos 1999; BirdLife 2008). Herons are often victims of poaching in wetlands. Herons belong to the group of species that are vulnerable to entanglement in power lines that interfere with traditional waterfowl routes between adjacent wetlands (Zogaris et al. 2003, Rudolini et al. 2005). Herons are often the victims of poaching in wetlands.

Ixobrychus minutus

The continued loss, shrinkage and degradation of seasonal/permanent freshwater wetlands is the main threat to the species. As top predators, herons are vulnerable to agrochemical pollution and heavy metals. Power lines over wetland areas are a mortality factor. The species is also vulnerable to disturbance from human presence, domestic livestock and poaching.

In more detail:

Threats to breeding and foraging habitat: The relative scarcity but also the continued loss, shrinkage and alteration of seasonal or permanent freshwater wetlands is a key threat to the species (BirdLife International 2008). Human disturbance of breeding habitats or the presence of domestic animals is another important stressor for the species.

Direct threats: As top predators in the wetland food chain, herons are particularly vulnerable to agrochemical pollution. Herons belong to the group of species that are vulnerable to entanglement in power lines that interfere with traditional waterfowl routes between neighbouring wetlands (Zogaris et. al. 2003, Rudolini et al. 2005). Finally, the species is often the victim of poaching in wetlands.

Pelecanus crispus

Threats to breeding habitat: Populations breeding in L. Little Prespa and L. Kerkini do not face problems in their habitat. In Amvrakikos Gulf, the colony is likely to face problems due to general water management and disturbance from fishermen and tourists.
Threats to overwintering habitat: General human interventions in wetlands (water management, bazaars, pollution, disturbance, etc.) seem to be causing problems.
Threats of competition: In some wetlands, there is likely to be a problem of competition with other fish-eating species, particularly *Microcarbo pygmaeus*, whose populations have increased significantly.

Pelecanus onocrotalus

In recent years the species does not seem to have any particular problems both in the nesting sites and in the wintering/migration areas. Despite the general issues of wetlands, e.g. poor water management, pollution, bazaars, expansion of aquaculture, disturbance by fishermen, etc, are causing some problems for the species (Handrinos and Akriotis 1997; Crivelli et al. 1997a, b). Also, in some wetlands, there is probably a problem of competition with other fish-eating species, especially *Phalacrocorax carbo*, whose populations have increased significantly.

Platalea leucorodia

The main threat to the species is the loss, shrinkage and alteration of freshwater wetlands, seasonal or permanent, which constitute breeding habitat for the species. In addition, disturbance to breeding colonies by human presence or the presence of domestic animals and poaching during wintering and migration.
In more detail:
Threats to breeding habitat: The relative scarcity but also the continued loss, shrinkage and alteration of freshwater wetlands, seasonal or permanent, is a key threat to the species. Also, disturbance to breeding habitats caused by human presence or the presence of domestic animals and overfishing (BirdLife International 2008).
Threats to foraging habitat: Threats to the species include habitat degradation by drainage and pollution of water bodies. In some areas, overharvesting of prey i.e. benthic organisms (benthic organisms, crustaceans and worms) by humans for food or bait may occur in some areas.

Immediate threats: The species is frequently shot by poachers.

Recurvirostra avosetta

Threats to breeding habitat: The intensification of production and the number of interventions in salt marshes (alteration of water levels in basins, alteration of microhabitats, widening - asphalting of dykes, destruction of islands) has resulted in threats to the reproductive success of the species. The species' reproductive success is also threatened by agrochemical pollution of wetlands (Goutner 2005).

Plegadis falcinellus

Threats to the steelhead include the degradation of wetland habitats through changes in hydrological regime, particularly the drainage of floodplains on the margins of wetlands, increased salinity and agrochemical pollution. The species is subject to poaching during migration and disturbance in feeding areas by human presence, dogs and grazing.

The species ***Aegolius funereus, Glaucidium passerinum, Falco cherrug, Grus grus, are*** not mentioned in the above deliverable. The main characteristics of these species, as well as the pressures and threats to them, have been reported in Section 5, in the relevant subsection required.

A detailed description of the pressures and threats faced by the species of interest by category is given below, which as we have seen in the previous subsection, are derived according to their ecological requirements (see Table 59), according to the "*Deliverable 2 Grouping of characterisation species according to their ecological requirements*" of the identification of compatible activities in relation to the species characterisation of the Special Protection Areas for avifauna (Dimalexis 2009) prepared by the Ministry of P

Large birds of prey

Large raptors are particularly vulnerable species and face many serious threats. It is characteristic that of the 22 species of this category, 15 are classified as endangered in the Red List of Threatened Birds compiled by the Hellenic Ornithological Society. The

main threats to birds of prey are related to the degradation of their habitats (abandonment of traditional agriculture, inappropriate forest management, pollution, housing development) and consequently the inability to find food. They also face major problems from the use of poisoned baits to combat 'harmful' mammals (wolf, fox, skunk, etc.) and from poaching. These species are particularly sensitive to human disturbance. Finally, the incorrect siting of wind farms can cause serious problems due to impact and killing to many large predators.

Herons and pelicans

Wetland drainage and other land reclamation projects degrade and destroy the breeding and feeding habitats of these species. In addition, some species, such as pelicans, are particularly sensitive to human disturbance during the breeding season and therefore anthropogenic disturbance is a significant threat to these species.

Interforestry

Human activities associated with the degradation of forest ecosystems are the most important threats to endo-forest species. Thus, deforestation and inappropriate forest management are the main causes that degrade the breeding and foraging habitats of the intraforest species.

Cranes

Agricultural intensification, residential development, abandonment of traditional land uses are degrading the breeding and foraging habitats of cranes. Also, pesticides, persecution and disturbance are major threats to this category of species.

Nocturnal

The main threats to nocturnal predators are the abandonment of traditional land uses, including extensive agriculture and livestock farming, the use of poison baits and inappropriate forest management. Agrochemical pollution, residential development, persecution and human disturbance also threaten these species.

Peacocks

Habitat degradation/destruction is the major threat to these species. Since most of the species in this category are migratory, the degradation of even small wetlands is particularly important, as it disrupts the network of wetland areas that the species use as resting and refueling stops during the migration period. Some wader species are threatened by hunting - poaching (e.g. *Vanellus vanellus*), while for breeding species, cattle grazing in wetland ecosystems is a threat, as they destroy ground nesting sites.

With regard to Special Conservation Area GR1260005, partially within which the project is located, and the neighbouring Bulgarian Special Conservation Area BG0001028, the pressures and threats to both Annex I habitat types of Directive 92/43/EEC (applies only to Special Conservation Area GR1260005), and of the important fauna and flora species listed in Annex II of the above Directive, have been fully analysed in a previous corresponding subsection of this document (*see Section 5, in the relevant subsection requiring a description of the species of interest and habitat types*). However, with regard to the habitat types under study in Annex I of the main Special Conservation Area under study GR1260005, and in order for the reader to have a more complete picture of the area under study, the negative human impacts, current and potential threats relevant to Greece, according to the "Habitat Types and Plant Species Monitoring Guide" (Directive 92/43/EEC) (Dimopoulos P. Bergmaier E., Theodoropoulos K., Fisher P. and Tsiafouli M. 2005) prepared by the University of Ioannina, Department of Environmental Management and Natural Resources - MINISTRY OF ENVIRONMENT, SPACE AND PUBLIC WORKS.

Table 60. Reference list of negative impacts and current and potential threats to the habitat types of Directive 92/43/EEC in the Natura network

1. Crops, agricultural agricultural activities, land use	1.1	Clearance for the establishment of crops (cereals, maize, tree crops, etc.)
	1.2	Clearings for the establishment of irrigated plantations (cotton, maize, rice, etc.) and tree crops such as olive, peach, etc.)
	1.3	Drainage, groundwater management
	1.4	Succession due to abandonment of grassland (removal of grazing)
	1.5	Succession due to abandonment of grazing by grassland, scrub, woodland, pteridophytes, etc.)
	1.6	Intensive grazing (fencing of grazing areas) and the effect of excessive numbers of animals
	1.7	Structural degradation due to the effect of fires
	1.8	Application of herbicides
	1.9	Airborne or direct introduction of nutrients through fertilisation of adjacent fields
2. Forestry and forestry use	2.1	Plantation of non-native species e.g. poplar, eucalyptus, etc.
	2.2	Selective felling of trees with a specific function (e.g. scout species, old growth, etc.)
	2.3	Changes in forest structure due to silvicultural manipulations (felling, reforestation with native or alien species) or abandonment of traditional forest use
	2.4	Construction of forest roads
	2.5	Intensive grazing of forests by excessive numbers of animals
	2.6	Depletion of forest resources
	2.7	Forest vegetation fires
3. Tourism, sport and recreational activities	3.1	Construction of sports and leisure infrastructure, tourist facilities (beach equipment, pavilions, restaurants, parking areas)
	3.2	Local disturbance from illegal camping, trampling, recreational excursions, fireplaces, waste disposal
	3.3	Activities and facilities for swimming and other water sports
	3.4	Disasters from moto-cross racing
	3.5	Winter sports activities and facilities
	3.6	Tourism and cave exploration
	3.7	Dredging and cleaning of beaches with heavy machinery
4. Hydraulic engineering, management and water consumption	4.1	Construction works and diversion of sources
	4.2	Hydromechanics and river alignment, river dynamics obstruction
	4.3	Filling and drainage of permanent and seasonal dikes
	4.4	Stream bed modification and construction works in ravines
	4.5	Destruction of gravel banks and flat mudflats
	4.6	Removal of reeds and other types of marsh vegetation
	4.7	Construction of dams and reservoirs
	4.8	Pollution and eutrophication of inland and coastal surface waters
	4.9	Dumping of rubbish in valleys and gutters
5. Construction works and mining activities	5.1	Construction outside built-up areas
	5.2	Construction of roads and paths
	5.3	Quarrying and deposition
	5.4	Sand and gravel extraction
	5.5	Construction works in coastal and offshore locations (construction and maintenance of harbours, breakwaters and jetties, dredging)
6. Biological and Environmental Environmental Risks	6.1	Physical scarcity
	6.2	Isolated occurrence or at the limits of distribution
	6.3	Habitat affected by invasive species
	6.4	Climatic influence (e.g. lower than average rainfall for years)
	6.5	Pathogenic infestations of key species (primary, secondary)

The following table shows the above threats for each of the habitat types listed in Annex I to Directive 92/43/EEC for the site GR1260005.

Table 61. Habitat types of Annex I habitat types of Directive 92/43/EEC, Natura site GR1260010 and human impacts

Type Habitat type	1. Crops, agricultural agricultural activities, land use									2. Forestry and Forestry and forest use							3. Tourism, sports and recreational activities						
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	3.3	3.4	3.5	3.6	3.7
4060						!															!!		
5210																	!!	!!		!!			
8210																							
9150											!!		!!	!	!								
9530*											!		!!	!		II					!		

Press Habitat	4. Hydraulic engineering, management and water consumption									5. Construction works and mining activities					6. Biological and Environmental hazards					
	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	
4060											!									
5210																				
8210												!!			?					
9150																				
9530*																				

Legend table 61
II: principal factor
I: factor of secondary importance
?: factor possibly relevant
**Habitats 5210, 62A0, 91CA and 95A0 are not mentioned in this deliverable*

With regard to the pressures and threats to the species listed in Annex II of Directive 92/43/EEC, the Special Conservation Area GR1260005, as well as the neighbouring Bulgarian Special Conservation Area BG0001028, as mentioned above, have been fully analysed in a previous chapter of this Special Ecological Assessment. These pressures and threats, according to the IUCN red list, and the Greek Red Data Book, are listed below as indicative *(only those species classified as VU or higher and analysed within the Greek Red Data Book*).

Bombina variegata

According to the threats listed in the IUCN red list the species does not appear to be significantly threatened on a global scale. Populations of this species may be locally threatened by the loss of suitable habitat as a result of urbanisation, road construction, industry (including oil extraction and transport) and the discharge of pollutants into wetlands. In addition, it is reported to be collected as bait by fishermen in some areas and is occasionally collected in large numbers both for the pet trade and for scientific use (Bülbül et al. 2018). The impact of harvesting on this species needs further research. Hybridization with *Bombina bombina* may also be considered a threat, at least in some areas. Hybridization in Transylvania has resulted in the loss of pure populations.

Lutra lutra

Threats to the species, according to the Greek Red Data Book (Legakis and Maragou 2009) are as follows: A serious problem for the otter is the destruction and degradation of wetland habitats (Macdonald and Mason 1990, Macdonald et al. 1998). In particular, the drainage of wetlands and the destruction of riparian vegetation (e.g. burning of reeds, cutting of trees, clearing, etc.), especially in lowland areas, hydroelectric dams (large or even small ones) and river and stream alignment projects are serious threats, which have intensified in recent years and are leading to a decline in the distribution of this species in Greece. In the long term, the effects of climate change and in particular prolonged droughts may have serious impacts on otter habitats. In addition, water pollution with toxic and residual pollutants (from agricultural waste and leaching) is a potentially significant risk to otter populations (Macdonald and Mason 1994). Indirectly, non-toxic water pollution, which is associated with eutrophication phenomena in Greek wetlands and may lead to a reduction in fish and

hence otter food, also has a negative impact. A similar problem is caused by intensive or even illegal fishing (Macdonald and Mason 1994). Finally, a smaller problem (although locally important) is accidental mortality in fishing gear or from passing cars on the roads. Accidental killing by hunters is usually also common.

Threats listed on the IUCN red list are that the species' aquatic habitats are highly vulnerable to anthropogenic change. The enclosure of rivers, removal of riparian vegetation, construction of dams, pumping of water for irrigation, drainage of wetlands for agricultural use, agricultural activities and associated anthropogenic impacts on aquatic systems are adverse to the species' populations. Also, wetland pollution is a major threat to otters. Coastal populations are particularly vulnerable to oil pollution. Pollution of rivers and lakes leads to a reduction in fish biomass by reducing food availability. In addition, important causes of mortality from various countries include drowning, deliberate killing and poaching. Nets for eels and other fish, as well as traps for marine crustaceans, are very attractive to otters, and many individuals trying to enter them become entangled and drown. Illegal hunting continues to be a problem in many parts of the species' range. In many European countries, political pressure, especially from fishermen, has resulted in the granting of permits to kill the species (Reuther and Hilton-Taylor 2004). Illegal killing for trade is increasing in Ukraine and the Danube Delta, and possibly in the eastern parts of the global range (European Mammal Assessment Laboratory 2006). In the longer term, the effects of climate change, and in particular prolonged droughts, may have serious impacts on otter habitats.

Vormela peregusna

Threats listed on the IUCN red list are the loss of natural habitat for the steppe. Steppe habitats are declining in Europe as they are being converted to cultivated agricultural land. Secondary poisoning by rodenticides may also pose a threat, as may population declines in key prey species of the species.

Dactylorhiza kalopissii

According to the threats listed on the IUCN red list, the species' habitat has been significantly reduced recently through soil drainage, tourism development, reservoir construction and intensive grazing. Also, the collection of this orchid along with the

trend of hybridization within the genus Dactylorhiza are threats to the species (Phitos et al. 1995, Delforge 1995).

Gladiolus palustris

According to the threats listed in the IUCN red list, the species' habitat is subject to many threats such as modification of cultural practices (mowing, grazing, abandonment of pastoral systems, forest planting), which often leads to vegetation change and competition for the species, water management and drainage, pollution and harvesting. Conversion of habitat for the species (grasslands) to cropland causes habitat loss. At the local level, there are threats such as aquaculture, roads and railways.

Elaphe quatuorlineata

According to the threats listed in the IUCN red list, the species is mainly threatened by habitat loss due to urbanisation, intensification of agricultural practices and development of tourism infrastructure. It is persecuted by humans in many areas of its distribution.

Testudo graeca

Threats listed on the IUCN red list are habitat degradation and loss (Lambert 1995; Bayley and Highfield 1996). Harvesting of the species for trade as pets has involved large numbers of animals and has been cited as a major factor in population decline, particularly in Morocco and Algeria (Lambert 1995, Highfield and Bayley 1996). (In Morocco, turtle shells are used to make tourist souvenirs (Highfield and Bayley 1996). The release of captive turtles from different populations of T. graeca into the habitat represents risks of genetic pollution (Andreu 2003). Deforestation, intensive land use, use of inorganic fertilizers and pesticides, overgrazing by cattle, extensive plantations and sand mining have been factors in turtle habitat loss. Natural predators, a major cause of juvenile and adult turtle mortality (Buskirk et al. 2001), have likely been aided by anthropogenic changes in turtle habitat, allowing for higher predator densities and their impact on turtles.

Barbastella barbastellus

Threats to the species according to the IUCN are habitat degradation and destruction, particularly the loss of old mature forests with old trees with loose bark or crevices that the species uses for nesting (Hutson et al. 2008b). Reforested areas are not suitable for the species. Also, loss of underground habitat and sites in old buildings pose a threat to the species. In Germany, habitat loss and fragmentation (caused, among other things, by infrastructure development, forestry, and renovation or demolition of old buildings) are a threat, and finally, caving and cave tourism may have negative impacts, as individuals of the species have been captured in caves in our country (Helversen and Weid 1990).

Miniopterus schreibersii

Threats listed on the IUCN red list are the disturbance of colonies of the species, both during winter and summer. Inappropriate protection of cave entrances (e.g. with inappropriately designed grills) can lead to abandonment or declining numbers. In 2002, mass mortality events were reported for populations in France (40% mortality up to 60% mortality in one year (Roué and Némoz 2002), Spain (mortality occurred in Spain during the same period, including 1,000 deaths out of 6,000 individuals in one colony), Italy and Portugal. In 2013 a mass mortality event occurred in a bat colony of the species, causing the death of about 500 individuals in northeastern Hungary (Bükk Mountains). Mortality events in Spain and Hungary were associated with viral mortality (Kemenesi et al. 2018). Another event with about 200 dead individuals was reported in 2018 from Georgia (EUROBATS 2018). Mortality following impacts on wind farm turbines is also a threat (has been recorded in Spain, Portugal and France), but can occur anywhere within the species' distribution range (Rodrigues et al. 2015).

Myotis bechsteinii

The threats listed on the IUCN red list are inappropriate management and development of forest habitats, intensive agriculture (e.g. the use of pesticides on agricultural land adjacent to forested areas occupied by the species) and human disturbance of the species' roosting sites. The loss of old trees with cavities is a particular problem. In Germany, infrastructure development (and associated habitat fragmentation) and forestry are the main threats (Schulenberg 2005).

Myotis blythii

Threats listed on the IUCN red list are changes in land management, particularly agricultural pollution, and other agricultural activities that may affect populations of the species. Disturbance to cave and building roosts is also a threat to the species.

Myotis emarginatus

Threats listed on the IUCN red list are agricultural activities, which may affect populations of the species, as the species is mainly associated with agricultural habitats. Disturbance to roosting sites (such as buildings and caves) is also a threat.

Myotis myotis myotis

Threats listed on the IUCN red list are agricultural activities (e.g. pesticide use, intensification of agriculture leading to uprooting of shrubs and hedgerows and small woodlands) as it is a typical species of agricultural - rural mosaic landscapes. Loss or disturbance to roost sites in underground habitats and buildings may also be a threat. However, they are not considered to be serious threats to the species at this time.

Rhinolophus euryale

Threats listed on the IUCN red list are loss of foraging habitat for the species and disturbance and loss of subterranean habitat. Fragmentation and loss of the species' habitats, such as vegetation barriers and riparian vegetation, is a significant threat because such areas are used for the species' movements. The species' heavy reliance on caves for roosting sites makes it particularly sensitive to cave disturbance, such as that caused by cave tourism. The use of strong pesticides is also believed to have contributed to the dramatic population declines of the species that occurred previously in France (Brosset et al. 1988).

Rhinolophus ferrumequinum

Threats listed on the IUCN red list include fragmentation and isolation of habitats used by the species, changes in the management regime of deciduous forests and agricultural areas, loss of food resources (insects) due to pesticide use, and disturbance and loss of subterranean habitats. In north-western Europe, habitat change is probably one of the main causes of the species' population decline. The conversion

of woodland to large-scale agriculture is particularly detrimental to the species. While declines in other areas, particularly in Eastern Europe, may not be as severe at present. However, the loss of traditional agricultural land cultivation practices as they move towards western-style economies may have significant impacts in the near future. pesticide use has been a recognised threat to the species' food resources (insects), particularly when these have been directed against the larvae, which are the species' favourite food. Populations in caves and other subterranean habitats have been subject to increased disturbance (e.g. from tourist visits) from changes in the use of such sites. In buildings, colonies may be affected by human interventions such as renovation or the application of insecticides used to restore timber (Hutson et al. 2001).

Rhinolophus hipposideros

Threats listed on the IUCN red list include disturbance and loss of subterranean habitat, changes in the management regime of agricultural areas (loss of scattered trees and plant cover due to agricultural intensification), and fragmentation and isolation of the species' habitat.

Canis lupus

The threats listed in the Greek Red Data Book (Legakis and Marangou 2009) are the following: Anthropogenic mortality, reduction in food availability throughout the species' distribution range due to the decline in extensive livestock production combined with the relatively low densities of wild ungulates (Sfugaris and Giannakopoulos 1999) and habitat fragmentation due to the construction of major roads and other transport infrastructure.

The threats listed in the IUCN red list are mainly human disturbance which is the biggest limiting factor in Europe today, due to fear, misunderstanding and the fact that the species attacks livestock, causing damage to livestock, have caused an uncomfortable relationship between the species and humans in many areas, leading to direct conflicts and retaliation and preventive persecution. In some countries, poorly regulated wolf hunting poses a threat, while in others wolf killing permits are issued regardless of biological understanding. Poaching is widespread and probably represents the most important mortality factor for wolves in many parts of Europe. Wolf depredation on domestic livestock has been a problem for centuries, and although the

number of sheep or cattle taken as a percentage is very low, the species' attack on domestic livestock and livestock remains the primary reason for wolf persecution. Wolves have also become a symbol of wider issues of social change facing rural life, so that the politics of managing the species has become highly controversial and intertwined with many other issues. It also appears that agencies and institutions in many countries are ill-equipped to deal with the biological and socio-political challenges of wolf management. Human land use is the most significant threat to wolf habitat. Wolves can live close to people, but they need safe areas. This is not always taken into account in land use planning in wolf areas and small, fragmented subpopulations in western Europe can result in animals moving into unsuitable habitats. Although wolves show a good ability to cross linear infrastructure such as motorways and railways, these structures can be associated with wolf mortality and there is a need to ensure wildlife permeability in all infrastructure projects. Wolf-dog hybridization has been increasingly reported in most European countries, but seems to be a major issue only in Italy and other Mediterranean countries due to poor dog management practices. Legislation and public attitudes towards dog management and control policies prevent the implementation of a coordinated effort to manage the occurrence and spread of hybridization (Ciucci 2012).

The specific threats to the European subpopulation of the Balkans, according to the same source, are: Poorly regulated legal hunting and illegal killing (often using poisoned bait) are killing unknown numbers of wolves across the wider distribution of the Balkan subpopulation. Other pressures commonly reported include habitat fragmentation due to construction of fenced highways and lack of wild game. In many countries, there is very limited knowledge about the ecology or status of the wolf (Huber et al. 2002; Iliopoulos 2005; Trbojević 2016).

Ursus arctos

Threats according to the Greek Red Data Book are poaching, use of poisoned baits (Antoniou et al. 1998) and habitat destruction/degradation by large infrastructure projects (motorways e.g. Egnatia Odos) and forest fires.

Threats listed on the IUCN red list are mortality from human disturbance as the species has a low reproductive rate. The species requires large habitats and any land use change makes it vulnerable. In Eastern Europe, land use developments tend to follow western examples with more intensive use of productive areas. The bear's ideal

habitat has disappeared in Europe through logging and deforestation. The planting of non-native conifer species has seriously altered local ecosystems in some places. Habitat fragmentation, particularly as a result of road building, is a major problem for a species that requires such large areas. Mortality caused by high-speed road and rail networks within the species' habitats is a major threat in some areas, including Greece and Croatia. Poaching remains a threat to many, but not all populations, and occurs regardless of population size. Poaching has probably worsened in the 1990s in countries such as Albania, Bulgaria, Bosnia and Herzegovina, Serbia, Montenegro, Bosnia and Herzegovina and FYROM as a result of the declining economic and social situation, but appears to have decreased over the last decade. Poaching in Russia is a particular problem. Five very small, isolated bear populations in southern and western Europe (located in France, Spain and Italy) are highly threatened due to their small populations. They could easily become extinct as a result of random fluctuations.

Rupicapra rupicapra balcanica

Threats listed on the IUCN red list are poaching and excessive hunting in parts of its distribution range, especially when it occurs outside protected areas and private hunting reserves (Shackleton 1997; Jurdíková 2000). Many of the less numerous subspecies (*e.g., R. r. balcanica, R. r. cartusiana, and R. r. tatrica*) are threatened by the deliberate introduction of subspecies from other geographic areas (*especially R. r. rupicapra*), leading to hybridization and genetic quagmire (Shackleton 1997). Human disturbance, particularly as a result of increased tourism and recreational activities in mountainous areas, may also be a problem (Shackleton 1997; Jurdíková 2000). Competition with domestic livestock and introduced species is a threat to the more vulnerable subspecies, although it is not considered a significant problem for *R. r. rupicapra*. The subspecies *R. rupicapra rupicapra*, however, suffers periodic outbreaks of mange, causing a decline in the local population (Shackleton 1997). In 2006 a new disease was recorded for the first time in this subspecies. In general, habitat loss is not a significant threat to the species, as much of its range is within protected areas. However, habitat loss may be a problem in some areas (e.g. for subspecies *balcanica* in Albania) (Shackleton 1997). Because its population is indeed very small, subspecies *cartusiana* is prone to extinction (Shackleton 1997).

Zamenis situla

According to the IUCN red list the threats listed are the pet trade, which is a significant threat in some areas. It is threatened in some areas of its range (e.g. Albania) by habitat loss due to agricultural intensification.

Emys orbicularis

Threats listed on the IUCN red list are habitat loss of the species (urbanization, road construction, wetland drainage), the effects of which have been considered critical for the decline of the species' populations (Atatur 1995, Servan 1995). The species is also very sensitive to water pollution, which has been considered a major factor in the species' extinction from areas (Atatur 1995, Servan 1995, Mascort 1996). The species has been considered to be at particularly high risk from competition for food, spawning sites from the non-native species *Trachemys scripta* (Kramer 1995, Servan 1995). Harvesting for food and pet trade has been a historical influence and continues at some sites, but is not a significant threat to the species overall. Over-exploitation of water sources reduces available habitat for the species and increases salinization.

Testudo hermanni

According to the Greek Red Book (Legakis and Maragou) the species is currently facing a multitude of problems (Hailey and Willemsen 2003) which include:

- Crop intensification, use of herbicides and insecticides (Willemsen and Hailey 2001), and use of heavy farm machinery (Hailey 2000).
- Land consolidation and general residential (or tourist) development outside traditional settlement nuclei.
- Opening of new roads, fragmentation of natural populations, increased vehicle traffic (Hailey and Goutner 1991).
- Fires (Hailey 2000).

In addition, the Mediterranean tortoise has been, and to a more limited extent still is, a target for collection as a pet. Current legislation and captive breeding have now generally restricted the international trade in the species, but this continues on a smaller, smuggled, scale. Collecting also continues to a more limited extent by Greek individuals, who transport individual animals from the countryside to urban areas. The

species is also consumed by some ethnic minorities, a practice that may seriously affect local populations, although the extent of this is not precisely known.

Threats listed on the IUCN red list are habitat loss due to expansion and intensification of agriculture. Also, urbanization and development of tourism infrastructure, fires, and collection for trade of domestic animals are threats to the species. In addition, genetic hybridization and the possible effects of microbes and diseases of released turtles (Stubbs 1989b, Willemsen 1995), road mortality from accidents on roads by passing vehicles and the use of pesticides in agriculture have a negative impact on the species' populations. Finally, in Serbia the shell is used in traditional medicine.

Their national and European importance for the conservation of biodiversity

The importance of the species for biodiversity conservation at national and European level is commented on individually in the subchapters describing each species of importance for the region.

The overall coherence of the NATURA 2000 network

The overall coherence of the Natura 2000 network in the wider study area is considered satisfactory.

Conservation status of the habitat types and/or species for which the NATURA 2000 site concerned has been designated.

For the habitat type(s) listed in Annex I to Directive 92/43/EC

With regard to Natura site GR1260005, as mentioned in the previous section, the conservation status of the structure and functions of the habitat types of the site, and their potential for recovery, was assessed from good (criterion B) to excellent (criterion A) (no assessment was carried out for habitat type 9540, since, as mentioned above, this habitat type no longer exists within the above protected area). The habitat types of interest, and all of the information on their conservation status reported in the respective SDFs of the Natura study area are listed in Table 62 below.

Table 62. Part of the Standard Data Form for the site GR1260005 (End 2022_12/03/2024), showing the Annex I habitat types of Directive 92/43/EEC of the site listed therein and their conservation status (not given is the habitat type 9540, which has a zero area, as it no longer exists within the Natura site, so there is no data concerning its conservation status)
(https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR1260005)

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover (ha)	Cave (number)	Data quality	A|B|C|D	A|B|C		
						Representativeness	Relative surface	Conservation	Global
4060			21,858	0,00	G	B	C	B	B
5210			333,434	0,00	G	B	C	B	B
62A0			1.124,39	0,00	G	A	B	A	A
8210			8,77456	0,00	G	B	C	B	B
9150			268,5	0,00	G	A	B	A	B
91CA			31,9466	0,00	G	A	C	A	B
9530	X		667	0,00	G	A	C	A	B
95A0			387,245	0,00	G	A	B	A	B

Habitat type 4060 occupies 21.858 ha within the Special Conservation Area, with the data provided being of good quality and based on field data. Its representativeness is classified as good (criterion B). The measurement of the area of the specific habitat in this habitat in relation to the total area of the national territory covered by this habitat is less than 2% (criterion C). The conservation status of the

structure and functions of the habitat type and its potential for restoration is classified as B, meaning good conservation, while the global assessment of the habitat's conservation value for the habitat type concerned is classified as good.

Habitat type 5210 occupies 333,434 ha within the Special Conservation Area, with the data provided being of good quality and based on field data. Its representativeness is rated as good (criterion B). The measurement of the area of the specific habitat in this habitat in relation to the total area of the national territory covered by this habitat is less than 2% (criterion C). The conservation status of the structure and functions of the habitat type and its potential for restoration is classified as B, meaning good conservation, while the global assessment of the habitat's conservation value for the habitat type concerned is classified as good.

Habitat type 62A0 occupies 1,124.39 ha within the Special Conservation Area, with the data provided being of good quality and based on field data. Its representativeness is classified as excellent (criterion A). The measurement of the area of the specific habitat in this habitat in relation to the total area of the national territory covered by this habitat is between 2 - 15% (criterion B). The conservation status of the structure and functions of the habitat type and its potential for restoration is classified as A, meaning excellent conservation, while the global assessment of the habitat's conservation value for the habitat type concerned is classified as excellent.

Habitat type 8210 occupies 8.77456 ha within the Special Conservation Area, with the data provided being of good quality and based on field data. Its representativeness is classified as good (criterion B). The measurement of the area of this habitat in this habitat in relation to the total area of the national territory covered by this habitat is less than 2% (criterion C). The conservation status of the structure and functions of the habitat type and its potential for restoration is classified as B, which means good conservation, while the global assessment of the conservation value of the habitat for the relevant habitat type is classified as good conservation value.

Habitat type 9150 occupies 268.5 ha within the Special Conservation Area, with the data provided being of good quality and based on field data. Its representativeness is classified as excellent (criterion A). The measurement of the area of the specific habitat in the specific habitat in relation to the total area of the national territory covered by the specific habitat is between 2 - 15% (criterion B). The conservation status of the structure and functions of the habitat type and its potential for restoration is classified as A, which means excellent conservation, while the global

assessment of the habitat's conservation value for the habitat type concerned is classified as good conservation value.

Habitat type 91CA occupies 31.9466 ha within the Special Conservation Area, with the data provided being of good quality and based on field data. Its representativeness is classified as excellent (criterion A). The measurement of the area of the specific habitat in this habitat in relation to the total area of the national territory covered by this habitat is less than 2% (criterion C). The conservation status of the structure and functions of the habitat type and its potential for restoration is classified as A, meaning excellent conservation, while the global assessment of the habitat's conservation value for the habitat type concerned is classified as good.

Habitat type 9530* occupies 667 ha within the Special Conservation Area, with the data provided being of good quality and based on field data. Its representativeness is rated as excellent (criterion A). The measurement of the area of the specific habitat in this habitat in relation to the total area of the national territory covered by this habitat is less than 2% (criterion C). The conservation status of the structure and functions of the habitat type and its potential for restoration is classified as A, meaning excellent conservation, while the global assessment of the conservation value of the habitat type concerned is classified as good conservation value.

Habitat type 95A0 occupies 387.245 ha within the Special Conservation Area, with the data provided being of good quality and based on field data. Its representativeness is classified as excellent (criterion A). The measurement of the area of the specific habitat in this habitat in relation to the total area of the national territory covered by this habitat is between 2 - 15% (criterion B). The conservation status of the structure and functions of the habitat type and its potential for restoration is classified as A, which means excellent conservation, while the global assessment of the habitat's conservation value for the habitat type concerned is classified as good conservation value.

For species listed in Annex II of Directive 92/43/EC:

With regard to the species of interest listed in Annex II of Directive 92/43/EEC, their conservation status was assessed from good (criterion B) to excellent good (criterion A) for all species of interest for which a conservation status assessment was carried out (no assessment was carried out for *Dactylorhiza kalopissii, Gladiolus*

palustris and *Vormela peregusna*). The species of interest, and all the information on their conservation status reported in the respective SDFs of sites GR1260005 and BG0001028, are shown in Table 63 below.

Table 63. Part of the Standard Data Forms of sites GR1260005 and BG0001028 (End 2022_12/03/2024), showing the Annex II species of interest of the sites listed in Annex II to Directive 92/43/EEC.

Natura Code	Species						Population in the site					Site assessment			
	G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
GR1260005	A	1193	*Bombina variegata*			p	0	0		R	DD	C	B	C	C
GR1260005	P	6996	*Dactylorhiza kalopissii*				0	0		R					
GR1260005	R	1279	*Elaphe quatuorlineata*			p	0	0		P	DD	C	A	C	C
GR1260005	P	4096	*Gladiolus palustris*			p	1	1	grids5x5	P	P	A		B	A
GR1260005	M	1355	*Lutra lutra*			p	0	0		P	M	C	A	C	B
GR1260005	R	1219	*Testudo graeca*			p	0	0		R	DD	C	B	C	C
GR1260005	M	2635	*Premela peregusna*				0	0			DD				
BG0001028	A	1193	*Bombina variegata*			p	19	19	localities	C	G	C	A	C	A
BG0001028	M	1308	*Barbastella barbastellus*			p	426	795	i	R	M	B	A	B	B
BG0001028	M	1352	*Canis lupus*			p	12	16	i	P	G	B	A	C	A
BG0001028	M	1355	*Lutra lutra*			p	6	7	i		G	C	A	C	A
BG0001028	M	1310	*Miniopterus schreibersii*			p	101	250	i	R	G	C	A	C	C
BG0001028	M	1323	*Myotis bechsteinii*			p	250	500	i	R	M	C	A	C	B
BG0001028	M	1307	*Myotis blythii*			p	11	50	i	R	G	C	A	C	C
BG0001028	M	1321	*Myotis emarginatus*			r	11	50	i	V	G	C	A	C	C
BG0001028	M	1324	*Myotis myotis*			p	11	50	i	R	G	C	A	C	C
BG0001028	M	1305	*Rhinolophus euryale*			p	11	50	i	R	G	C	A	C	C
BG0001028	M	1304	*Rhinolophus ferrumequinum*			p	51	100	i	R	G	C	A	C	C
BG0001028	M	1303	*Rhinolophus hipposideros*			p	251	500	i	C	G	B	A	C	A
BG0001028	M	1371	*Rupicapra rupicapra balcanica*			p	20	40	i		M	C	B	B	B
BG0001028	M	1354	*Ursus arctos*			p	22	22	i		G	B	A	B	A
BG0001028	M	2635	*Pre-melon peregusna*			p	0	0		P	DD	C	B	C	B
BG0001028	P	4103	*Dactylorhiza kalopissii*			p	85	85	i		G	A	B	A	A
BG0001028	P	4096	*Gladiolus palustris*			p	33	33	i		G	C	B	B	B
BG0001028	R	1279	*Elaphe quatuorlineata*			p	2	2	localities	V	P	A	A	C	A
BG0001028	R	1293	*Elaphe situla*			p	0	0	localities	P	DD	C	A	C	A
BG0001028	R	1220	*Emys orbicularis*			p	3	3	localities	V	P	C	A	B	A
BG0001028	R	1219	*Testudo graeca*			p	22	22	localities	C	G	C	A	C	A
BG0001028	R	1217	*Testudo hermanni*			p	4	4	localities	V	P	C	A	C	A

From the above table

For Special Conservation Area GR1260005

Bombina variegata is a resident species in the study area, with its population in the study area corresponding to 0-2% of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is given a conservation criterion of B, meaning good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

No data are given for ***Dactylorhiza kalopissii*.**

Elaphe quatuorlineata is a resident species in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. The conservation status reflecting the degree of protection of the habitat important for the species and the likelihood of its recovery is classified as A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Gladiolus palustris is a resident species in the study area and occurs in at least one 5x5 km square within the study area. The data given are based on a rough estimate. No conservation status assessment was carried out to reflect the degree of habitat protection important to the species and the likelihood of its recovery. The population of the species is classified as non-isolated but is located within the range boundary and the overall conservation value of the site is excellent.

Lutra lutra is a resident species in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are of moderate quality and are based on both field data and partial modelling of the distribution of the species. Conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is assigned a conservation criterion of A, indicating excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Testudo graeca is a resident species in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is classified as B, which means good conservation. The population of the species is

classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

No data are given for ***Vormela peregusna*).**

For Special Conservation Area BG0001028

Bombina variegata is a resident species in the study area, and has at least 19 sites in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, indicating excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is excellent.

Barbastella barbastellus is a resident species in the study area and has at least 426 individuals in the area. The data provided are of moderate quality and are based on both field data and partial modelling of the distribution of the species. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as not isolated but is located within the range boundary, and the overall conservation value of the site is good.

Canis lupus is a resident species in the study area and has at least 12 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is excellent.

Lutra lutra is a resident species in the study area and there are at least six individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, meaning excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is excellent.

Miniopterus schreibersii is a resident species in the study area and has at least 101 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated A, which means excellent conservation.

The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Myotis bechsteinii is a resident species in the study area and has at least 250 individuals in the area. The data provided are of moderate quality and are based on both field data and partial modelling of the distribution of the species. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, indicating excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Myotis blythii is a resident species in the study area and has at least 11 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Myotis emarginatus is a species that breeds in the study area and has at least 11 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Myotis myotis is a resident species in the study area and has at least 11 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Rhinolophus euryale is a resident species in the study area and has at least 11 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Rhinolophus hipposideros is a resident species in the study area and has at least 251 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is excellent.

Rhinolophus ferrumequinum is a resident species in the study area and has at least 51 individuals in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, indicating excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Rupicapra rupicapra balcanica is a resident species in the study area and has at least 20 individuals in the area. The data provided are of moderate quality and are based on both field data and partial modelling of the distribution of the species. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, good conservation. The population of the species is classified as non-isolated but is located within the range boundary, and the overall conservation value of the site is good.

Ursus arctos is a resident species in the study area and has up to 22 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is rated A, which means excellent conservation. The population of the species is classified as not isolated but is located within the range boundary, and the overall conservation value of the site is excellent.

Vormela pergusna is a resident species in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is given a conservation criterion of B, meaning good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Dactylorhiza kalopissii is a resident species in the study area and numbers up to 85 individuals in the area. The data given are of good quality and are based on field

data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated B, which means good conservation. The population of the species is classified as nearly isolated, and the overall conservation value of the site is excellent.

Gladiolus palustris is a resident species in the study area and has up to 33 individuals in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated B, which means good conservation. The population of the species is classified as not isolated but is within the range boundary, and the overall conservation value of the site, which relates to the conservation of the species, is good.

Elaphe quatuorlineata is a resident species in the study area and has up to two sites in the area. The data given are based on a rough estimate. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of recovery is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is excellent.

Zamenis situla is a resident species in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. The conservation status reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery is given a conservation criterion of A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is excellent.

Emys orbicularis is a resident species in the study area and has up to three sites in the area. The data given are based on a rough estimate. The conservation status, reflecting the degree of protection of habitat important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as not isolated but is located within the range boundary, and the overall conservation value of the site is excellent.

Testudo graeca is a resident species in the study area and has up to 22 sites in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, indicating excellent conservation. The

population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is excellent.

Testudo hermanni is a resident species in the study area and has up to four sites in the area. The data given are based on a rough estimate. The conservation status, reflecting the degree of protection of habitat important to the species and the likelihood of recovery, is rated A, indicating excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is excellent.

As regards the species of avifauna listed in Annex I to Directive 2009/147 and migratory species with a significant presence

The selected species of avifauna of interest, and all of their information, listed in the respective SDFs of the nearest Natura 2000 Special Protection Areas BG0002078, GR1260010, BG0002098 and BG0002072 under study, are shown in Table 63 below, which also shows in detail the conservation status, reflecting the degree of habitat protection important for each species and the likelihood of its recovery.

Table 63. Section of the Standard Data Forms (Standard Data Forms) of the Natura 2000 network sites BG0002078, GR1260010, BG0002098 and BG0002072, showing the species of avifauna of interest of the site recorded on them and the conservation status of their site.

Natura code	Species						Population in the site					Site assessment			
	G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
BG0002078	B	A402	*Accipiter brevipes*			r	1	2	p		G	C	B	C	C
BG0002078	B	A223	*Aegolius funereus*			w	22	22	i		G	B	A	C	B
BG0002078	B	A223	*Aegolius funereus*			p	10	12	p		G	B	A	C	B
BG0002078	B	A091	*Aquila chrysaetos*			p	1	2	p		G	C	A	C	C
BG0002078	B	A089	*Clanga pomarina*			r	1	1	p		G	C	B	C	C
BG0002078	B	A104	*Tetrastes bonasia*			p	20	30	p		G	C	A	C	C
BG0002078	B	A215	*Bubo bubo*			p	2	4	p		G	C	B	C	C
BG0002078	B	A403	*Buteo rufinus*			p	1	2	p		G	C	B	C	C
BG0002078	B	A080	*Circaetus gallicus*			r	1	2	p		G	C	A	C	C
BG0002078	B	A511	*Falco cherrug*			r	1	2	i		G	C	A	B	B
BG0002078	B	A103	*Falco peregrinus*			r	1	2	p		G	C	A	C	C
BG0002078	B	A217	*Glaucidium passerinum*			p	3	5	p		G	B	A	A	A
BG0002078	B	A078	*Gyps fulvus*			c	1	3	i		G	C	B	C	C
BG0002078	B	A093	*Aquila fasciata*			r	0	1	i		G	A	B	B	A
BG0002078	B	A092	*Hieraetus pennatus*			r	1	1	p		G	C	A	C	C
BG0002078	B	A073	*Milvus migrans*			r	2	2	p		G	C	A	B	C
BG0002078	B	A072	*Pernis apivorus*			r	2	4	p		G	C	A	C	B

Natura code	Species						Population in the site					Site assessment			
	G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
BG0002078	B	A108	*Tetrao urogallus*			p	15	25	males			C	A	A	A
GR1260010	B	A402	*Accipiter brevipes*			r				P	DD	C	B	C	B
GR1260010	B	A091	*Aquila chrysaetos*			r	2	2	p		G	C	B	C	B
GR1260010	B	A090	*Clanga clanga*			w	1	1	i		G	C	B	B	B
GR1260010	B	A404	*Aquila heliaca*			c				P	DD	C	B	B	B
GR1260010	B	A089	*Clanga pomarina*			r	5	8	P		G	B	B	C	B
GR1260010	B	A215	*Bubo bubo*			p	2	4	P		G	C	B	B	B
GR1260010	B	A403	*Buteo rufinus*			r	2	4	p		G	C	B	B	B
GR1260010	B	A030	*Ciconia nigra*			r	2	5	p		G	C	B	C	B
GR1260010	B	A080	*Circaetus gallicus*			c				P	DD	C	B	C	B
GR1260010	B	A080	*Circaetus gallicus*			r	4	6	p		G	C	B	C	B
GR1260010	B	A081	*Circus aeruginosus*			c				P	DD	C	B	C	B
GR1260010	B	A082	*Circus cyaneus*			c				P	DD	C	B	C	B
GR1260010	B	A083	*Circus macrourus*			c				P	DD	C	B	B	C
GR1260010	B	A084	*Circus pygargus*			c				P	DD	D	B	C	B
GR1260010	B	A101	*Falco biarmicus*			c				P	DD	C	B	C	C
GR1260010	B	A511	*Falco cherrug*			c				P	DD	C	B	C	B
GR1260010	B	A098	*Falco columbarius*			c				P	DD	C	B	C	B
GR1260010	B	A100	*Falco eleonorae*			c	15	75	i		G	C	B	C	B
GR1260010	B	A095	*Falco naumanni*			c				P	DD	C	B	C	B
GR1260010	B	A709	*Falco peregrinus*			c				P	DD	C	B	C	B
GR1260010	B	A709	*Falco peregrinus*			r	3	5	p		G	C	B	C	B
GR1260010	B	A097	*Falco vespertinus*			c				P	DD	C	B	C	B
GR1260010	B	A078	*Gyps fulvus*			c	0	3	i		G	C	C	C	B
GR1260010	B	A075	*Haliaeetus albicilla*			p	1	1	i		G	A	B	B	A
GR1260010	B	A092	*Hieraetus pennatus*			c				P	DD	C	B	C	B
GR1260010	B	A092	*Hieraetus pennatus*			r	2	3	p		G	C	B	C	B
GR1260010	B	A073	*Milvus migrans*			c				P	DD	C	B	C	C
GR1260010	B	A073	*Milvus migrans*			r				P	DD	C	B	B	B
GR1260010	B	A077	*Neophron percnopterus*			c	0	5	i		G	C	B	C	B
GR1260010	B	A072	*Pernis apivorus*			r				P	DD	C	B	C	B
BG0002098	B	A402	*Accipiter brevipes*			r	5	8	p		G	A	A	C	A
BG0002098	B	A402	*Accipiter brevipes*			c	20	35	i		G	A	A	C	A
BG0002098	B	A404	*Aquila heliaca*			c	0	1	i		G	B	B	C	B
BG0002098	B	A089	*Clanga pomarina*			c	5	15	i		G	C	B	C	C
BG0002098	B	A029	*Ardea purpurea*			c	5	15	p		G	C	B	C	C
BG0002098	B	A024	*Ardeola ralloides*			c	10	25	i		G	C	B	C	C
BG0002098	B	A021	*Botaurus stellaris*			w	0	3	i		G	C	B	C	C
BG0002098	B	A021	*Botaurus stellaris*			c	0	0		P	DD	C	B	C	C
BG0002098	B	A215	*Bubo bubo*			p	3	3	p		G	C	B	C	C
BG0002098	B	A403	*Buteo rufinus*			p	3	3	p		G	C	B	C	C
BG0002098	B	A031	*Ciconia ciconia*			c	100	250	i		G	C	A	C	A

Natura code	Species						Population in the site					Site assessment			
	G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
BG0002098	B	A031	*Ciconia ciconia*			r	57	57	p		G	C	A	C	A
BG0002098	B	A030	*Ciconia nigra*			r	0	1	p		G	C	B	C	C
BG0002098	B	A030	*Ciconia nigra*			c	10	15	i		G	C	B	C	C
BG0002098	B	A080	*Circaetus gallicus*			r	3	3	p		G	C	A	C	A
BG0002098	B	A080	*Circaetus gallicus*			c	10	20	i		G	C	A	C	A
BG0002098	B	A081	*Circus aeruginosus*			c	15	25	i		G	C	B	C	C
BG0002098	B	A081	*Circus aeruginosus*			w	0	3	i		G	C	B	C	C
BG0002098	B	A082	*Circus cyaneus*			w	0	6	i		G	C	B	C	C
BG0002098	B	A082	*Circus cyaneus*			c	5	10	i		G	C	B	C	C
BG0002098	B	A083	*Circus macrourus*			c	2	2	i		G	C	B	C	C
BG0002098	B	A084	*Circus pygargus*			c	5	10	i		G	C	B	C	C
BG0002098	B	A027	*Ardea alba*			w	0	8	i		G	C	A	C	C
BG0002098	B	A027	*Ardea alba*			c	10	25	i		G	C	A	C	C
BG0002098	B	A026	*Egretta garzetta*			c	40	90	i		G	C	A	C	C
BG0002098	B	A511	*Falco cherrug*			p	1	1	p		G	B	A	C	B
BG0002098	B	A511	*Falco cherrug*			c	1	2	i		G	B	A	C	B
BG0002098	B	A103	*Falco peregrinus*			c	3	5	i		G	C	B	C	C
BG0002098	B	A103	*Falco peregrinus*			r	1	1	p		G	C	B	C	C
BG0002098	B	A103	*Falco peregrinus*			w	2	3	i		G	C	B	C	C
BG0002098	B	A097	*Falco vespertinus*			c	15	80	i		G	C	B	C	C
BG0002098	B	A127	*Grus grus*			c	0	5	i		G	C	A	C	C
BG0002098	B	A075	*Haliaeetus albicilla*			w	0	1	i		G	C	B	C	C
BG0002098	B	A092	*Hieraetus pennatus*			c	3	7	i		G	C	B	C	C
BG0002098	B	A022	*Ixobrychus minutus*			r	10	15	p		G	C	A	C	C
BG0002098	B	A022	*Ixobrychus minutus*			c	50	100	i		G	C	A	C	C
BG0002098	B	A077	*Neophron percnopterus*			r	0	2	i		G	C	B	C	C
BG0002098	B	A023	*Nycticorax nycticorax*			c	15	50	i		G	C	B	C	C
BG0002098	B	A020	*Pelecanus crispus*			c	10	50	i		G	C	B	C	B
BG0002098	B	A019	*Pelecanus onocrotalus*			c	0	1	i		G	C	B	C	C
BG0002098	B	A072	*Pernis apivorus*			c	15	30	i		G	C	B	C	C
BG0002098	B	A072	*Pernis apivorus*			r	1	3	p		G	C	B	C	C
BG0002098	B	A393	*Microcarbo pygmaeus*			c	50	250	i		G	C	B	C	C
BG0002098	B	A393	*Microcarbo pygmaeus*			w	20	100	i		G	C	B	C	C
BG0002098	B	A034	*Platalea leucorodia*			c	10	15	i		G	C	B	C	C
BG0002098	B	A032	*Plegadis falcinellus*			c	20	35	i		G	C	B	C	C
BG0002098	B	A132	*Recurvirostra avosetta*			c	0	10	i		G	C	B	C	C
BG0002098	B	A402	*Accipiter brevipes*			r	1	2	p		G	C	B	C	C
BG0002098	B	A089	*Aquila pomarina*			r	1	2	p		G	C	B	C	C
BG0002098	B	A215	*Bubo bubo*			p	1	1	p		G	C	A	C	C
BG0002072	B	A403	*Buteo rufinus*			p	3	4	p		G	C	B	C	B
BG0002072	B	A031	*Ciconia ciconia*			r	3	3	p		G	C	B	C	C
BG0002072	B	A080	*Circaetus gallicus*			c	0	0		P	DD	C	A	C	C

Natura code	Species						Population in the site					Site assessment			
	G	Code	Scientific Name	S	NP	T	Size Min	Size Max	Unit	Cat.	D.qual.	Pop. A|B|C|D	Con. A|B|C	Iso. A|B|C	Glo. A|B|C
BG0002072	B	A080	*Circaetus gallicus*			r	2	3	p		G	C	A	C	C
BG0002072	B	A103	*Falco peregrinus*			c	1	1	i		G	C	A	C	C
BG0002072	B	A103	*Falco peregrinus*			r	2	2	p		G	C	A	C	C
BG0002072	B	A092	*Hieraetus pennatus*			r	1	1	p		G	C	B	C	C
BG0002072	B	A072	*Pernis apivorus*			c	0	0		P	DD	C	A	C	B
BG0002072	B	A072	*Pernis apivorus*			r	3	5	p		G	C	A	C	B

The analysis of the above table shows that:

As regards BG0002078

Accipiter brevipes is a species that breeds in the study area and numbers at least one pair in the area. The data given are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Aegolius funereus is a resident species in the study area and has at least ten individuals in the area. The data provided are considered insufficient. The conservation status, which reflects the degree of protection of the habitat important to the species and the likelihood of its recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good. The species also winters in the study area. In this category of the species' relationship with Natura (overwintering) the data given are also of good quality and based on field data. The species numbers up to 22 individuals when overwintering. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated A. The species' population is also classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the species, is also good.

Aquila chrysaetos is a resident species in the study area and has at least one pair in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The

population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Clanga pomarina is a species that breeds in the study area and numbers up to one pair in the area. The data given are of good quality and based on field data. The conservation status, which reflects the degree of habitat protection important for the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as not isolated but within the limits of its range, and the overall conservation value of the site is adequate.

Tetrastes bonasia is a resident species in the study area and has at least 20 pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Bubo bubo is a resident species in the study area and there are at least two pairs in the area. The data provided are of good quality and are based on field data. The conservation status, which reflects the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Buteo rufinus is a resident species in the study area and has at least one pair in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Circaetus gallicus is a species that breeds in the study area and numbers at least one pair in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Falco cherrug is a species that breeds in the study area and has at least one individual in the area. The data provided are of good quality and are based on field data.

The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as not isolated but is located within the range boundary, and the overall conservation value of the site is good.

Falco peregrinus is a species that breeds in the study area and has at least one pair in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Glaucidium passerinum is a resident species in the study area and has at least three pairs in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as nearly isolated, and the overall conservation value of the site is excellent.

Gyps fulvus is a species that is concentrated in the study area and has at least one individual in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Aquila fasciata is a species that breeds in the study area and numbers up to one individual in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as not isolated but is located within the range boundary, and the overall conservation value of the site, as it relates to the conservation of the species, is excellent.

Hieraaetus pennatus is a species that breeds in the study area and numbers up to one pair in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent

conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Milvus migrans is a species that breeds in the study area and has up to two pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as not isolated but is within the range boundary, and the overall conservation value of the site is adequate.

Pernis apivorus is a breeding species in the study area and there are two pairs in the area. The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Tetrao urogallus is a resident species in the study area and there are at least 15 males in the area. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as nearly isolated, and the overall conservation value of the site is excellent.

For GR1260010

Accipiter brevipes is a breeding species in the study area, with its population in the study area accounting for 0 - 2 % of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is classified as B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Aquila chrysaetos is a breeding species in the study area and there are up to two pairs in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The

population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Clanga clanga is an overwintering species in the study area, and numbers up to one individual in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as not isolated but within the range boundary, and the overall conservation value of the site, which is relevant to the conservation of the species, is good.

Aquila heliaca is a species that occurs in concentrations in the study area with the population in the study area representing 0 - 2% of the national population (population criterion C). The data provided are considered insufficient. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as not isolated but within the limits of its range, and the overall conservation value of the site is good.

Clanga pomarina is a species that breeds in the study area and has at least five pairs in the area. The data given are of good quality and are based on field data. The conservation status, which reflects the degree of habitat protection important for the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Bubo bubo is a resident species in the study area and there are at least two pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as not isolated but is located within the range boundary, and the overall conservation value of the site, which is relevant to the conservation of the species, is good.

Buteo rufinus is a species that breeds in the study area in the study area and has at least two pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good

conservation. The population of the species is classified as not isolated but is located within the range boundary, and the overall conservation value of the site is good.

Ciconia nigra is a species that breeds in the study area and has at least two pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Circaetus gallicus is a breeding species in the study area and there are at least four pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is good. The species also occurs in concentrations in the study area. In this category of the species' relationship with Natura (in concentrations), the data provided are considered insufficient. The conservation status, which reflects the degree of protection of the habitat important for the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also good.

Circus aeruginosus is a species that occurs in concentrations in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Circus cyaneus is a species that occurs in concentrations in the study area, with its population in the study area representing 0 - 2 % of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Circus macrourus is a species that occurs in concentrations in the study area, with its population in the study area representing 0 - 2 % of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is rated B, which means good conservation. The population of the species is classified as not isolated but within the limits of its range, and the overall conservation value of the site is good.

Circus pygargus is a species that occurs in concentrations in the study area, with its population in the study area representing 0 - 2 % of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Falco peregrinus is a breeding species in the study area and there are at least three pairs in the area. The data provided are of good quality and are based on field data. The conservation status, which reflects the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is good. The species is also observed in concentrations in the study area. In this category of the species' relationship with Natura (in concentrations) the data given are considered insufficient. The conservation status, which reflects the degree of protection of the habitat important for the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also good.

Gyps fulvus is a species that occurs in concentrations in the study area and has up to three individuals in the area. The data given are of good quality and are based on field data. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated C, which means moderate or degraded conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Hieraaetus pennatus is a species that breeds in the study area and has at least two pairs in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is good. The species is also observed in concentrations in the study area. In this category of the species' relationship with Natura (in concentrations) the data given are considered insufficient. The conservation status, which reflects the degree of protection of the habitat important for the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a large range, and the overall conservation value of the site, as it relates to the conservation of the species, is also good.

Milvus migrans is a breeding species in the study area, with its population in the study area representing 0 - 2% of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is given a B criterion, which means good conservation. The population of the species is classified as not isolated but within the limits of its range, and the overall conservation value of the site is good. The species is also observed in concentrations in the study area. In this category of the species' relationship with Natura (in concentrations) the data given are also classified as insufficient. The conservation status, which reflects the degree of protection of the habitat important for the species and the likelihood of its recovery, is also rated B. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Neophron percnopterus is a species that breeds in the study area and has up to five individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is good.

Pernis apivorus is a breeding species in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Falco naumanni is a species that occurs in concentrations in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Falco eleonorae is a species that concentrates in the study area and numbers up to 15 individuals in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is good.

Falco columbarius is a species that occurs in concentrations in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Falco vespertinus is a species that occurs in concentrations in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of

the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Falco biarmicus is a species that occurs in concentrations in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is assigned a conservation criterion of B, meaning good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Falco cherrug is a species that occurs in concentrations in the study area, with its population in the study area representing 0-2% of the national population (population criterion C). The data provided are considered insufficient. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Haliaeetus albicilla is a resident species in the study area and has up to one individual in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as not isolated but is located within the range boundary, and the overall conservation value of the site is excellent.

For BG0002098

Accipiter brevipes is a breeding species in the study area and there are at least five pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important for the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is excellent. The species is also observed in concentrations in the study area and has at least 20 individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also considered to be

of good quality. The conservation status, reflecting the degree of protection of the habitat that is important for the species and the likelihood of its recovery, is also rated as A. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is also excellent.

Aquila heliaca is a species that is observed in concentrations in the study area and numbers up to one individual in the area. The data given are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, which relates to the conservation of the species, is good.

Clanga pomarina is a species that is observed in concentrations in the study area and has at least five individuals in the area. The data given are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Ardea purpurea is a species that is observed in concentrations in the study area and at least five pairs in the area. The data given are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Ardeola ralloides is a species that is observed in concentrations in the study area and at least ten individuals in the area. The data given are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Botaurus stellaris is a wintering species in the study area and numbers up to three individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good

conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area. In this category of the species' relationship with Natura (in concentrations) the data given are considered insufficient. The conservation status, which reflects the degree of protection of the habitat important for the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also considered sufficient.

Bubo bubo is a resident species in the study area and there are up to three pairs in the area. The data provided are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Buteo rufinus is a resident species in the study area and there are up to three pairs in the area. The data provided are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Ciconia ciconia is a breeding species in the study area, with up to 57 pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is excellent. The species is also observed in concentrations in the study area and numbers at least 100 individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated as A. The species population is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also excellent.

Ciconia nigra is a breeding species in the study area and numbers up to one pair in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area and numbers at least ten individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also considered to be of good quality. Conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Circaetus gallicus is a species that breeds in the study area and numbers up to three pairs in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is excellent. The species is also observed in concentrations in the study area and numbers at least ten individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated as A. The species population is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also excellent.

Circus aeruginosus is a wintering species in the study area and numbers up to three individuals in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area and has at least 15 individuals in the area when in concentration. In this category of the species' relationship with Natura (in

concentration) the data provided are also considered to be of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Circus cyaneus is a wintering species in the study area and numbers up to six individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area and has at least five individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also considered to be of good quality. Conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Circus macrourus is a species that occurs in concentrations in the study area, with up to two individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Circus pygargus is a species that occurs in concentrations in the study area, with at least five individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Ardea alba is an overwintering species in the study area, with up to eight individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent

conservation. The species population is classified as non-isolated with a large range, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area and numbers at least ten individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data given are also of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated as A. The species population is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Egretta garzetta is a species observed in concentrations in the study area, and numbers at least 40 individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Falco cherrug is a resident species in the study area and numbers up to one pair in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good. The species is also observed in concentrations in the study area and numbers at least one individual in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated as A. The species population is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also good.

Falco peregrinus is a breeding species in the study area and numbers up to one pair in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in

concentrations in the study area and has at least three individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also considered to be of good quality. Conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate. Finally, the species overwinters in the study area and has at least two individuals in the area when overwintering. In this category of the species' relationship with Natura (overwintering) the data provided are also of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Falco vespertinus is a species observed in concentrations in the study area and numbers at least 15 individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Grus grus is a species that occurs in concentrations in the study area and has up to five individuals in the area. The data provided are of good quality and are based on field data. Conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Haliaeetus albicilla is a wintering species in the study area and numbers up to one individual in the area. The data provided are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Hieraaetus pennatus is a species that occurs in concentrations in the study area and has at least three individuals in the area. The data provided are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection

important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

***Neophron percnopterus*)** is a species that breeds in the study area and has up to two individuals in the area. The data given are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Pernis apivorus is a species that breeds in the study area and numbers up to one pair in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area and has at least 15 individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also considered to be of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Nycticorax nycticorax is a species that is observed in concentrations in the study area and has at least 15 individuals in the area. The data provided are of good quality and are based on field data The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Pelecanus crispus is a species that occurs in concentrations in the study area and has at least ten individuals in the area. The data provided are of good quality and are based on field data The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which

means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Pelecanus crispus is a species observed in concentrations in the study area and numbers up to one individual in the area. The data provided are of good quality and are based on field data The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as not isolated with a wide distribution, and the overall conservation value of the site, which is relevant to the conservation of the species, is adequate.

Microcarbo pygmaeus is an overwintering species in the study area and numbers at least 20 individuals in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area and numbers at least 50 individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also considered to be of good quality. Conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated B. The population of the species is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Ixobrychus minutus is a breeding species in the study area and there are at least ten pairs in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area and numbers at least 50 individuals in the area when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also considered to be of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated as A. The species population is

also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Platalea leucorodia is a species observed in concentrations in the study area and has at least ten individuals in the area. The data provided are of good quality and are based on field data The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of its recovery, is classified as B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Plegadis falcinellus is a species that occurs in concentrations in the study area and has at least 20 individuals in the area. The data provided are of good quality and are based on field data The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Recurvirostra avosetta is a species observed in concentrations in the study area and numbers up to ten individuals in the area. The data provided are of good quality and are based on field data The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

For BG0002072

Accipiter brevipes is a species that breeds in the study area and numbers at least one pair in the area. The data given are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Clanga pomarina is a species that breeds in the study area and has at least one pair in the area. The data given are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated B, which means good conservation. The

population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Bubo bubo is a resident species in the study area and numbers up to one pair in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Buteo rufinus is a resident species in the study area and there are at least three pairs in the area. The data provided are of good quality and are based on field data. The conservation status reflecting the degree of habitat protection important to the species and the likelihood of recovery is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is good.

Ciconia Ciconia is a species that breeds in the study area and has up to three pairs in the area. The data given are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Circaetus gallicus is a breeding species in the study area and there are at least two pairs in the area. The data provided are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area. In this category of the species' relationship with Natura (in concentrations) the data given are also considered to be of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated A. The species population is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Falco peregrinus is a breeding species in the study area and there are up to two pairs in the area. The data provided are of good quality and are based on field data. The

conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, which means excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate. The species is also observed in concentrations in the study area and numbers up to one individual when in concentration. In this category of the species' relationship with Natura (in concentration) the data provided are also considered to be of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated as A. The species population is also classified as non-isolated with a wide distribution, and the overall conservation value of the site is also adequate.

Hieraaetus pennatus is a species that breeds in the study area and numbers up to one pair in the area. The data given are of good quality and based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated B, which means good conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site is adequate.

Pernis apivorus is a breeding species in the study area and there are at least three pairs in the area. The data given are of good quality and are based on field data. The conservation status, reflecting the degree of habitat protection important to the species and the likelihood of recovery, is rated A, meaning excellent conservation. The population of the species is classified as non-isolated with a wide distribution, and the overall conservation value of the site, as it relates to the conservation of the species, is good. The species is also observed in concentrations in the study area. In this category of the species' relationship with Natura (in concentrations) the data given are also considered to be of good quality. The conservation status, reflecting the degree of protection of the habitat important to the species and the likelihood of its recovery, is also rated A. The species population is also classified as non-isolated with a wide distribution, and the overall conservation value of the site, in terms of the species' conservation, is also good.

The existing baseline conditions, where they have been established, are

The objective of this Specific Ecological Assessment is to assess the potential impacts of the project location on the important species, conservation objectives and integrity of the Natura 2000 protected areas under consideration.

The existing reference values (target value and exogenous target value) are given in Tables 64, 65 and 66 below, in accordance with the tables given in an annex at the end of the above mentioned decisions presented in a previous section (Government Gazette 3118/B/10-05-2023 and Government Gazette 1807/B/22-03-2023) and referring to the habitat types of interest and species of interest (fauna, flora and avifauna).

Table 64. Part of the tables in which the Conservation Objectives of Annex II species of interest are listed for the protected GR1260005 under study (Source: 1807/B/22-03-2023).

Πίνακας GR1260005_2. Είδη του Παραρτήματος ΙΙ της Οδηγίας 92/43/ΕΟΚ

Πίνακας GR1260005_2.1. *Dactylorhiza kalopissii* subsp. *kalopissii* (6996)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Εξάπλωση	Εκτάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Βόσκηση	% βοσκημένων ατόμων	<20%	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.2. *Gladiolus palustris* (4096)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Εξάπλωση	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.5. *Bombina variegata* (1193)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	500	Διατήρηση	
Εξάπλωση	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	35	Διατήρηση	
Ενδιαίτημα αναπαραγωγής	Αριθμός αναπαραγωγικών θέσεων	4	Διατήρηση	

Πίνακας GR1260005_2.6. *Elaphe quatuorlineata* (1279)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	200	Διατήρηση	
Εξάπλωση	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	24	Διατήρηση	
Ενδιαίτημα	Εκτάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.7. *Testudo graeca* (1219)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός αναπαραγωγικών ατόμων	1.500	Διατήρηση	

Πίνακας GR1260005_2.8. *Lutra lutra* (1355)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός κελιών (1 χλμ. x 1 χλμ.)	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Εξάπλωση	τ.χλμ.	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Ενδιαίτημα	τ.χλμ.	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_2.9. *Ursus arctos* (1354)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός ατόμων	5	Επίτευξη	
Αναπαραγωγική ικανότητα πληθυσμού	Αριθμός χωροκρατειών θηλυκών με μικρά	1-2	Επίτευξη	
Εξάπλωση	τ. χλμ.	45	Διατήρηση	
Ενδιαίτημα	τ. χλμ.	39	Διατήρηση	Το ενδιαίτημα του είδους χαρακτηρίζεται από έντονη δασοκάλυψη (δάση φυλλοβόλων και κωνοφόρων) έως ανοιχτές περιοχές με χαμηλότερη δασοκάλυψη και θαμνώδη βλάστηση.
Τομείς διαχείμασης	τ. χλμ.	13,7	Διατήρηση	

Πίνακας GR1260005_2.10. *Vormela peregusna* (2635)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Πληθυσμός	Αριθμός ατόμων	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Table 65. Part of the tables in which the Conservation Objectives of the Annex I habitat types of interest are listed for the protected GR1260005 under study (Source: 1807/B/22-03-2023).

Πίνακας GR1260005_1. Τύποι οικοτόπων του Παραρτήματος Ι της Οδηγίας 92/43/ΕΟΚ

Πίνακας GR1260005_1.1. Αλπικά και βόρεια χέρσα εδάφη (4060)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	21,9	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	Χαρακτηριστικά είδη: *Juniperus communis* subsp. *nana* στον θαμνώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.

Πίνακας GR1260005_1.2. Δενδροειδή *Juniperus* spp. (5210)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	333,4	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>40%	Διατήρηση	Χαρακτηριστικά είδη: *Juniperus* spp. στον θαμνώδη όροφο. Σημειώνεται ότι ο στόχος αφορά κυριαρχία ή συγκυριαρχία των χαρακτηριστικών ειδών στον θαμνώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.

Πίνακας GR1260005_1.3. Ξηρές χλοώδεις διαπλάσεις της ανατολικής Μεσογείου (Scorzoneratalia villosae) (62A0)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	1.124,4	Διατήρηση	
Κάλυψη μη τυπικών ειδών (πλην ξενικών & χωροκατακτητικών)	% κάλυψη	<10%	Ανεπαρκή δεδομένα	Μη τυπικά είδη: φανερόφυτα (δέντρα & θάμνοι) και τα φρυγανικά είδη.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.4. Ασβεστολιθικά βραχώδη πρανή με χασμοφυτική βλάστηση (8210)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	8,8	Διατήρηση	
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου	Ανεπαρκή δεδομένα	
		επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου		

Πίνακας GR1260005_1.5. Μεσοευρωπαϊκά ασβεστόφιλα δάση οξιάς Cephalanthero-Fagion (9150)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	268,5	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>75%	Διατήρηση	Χαρακτηριστικά είδη: *Fagus* spp. στον δενδρώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.
Παρουσία δέντρων μεγάλης ηλικίας/διαμέτρου	Αριθμός ατόμων ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία νεκρού ξύλου	Κυβ. μ. ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.6. Πευκοδάση (*Pinus sylvestris*) Ροδόπης και Οροσειράς του Αίμου (91CA)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	31,9	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>50%	Ανεπαρκή δεδομένα	Χαρακτηριστικά είδη: *Pinus sylvestris* στον δενδρώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.
Παρουσία δέντρων μεγάλης ηλικίας/διαμέτρου	Αριθμός ατόμων ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία νεκρού ξύλου	Κυβ. μ. ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Πίνακας GR1260005_1.7. (Υπο)μεσογειακά πευκοδάση με ενδημικά μαυρόπευκα (9530)

Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
Έκταση	Εκτάρια	667,7	Διατήρηση	
Κάλυψη χαρακτηριστικών ειδών	% κάλυψη	>50%	Διατήρηση	Χαρακτηριστικά είδη: *Pinus nigra* στον δενδρώδη όροφο.
Κάλυψη ξενικών ή/και μη αυτόχθονων χωροκατακτητικών ειδών	% κάλυψη	<5% και σε λιγότερο από το 25% του συνόλου επιλεγμένων θέσεων αξιολόγησης του τύπου οικοτόπου	Ανεπαρκή δεδομένα	Αφορά δενδρώδη ή θαμνώδη ξενικά ή/και μη αυτόχθονα χωροκατακτητικά είδη.
Παρουσία δέντρων μεγάλης ηλικίας/διαμέτρου	Αριθμός ατόμων ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
Παρουσία νεκρού ξύλου	Κυβ. μ. ανά εκτάριο	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Table 66. Part of the tables in which the Conservation Objectives for Annex I bird species of interest are listed for the protected GR1260010 under study (Source: 3118/B/10-05-2023).

Στόχοι διατήρησης για την ΖΕΠ Όρος Μπέλες (GR1260010)

Είδη που αναφέρονται στις παρ. 1 και 4 του άρθρου 4 της 2 υπό στοιχεία 37338/1807/Ε.103/01.09.2010 κοινής υπουργικής απόφασης

Κωδικός	Ονομασία	Τύπος	Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
A402	*Accipiter brevipes*	r	Πληθυσμός	Ζευγάρια	5	Διατήρηση	
A091	*Aquila chrysaetos*	r	Πληθυσμός	Ζευγάρια	5	Επίτευξη	
A404	*Aquila heliaca*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A215	*Bubo bubo*	p	Πληθυσμός	Ζευγάρια	2	Διατήρηση	
A403	*Buteo rufinus*	r	Πληθυσμός	Ζευγάρια	2	Διατήρηση	
A030	*Ciconia nigra*	r	Πληθυσμός	Ζευγάρια	2	Διατήρηση	
A080	*Circaetus gallicus*	r	Πληθυσμός	Ζευγάρια	4	Διατήρηση	
A080	*Circaetus gallicus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A081	*Circus aeruginosus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A082	*Circus cyaneus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A083	*Circus macrourus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A859	*Clanga clanga*	w	Πληθυσμός	Άτομα	1	Διατήρηση	
A858	*Clanga pomarina*	r	Πληθυσμός	Ζευγάρια	7	Επίτευξη	
A101	*Falco biarmicus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A511	*Falco cherrug*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A098	*Falco columbarius*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A100	*Falco eleonorae*	c	Πληθυσμός	Άτομα	15	Διατήρηση	
A095	*Falco naumanni*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A103	*Falco peregrinus*	r	Πληθυσμός	Ζευγάρια	3	Διατήρηση	
A103	*Falco peregrinus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A097	*Falco vespertinus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Κωδικός	Ονομασία	Τύπος	Παράμετρος	Μονάδα μέτρησης παραμέτρου	Τιμή στόχου	Εξειδικευμένος στόχος	Παρατηρήσεις
A078	*Gyps fulvus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A075	*Haliaeetus albicilla*	p	Πληθυσμός	Άτομα	1	Διατήρηση	
A092	*Hieraaetus pennatus (Aquila pennata)*	r	Πληθυσμός	Ζευγάρια	3	Επίτευξη	
A092	*Hieraaetus pennatus (Aquila pennata)*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A073	*Milvus migrans*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A073	*Milvus migrans*	r	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A077	*Neophron percnopterus*	c	Πληθυσμός	Άτομα	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	
A072	*Pernis apivorus*	r	Πληθυσμός	Ζευγάρια	3	Διατήρηση	
A234	*Picus canus*	p	Πληθυσμός	Ζευγάρια	Ανεπαρκή δεδομένα	Ανεπαρκή δεδομένα	

Memo

Code: The code of the species as indicated in the Natura 2000 database
Name: The scientific name of the species
Type: The population type under which the species occurs in the Special Protection Area

- Permanent (p): the species occurs in the site throughout the year (non-migratory species, resident population of a migratory species)
- Reproductive (r): the species uses the site for rearing chicks (e.g. breeding, nest building).
- Concentrative (c): the species uses the site for staging or roosting or stopping during migration or for changing wing outside its breeding site and excluding overwintering.
- Overwintering (w): the species uses the site during winter.

Parameter: The parameter against which the Conservation Objective is defined.
Parameter unit of measurement: The unit of measurement by which the parameter against which the Conservation Target is defined is specified.
Target value: The reference value of the Conservation Target for each species, which is the same as the Satisfactory Reference Value (Desirable Reference Value, NRV) for the species in the relevant Special Protection Area.
Specific target: The action required to meet the Conservation Objective.

For the species of fauna and flora of interest listed in Annex II to Directive 92/43/EEC and of interest to birds listed in Annex I to the Birds Directive, for which insufficient data are shown in the above extract from Tables 65 and 66 (*for the habitat types of interest listed in Annex I to Directive 92/43/EEC, a target value and a specific target value are given for all of them*), but also for the species of avifauna of interest which the nearest Bulgarian Special Protection Areas under consideration conserve, the general conservation objective for the Natura 2000 network of protected areas under consideration could be taken to be the maintenance or restoration to a satisfactory conservation status, on the basis of the content of the Standard Data Forms for those Special Protection Areas and for the neighbouring Bulgarian Special Conservation Area (Tables 67 and 68).

Table 67. Part of the Standard Data Forms (standard data forms) for the Natura 2000 network sites BG0002078, GR1260010, BG0002098 and BG0002072, in which the population data of the Annex I species of interest of the Birds Directive are listed.

Natura code	Scientific Name	T	Size Min	Size Max	Unit	Cat.	Pop. A|B|C|D
BG0002078	*Accipiter brevipes*	r	1	2	p		C
BG0002078	*Aegolius funereus*	w	22	22	i		B
BG0002078	*Aegolius funereus*	p	10	12	p		B
BG0002078	*Aquila chrysaetos*	p	1	2	p		C
BG0002078	*Clanga pomarina*	r	1	1	p		C
BG0002078	*Tetrastes bonasia*	p	20	30	p		C
BG0002078	*Bubo bubo*	p	2	4	p		C
BG0002078	*Buteo rufinus*	p	1	2	p		C
BG0002078	*Circaetus gallicus*	r	1	2	p		C
BG0002078	*Falco cherrug*	r	1	2	i		C
BG0002078	*Falco peregrinus*	r	1	2	p		C
BG0002078	*Glaucidium passerinum*	p	3	5	p		B
BG0002078	*Gyps fulvus*	c	1	3	i		C
BG0002078	*Aquila fasciata*	r	0	1	i		A
BG0002078	*Hieraetus pennatus*	r	1	1	p		C
BG0002078	*Milvus migrans*	r	2	2	p		C
BG0002078	*Pernis apivorus*	r	2	4	p		C
BG0002078	*Tetrao urogallus*	p	15	25	males		C
GR1260010	*Accipiter brevipes*	r				P	C
GR1260010	*Aquila chrysaetos*	r	2	2	p		C
GR1260010	*Clanga clanga*	w	1	1	i		C
GR1260010	*Aquila heliaca*	c				P	C
GR1260010	*Clanga pomarina*	r	5	8	P		B

Natura code	Scientific Name	T	Size Min	Size Max	Unit	Cat.	Pop. A|B|C|D
GR1260010	*Bubo bubo*	p	2	4	P		C
GR1260010	*Buteo rufinus*	r	2	4	p		C
GR1260010	*Ciconia nigra*	r	2	5	p		C
GR1260010	*Circaetus gallicus*	c				P	C
GR1260010	*Circaetus gallicus*	r	4	6	p		C
GR1260010	*Circus aeruginosus*	c				P	C
GR1260010	*Circus cyaneus*	c				P	C
GR1260010	*Circus macrourus*	c				P	C
GR1260010	*Circus pygargus*	c				P	D
GR1260010	*Falco biarmicus*	c				P	C
GR1260010	*Falco cherrug*	c				P	C
GR1260010	*Falco columbarius*	c				P	C
GR1260010	*Falco eleonorae*	c	15	75	i		C
GR1260010	*Falco naumanni*	c				P	C
GR1260010	*Falco peregrinus*	c				P	C
GR1260010	*Falco peregrinus*	r	3	5	p		C
GR1260010	*Falco vespertinus*	c				P	C
GR1260010	*Gyps fulvus*	c	0	3	i		C
GR1260010	*Haliaeetus albicilla*	p	1	1	i		A
GR1260010	*Hieraetus pennatus*	c				P	C
GR1260010	*Hieraetus pennatus*	r	2	3	p		C
GR1260010	*Milvus migrans*	c				P	C
GR1260010	*Milvus migrans*	r				P	C
GR1260010	*Neophron percnopterus*	c	0	5	i		C
GR1260010	*Pernis apivorus*	r				P	C
BG0002098	*Accipiter brevipes*	r	5	8	p		A
BG0002098	*Accipiter brevipes*	c	20	35	i		A
BG0002098	*Aquila heliaca*	c	0	1	i		B
BG0002098	*Clanga pomarina*	c	5	15	i		C
BG0002098	*Ardea purpurea*	c	5	15	p		C
BG0002098	*Ardeola ralloides*	c	10	25	i		C
BG0002098	*Botaurus stellaris*	w	0	3	i		C
BG0002098	*Botaurus stellaris*	c	0	0		P	C
BG0002098	*Bubo bubo*	p	3	3	p		C
BG0002098	*Buteo rufinus*	p	3	3	p		C
BG0002098	*Ciconia ciconia*	c	100	250	i		C
BG0002098	*Ciconia ciconia*	r	57	57	p		C
BG0002098	*Ciconia nigra*	r	0	1	p		C
BG0002098	*Ciconia nigra*	c	10	15	i		C
BG0002098	*Circaetus gallicus*	r	3	3	p		C
BG0002098	*Circaetus gallicus*	c	10	20	i		C
BG0002098	*Circus aeruginosus*	c	15	25	i		C
BG0002098	*Circus aeruginosus*	w	0	3	i		C

Natura code	Scientific Name	T	Size Min	Size Max	Unit	Cat.	Pop. A|B|C|D
BG0002098	*Circus cyaneus*	w	0	6	i		C
BG0002098	*Circus cyaneus*	c	5	10	i		C
BG0002098	*Circus macrourus*	c	2	2	i		C
BG0002098	*Circus pygargus*	c	5	10	i		C
BG0002098	*Ardea alba*	w	0	8	i		C
BG0002098	*Ardea alba*	c	10	25	i		C
BG0002098	*Egretta garzetta*	c	40	90	i		C
BG0002098	*Falco cherrug*	p	1	1	p		B
BG0002098	*Falco cherrug*	c	1	2	i		B
BG0002098	*Falco peregrinus*	c	3	5	i		C
BG0002098	*Falco peregrinus*	r	1	1	p		C
BG0002098	*Falco peregrinus*	w	2	3	i		C
BG0002098	*Falco vespertinus*	c	15	80	i		C
BG0002098	*Grus grus*	c	0	5	i		C
BG0002098	*Haliaeetus albicilla*	w	0	1	i		C
BG0002098	*Hieraetus pennatus*	c	3	7	i		C
BG0002098	*Ixobrychus minutus*	r	10	15	p		C
BG0002098	*Ixobrychus minutus*	c	50	100	i		C
BG0002098	*Neophron percnopterus*	r	0	2	i		C
BG0002098	*Nycticorax nycticorax*	c	15	50	i		C
BG0002098	*Pelecanus crispus*	c	10	50	i		C
BG0002098	*Pelecanus onocrotalus*	c	0	1	i		C
BG0002098	*Pernis apivorus*	c	15	30	i		C
BG0002098	*Pernis apivorus*	r	1	3	p		C
BG0002098	*Microcarbo pygmaeus*	c	50	250	i		C
BG0002098	*Microcarbo pygmaeus*	w	20	100	i		C
BG0002098	*Platalea leucorodia*	c	10	15	i		C
BG0002098	*Plegadis falcinellus*	c	20	35	i		C
BG0002098	*Recurvirostra avosetta*	c	0	10	i		C
BG0002072	*Accipiter brevipes*	r	1	2	p		C
BG0002072	*Aquila pomarina*	r	1	2	p		C
BG0002072	*Bubo bubo*	p	1	1	p		C
BG0002072	*Buteo rufinus*	p	3	4	p		C
BG0002072	*Ciconia ciconia*	r	3	3	p		C
BG0002072	*Circaetus gallicus*	c	0	0		P	C
BG0002072	*Circaetus gallicus*	r	2	3	p		C
BG0002072	*Falco peregrinus*	c	1	1	i		C
BG0002072	*Falco peregrinus*	r	2	2	p		C
BG0002072	*Hieraetus pennatus*	r	1	1	p		C
BG0002072	*Pernis apivorus*	c	0	0		P	C
BG0002072	*Pernis apivorus*	r	3	5	p		C

Table 68. Section of the Standard Data Forms for Natura 2000 sites GR1260005 and BG0001028, which contain the population data of the fauna and flora species of interest listed in Annex II to Directive 92/43/EEC.

Natura Code	Scientific Name	T	Size Min	Size Max	Unit	Cat.	Pop. A|B|C|D
GR1260005	*Bombina variegata*	p	0	0		R	C
GR1260005	*Dactylorhiza kalopissii*		0	0		R	
GR1260005	*Elaphe quatuorlineata*	p	0	0		P	C
GR1260005	*Gladiolus palustris*	p	1	1	grids5x5	P	A
GR1260005	*Lutra lutra*	p	0	0		P	C
GR1260005	*Testudo graeca*	p	0	0		R	C
GR1260005	*Premela peregusna*		0	0			
BG0001028	*Bombina variegata*	p	19	19	localities	C	C
BG0001028	*Barbastella barbastellus*	p	426	795	i	R	B
BG0001028	*Canis lupus*	p	12	16	i	P	B
BG0001028	*Lutra lutra*	p	6	7	i		C
BG0001028	*Miniopterus schreibersii*	p	101	250	i	R	C
BG0001028	*Myotis bechsteinii*	p	250	500	i	R	C
BG0001028	*Myotis blythii*	p	11	50	i	R	C
BG0001028	*Myotis emarginatus*	r	11	50	i	V	C
BG0001028	*Myotis myotis*	p	11	50	i	R	C
BG0001028	*Rhinolophus euryale*	p	11	50	i	R	C
BG0001028	*Rhinolophus ferrumequinum*	p	51	100	i	R	C
BG0001028	*Rhinolophus hipposideros*	p	251	500	i	C	B
BG0001028	*Rupicapra rupicapra balcanica*	p	20	40	i		C
BG0001028	*Ursus arctos*	p	22	22	i		B
BG0001028	*Premela peregusna*	p	0	0		P	C
BG0001028	*Dactylorhiza kalopissii*	p	85	85	i		A
BG0001028	*Gladiolus palustris*	p	33	33	i		C
BG0001028	*Elaphe quatuorlineata*	p	2	2	localities	V	A
BG0001028	*Elaphe situla*	p	0	0	localities	P	C
BG0001028	*Emys orbicularis*	p	3	3	localities	V	C
BG0001028	*Testudo graeca*	p	22	22	localities	C	C
BG0001028	*Testudo hermanni*	p	4	4	localities	V	C

Main pressures and threats they face

The pressures and threats to the bird species of interest listed in Annex I of Directive 2009/147/EC, the fauna and flora species of interest listed in Annex II of Directive 92/43/EEC and the habitat types of interest listed in Annex I of Directive 92/43/EEC have been fully analysed in previous chapters of this SEA. Furthermore, with regard to the pressures and threats referred to in the Standard Data Forms for the

Natura 2000 study sites have been reported in a previous chapter of this SEA (see Tables 7, 8, 9, 10 and 11).

Ecological functions

The wider area of the project under study is located within the Regional Unit of Serres, on the mountain Orvilos, on the Greek-Bulgarian border. It is located on the border of the prefectures of Drama and Serres, and continues into Bulgaria, being essentially the southernmost mountain of the Pirin mountain range. It is connected to the east with the Falakro Mountains, to the south with the Menoikio Mountains, and to the west with the Brontus Mountains. The flora of the wider area of the mountain includes pine and beech forests and areas of alpine and subalpine meadows. Of the flora species listed in Annex II to Directive 92/43/EEC, according to the website www.votaniki.gr, *Dactylorhiza kalopissii, Gladiolus palustris, Viola delphinantha* have been recorded in the protected Natura 20005 area, while the following species of minor importance have been recorded: *Androsace villosa, Anthyllis vulneraria subsp. Anthyllos vulgarica, Arctostaphylos uva-ursi, Arenaria filicaulis subsp. graeca, Asperula aristata subsp. nestia, Centaurea parilica, Cephalanthera damasonium, Colchicum doerfleri, Corallorhiza trifida, Cytisus agnipilus, Dianthus gracilis subsp. drenowskianus, Dianthus noeanus, Dianthus petraeus subsp. orbelicus, Dianthus simulans, Epipactis helleborine, Erysimum drenowskii, Festuca pirinica, Fritillaria drenovskii, Genista subcapitata, Haplophyllum balcanicum, Himantoglossum hircinum, Hypericum rochelii, Inula ensifolia, Iris reichenbachii, Laserpitium siler subsp. leave, Lilium martagon, Limodorum abortivum, Neottia nidus-avis, Nigritella nigra, Orchis morio, Orchis ustulata, Paronychia macedonica, Paronychia rechingeri, Platanthera bifolia, Platanthera chlorantha, Poa thessala, Potentilla apennina subsp. stoianovii, Saxifraga ferdinandi-coburgi, Saxifraga stribrnyi, Sempervivum kindingeri, Sideritis scardica, Silene balcanica, Silene radicosa subsp. radicosa, Stachys recta subsp. recta, Thymus thracicus, Viola perinensis.* According to the database and mapping for land cover (Corine land cover 2018), the production permit polygons of the project under study are located within transitional forest and shrubland, broadleaf forest, and sparse vegetation areas.

Trends in the development of the Study Area

The study area examined is located within a wider area of high wind potential and as such there are numerous applications for wind farms, which are considered on a case by case basis and only implemented if assessed as not likely to damage the integrity and conservation status of the Natura 2000 network sites in the wider study area. Furthermore, the project under consideration may also bring direct benefits to the settlements within the wider study area, with an increase in temporary or permanent jobs as a result of its development.

7. DETAILED IMPACT ASSESSMENT - ANALYSIS AND EVALUATION OF IMPACTS

The previous sections have already presented the tables of species recorded in the field survey area, the important species and important habitat types of both the main protected area under study Special Conservation Area GR1260005 have been reported, partially within which the project under study is located, as well as the important species of the neighbouring Special Protection Areas BG0002078, GR1260010, BG0002098 and BG0002072, and the important species of the neighbouring Special Conservation Area BG0001028, their protection status, ecological requirements, threats, etc. have been reported.etc., and the rationale for listing the species of importance for the project site in the respective tables.

The survey area examined is, as already mentioned, located within an area of high wind potential and as such there are applications for wind farms, which are considered on a case by case basis and implemented if they are assessed as not likely to damage the integrity and conservation status of the area.

Impact assessment methodology/framework

In order to assess and evaluate the potential impacts of the proposed project on the above mentioned species of avifauna important to the area, the ecological sensitivity of the species, the sensitivity to impacts from wind farm siting and other threats to these species, and the estimated magnitude of each impact will be taken into account, based on field surveys and analyses of these (e.g.e.g. spatial distribution, height and movement behaviour for birds, critical nesting, roosting, foraging habitats, etc.).

Based on the above, the significance of the effects on the conservation status of each of the above species is assessed, i.e. the extent to which the project under consideration will worsen the conservation status of each species or the effort to restore it.

As already mentioned, the potential impacts of the installation and operation of wind farms on bird populations are divided into *impact mortality*, which only concerns the operation phase of the project and for which the magnitude of the impact on the installed turbines or on the energy transmission grid is assessed, and *direct habitat loss,* which concerns both the construction and operation phases of the project, and essentially the magnitude of the impact of the

In view of the above, and given that the project will be installed in a small area (within which an even smaller intervention will take place), within habitat types that are abundant in the area, it was assessed in advance that the most significant potential impact to be investigated relates to impact mortality. No direct habitat loss is not expected to occur as no raptor nesting sites were identified in the project installation area and the availability of similar habitat to existing habitat in the area is high. Furthermore, the Environmental Impact Assessment submitted foresees the horticultural restoration of the impact areas. Similarly, the impact of disturbance and movement barriers is considered negligible as, based on the proposals in this Special Ecological Assessment, it is envisaged that the installation of the project will cease during the breeding season of the birds, and the high availability of similar habitat types in the area and the small size of the intervention area preclude habitat fragmentation and habitat discontinuity. Finally, as mentioned above, the intervention within the production licence blocks of the project under study will be much smaller, since only the areas within the project that will be used for the installation of each wind turbine (foundations, infrastructure works, etc.) will be affected, while the opening of access roads will be significantly reduced due to the existing road network in the wider area. This is reinforced by the fact that only a very small part of the planned new opening will take place within the protected Special Area of Conservation , which is essentially the access road between the three wind turbines, which are located within it, and without passing through any type of priority habitat.

Moreover, the impacts on the natural environment from the electrical interconnection works of the project (voltage step-up substation and high and medium voltage lines, as well as the transmission lines) are minor and are mainly limited to the construction phase and, with regard to the transmission lines in particular, the Special Ecological Assessment proposes that they be installed underground, so as not to cause any negative impact on the avifauna of the area. Finally, the wider project area is not fenced off and the disturbance during the construction phase is of short duration and intensity and ultimately reversible after the end of the construction works.

Co-operative effects

The assessment and evaluation of the effects on bird populations of the project under consideration shall take into account the synergistic effects of existing, approved or planned projects as assessed in the interpretative guide for the management of

Natura 2000 sites on the basis of Article 6 of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206/22.07.1992).

As mentioned above in the impact assessment methodology, the categories of impacts that will be considered are impact *mortality due to impact, direct habitat loss* and *disturbance and displacement due to barrier creation.*

Synergistic impacts from the installation of a project in an area result from the cumulative effect of all types of impacts from these projects (approved or planned) and are primarily on the avifauna of the area. According to the international literature and the Guidelines, synergistic effects can be considered at two levels. Projects located within a very short distance and radius from the project under consideration (usually < 2 km) and those located within a larger radius and area (usually between 2 km and 10 km). The reason is that in the first case the project in question may be small in size with little or no impact mainly on the species of avifauna but in a short radius around it many other small or larger projects may be located and in total cause impacts on the species and in the second case, regardless of the assessment of the specific project, numerous projects, regardless of the size of the impact, may be located in a larger radius which multiply the impact of the project under consideration. It is considered that the wind farms that are worthy of reference and examination are mainly those that have been granted an operating licence, an installation licence and a production licence within a radius of 10 km from the project under consideration.

In the wider installation area of the project under study, which **is partially located within GR1260005**, and within a radius of 10 km from the boundaries of the production licence blocks, there are four wind farms that have been granted an operating licence (see Table 29, Source: P.A.E. - Energy Regulatory Authority available on 09/12/2024), which have a total capacity of 79,1 MW, and consist of 39 wind turbines. Of the four wind power plants in operation (licensed), none is located within 2 km of the project under consideration. It is worth noting that of the four wind farms with an operating licence, one (KORYFI wind farm, consisting of 20 turbines) is partially located within the 10 km radius area (Map 145), with the result that of the 20 turbines of which the above wind farm consists, 15 of them are located within the area. Therefore, the total number of turbines of the wind farms in operation within a 10 km radius of the project under consideration is 34 turbines. Also, in the area of the study

project, and within a radius of 10 km, there are five wind farms, which have been granted a production license (Source: R.A.E. available on 09/12/2024), which have a total capacity of 59 MW and consist of 17 wind turbines. Of the above five wind farms with a production license, two are located less than 2 km from the project under study, and none of them are located within the main protected area under study, the Natura 2000 Special Conservation Area GR1260008.

With regard to the main study area GR1260005, and given that the project is partly located within it, in order to better address its synergistic effects, as there are wind farms outside its boundaries but within a 10 km radius, the project will be located in the main study area GR1260005. of the project under study, was chosen by the study team, in this Special Ecological Assessment to take into account the wider boundaries of the entire area enclosed within the above-mentioned protected area of the Natura network Special Area of Conservation (GR1260005) and the area within a 10 km radius of the project under study. Therefore, the area resulting from the merging of the boundaries of the two areas mentioned above will henceforth be referred to as the 'Cooperative Impact Study Area' (Map 146).

Therefore, there are 4 wind farms (operating license) within the Cooperative Impact Study Area. These wind power plants in operation have a total capacity of 79.1 MW and consist of 39 wind turbines (Map 147). It is worth noting that one of the four wind power plants in operation is partially located within the Study Area, with the result that five of the 20 wind turbines that make up the above wind power plant are located outside the Study Area. In the analysis and assessment of synergistic impacts, only the area of the operating blocks of the above wind farms located within the Synergistic Impact Study Area will be counted, but also the number of wind turbines located within it. Therefore, the area of the polygons of the above wind farms in operation (total area of polygons located within the Study Area) is 289.03 ha and the total number of wind turbines (wind turbines in operation within the Study Area) is 34. Finally, there are five wind farms within the Study Area, with a production licence, which have a total capacity of 59 MW. Therefore, as stated above for the licensed wind farms, only the area of the licensed wind farms located within the Cooperative Impact Study Area will be counted, but the total number located within the Cooperative Impact Study Area will also be counted for the licensed wind farms. The total area of the wind farms with a production licence (total area of wind farms located within the Co-operation Study Area) is 301,45 ha, and the total number of wind turbines is 17 (wind turbines with a

production licence within the Co-operation Study Area) (Map 147). Within the above five wind farms with production license, the project under study is not included, which, as mentioned above, has a total capacity of 58.8 MW, consists of 14 wind turbines and the area of its production polygons is 366.76 ha.

Although the number of wind turbines to be installed is relatively high for the area, the majority of those in the production license, and as mentioned in the previous section, may receive a negative opinion until the stage of obtaining the operating license, at which point it is not possible to judge a wind farm for its synergistic effects in relation to wind farms that may never be built. In addition, with regard to the project under study, in order to minimize the possibility of any negative impact due to an increase in the mortality of the important species of avifauna that are seasonally or permanently hosted in the area, additional mitigation measures for potential impacts are proposed in the following section, based on the new technologies provided, which in most of the existing wind farms in the region, do not exist.

Impact mortality

As already mentioned, the risk of birds colliding with wind turbines is the most significant direct risk from the operation of wind farms. The species most at risk are scavenging - large predatory species that mainly take advantage of warm updrafts, carrying out passive flight during most of their flight activity. Due to their large size, these species lack the ability to perform rapid manoeuvres to avoid obstacles such as wind turbines or the overhead power lines that sometimes accompany them. The direct loss of individuals due to impact can be particularly detrimental to populations of species at high risk of impact, due to the fact that they are K-selection species in terms of their evolutionary growth strategies (long biological cycle, low capacity to produce offspring with a long period of time until sexual maturity and high levels of mortality, low replacement population). Therefore, the risk of impact for these species can have a significant impact on Species at high risk of impact include, in descending order, large predators (scavengers, eagles, etc.), other bird species of similar size, such as storks, pelicans, swans, herons, etc. and, to a lesser extent, medium-sized raptors (falcons).

WWF Greece implemented a systematic study of the impacts on the birds of prey in Thrace in the period 2008-2010. During the period 2008-2009, the survey was carried out in 127 of the 163 wind turbines installed at that time in the prefectures of

Evros and Rodopi, with a systematic search for dead birds every 14 days. In the year 2009 - 2010, the survey was limited to 88 of the 163 wind turbines mentioned above, which were selected due to the highest flight record based on the data of the previous period, and the sampling effort was increased by creating daily sweeps. Fourteen raptors were found dead during the entire period described above. No other systematic records of similar effort have been made in subsequent years, and any collision incidents that have been documented consist either of individuals found by chance, by tracking the satellite signal of those carrying transmitters, or by surveys during studies implemented during the preparation of Special Ecological Assessments or during the implementation of Monitoring Programs at the developing or already installed wind farms. Most mortality incidents occur in the scavenging species black vulture and vulture.

According to the impact victim search programme in 9 existing wind farms in the Thrace region in 2009 - 2010, the estimated adjusted mortality rate of birds of prey was calculated at 0.152 and 0.173 for raptors and vultures respectively, per year and per turbine. Considering these estimates, with respect to the existing wind farms within the Cooperative Impact Study Area, numbering 34 wind turbines, the annual mortality rates are 5.17 and 5.88 respectively, while including all 14 wind turbines in the study project, the mortality rates are 7.30 and 8.30 for raptors and vultures respectively. In the case, under which all of the wind farms under licensing (production license) would be licensed (this estimate is the worst case scenario), within the Co-operative Impact Study Area, there would be 65 wind turbines (installed and under production licensing), and the estimated mortality rates would be 9.88 and 11.25 predators and vultures, respectively. The above reported rates are relatively high and it is estimated that if close to reality they would result in losses to the populations of the above species operating in the area, however, the actual mortality within the entire "Cooperative Impact Study Area" may differ significantly (estimated to be much lower), as the above based estimates refer to a wider geographical area, with a significantly higher presence of scavenging and predator species, and do not take into account

In conclusion, with regard to the project under study, the contribution that its construction may have on the overall cumulative impact due to impacts on energy infrastructure of species of interest (with a focus on scavengers - large predators, as well as other large important species) is considered to be relatively small in relation to the total existing and licensed energy infrastructure, as demonstrated above,

constituting a small percentage of any overall impact. Of course, both the location of each project and the specifics of each installed wind farm may alter this percentage to higher or lower values.

However, without downplaying the value of the work carried out in previous years, which has been the springboard for increasing the measures to prevent the impact of important species of avifauna on wind turbines throughout the Greek territory, their ominous forecasts seem to be far from reality and need to be updated. According to the data of the Biodiversity Conservation Society of Thrace, seven *Aegypius monachus* were killed in the period 2010-2023 (0.5 per year) and nine *Gyps fulvus* in the period 2008-2022 (0.6 per year). Since 2015 when 265 wind turbines are installed, i.e. over eight years, **five *Aegypius monachus* mortalities** (2018, 2019, 2020, 2022, 2023) and **four *Gyps fulvus* mortalities** (2015, 2018, 2021, 2022) have been recorded. According to the above, the estimated mortalities from the initial prediction models are more than a multiple of the actual mortalities resulting from the installed wind turbines. The above mentioned, combined with the fact that the population of *Aegypius monachus* in Greece **increased at a rate of 3.5% per year** from 1993 to 2022, while the population of *Gyps fulvus* in the eastern Rhodopes **increased at a rate of 18.4% per year** from 1989 to 2022 (Bounas et al. 2025), show strikingly and beyond any doubt that the predictions of the above models are obviously falsified. It is also important to note that even if all of the above mentioned wind turbines are licensed (worst case scenario), it does not mean that they will be built in their entirety. The scenario mentioned, although rather unrealistic, is mentioned together with all the above comments in order to make clear to anyone the fact of the anyway insignificant impact of impacts even in these unrealistic conditions

Habitat loss and degradation

All of the installed wind farms and their accompanying projects may reduce areas suitable for use by bird species, such as areas or sites suitable for nesting, roosting, cover, foraging, etc. All of the above projects, or more correctly the most significant in terms of generating negative impacts, are usually located within the wind farm polygons, although associated projects such as access roads may be assessed for several kilometres outside these. However, the otherwise dense network of forest roads located within productive forests, the road network connecting mountain settlements, villages,

etc., the road network serving other purposes, such as the network of rural roads, the network serving livestock needs, etc, which often already exist in areas where new wind farms are located, it is not easy to distinguish the effects of these roads from those parts of the road network that are also used as access roads to wind farms.

In order to carry out the assessment of this paragraph, certain assumptions were used, such as that all of the land within the polygons of the wind farms being licensed in the area is the area that will be lost to avifauna (strict approach) despite the fact that the magnitude of habitat loss will be much smaller than this as the encroachment within the wind farms' occupation polygons will be much smaller (approximately 5-10% of the polygons). It was considered appropriate to estimate this using this rigorous approach, as it was not possible to accurately estimate the percentage of responsibility of each wind farm for the increase in road density (as it is no longer known which alignment will be followed for each planned wind farm, whether it will follow existing roads or new road construction, etc.).

Table 69. Calculation of habitat loss (in ha), in case of approval of all wind farms under licensing (licensing stage under production), in synergy with the existing ones, within the considered "Cooperative Impact Study Area" (worst case scenario)

Explanation of Corine land cover codes 2018	Corine codes land cover 2018	Cover area in the whole 'Synergistic Impact Study Area' (ha)	Habitat coverage area of the entire polygons of the wind farms to be licensed, in synergy with the existing ones, within the entire "synergistic impact study area" (ha)	Estimated percentage of area likely to be affected by habitat loss (% of each habitat within the whole synergistic impact study area)
Discontinuous urban fabric	112	187,14	-	-
Industrial and commercial zones	121	64,80	35,74	55,15
Road and rail networks	122	4,99	-	-
Non-irrigated arable land	211	3.322,61	-	-
Permanently irrigated arable land	212	194,77	-	-
Vineyards	221	703,67	-	-
Meadows	231	747,81	-	-
Composite crops	242	538,35	-	-
Land used mainly for agriculture together with significant parts of natural vegetation	243	6.284,24	-	-
Broadleaf forest	311	11.068,39	283,07	2,56
Coniferous forest	312	2.403,88	14,05	0,58
Mixed forest	313	3.986,12	93,78	2,35
Natural pastures	321	2.949,59	80,07	2,71
Hardwood vegetation	323	3.738,72	66,47	1,78

Explanation of Corine land cover codes 2018	Corine codes land cover 2018	Cover area in the whole 'Synergistic Impact Study Area' (ha)	Habitat coverage area of the entire polygons of the wind farms to be licensed, in synergy with the existing ones, within the entire "synergistic impact study area" (ha)	Estimated percentage of area likely to be affected by habitat loss (% of each habitat within the whole synergistic impact study area)
Transitional woodland and scrubland	324	6.694,00	78,92	1,18
Areas with sparse vegetation	333	5.171,82	305,15	5,90

Table 70. Calculation of habitat loss (in ha), in the case that out of all the wind farms under licensing, only the project under study is licensed (best case scenario), in synergy with the existing ones, within the "synergistic impact study area"

Explanation of Corine land cover codes 2018	Corine codes land cover 2018	Cover area in the whole 'synergistic impact study area' (ha)	Habitat coverage area of the study project installation polygons (ha) in synergy with existing ones within the synergistic impact study area	Estimated percentage of area that may be affected by habitat loss (% of each habitat of the total synergistic impact study area)
Discontinuous urban fabric	112	187,14	-	-
Industrial and commercial zones	121	64,80	35,74	55,15
Road and rail networks	122	4,99	-	-
Non-irrigated arable land	211	3.322,61	-	-
Permanently irrigated arable land	212	194,77	-	-
Vineyards	221	703,67	-	-
Meadows	231	747,81	-	-
Composite crops	242	538,35	-	-
Land used mainly for agriculture together with significant parts of natural vegetation	243	6.284,24	-	-
Broadleaf forest	311	11.068,39	186,06	1,68
Coniferous forest	312	2.403,88	-	-
Mixed forest	313	3.986,12	43,10	1,08
Natural pastures	321	2.949,59	80,07	2,71
Hardwood vegetation	323	3.738,72	57,40	1,54
Transitional woodland and scrubland	324	6.694,00	72,38	1,08
Areas with sparse vegetation	333	5.171,82	181,04	3,50

From the percentages calculated in Table 69 above, if all the wind farms under licensing (worst case scenario) (licensing stage under production) were to be licensed, in synergy with the existing ones, the estimated losses, in descending order, would be in the following habitats: industrial and commercial zones, sparse vegetation areas,

natural grasslands, natural pastures, broadleaf forest, mixed forest, hardwood forest, transitional woodland and scrubland, coniferous forest. The above habitats dominate according to the database and land cover mapping (Corine land cover 2018) reflected in the documentation maps (see map 20), covering in total more than 75% (121: 0.13%, 311: 23.03%, 312: 5.00%, 313: 8.29%, 321: 6.14%, 323: 7.78%, 324: 13.93%, 333: 10.76%) of the study area (total Synergistic Impact Study Area).

However, according to Table 70 above and the percentages calculated therein in the case that of all the wind farms under permitting, in synergy with the existing ones, only the study project receives permitting (best case scenario), the estimated habitat losses are much smaller and involve, in descending order, the following habitats: Industrial and commercial zones, sparse vegetation areas, natural grasslands, natural pastures, broadleaf forest, hardwood forest, transitional woodland and shrub areas, mixed forest. The above habitats are dominant within the above area, according to the land cover database and mapping (Corine land cover 2018) reflected on the documentation maps (see Map 20), totalling more than 70% of the synergistic impact study area. Therefore, due to the fact that the study project is sited within habitats that are abundant throughout the Synergistic Impact Study Area, and due to the fact that the contribution of this project to cumulative/synergistic impacts is relatively small, as this is a project consisting of 14 wind turbines, it is considered that the study project would have a minor impact on habitat loss/degradation in the study area and the region in general.

Disturbance, displacement and barrier creation

The anticipated cumulative impacts due to disturbance during both the construction and operational phases of the wind farms are associated with the construction activities of the wind farms and their associated infrastructure, as well as the operation of the wind farms and the use of associated works (e.g. road construction), which on the whole have been associated with displacement of species due to disturbance and avoidance efforts. With respect to the construction phase, the impact of disturbance would last for a limited period of time, therefore any potential impact would be short-term, non-transient and reversible, as long as it occurs outside of the breeding season as anticipated herein.

The assessment of cumulative impacts due to displacement, either as an indirect impact of disturbance or for avoidance of the wind farm and its associated works that may be encountered by bird species, was carried out on the assumption that total species activity is halved within a 500 m radius of the wind farm turbine sites. Based on this, the total area within which a halving of the activity of the species of interest is expected to occur was calculated, within which it was assumed to include areas with scattered patches of necessary resources for avifauna, such as suitable nesting, cover, roosting, feeding sites, etc. As noted above, in any areas/locations of suitable habitat included within the above areas where impacts due to disturbance and displacement are expected to occur, there will not be a complete cessation of activity for avian species, therefore there is no question of loss of all such habitat (Tables 71 and 72).

Table 71. Calculation of the affected area (in ha) of degradation due to disturbance within a 500 m radius of each wind turbine, in case of approval of all wind farms under licensing (licensing stage under production), in synergy with the existing wind farm, within the considered overall synergistic impact study area (worst case scenario)

Explanation of Corine land cover codes 2018	Corine codes land cover 2018	Cover area in the total 'synergistic impact study area' (ha)	Estimated area of affected habitat of species of interest around the perimeter of the entire area under permit wind turbines (500 m radius), in synergy with the existing ones, within the total synergistic impact study area (ha)	Estimated percentage of area likely to be affected by disturbance (% of each habitat within the whole synergistic impact study area)
Discontinuous urban fabric	112	187,14	-	-
Industrial and commercial zones	121	64,80	35,86	55,34
Road and rail networks	122	4,99	-	-
Non-irrigated arable land	211	3.322,61	-	-
Permanently irrigated arable land	212	194,77	-	-
Vineyards	221	703,67	-	-
Meadows	231	747,81	-	-
Composite crops	242	538,35	-	-
Land used mainly for agriculture together with significant parts of natural vegetation	243	6.284,24	-	-
Broadleaf forest	311	11.068,39	675,22	6,10
Coniferous forest	312	2.403,88	43,16	1,80
Mixed forest	313	3.986,12	260,57	6,54
Natural pastures	321	2.949,59	176,55	5,99
Hardwood vegetation	323	3.738,72	151,17	4,04
Transitional woodland and scrubland	324	6.694,00	266,16	3,98
Areas with sparse vegetation	333	5.171,82	580,00	11,21

The percentages of the areas calculated in Table 71 above refer to the case where all the wind farms under licence (worst case scenario) (licensing stage under production) will be licensed in synergy with the existing ones. The habitats that show losses due to displacement, in relation to the total available suitable habitats within the whole synergistic impact study area, in descending order, are: industrial and commercial zones, sparse vegetation, mixed forest, broadleaf forest, natural grassland, hardwood vegetation, transitional woodland and scrub, coniferous forest. The above habitats dominate according to the database and land cover mapping (Corine land cover 2018) reflected in the documentation maps (see map 20), covering in total more than 75% (121: 0.13%, 311: 23.03%, 312: 5.00%, 313: 8.29%, 321: 6.14%, 323: 7.78%, 324: 13.93%, 333: 10.76%) of the study area (total Synergistic Impact Study Area).

Table 72. Calculation of the affected area (in ha) of nuisance degradation within a 500 m radius of each wind turbine, in case of approval of the project under study only, in synergy with the wind turbines of the existing wind farms within the synergistic impact study area (best case scenario).

Explanation of codes Corine land cover 2018	Corine codes land cover 2018	Cover area in the whole 'synergistic impact study area' (ha)	Estimated area of affected habitat of species of interest around the perimeter of the wind turbines under permit for the study project, in synergy with existing wind turbines (500 m radius) (ha)	Estimated percentage of area likely to be affected by disturbance (% of each habitat of the whole synergistic impact study area)
Discontinuous urban fabric	112	187,14	-	-
Industrial and commercial zones	121	64,80	35,86	55,34
Road and rail networks	122	4,99	-	-
Non-irrigated arable land	211	3.322,61	-	-
Permanently irrigated arable land	212	194,77	-	-
Vineyards	221	703,67	-	-
Meadows	231	747,81	-	-
Composite crops	242	538,35	-	-
Land used mainly for agriculture together with significant parts of natural vegetation	243	6.284,24	-	-
Broadleaf forest	311	11.068,39	542,46	4,90
Coniferous forest	312	2.403,88	-	-
Mixed forest	313	3.986,12	116,24	2,92
Natural pastures	321	2.949,59	176,55	5,99
Hardwood vegetation	323	3.738,72	111,28	2,98
Transitional woodland and scrubland	324	6.694,00	231,02	3,45
Areas with sparse vegetation	333	5.171,82	281,99	5,45

However, according to Table 72 above, and the percentages calculated therein, in the event that of all the wind farms under permitting, only the project under study receives permitting (best case scenario), in synergy with the existing ones, the estimated habitat losses due to displacement relative to the total available suitable habitat within the entire study area of the protected area, where a 50% reduction in the activity of the species of interest is expected, are small and relate to a half (50%) The above habitats are dominant within the above area, according to the land cover database and mapping (Corine land cover 2018) reflected on the documentation maps (see Map 20), totalling over 70% of the synergistic impact study area. Therefore, due to the fact that the study project is sited within habitats that are abundant throughout the Collaborative Impact Study Area, and due to the fact that the contribution of this project to cumulative/collaborative impacts is relatively small, as this is a project consisting of 14 wind turbines, it is considered that the study project would have a minor impact on habitat loss/degradation in the study area and the region in general.

Based on the above percentages of areas expected to experience a reduction in avian species activity and their susceptibility to disturbance and displacement, the species expected to experience impacts to populations operating within the study area of synergistic impacts, **should all of the wind turbines being licensed be permitted and installed**, are large raptor-drop-winged birds and the roseate pelican.

Given the totality of the above information, it is concluded that synergistic impacts from the installation and operation of the project under study relative to existing projects in the area are not expected to occur. However, in the theoretical case that the worst-case scenario of the installation of all the wind farms under licensing is verified, although synergistic impacts are expected to be relatively high, the additive effect of the 14 wind turbines of the project under study is not expected, based on the above analysis, to be of such an extent that it would negatively affect the protected objects of all the protected areas of the wider study area, their conservation status, conservation objectives, etc. Also, the set of mitigation measures proposed for the study project that are discussed in subsequent sections of this Special Ecological Assessment will also help in the above direction.

An important factor in the above assessments, however, is that in addition to the horizontal quantitative assessment of the areas undertaken, a more qualitative assessment of the sites to be "occupied" by the project should be made, based on the most important habitats for each of the species of interest in the set of protected areas that constitute the critical habitats. In this Special Ecological Assessment, the above assessment for the project under study is followed in the following sections where the potential impacts of its installation and operation are discussed.

Analysis of records of important bird species (species listed in Table 73) - Impact risk assessment

Table 73 below records for the important raptor and other large bird species observed in the area, the number of transits, the number of transits per hour of raptor observation, and the number of recorded movements per impact zone A, B and C and the number of movements in the direct impact zone. The time spent observing raptors is defined as the time during which the field observers were at the observation positions at the raptor point observation stations from the observation points. Although some records of large raptors were made from both the point recording stations of the ostriches and the linear cross-sections with ostrich wetting, the above time of realisation of these (ostrich) records was not counted for the estimation of individual crossings per hour of raptor observation. This more stringent selection was made by the study team in order to avoid counting all of the time spent observing stratiforms as predator observation time. Since, the above time was not a time when observers had a wide field of view and strained their attention in observing predators there was a varying degree of effectiveness in recording them. Therefore, **despite the fact that the raptor records made from both these points - routes were recorded and counted in the table below**, these were considered as random (***not random passages of raptors and large important species, but random sightings***) and the total observation time was not counted, rather the net raptor observation time was counted which involved the presence of observers to record raptors at the locations of the monitoring observation points mentioned oh The result of this more rigorous approach by the study team is that a higher number of raptor crossings per raptor observation hour is shown, i.e. an overestimation of the above indicator, which was considered preferable to any underestimation of it (if the duration of other bird surveys were included as recording time), in this ecologically important area for raptors.

The total minutes of raptor observation during field recordings based on the above was 14,615 (or 243.58 hours). Using the development axis of the project under study as a reference, three proximity zones were defined that are related to the project under study. Zone A which covers a distance of 250 m on either side of the project development axis and within this area raptors may be negatively affected by the project because there is an increased potential for disturbance and collision. Zone B, which starts at 250 metres and extends up to 1,000 metres from the project development axis,

with birdlife being less affected within this zone than in Zone A. Zone C, which starts at 1,000 metres and extends up to 2.000 metres from the project development axis, which in terms of risk and disturbance rating is even milder than Zone B, but is nevertheless assessed for large birds or birds of prey as their territories are large and may be affected by the project theoretically within it. The Zone of Direct Effect was defined as the zone within a radius of 100 metres from the installation site of each turbine, at a height of 90 to 210 metres, which is the height at which the blades of the turbines rotate, and is considered the zone of highest risk of impact for birds of prey.

To estimate the magnitude of the mortality levels that may occur, the Band model (collision risk model, Band et al. 2007, Band 2012) is applied to provide an estimate of the annual mortality of the important raptor species at the wind farm. Scottish Natural Heritage reports a methodology for the overall estimate of the total number of theoretical collisions that would be observed, but without taking into account the fact that birds actively avoid wind turbines. Combining this estimate with a theoretical avoidance rate yields an estimate of the theoretical number of impacts. Thus, in a first step, a theoretical impact risk is calculated taking into account the technical characteristics of the turbines (number of blades, rotor diameter and period), the size (blade length and span) and the speed (average minimum and maximum, if available) of the species under consideration. Impact risk, refers to the probability of impact of a particular species when passing, without performing an avoidance effort, through the surface of the rotor. The number of passes of the species through the rotor's virtual surface is then calculated, and extrapolated to a one-year period, based on the data collected from the field (field records). Since it is not feasible to record field passes from the exact virtual rotor surface, the number of passes from the virtual vertical surface of the wind farm (risk window) is used and extrapolated to the total area defined by the rotors (in the one-dimensional version of the model which is simply passes perpendicular to the axis of the wind farm). Thus, we essentially have an estimate of the number of passes from the rotor surface per year. Finally, by combining the above with a theoretical avoidance rate we finally obtain the number of impacts we expect to have.

Explanation of data used to calculate the number of impacts:

A) Impact risk

Typically, for the species analysed, the model of simple passages of individuals through the risk window (not extensive use of the site, e.g. foraging, etc.) is used since it is estimated, based on the frequency and behaviour of their flight, that this best simulates the observed flights and behaviour of the recorded species in the area. However, in order to assess the risk of collision of the snake darter, this Special Ecological Assessment has applied a much more rigorous version of the model that takes into account the volume of the area within which the species operates (in three dimensions), as this species appears to make extensive use of the wider study area. The above calculation is based on the technical characteristics of the wind turbines (number of blades, rotor diameter and period) and the size (length, blade span) and speed of the bird. For the technical characteristics, we took into account the wind turbine model data to be used in the project under study. For the size of the bird we used the data from the guide to birds in Greece (Mullarney et al. 2007) and for an indicative value of the speed of each species we referred to other similar studies carried out in the area, or to other literature sources. The calculation of risk (F), was carried out using the Excel spreadsheet provided on the Scottish Natural Heritage website (https://www.nature.scot/wind-farm-impacts-birds-calculating-probability-collision).

B) Number of rotor passes per year

The calculation of the number of rotor passes per year was based on the data collected from the field records. Specifically, based on the species' flight maps, we took into account the number of individuals observed from the surface of the risk window (Aw, width equal to that of the wind farm, and height equal to the maximum height covered by the passes Hmax = blade length + tower height). The number of all passages that intersected the axis joining the wind turbines at the risk window surface were taken into account.

Thus:

$Aw\ (m^2) = W \times H_{max}$

Similarly, the area covered by the rotors (AR) is calculated based on the number of rotors (N) and the area covered by the rotors, i.e:

$AR\ (m^{(2)}) = N \times PR^2$

Where:

R is the length of the blade

Based on the number of observed passes through the risk window, a reduction was made to a period of one year (taking into account the period within the year during which the species is active, i.e. 12h/day, and the corresponding months in the area of presence in the area).

More specifically, the following variables were used

K = number of passes observed

L= total hours of observation of predators at the wind farm

M= number of months during which the species is present in the area

S= number of hours per year that the species is present in the area = M x 30 x 12

And finally the expected number of passes from Aw per year P is: P= (K x S) / L

Based on the above, the expected number of passes from the surface of the rotor per year is: T=P x (AR/AW)

C) Number of impacts per year and avoidance

The expected number of impacts (without avoidance) per year is calculated based on the number of passes per year T, and the impact risk: C= T x F

The above estimated number is usually corrected based on an internationally accepted value of an avoidance rate (degree) of 98% (Eichhorn et al. 2012, Vasilakis et al. 2016), whereby the final estimate is obtained. However, given that Band's model has been criticized mainly as the predetermined and fixed degree of avoidance of wind turbines for each species, and the fact that the above degree of avoidance has been derived for ideal visibility conditions with good weather conditions, but also due to the general sensitivity of the area and the adverse weather conditions that may seasonally prevail in the area limiting the visibility of species and therefore their degree of avoidance, the study team preferred for this The study team considered that using the above avoidance rate is sufficient to avoid the underestimated likelihood of collision of important species and did not proceed to use an even stricter rate as in any case the proposed mitigation measures that follow in later sections of this report even suggest stopping the operation of wind turbines when adverse weather conditions prevail causing visibility limitation.

Table 73. Data from the flight analysis of important raptors and other important species in the area

Species	Number individual crossings	Individual crossings per hour of predator observation	Transits within Zone A (Outside Direct Effect Zone)	Transits within Zone B	Crossings within Zone C	Crossings within the Direct Effect Zone
Aquila chrysaeetos	1	0,004105427	1			
Circaetus gallicus	18	0,073897692	5	4	5	4
Circus aeruginosus	4	0,016421709		1	3	
Circus cyaneus	3	0,012316282	1		2	
Circus pygargus	5	0,020527136		2	3	
Falco naumanni	2	0,008210854			2	
Falco peregrinus	2	0,008210854		1	1	
Hieraetus pennatus	1	0,004105427			1	
*Pelecanus onocrotalus**	152	0,624024960			2	

*The *species Pelecanus onocrotalus, as already mentioned above, was recorded twice in total, with one of these records being a passage of 150 individuals, and taking place outside the impact zones with the wind turbines of the project under study (distance of more than 2 km from the location of the nearest wind turbine of the project under study), and also outside the P.E.P. (distance of 2 km from the boundaries of the production polygons of the project).*

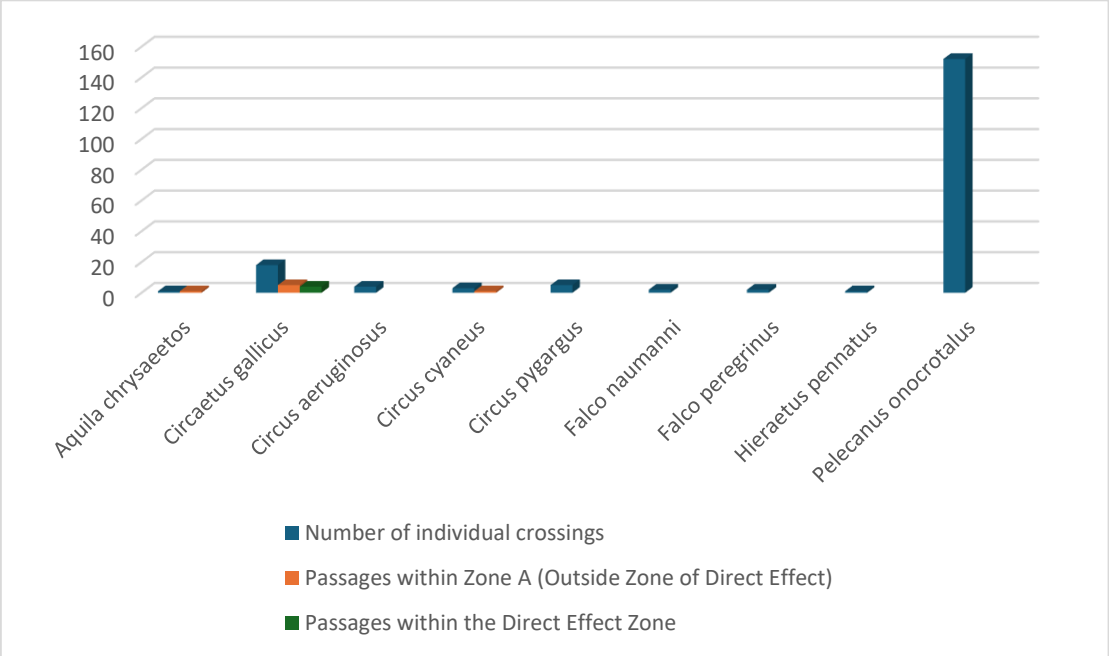


Figure 1: Total number of movements of important predators and movements in zone A and in the zone of direct impact

Aquila chrysaetos

As mentioned in the previous section, the species was recorded once (one individual) in the study area during the month of October, with this individual passage occurring within Zone A (distance less than 250 m from the installation site of the nearest wind turbine of the study project).

The main characteristics of the species, and the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of this being only the hours of raptor recording) throughout the project field survey area was very low (0.004 crossings per hour) and within the range of values reported at other viewpoints and wind farms (in the Thrace region according to Carcamo et al. 2011 considering combined data from Tables 7 and 37 of this study) which is from 0 to 0.1 crossings per hour approximately. However, the comparison is indicative as the above range of values refers to installed wind farms, which may cause a bias in the measurements due to higher disturbance and therefore in those areas the activity of the species may have been even higher than the recorded value.

The only data that can be presented for the species is then presented again, which relates to the flight records of the species, as it is not possible to present either a capture of activity using Kernal density algorithms (due to the single record) or a calculation of collisions per year based on the SNH (Scottish Natural Heritage) methodology, as the number of observed passes through the risk window is zero and therefore the probability of the species colliding with the turbines is zero.

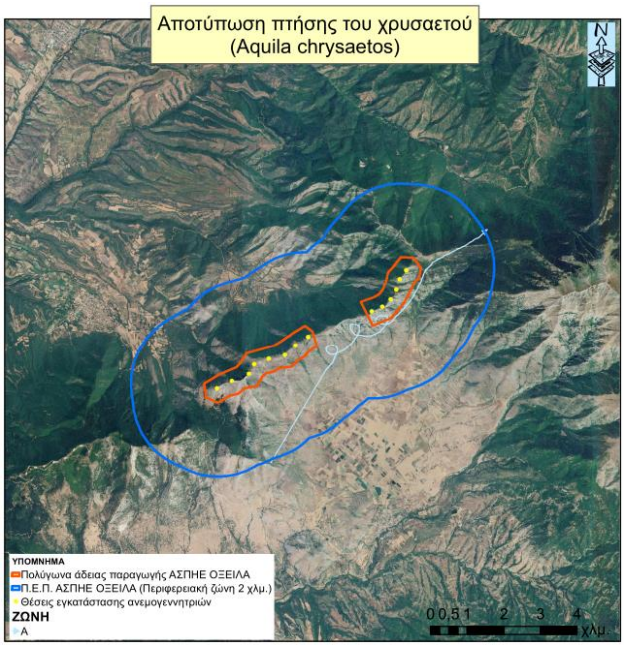


Figure 2: Illustration of the activity of the species based on the records made in the field survey area

Circaetus galicus

As mentioned in the previous section, the species was recorded 13 times (a total of 18 individuals) in the study area during the months of May, June, July, August and September, with one of these records involving the passage of three individuals and taking place within the Direct Impact Zone (distance of less than 100 m from the installation site of the nearest wind turbine of the study project, and flight altitude greater than 90 m and less than 210 m). Also, of the total number of records, three involved the passage of two persons per flight/record. Of these three recordings involving two persons per flight/recording, one took place within Zone A, the second took place within Zone B (distance between 250 and 1 000 metres from the location of the nearest wind turbine of the project under study) and the third took place within Zone C (distance between 1 000 and 2 000 metres from the location of the nearest wind turbine of the project under study). Finally, of the remaining nine single records (one person crossing per flight/record), one occurred within the Direct Impact Zone, three occurred within Zone A, two occurred within Zone B, and three occurred within Zone C.

The main characteristics of the species and the pressures and threats to it have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of this being only the hours of raptor recording) throughout the wind station survey field area was present (0.074 crossings per hour) and within the range of values reported at other viewpoints and wind stations (e.g.e.g. in the Thrace region according to Carcamo et al. 2011 taking into account the combined data of Tables 7 and 37 of this study) which are between 0 and 0.12 transits per hour approximately and an average value close to 0.051. However, as mentioned in the analysis of the previous species, the comparison is indicative as the above range of values refers to installed wind farms which may cause a bias in the measurements due to higher disturbance and therefore in those areas the activity of the species may have been even higher.

The impact risk for the species, under the much stricter assumption that all of the species' flights in the area were flights indicating use of the site by the species and not just passes, for flight speeds from 7.0 m/sec to 17.7 m/sec, ranges between 8.2 % and 19.6 %, while the number of passes from the rotor surface per year is 7.89 passes/year. Therefore, the expected impacts (without avoidance) are from 0.647 to 1.547 impacts per year. Correcting the above expected non-avoidance impacts with the **98%** avoidance rate, the final estimate for impacts of this species per year is from **0.013 to 0.031 impacts per year**, while correcting the above expected non-avoidance impacts with the much more stringent **95%** avoidance rate, the final estimate for impacts of this species per year is from **0.032 to 0.077 impacts per year.** The strict way of evaluating impact estimates described above, although it greatly increases the final estimate for impacts of this species per year, was considered by the study team to be more appropriately treated in this way because of the ecological importance of the study area, i.e., preferring to have an overestimation of the values, but in no way an underestimation.

In the following, the illustration of the activity of the species using Kernal density algorithms is presented based on all the records made in the field survey area (darker shading indicates more intense activity), without separating flights of very high altitude or flights made at a farther distance from the wind turbines to be installed.

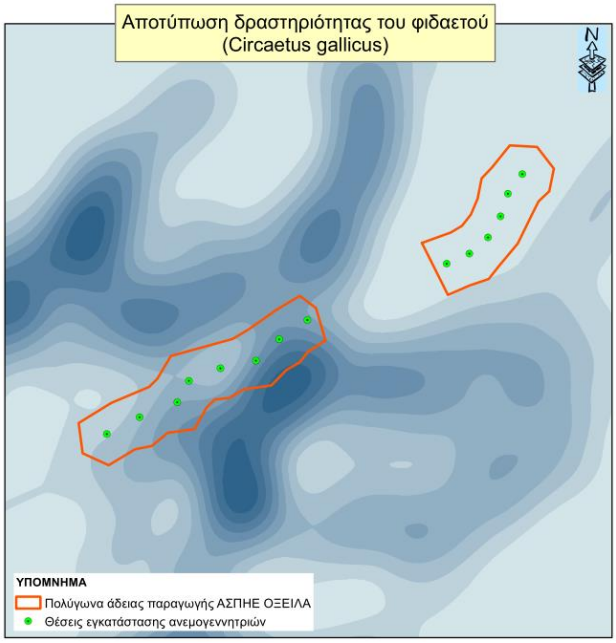


Figure 3: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Circus aeruginosus

As mentioned in the previous section, was recorded four times (four individuals) in the study area during the observations in April, May and July, with three individual transits of the species occurring within Zone C and the fourth individual transit occurring within Zone B.

The main characteristics of the species, and the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of transits per hour of observation (and even with the strictest estimate of this being only for the hours of raptor recording) across the wind farm field survey area was very low (0.016 transits per hour).

The following is a visualisation of species activity using Kernal density algorithms based on the total number of recordings made in the field survey area (darker shading indicates more intense activity), without separating out flights of very high altitude or flights made at a farther distance from the wind turbines to be installed. It is not possible to present a calculation of collisions per year based on the SNH (Scottish Natural Heritage) methodology as the number of observed passes through the risk window is zero and therefore the probability of the species colliding with the turbines is zero

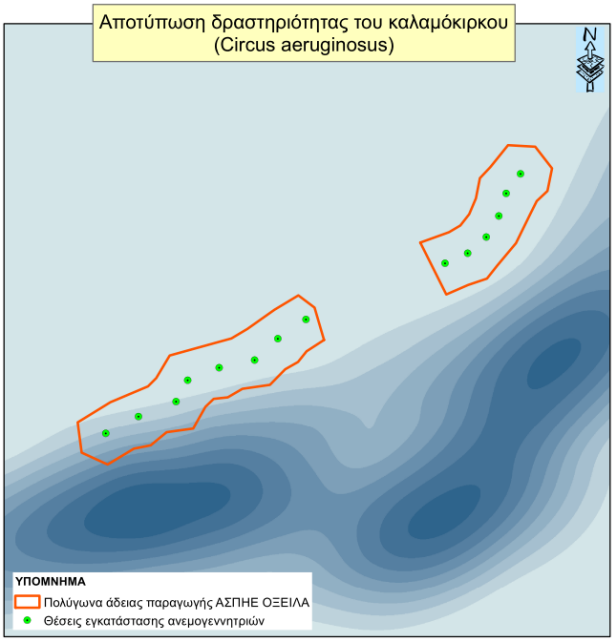


Figure 4: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Circus cyaneus

As mentioned in the previous section, the species was recorded three times (three individuals) in the study area during observations in November and December, with one individual passage occurring within Zone A and two individual passages occurring within Zone C.

The main characteristics of the species, and the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of crossings per hour of observation (and indeed the strictest estimate of this being only for predator recording hours) across the project field survey area was low (0.012 crossings per hour). Similarly low was the presence of the species at other viewpoints and wind stations (e.g. for the Thrace area, according to Carcamo et al. 2011 considering combined data from Tables 7 and 37 of this study), which is between 0 and 0.011 crossings per hour approximately. However, as mentioned in the analysis of the previous species, the comparison is indicative as the above range of values refers to installed wind farms, which may cause a bias in the measurements due to higher disturbance and therefore in those areas the activity of the species may have been even higher.

The impact risk for the species, for flight speeds from 10.5 m/sec to 12.8 m/sec, ranges between 2.6% and 3.2%, while the rotor passes per year are 1.128 passes/year. Therefore, the expected impacts (without avoidance) are from 0.029 to 0.036 impacts per year. Correcting the above expected non-avoidance impacts with the **98%** avoidance rate, the final estimate for impacts of this species per year is from **0.0006 to 0.0007 impacts per year**, while correcting the above expected non-avoidance impacts with the much more stringent **95%** avoidance rate**,** the final estimate for impacts of this species per year is from **0.0015 to 0.0018 impacts per year.**

The following is a depiction of species activity using Kernal density algorithms based on all records made in the field survey area (darker shading indicates more intense activity), without separating out very high altitude flights or flights made at a farther distance from the wind turbines to be installed.

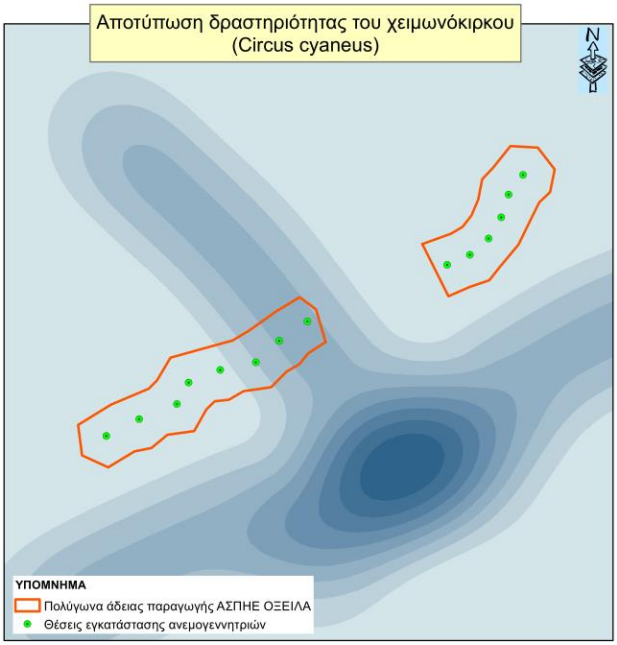


Figure 5: Illustration of species activity using Kernal density algorithms based on the records made in the field survey area (darker shading indicates more intense activity).

Circus pygargus

As mentioned in the previous section, the species was recorded five times (five individuals) in the study area during observations in June, July, September and October, with two individual crossings occurring within Zone B and three individual crossings occurring within Zone C.

The main characteristics of the species and the pressures and threats to it have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of that for the hours of predator recording only) in the whole field survey area of the wind farm was very low (0.021 crossings per hour).

The following is a depiction of species activity using Kernal density algorithms based on all the records made in the field survey area (darker shading indicates more intense activity), without separating out flights of very high altitude or flights made at a farther distance from the wind turbines to be installed. It is not possible to present a calculation of collisions per year based on the SNH (Scottish Natural Heritage) methodology as the number of observed passes through the risk window is zero and therefore the probability of the species colliding with the turbines is zero

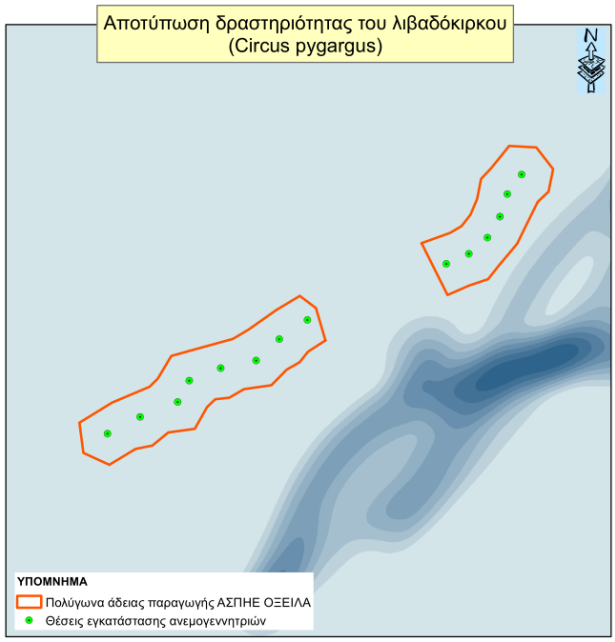


Figure 6: Illustration of species activity using Kernal density algorithms based on records made in the field survey area (darker shading indicates more intense activity).

Falco naumanni

As mentioned in the previous section, the species was recorded once (a total of two individuals) in the study area during observations in April, with the record involving passage of two individuals occurring within Zone C.

The main characteristics of the species, and the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of crossings per hour of observation (and even with the strictest estimate of this being only the hours of raptor recording) throughout the wind farm field survey area was very low (0.008 crossings per hour).

The only data that can be presented for the species is then presented again and relates to the flight record, as it is not possible to present either a capture of activity using Kernal density algorithms (due to the single record) or a calculation of collisions per year based on the SNH (Scottish Natural Heritage) methodology, as the number of observed passes through the risk window is zero and therefore the probability of the species colliding with the turbines is zero.

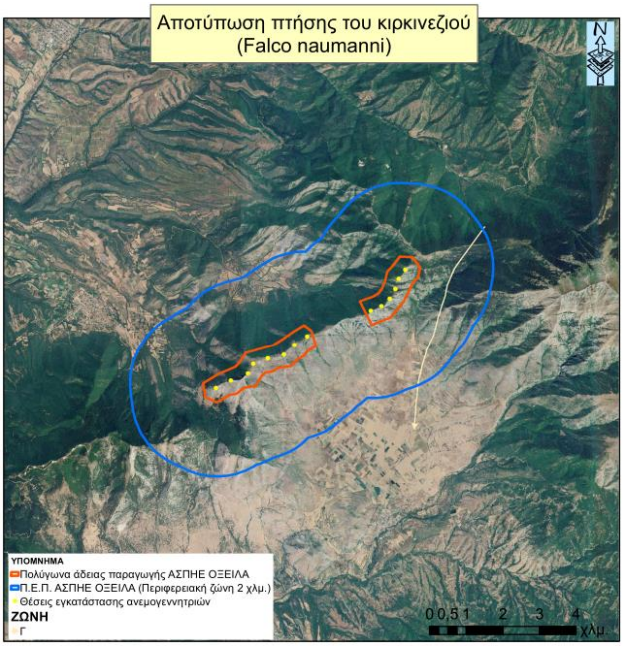


Figure 7: Illustration of the activity of the species based on the records made in the field survey area

Falco peregrinus

As mentioned in the previous section, the species was recorded twice (two individuals) in the study area during the observations in September, with one individual passage taking place within Zone B and the second individual passage taking place within Zone C.

The main characteristics of the species, and the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of transits per hour of observation (and even with the strictest estimate of this being only the hours of raptor recording) throughout the wind farm field survey area was very low (0.008 transits per hour).

The only data that can be presented for the species is again presented below, and relates to flight records, as it is not possible to present either a capture of activity using Kernal density algorithms (more than two records are required) or a calculation of collisions per year based on the SNH (Scottish Natural Heritage) methodology, as the number of observed passes through the risk window is zero and therefore the probability of the species colliding with the turbines is zero.

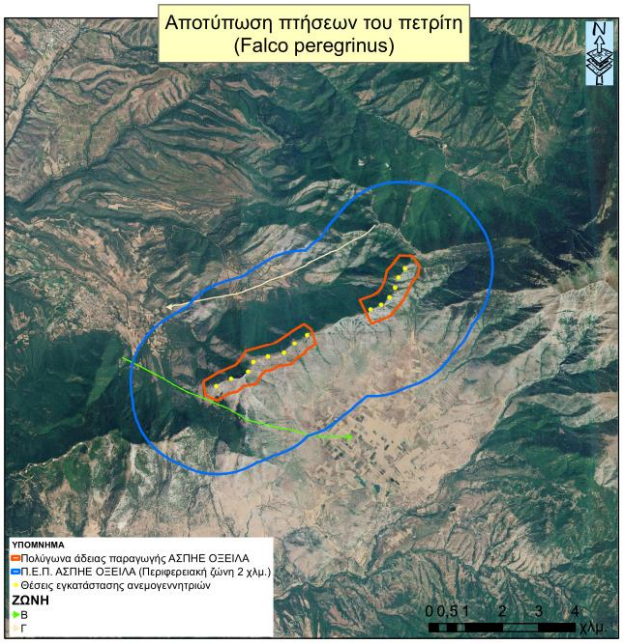


Figure 8: Illustration of the activity of the species based on the records made in the field survey area

Hieraaetus pennatus

As mentioned in the previous section, the species was recorded once (one individual) in the study area during the observations in September, with this individual passage taking place within Zone C.

The main characteristics of the species, and the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of transits per hour of observation (and even with the strictest estimate of this being only for the hours of raptor recording) throughout the field survey area of the wind station was very low (0.004 transits per hour) and is within the range of values reported at other viewpoints and wind stations in the Thrace region (Carcamo et al. 2011 considering combined data from Tables 7 and 37 of this study) which are from 0 to 0.038 crossings per hour approximately. However, as mentioned in the analysis of the previous species, the comparison is

indicative as the above range of values refers to installed wind farms, which may cause a bias in the measurements due to higher disturbance and therefore in those areas the activity of the species may have been even higher.

The only data that can be presented for the species is the flight record, as it is not possible to present either a capture of activity using Kernal density algorithms (due to the single record) or a calculation of collisions per year based on the SNH (Scottish Natural Heritage) methodology, as the number of observed passes through the risk window is zero and therefore the probability of the species colliding with the turbines is zero.

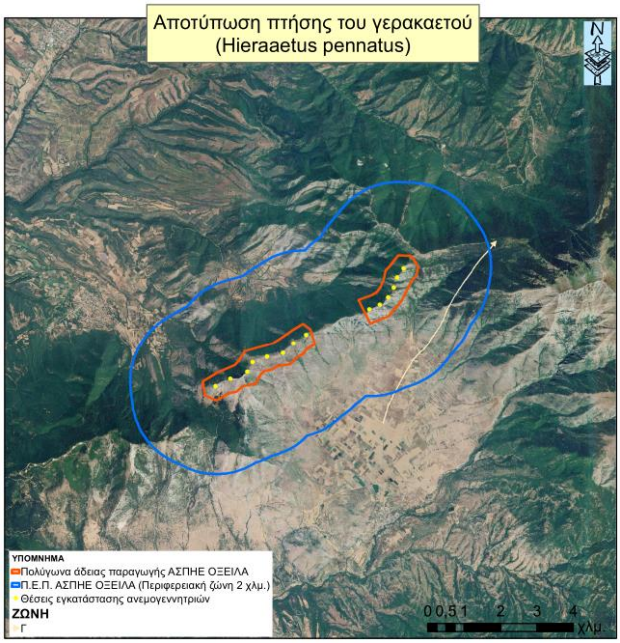


Figure 9: Illustration of the activity of the species based on the records made in the field survey area

Pelecanus onocrotalus

As mentioned in the previous section, the species was recorded twice (a total of 152 individuals) in the study area during the observations during the months of April and October, with one of the two records being a passage of 150 individuals and taking place outside the impact zones with the wind turbines of the wind farm under study (distance greater than 2 km. from the location of the nearest wind turbine of the project under study), on 11/4/2024, south of and outside the Field Survey Area (Regional Zone 2 km from the boundaries of the project production polygons). The flight altitude of

this particular log exceeded approximately 400 meters. Finally, the second record of the species involved the passage of two individuals and occurred within Zone C.

The main characteristics of the species, as well as the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

The activity of the species and the intensity of crossings per hour of observation (and indeed the strictest estimate of this, which only refers to hours of raptor recording) throughout the wind farm field survey area was present (0.62 crossings per hour), but it should be stressed that this activity is the result of a single recording, in which a crossing of 150 individuals occurred, and which took place **outside the Field Survey Area.**

The only data that can be presented for the species is again presented below, and relates to the flight record, as it is not possible to present either a capture of activity using Kernal density algorithms (due to the single record) or a calculation of collisions per year based on the SNH (Scottish Natural Heritage) methodology, as the number of observed passes through the risk window is zero and therefore the probability of the species colliding with the turbines is zero.

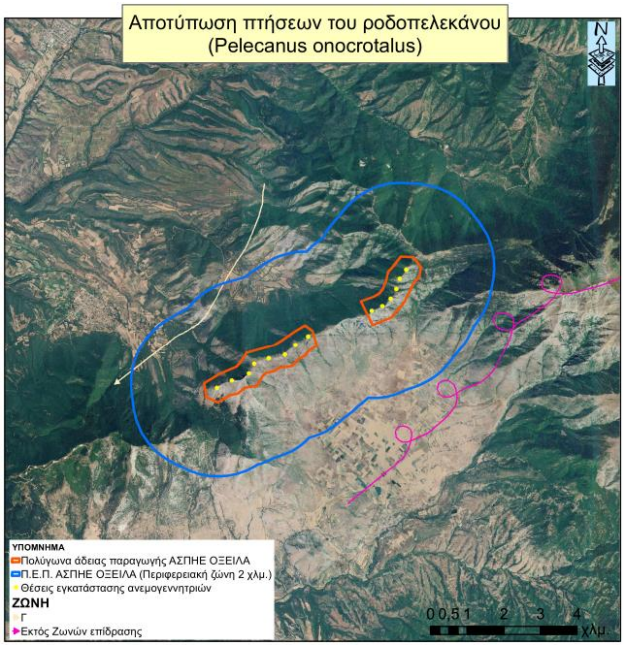


Figure 10: Illustration of the activity of the species based on the records made in the field survey area

Caprimulgus europaeus

As mentioned in the previous section, the species was recorded seven times (a total of nine individuals) in the study area during the observations in May, June, July and September.

In Europe, the species breeds largely in Russia and Turkey, and also mainly in France and Belarus.

The population in Europe is estimated at 597,000 - 1,110,000 males displaying spatial behaviour (1,190,000 - 2,220,000 mature individuals), while in the EU28 the population is estimated at 180,000 - 336,000 males displaying spatial behaviour (360,000 - 671,000 mature individuals). In Greece, the population is estimated at 10,000 - 30,000 individuals, corresponding to 2% of the European population (BirdLife International 2021). 42% of the European population is found in Russia.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened (LC) (BirdLife International 2021). It is also listed in category SPEC 3 species of European interest in terms of conservation by Birdlife International (BirdLife International 2017).

The species nests on ground with sparse or no vegetation, often on well-drained soils (Cramp 1985). It mainly uses dry, open areas with scattered trees and shrubs, woodland and woodland (especially clearings), recently wooded areas and new woodland plantations. It also uses areas of steppes, scrub, sparsely wooded or rocky hillsides and dunes. Breeds between the end of May and August. It usually lays one to two eggs. It feeds on insects caught in the air. It hunts in open areas with scattered trees and shrubs and in clearings, along woodlands, in gardens and orchards, in wetlands, in meadows and fields, around pastures and in standing water. The species is migratory and winters mainly in southern and eastern Africa.

Threats listed on the IUCN red list are a reduction in insect availability due to pesticide use (Tucker and Heath 1994) and habitat loss or degradation generally caused by intensive grazing and the conversion of such habitats to agricultural land, vineyards and urban areas. Disturbance from recreational activities and mortality from collision with passing vehicles may also contribute to population declines (Tucker and Heath 1994). The species has many predators, especially on eggs and chicks, including: crows (*Corvus corax*), magpies (*Pica pica*), jays (*Garrulus glandarius*), nocturnal predators,

hedgehogs (*Erinaceus europaeus*), weasels (*Mustela nivalis*) and domestic dogs. Also, climate change may change the geographic distribution of the species in the future (Tucker and Heath 1994).

The recommended conservation actions, according to the IUCN, are as follows:

- Conservation and enhancement of existing forest habitats
- Undertake further work on restoration of research sites, including those in planted forests, to prevent fragmentation and increase spatial connectivity
- Develop agri-environmental programmes to help provide foraging habitat
- Reduce disturbance due to visitors and development of urban areas near important breeding areas of the species.

Of all the threats documented, the installation of the proposed wind farm is not expected to cause any serious impacts to the species. No increased concentrations of the species were observed. Based on the above and the fact that the species is directly associated with vegetation and soil and flies at a relatively low altitude, the significance of the impact on the species from the wind farm installation is considered negligible.

Lanius collurio

As mentioned in the previous section, the species was recorded ten times (22 individuals in total) in the study area during the observations in May, June, July, August and September.

The species has a wide distribution in mainland Greece, while it also breeds on some islands (e.g. Lemnos, Lesvos). It is common during the autumn migration and more uncommon during the spring migration. In Europe, the breeding population is estimated at 8,210,000-13,000,000 pairs (16,400,000-26,000,000 mature individuals), while in the EU28 the population is estimated at 5,440,000-7,310,000 pairs (10,800,000-14,700,000 mature individuals). The Greek population is estimated to number 40,000-60,000 pairs, corresponding to <1% of the European population (BirdLife International 2021). From 1970 to 1990 there was a dramatic population decline in the western and northeastern breeding range (Harris and Franklin 2000).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece the species has not been assessed and therefore does not have a threatened status (NE), while according to IUCN at European level it is listed as a species of reduced concern (LC)

(BirdLife International 2021). It is also classified as a SPEC 2 species of European interest in terms of conservation by BirdLife International (BirdLife International 2017).

The species has a wide distribution in mainland Greece, but also breeds on some islands (e.g. Lemnos, Lesvos).

The species is found in temperate and Mediterranean climates (Lefranc and Worfolk 1997). It prefers sunny, warm, usually dry and gently sloping soils, with scattered shrubs or low trees, open grassland on slopes with maquis, in crops, on the boundaries and in forest clearings, in hedgerows and in vineyards, which are also its foraging grounds (Cramp and Perrins 1993, Tucker and Heath 1994). It is also found in rural areas, on land, open fields, open buildings, gardens, hedgerows and scrub along railways or highways. It is also found in camps, burnt forests and spruce (Picea) plantations (Yosef et al., 2012). Nesting occurs from May to July (Lefranc and Worfolk 1997) and the pair lays three to seven eggs. The nest consists mainly of plant material such as grass, lichens, grass, moss, reeds (Phragmites) and animal remains such as hair and fur. It is set in dense, thorny shrubs such as currant (Crataegus), blackberry (*Prunus spinosa*), blackberry (Rubus) or rose bush (Rosa) (Yosef et al. 2012). Its food consists mainly of insects and other invertebrates as well as small mammals, birds, amphibians and reptiles. The species is migratory, wintering in eastern and southern Africa (Lefranc and Worfolk 1997).

In Greece, the eagle-eye is found as a summer breeding bird, but also as a transient visitor during both migrations. From Crete it is reported as a summer visitor and from Cyprus as a transient bird, possibly nesting in Troodos. It moves from about 500 to 1,500 m, but in some areas it may climb even higher (e.g. Helmos, Katara). Conversely, it may also frequent areas at sea level (Thrace). Eagles settle in well-managed, sunny areas with clearings, sparse vegetation (e.g. herbaceous stands, grasslands, dry meadows), alternating with scattered shrubs and hedges, usually with less than 50% plant cover. Perching posts are needed for hunting, surveying the surrounding area as well as for foraging, with shrubs about 1-3 m high, mostly thorny (rosebushes, gorse, mulberry, etc.). The diet of the eagle-eye consists of a wide range of prey, mainly insects and small invertebrates or vertebrates, and the hunting techniques used depend on the prey. However, their diet also includes foods of plant origin.

According to the threats recorded in the list of threats to the species of characterization (Dimalexis 2009), the reported threats to the species are:

- Expansion - intensification of annual crops
- Extensive expansion of agricultural activities - expansion of annual growth - reforestation
- Extension of agricultural expansion and intensification of forestry activities
- Commercial - industrial development (ports, airports, industrial zones)
- Tourism-recreation infrastructure (ski resorts, golf courses, golf courses, golf courses, campsites)
- Construction of all types of roads and railways
- Abandonment of traditional agricultural practices and land use, including the abandonment of extensive farming and livestock farming
- Pollution from agrochemicals discharged into water bodies, waterlogging of receptors.

Threats listed on the IUCN red list are habitat loss and fragmentation of the species, resulting from deforestation and agricultural intensification and increased pesticide use causing a decline in its main food source (insects) (Yosef et al. 2012). High application of inorganic nitrogen fertilizer can also pose a threat (Tucker and Heath 1994). Also, the creation of cooler and milder summers affects reproduction in the northern and western areas of its range (Yosef et al. 2012).

The recommended conservation actions, according to the IUCN, are as follows:

- Promotion of low-intensity cultivation, as the species requires large-scale habitat conservation
- Management should include maintaining or creating open grasslands with alternating high and low vegetation and thorny shrublands, maintaining vegetation barriers between crops and creating them in intensively managed orchards and vineyards, and maintaining terrestrial areas
- Reducing pesticide use (Tucker and Heath 1994).

Of all the threats listed above, the installation of the proposed wind farm is not expected to cause any serious impacts to the species. No increased concentrations of the species were observed. A percentage greater than 40% of the individuals recorded during the fieldwork (nine individuals) were recorded at the fixed Point count station 1 (Point count station 1 - see documentation maps) installed for the needs of the

fieldwork, in four records. Based on the above and the fact that the species is directly associated with vegetation and soil and flies at a relatively low altitude, the significance of the impact on the species from the installation of the wind farm is considered negligible.

Lullula arborea

As mentioned in the previous section, the species was recorded 39 times (total 159 individuals) in the study area throughout the fieldwork (January 2024 - December 2024) and can be classified as abundant in the study area.

This species breeds in most European countries, particularly in Spain, Romania, Poland, Turkey and Portugal.

The European population of the species is estimated to be 2,140,000 - 4,570,000 pairs (4,290,000 - 9,130,000 mature individuals), while in the EU28 it is estimated at 1,760,000 - 3,180,000 (3,530,000 - 6,360,000 mature individuals). In Europe, the population of the species is estimated to have declined by more than 4% over the last decade. The Greek population is estimated to number 5,000-20,000 pairs, corresponding to <1% of the European population (BirdLife International 2021).

The species has a wide distribution in mainland Greece and is also observed on several islands.

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex III). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as threatened (LC) (BirdLife International 2021). It is also classified as a SPEC 2 species of European conservation concern by Birdlife International (BirdLife International 2017).

The species inhabits a variety of open habitats on well-drained soils, with a preference for low-intensity acidic sandy soils or abandoned farmland (fallow fields), scrubland, orchard steppes and forest habitat boundaries. It breeds in open rocky areas, open forests, shrublands with scattered clumps of trees, etc. (in mountain and semi-mountainous areas) and is also observed at lower altitudes in winter. The species is found up to 3 000 m altitude. The tree starling is a monogamous species and breeds from March to July. The nest is built on the ground and is usually protected by bushes or stumps and lined with leaves, pine needles and moss. It usually lays three to five eggs (Donald 2004). It is primarily an insectivorous species that often feeds on the

ground where it nests. Often chirps from rocks or from trees or individual shrubs. The species is migratory in the northern part of its range and in Central Europe and Russia. In western Europe and the Mediterranean Basin it is epidemic (Snow and Perrins 1998).

Threats listed on the IUCN red list include habitat loss and degradation of the species due to agricultural intensification or deforestation due to abandonment of extensive livestock farming (Tucker and Heath 1994). Also, extreme winter weather conditions can cause significant declines in the species' populations (Donald 2004).

The recommended conservation actions, according to the IUCN, are as follows:

- Promotion and continuation of extensive livestock farming and protection of the species' habitats
- Continue to maintain and protect the species and protect its habitat, and protect the habitat of the species; manage new plantations (Tucker and Heath 1994).

Of all the threats recorded above, the installation of the wind farm under consideration will not cause any serious impact on the species. Four to five pairs of the species are estimated to be active in the wider project area, making use of the open farmland of the field survey area, as well as the adjacent, abundant counterparts. Approximately one-third of the individuals recorded during the fieldwork (43 individuals) were recorded on the two line transects installed for the fieldwork, in ten records (Line transects 1 and 2 - see documentation charts). Based on the above and the fact that the species is directly associated with vegetation and soil and flies at a relatively low altitude, the significance of impacts to the species from the wind farm installation is considered negligible.

Leiopicus medius

As mentioned in the previous section, the species was recorded once (one individual) in the study area during the observations in May.

The European population of the species is estimated at 401,000-695,000 pairs (802,000-1,390,000 mature individuals), while in the EU28 the population is estimated at 802,000-1,390,000 pairs (602,000-1,070,000 mature individuals). The Greek population of the species is estimated to number 10,000-30,000 pairs, corresponding to 3 % of the European population (BirdLife International 2021). The species is found in

Central and Eastern Europe. The population of the species is considered stable, although it is threatened by habitat destruction (Gorman 2004).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at the European level, the species is not classified as threatened (LC) (BirdLife International 2021). It is also not classified as a species of European interest in terms of protection by BirdLife International.

The species has a wide distribution in mainland Greece from the Peloponnese and further north. It also breeds on Lesvos, where the only island population is preserved (Handrinos and Akriotis 1997).

Throughout most of its range, it inhabits extensive, mature oak forests, or forests of other deciduous trees with a high proportion of large mature oaks. Clusters of oak stands belonging to *Quercus petraea* and *Quercus cerris*, about 100 years old, are considered the most ideal habitats for this species (Danko et al. 2002, Schmitz 1993). It also inhabits mixed deciduous forests, parks, riparian forests and wooded pastures (Winkler et al. 1995), as well as in mixed deciduous-coniferous forests where it feeds on pine and spruce seeds (Cramp 1985). In Greece, it has exceptionally been observed in pure stands of black pine and cephalonia fir at relatively high altitudes on the mainland, while in Lesvos it is common in olive groves (Handrinos and Akriotis 1997). The main factors influencing whether and to what extent an area can be a habitat for the species are the presence of old oaks and suitable trees for nesting (Pasinelli 2000a). Breeding of the species begins from mid-April to early May. It feeds on various species of insects that live on the bark and leaves of trees (Cramp1985). In winter when insect availability is low, it feeds on nuts, various fruits and other plant foods (Heinze 1994). It is less affected by the presence of dead wood than other woodpeckers and is estimated to feed more on healthy rather than dead trees which it uses only for nesting (Pasinelli 2000b). It feeds on the highest crown height of mature oaks in very high proportions and prefers large, mature trees with large crowns (Pasinelli and Hegelbach 1997).

According to the listed threats in the list of threats to the species designation (Dimalexis 2009), the reported threats to the species are:

- Whitefish
- Inappropriate forest management
- Deforestation
- Changes in the extent and distribution of habitats due to climate change.

Threats listed on the IUCN red list are mainly inappropriate forest management, particularly in terms of fragmentation of oak forests, removal of old and decaying trees and replacement of native deciduous trees with conifers. Also, the effects of air pollution may pose a risk to the species (Hagemeijer and Blair 1997). Finally, climate change and adverse weather conditions affect populations at local scales (Winkler et al. 2014).

The recommended conservation actions, according to the IUCN, are as follows:

- Take conservation measures for the species
- Maintain suitable trees, within forested areas, for nesting and foraging
- Maintain suitable land areas on a regional scale (Robles et al. 2007).
- Fully understand and assess the effects of air pollution on the availability and abundance of prey (arthropods) of the species (Hagemeijer and Blair 1997).

Of all the threats documented, the installation of the proposed wind farm is not expected to cause any serious impact on the species. No increased concentrations of the species were observed. Based on the above and the fact that the species is directly associated with vegetation and soil and flies at a relatively low altitude, the significance of the impact on the species from the wind farm installation is considered negligible.

Melanocorypha calandra

As mentioned in the previous section, the species was recorded four times (26 individuals in total) in the study area during observations in February, April, May and June.

The species is partially migratory with a wide distribution. It generally breeds in warm temperate zones from the Mediterranean basin to southern Russia, while in northwestern Europe it is a very rare visitor. In Europe it breeds mainly in Russia and Iberia, but smaller breeding populations occur elsewhere in southern and southeastern Europe (Hagemeijer and Blair 1997).

The European population is estimated at 9,940,000 - 19,200,000 pairs (19,800,000 - 38,400,000 mature individuals), while in the EU28, according to the IUCN red list, the population is estimated at 4,270,000 - 6,410,000 pairs (8,850,000 - 12,900,000 mature individuals). The Greek population is estimated at 40,000 - 60,000 pairs, less than 1% of the European population. (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to the IUCN at European level it is listed as a species of declining concern (LC) (BirdLife International 2021). It is also classified as a SPEC 3 species of European conservation concern by Birdlife International (BirdLife International 2017).

In Greece, the galantra occurs mainly as a permanent breeding species in many areas, especially in northern and central Greece. The populations in Crete are likely to be fully migratory.

The species is found in open areas, pastures, extensive cereal crops and steppes with dense grass cover. In the Mediterranean basin it is found mainly in dry grasslands and dry crops. It prefers fallow fields and to a lesser extent cultivated fields with legumes and barley. In Greece it is found in low vegetation grasslands, on the margins of freshwater reservoirs or ponds, crops and dry rocky areas. The species is monogamous and lays its eggs from early April to July. The nest is made of grass stems and small leaves, lined with softer material and built in a shallow cavity in the ground, often under a log. The species feeds on seeds and large insects. During spring it includes in its diet shoots of herbaceous plants. The species is found in large flocks in autumn and winter (Snow and Perrins 1998).

Threats listed in the IUCN red list are agricultural intensification and subsequent changes in land use, for example loss of fallow land, changes of crops from cereals to vineyards and olive groves (de Juana and Suárez 2004). Afforestation is also a major threat to the species. Finally, hunting (Tucker and Heath 1994) and pesticide use (Papp and Fântână 2008) may have contributed to population declines of the species.

The recommended conservation actions, according to the IUCN, are as follows:

- Broad habitat conservation measures for the species
- Conservation of traditional land use practices, such as low-intensity cereal cultivation, including extensive livestock farming
- Research should focus on the biological processes affecting the distribution and abundance of the species (Tucker and Heath 1994).

Of all the recorded threats, the installation of the wind farm under consideration is not expected to cause any serious impact on the species. No increased concentrations of the species were observed. Based on the above and the fact that the species is directly

associated with vegetation and soil and flies at a relatively low altitude, the significance of the impact on the species from the wind farm installation is considered negligible.

Alectoris graeca

As mentioned in the previous section, the species was recorded 20 times (70 individuals in total) in the study area during the observations in January, February, March, April, May, June, September, October and December.

In Europe, the species breeds mainly in Italy, Greece, Croatia, Montenegro, Montenegro, Switzerland and Bosnia and Herzegovina.

The European population of the species is estimated at 37,600 - 61,400 pairs (75,300 - 123,000 adults), while the EU28 population is estimated at 25,500 - 37,700 pairs (51,100 - 75,400 adults). The Greek population is estimated at 7,000-13,000 pairs, which is 20% of the European population (BirdLife International 2021).

The species is protected by Directive 2009/147/EC (Annex I and II) and the Bern Convention (Annex III). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is classified as VU and NT respectively (BirdLife International 2021). It is also classified as a SPEC 1 species of European interest in terms of conservation by Birdlife International (BirdLife Interanational 2017).

According to the IUCN red list, the population trend is declining rapidly, especially in the Balkans, based on an assessment of data and available evidence (Griffin 2011). The species is declining due to habitat degradation caused by agricultural intensification and urbanization. It is also declining due to excessive hunting in some areas (del Hoyo et al. 1994).

The species is found in the Peloponnese, throughout mainland Greece, east to Xanthi, and in some Ionian Islands (Handrinos and Akriotis 1997).

The species uses a variety of habitats of different altitudes up to 3,000 m in the Alps and almost to sea level in Sicily and Greece. It generally prefers open upland rocky habitats, with sparse vegetation, steep slopes, scrub and scattered coniferous trees (Griffin 2011). Avoids dense woodland and prefers forest edges with open areas, grasslands and sparse low shrubland. It nests on the ground in dense herbaceous vegetation or in soil depressions or at the base of rocks. The nest is constructed by the female, which she covers with dry leaves, grass and a few feathers. The home range of

a pair varies from 0.1 to 1 km2 . It lays its eggs from mid-May to June in the Alps and from late April to June in Greece. It is usually monogamous. It feeds mainly on seeds, fruits and some invertebrates (insects and insect larvae). Foraging continues throughout the day in winter, but early morning and late afternoon in summer. The species is epidemic, however, altitudinal movements are reported in upland breeding areas, initially moving higher immediately after breeding and then lower as winter progresses. Birds may remain at breeding altitudes of 1,900-2,700 m in winter if snowfall is not too heavy (McGowan and Kirwan 2014). It is a social species. It lives in family groups of 10-15 individuals, which in winter can reach up to 50 individuals by combining two or more groups. During the months of January - February these groups break up and form pairs. It is a terrestrial species, roosting on the ground and rarely in trees or bushes. It runs very fast and rarely flies. The flight of the species is fast, sharp and straight.

According to the recorded threats in the list of threats to the species designation (Dimalexis 2009), the reported threats to the species are:

- Mining activities (quarries - mines)
- Construction of roads of all categories (including railways)
- Hunting - poaching - trapping - collecting eggs or chicks - nest destruction
- Noisy recreational activities
- Changes in the frequency and intensity of forest fires (increase or decrease)
- Abandonment of traditional agricultural practices and land use (including abandonment of extensive agriculture and livestock farming)
- Introduction of genetic material (hybridisation, mutants).

Threats listed on the IUCN red list are loss and degradation of habitat (Bernard-Laurent and de Franceschi 1994) of the species. Also, abandonment of traditional agro-pastoral activities (Budinski et al. 2010, Rippa et al. 2011), poaching, extreme climatic events (Bernard-Laurent and Leonard 2000), hybridization with released - farmed *Alectoris chukar* and *Alectoris rufa* (Barilani et al. 2007, Randi 2008) and the transfer of pathogenic parasites from these species (Manios et al. 2002, Rosà et al. 2011) are important threats to the species. An additional threat is the increase in tourism in mountainous areas, especially in the French and Austrian Alps.

The proposed conservation actions, according to the IUCN, are as follows:

- Conduct research on population trends of the species
- Improving knowledge of the impact of hunting on the species

- Implement measures to reduce the abandonment of traditional agro-pastoral activities
- Improving legislation to reduce poaching and over-exploitation of the species
- Investigate hybridisation of the species with captive-bred *A. chukar* and *A. rufa* and the transfer of pathogenic parasites from these species.

Of all the threats recorded above, the installation of the wind farm under study will not cause any serious impact on the species. Three to four pairs of the species are estimated to be active in the area of the project. More than 1/3 of the individuals recorded during the fieldwork (25 individuals) were recorded in Line transect LT1, which was installed for the purposes of the fieldwork, in seven recordings (Line transect 1 - see documentation charts). Based on the above and the fact that the species is directly associated with vegetation and soil and flies at a relatively low altitude, the significance of impacts to the species from the wind farm installation is considered negligible.

Analysis of mammal records (except for the worst mammals)

The records of other mammals (except the worst) in the field survey area revealed the existence of mainly common species of this fauna class. These common species are observed in most parts of Greece, are species with satisfactory (*Lepus europaeus*) or particularly large populations (*Vulpes vulpes*), the protection status of which is described in detail in the relevant tables in this report. However, of particular interest are the following two species: Endangered), while according to the IUCN at European level it is listed as a species of reduced concern (LC) and ***Ursus arctos***, which is a priority species of Directive 92/43/EEC (a *species whose conservation requires the establishment of Special Conservation Zones and indeed as a priority species*), and which according to the Greek Red Data Book in Greece is classified as a threatened species (EN: endangered), while according to the IUCN at European level it is listed as a species of reduced concern (LC). A total of 11 mammal species were recorded, with the bear belonging to Annex II of Directive 92/43/EEC (also belonging to Annex IV), the wolf belonging to Annex V of the Directive and the bobcat belonging to Annex IV of the Directive. The main characteristics of the above mammal species observed during the field survey are listed below. The data are based on reliable sources (Legakis, A. and Maragou, P. (eds.). 2009. *The Red Book of Endangered Animals of Greece. Hellenic Zoological Society, Athens, 528 p.*; Bakaloudis D. 2008. *Biology of Wild Fauna. Yachoudis Publications, Thessaloniki, p. 413*, *IUCN Red List of Threatened Species, www.iucnredlist.org, available 26/11/2024.*

Felis silvestris

The species was recorded during the field survey during the months of February, April, June and September.

The species has a very wide distribution range that extends across Europe. In Greece it is found throughout the mainland and in Evia. In Crete, the subspecies *Felis silvestris cretica* is found. The species has been observed more in northern and northeastern Greece, where the population density seems to be higher. The population trend has not been quantified but is believed to be stable. In Crete it occurs at low densities. One of the major obstacles to effective conservation in Europe is the lack of information on current population status and trends (Macdonald et al. 2004).

The species is protected by Directive 92/43/EC (Annex IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified in an endangered category (NE and LC respectively). It is also protected by the CITES Convention (Appendix II).

The European wildcat is a forest-dwelling species and prefers mainly broadleaf forests, but is also found in wetlands, shrublands and grasslands away from human activities. It is also found in riparian forests, marshes and coastal areas near the sea. It avoids areas with intensive crops (Nowell and Jackson 1996). Rodents are the mainstay of the European bobcat's diet (Nowell and Jackson 1996, Biro et al. 2005) However, rabbits are still an important prey (Nowell and Jackson 1996, Lozano et al. 2006). It also feeds on birds, amphibians, reptiles, eggs, large insects and spiders. The diet composition shows only slight seasonal variation: rabbits or rodents are the main food items throughout the year. The species breeds once a year. The breeding season lasts from January to March. After a gestation period of 56-68 days, it gives birth to 1-8 (usually 3-4) chicks. The young stay with the mother from 4 to 10 months, while the male does not participate in rearing the young. The species is nocturnal, usually active at night, only in areas where there are no human activities. The endemic area of males varies according to the abundance of prey. The population density ranges from 1 individual per 0,7 to 10 km2 .

The threats listed in the IUCN red list are hybridisation, disease transmission and competition with domestic cats. Also, loss, degradation and fragmentation of the species' habitat is a major threat. There is a high potential for disease transmission between domestic cats and feral cats (Nowell and Jackson 1996; Fromont et al. 1998; Daniels et al. 1999), with some infections being permanently maintained in feral cat populations following transmission from domestic cats. Other threats include significant mortality caused by humans (Nowell and Jackson 1996, Lüps et al. 2002, Schulenberg 2005). The species is still considered undesirable in Scotland and is illegally persecuted.

Vulpes vulpes

The species was recorded during the field survey during the months of January, February, March, April, May, June, August, September, October and November.

The species has an extremely wide distribution range. It spreads throughout the northern hemisphere, from the Arctic Circle, across Europe to North Africa, Central

America and the Asian steppes. The species is the most common widespread saccharophage in the world (Larivière and Pasitschniak-Arts 1996) and in Europe populations are stable. According to the Greek Red Data Book in Greece and to the IUCN at European level the species is not classified in a risk category (NE and LC respectively). It is protected by the CITES International Convention (Appendix III).

In Greece, it is found throughout the mainland and on some islands.

The species in Europe is found in a wide variety of habitats, including all types of forests and open habitats. The species is well adapted to many anthropogenically influenced habitats, including farmland and peri-urban areas (Larivière and Pasitschniak-Arts 1996, Stubbe 1999). It breeds once a year and the onset of breeding varies from region to region, but usually starts in December or January in the southern, January - February in the central regions and February - April in the northern limits of its range. It usually gives birth to 5 to 8 young. The young remain with their mother until the following autumn. The size of the endemic area varies depending on the quality of the habitat. In poorer habitats the size of the endemic area can be up to 4000 ha, while in better quality habitats (mixed agricultural land with forests) it can be up to 200-600 ha. The average population density is one family per square kilometre but can vary up to 5 families (about 20 individuals) per square kilometre.

The species is almost omnivorous with a diet consisting of invertebrates (e.g. earthworms and beetles), mammals (small rodents, hares and rabbits) and birds. Tish, it feeds on eggs, reptiles and carcasses. Finally, a significant part of the species' diet consists of fruit. Their diet is opportunistic and at certain times of the year, when prey is scarce, the worms can cover more than 50% of their diet.

Threats listed on the IUCN red list include human persecution of the species as prey in several European countries and as an undesirable species especially near rural areas. However, these threats do not pose a threat to the survival of the species.

Sciurus vulgaris

The species was recorded during the field survey in February and November.

The species has a wide range of distribution in the Palaearctic, extending from Ireland, Spain and Portugal in the west, through continental Europe, Russia, Mongolia and northeastern China to the Pacific coast (Panteleyev 1998; Gurnell and Wauters 1999). It is absent from most Mediterranean islands. It occurs from sea level up to 3,100

m in the Alps (Spitzenberger 2002). Although described as common over most of its distribution range (Gurnell and Wauters 1999), there have been well-documented population declines in many European countries. Typical densities range from 0.1 to 1.5 individuals per hectare (Gurnell and Wauters 1999).

The species is protected by the Bern Convention (Appendix III). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified in a risk category (NE and LC respectively).

The species is most abundant in large areas of coniferous forests, while it also occurs in deciduous and mixed forests, parks and gardens. Its diet is mainly vegetarian, consisting of seeds, acorns, nuts, which it opens with its front incisors. In the absence of these types of food, it feeds on mushrooms, flowers and vegetables, and occasionally feeds on chicks and eggs of small birds. It uses large cavities or holes for nesting and protection (Parker 1990; Nowak 1991). It also uses artificial boxes for nesting. It breeds twice a year, the first from February to March and the second from May to August. It gives birth to 5-7 young after a gestation period of 38-39 days. The size of the endemic area ranges from 2 to 10 ha.

The threats listed on the IUCN red list are the loss and fragmentation of the species' habitat. Competition with the grey squirrel (*Sciurus carolinensis*) is also a threat to the species (Gurnell and Pepper 1993, Wauters et al. 1997, Bertolino and Genovesi 2003). Grey squirrels not only compete with smaller red squirrels, but also carry viruses that are highly pathogenic to red squirrels.

Lepus europaeus

The species was recorded throughout the fieldwork (January 2024 - December 2024).

The species has an extremely wide distribution range, extending from Western Europe to Western Siberia and Southwest Asia. It occurs on many Mediterranean islands. It is considered locally common, with typical population densities ranging from 0.2 to 0.7 individuals per hectare (Homolka and Zima 1999). In western and central Europe, the species has suffered a significant decline over the last 50 years (Flux and Angermann 1990; Homolka and Zima 1999; Battersby 2005; Smith et al. 2005), although there is evidence that the population trend has stabilised in recent years in some countries. There is no information on population trends in Eastern and South-

Eastern Europe. In Greece, it is found throughout the mainland, including the islands of Crete, Evia and Lemnos, and reaches up to 1,500 m altitude.

The species is protected by the Bern Convention (Annex III). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified in an endangered category (NE and LC respectively).

It is a highly adaptive species and occupies a wide variety of habitats, grasslands, steppes, open temperate woodlands, croplands and pastures (Flux and Angermann 1990, Homolka and Zima 1999). It tends to be particularly abundant in open, flat areas where cereal crops dominate. Scattered trees in open areas, shrubs, and hedgerows are used as cover when the species is resting (Homolka and Zima 1999). Tish is found in open forests at the southernmost limits of its range. The breeding season starts from mid-January-February until mid-summer. The species has 1-4 births per year; the number of young varies from 1 to 8 young per birth. The species has several enemies, some carnivorous mammals (fox, stonecrop) and birds of prey (golden eagle, buffalo). It feeds mainly on grasses and herbaceous plants (grasses, forbs, broadleaf and agricultural plants during the summer, and during the winter it feeds on shoots, twigs and bark of low shrubs and young trees (Kontsiotis 2005). When available, wild grasses are preferred, but where intensive agricultural practices have reduced the availability of its food source, cultivated species are selected (Reichlin et al. 2006).

Threats listed on the IUCN red list are agricultural intensification, particularly the increased use of pesticides, fertilizers and heavy machinery, which is thought to be the main cause of population decline in Western and Central Europe (Homolka and Zima 1999). A recent study reviewing the available literature on the relationship between rabbit abundance and land use practices in 12 European countries confirmed that the main cause of rabbit declines was agricultural intensification (Smith et al. 2005). It is concluded that this threat may affect the species throughout its global range where agriculture is practiced. Agricultural intensification in eastern and south-eastern Europe is a potential cause for concern, particularly in countries that have recently joined the EU or are likely to do so in the near future. In Greece, the introduction of rabbits from the regions has been identified as a threat to local gene pools (Mamuris et al. 2001). It is a popular game species throughout its distribution range in Europe, but hunting is regulated and appears to be viable. The review by Smith et al. (2005) found no evidence of a relationship between hunting pressure and population densities.

Martes foina

The species was recorded during the field survey during the months of January, February, March, April, May, June, August, September, October and November.

The species occurs in large parts of Europe and Central Asia. In Greece it is found throughout the mainland and on several islands such as Crete, Rhodes, Corfu and Thassos. The species is protected by the Bern Convention (Annex III). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified in an endangered category (NE and LC respectively). It is also protected by the CITES Convention (Appendix III).

The species prefers more open habitats than other species of pine cones. Its habitat preferences vary in different parts of its distribution range. It is commonly found in deciduous forests, forest edges, and open rocky slopes. It may occur at elevations up to 4,000 m (4,000 ft) during the summer months. It is also found in open areas (grasslands, farmland, loose shrublands) and very often near settlements or even inside buildings (Nowak 1999; Virgos and Garcia 2002). In central Europe (Switzerland, northeastern France, Austria and southern Germany), the species is very common in urban areas, building its nest in attics, warehouses and barns, often causing damage to roofs and insulation of houses and to electrical wiring and pipes in houses and cars (Broekhuizen 1999). It is a solitary, nocturnal species, but is found in family groups (female with young) during the breeding season. In the absence of predators the species experiences population growth and can cause problems for populations of protected birds breeding on the ground, but helps control rodents near farms and regenerate valuable trees by dispersing forest seeds. It is an omnivorous and opportunistic species, although it prefers birds and small mammals. It feeds on what is available seasonally such as eggs, berries, succulents and other fruits. If food is scarce it feeds on litter.

According to the IUCN red list the species does not face any serious threats. It is sometimes persecuted by humans as an undesirable species, and in India and Russia it is hunted for its fur.

Meles meles

The species was recorded during the field survey during the months of March, April and October.

The species is distributed throughout Europe, Asia and Japan. In Greece it is found in mainland and island Greece.

The species is protected by the Bern Convention (Annex III). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified in an endangered category (NE and LC respectively).

In Europe, it is found in continental and island Greece. It mainly nests in forests or woodlands, and feeds in open or agricultural areas. It is also found in mixed broadleaf forests with several gaps, in shrublands and in natural hedgerows at the borders of agricultural crops. It breeds once a year from late winter to mid-summer. Oestrus lasts 4-6 days and mating lasts 15-60 minutes. Pregnancy lasts seven weeks and most births occur in February and March. It gives birth to 2-6 blind cubs, which open their eyes after a month. They are weaned after 12 weeks. They mature sexually in 9-10 months for males and 1-2 years for females. The mortality rate of juveniles is 50 % and that of adults 30 %. It lives up to 15 years.

It is a social species and forms groups of usually 6 individuals (rarely groups of 23 individuals have been recorded), where it lives and stays in underground galleries, consisting of many different spaces and many entrances. It is usually active at night, but several times moves in the early morning or late afternoon. In areas with more favourable temperatures, the species appears as a solitary species. The extent of the endemic area ranges from 30 - 50 ha in good quality habitats, and up to 150 ha in other areas. The population density is 2-20 individuals per 100 ha (Macdonald and Barret 1993).

The species' diet consists of a wide variety of foods, including insects, small mammals, reptiles, fruits, plants and litter, as well as bird eggs. In northern Europe earthworms are the most important food species, while in southern Europe it feeds mainly on insects and succulent fruits.

Threats listed on the IUCN red list are changes in land use, which cause loss of suitable habitat (Mitchell-Jones et al. 1999). It is sometimes persecuted as an undesirable species. In Central Europe the population was previously reduced by rabies, but this threat has now been reduced by rabies controls. In the UK the species is associated with bovine tuberculosis, which is used in some cases as an excuse to eradicate the species (there is no evidence for this). During hunting for foxes or raccoons, badgers are often killed by mistake. In the Russian Federation the species is sometimes hunted for meat and fat used as medicine. The species is sensitive to habitat

fragmentation and the population size is important for the continued survival of the species. In Germany, the species is hunted every year. It is possible that the introduced species *Nyctereutes procyonoides* competes with the badger and a project in Finland is looking at this potential threat. Badgers are heavily hunted in Finland, the annual harvest has increased in recent years to about 10,000 badgers. The hunting season in Finland is all year round, with the exception of females and cubs, which are protected from May to July.

Capreolus capreolus

The species was recorded throughout the fieldwork, except during the month of July.

The deer has a wide range of distribution in the Paleoarchipelago. It is found throughout Europe (with the exception of Ireland, Cyprus, Corsica, Sardinia, Sicily and most of the smaller islands), including western Russia (Stubbe 1999). In our country it is found in central and northern Greece.

It is a widespread and common species. Densities in the northern and southern parts of its distribution range tend to be lower than in the central parts. The population of Central Europe is estimated at about 15,000,000 individuals (EMA Workshop 2006).

In Greece, it spreads only in the mainland, with the southernmost edge of its distribution being the Oiti, Vardousia, Giona and Parnassos mountains. It disappeared from the Peloponnese at the beginning of the 20th century, but has been introduced from northern Greece to the state breeding farm of Kalavryta. It has also been introduced and lives in the wild in northern Evia and in the Parnitha National Park. Small or larger populations of roe deer are found in mountainous or semi-mountainous forest areas of Epirus, Thessaly, Central Greece, Macedonia and Thrace (Sfuggaris et al. 2006, Adamakopoulos et al. 1991). Data on the abundance of the species throughout its range are lacking. According to the only field survey approach conducted in Epirus in 1998-2001, the population density of roe deer in the autumn-winter period is 0.14-4.82 individuals/sq km (Sfuggaris 2002, Sfuggaris and Giannakopoulos 2005). Although for some areas there is evidence of limited range expansion or local population growth (e.g. Rhodope, some areas of Central Greece), the deer is certainly not abundant and Greece has significantly lower population densities than its European counterparts. In Greece there is a significant degree of habitat fragmentation and

unpublished data suggest a clear distinction of subpopulations with limited communication.

The species is protected by the Bern Convention (Annex III). According to the Greek Red Data Book in Greece the species is classified as Vulnerable (VU), while according to the IUCN at European level it is listed as a species of reduced concern (LC).

The deer is the smallest species of the deer family (Cervidae), with a height up to the shoulder of about 65 cm, and a weight of 19-30 kg. Males are more robust and have small, branched horns. They usually live 10 to 12 years. The species occupies a wide variety of habitats, including deciduous, mixed or coniferous forests adjacent to agricultural crops, grasslands, managed forests, and in grasslands with shrub and tree hummocks (Sempere et al. 1996). It avoids open areas and forests with large gaps (Cederlund 1983). It gives birth to 1-3 young between April and June. In summer it is found either as solitary or in family groups, usually the female with her young. In winter it forms family groups, which may consist of 40-90 individuals in open habitat types and 10-15 individuals in forested habitats. Fights between males develop for dominance of the territory (Sempere et al. 1996). The size of the endemic area varies between the sexes and ranges from 5 to 10 ha. The diet of the species consists of a wide variety of plant species. Usually 25% of these are woody plants, 54% dicotyledons and 16% monocotyledons. In cases where it is difficult to find food, it feeds on conifer needles, seeds and fruits (Sempere et al. 1996).

It is a prey species in most countries where it is widespread. Poaching is a potential threat to the species. In Greece, hunting of the species is prohibited.

According to the Greek Red Data Book (Legakis and Marangou 2009), poaching remains the most important threat. Persecution by hounds while hunting other game species living in the same habitats, such as wild boars and hares, which are legally hunted, also exerts considerable pressure. In addition, significant threats are posed by the alteration of its physiognomy and the speculation of its habitats. In particular, the abandonment of mountain crops, forest fires and the unplanned development of infrastructure (roads, tourism businesses) appear to be contributing to the degradation of the deer's habitats. Particular degradation is caused by the opening of excessively dense forest roads, even in isolated areas. Anthropogenic disturbance (recreational tourism, anthropogenic fires, road traffic) could also be considered a major threat, as confirmed by the presence of significant nuclei of the roe deer population in

mountainous, isolated and low-disturbance areas. Finally, low population densities, where they are observed, are in themselves a significant threat to the species, as they limit its chances of survival.

According to the NRC (Legakis and Marangou 2009), the conservation measures required are as follows: More research on the ecological distribution and habitat of the species, assessment of threats to its population and habitat, development and implementation of a specialized management plan, investigation of reintroduction in areas where the species was previously present, and training actions for the staff of the agencies involved in its management.

Sus scrofa

The species was recorded during the field survey in February, March, May and October.

The species is distributed in Europe, Asia, and North Africa. In Greece, it is found in central and northern Greece, and has recently been introduced in the Peloponnese. According to the Greek Red Data Book in Greece and to the IUCN at European level, the species is not classified in an endangered category (NE and LC respectively). Wild boar populations in Europe increased significantly in the latter part of the 20th century (Spitz 1999), but in recent decades are believed to be stable in most areas (EMA Workshop 2006).

The species occurs in a wide variety of habitats, from temperate to tropical, from high mountains and forests to scrubland. However, it prefers broadleaf forests and especially evergreen oak and beech forests. It is also found in more open habitats, such as steppes, Mediterranean shrublands (toadflax) and croplands, as long as water and tree cover are available (Spitz 1999). The species breeds once a year and usually gives birth to 4-8 young. The endemic range covers an area of 100 to 400 ha, with that of the male being twice that of the female. The species is omnivorous and usually prefers fruits, succulent fruits, bulbs, shoots, small mammals (rodents), eggs, insects, invertebrates, amphibians, reptiles and carcasses of dead animals.

According to the IUCN red list there are no significant threats to the species. There are occasional outbreaks of swine fever and African swine fever that cause local mortality, but populations recover quickly (Oliver 1993). Also, habitat destruction,

poaching and persecution (often in retaliation for damage to crops) can cause local declines in parts of the species' range (Oliver 1993).

Canis lupus

The species was recorded during the field survey during the months of February and October.

The main characteristics of the species, and the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

Ursus arctos

The species was recorded during the field survey in the months of September and October.

The main characteristics of the species, as well as the pressures and threats affecting it, have been reported in Section 5 (species of interest), in the relevant subsection where required.

Analysis of the records of Bats

With regard to the chiroptera, according to the literature review, it appears that the project under study is located both outside areas with significant bat caves and outside the wider feeding area of chiroptera. According to the LIFE GRECABATS project, the 230 most important bat sanctuaries in Greece (caves, mines, buildings, etc.) and caves as habitats of Directive 92/43/EEC (8310: Caves which are not exploited for tourism) were selected to be proposed as protection sites by the specific Environmental Studies and the following Management Plans. The main criteria for their selection were the number of species and colony sizes of cephalopods and the number of typical species and narrowly endemic species of invertebrates for the 8310 habitat. The proper management of most of the Annex II species of bats of the Habitats Directive, but also of cave colonies and their other typical and important species, requires proper management of the surrounding area. This space feeds the bats, but also determines the availability and quality of organic matter and water inside the bedrock and caves, and plays a decisive role in their microclimate. Based on the above, protection areas around each significant cave site or wider feeding areas were designed and proposed by the

above project. Based on the initial assessments made by the study team of the above program, and the polygons drawn as an auxiliary file for the preparation of the Environmental Impact Assessments of Greece and the definition of the Ecosystem Spatial Units of the handlers (08/10/2019), both the area of the production license polygons of the studied project and the entire field survey area of this study were outside the significant handler areas. Subsequently, it was chosen by the study team of the above project to significantly expand the above areas, increasing the extent of the significant areas of the bats (their feeding areas) to multiple degrees. And in this case, both the production polygons of the studied project, and its field survey area, are located outside the above-mentioned larger foraging areas. The nearest wider feeding area would be the location 'Kataraktes, Tristomo and the Warm Waters Cave'. More specifically, this wider protection area (kurnia and wider feeding area) is, as mentioned above, located approximately 5.40 km south of the production polygons of the project (Map 165).

From the records of bats, the seasonal presence of 14 species of bats was found in the survey area. Of these 14 species recorded seasonally in the area, seven are Annex II species of Directive 92/43/EEC (but also belong to Annex IV), while the following species are listed as threatened according to the IUCN: *Barbastella barbastellus*: VU (Vulnerable), *Myotis bechsteinii*: VU (Vulnerable) and *Miniopterus schreibersii*: VU (Vulnerable). Table 74 below shows the recorded crossing frequencies per hour of record for each species, which are also shown in Figure 11 below, and in Figure 12 as the number of crossings per hour of record and per month (handedness activity per month of presence).

Table 74. Recording rate of handler species observed during field surveys in the field survey area (number of records per recording hour).

Species	Number of records per recording hour
Barbastella barbastellus	**0,004**
Hypsugo savii	0,248
Miniopterus schreibersii	**0,007**
Myotis bechsteinii	**0,004**
Myotis emarginatus	0,004
Myotis myotis	0,056
Nyctalus leisleri	0,330
Nyctalus noctula	0,007
Pipistrellus kuhlii	0,159

Species	Number of records per recording hour
Pipistrellus nathusii	0,041
Pipistrellus pipistrellus	0,111
Rhinolophus ferrumequinum	0,052
Rhinolophus hipposideros	0,019
Vespertilio murinus	0,119

***** *In a shaded cell in bold type, species classified in the VU threat category at European (or in the absence of such a category at global level), according to the IUCN*

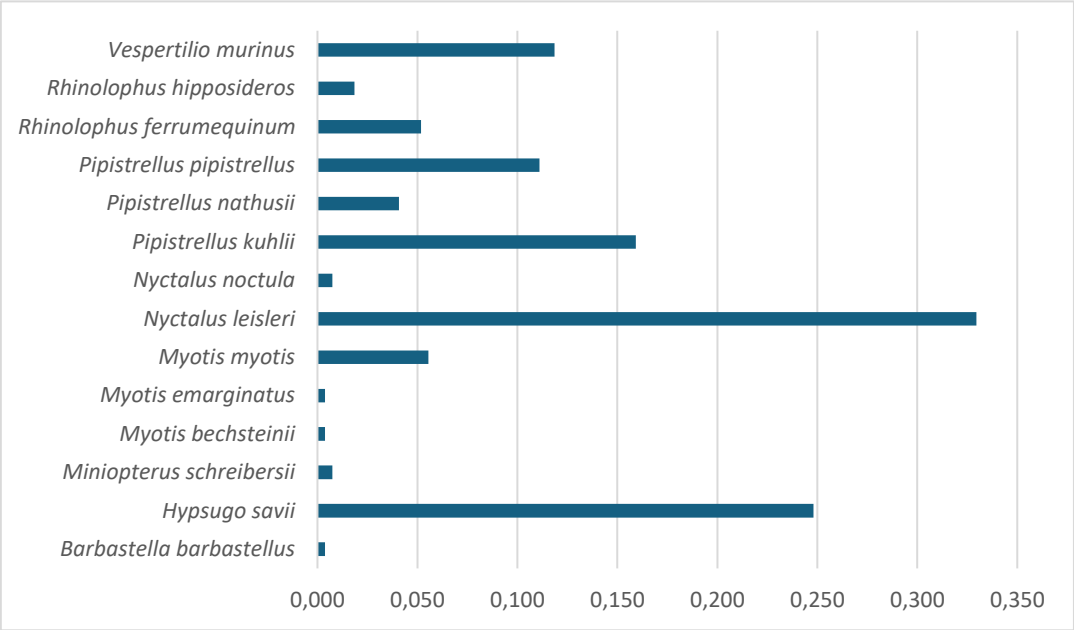


Figure 11: Graphical representation of the number of records per recording hour of the chiral species observed in the field survey area.

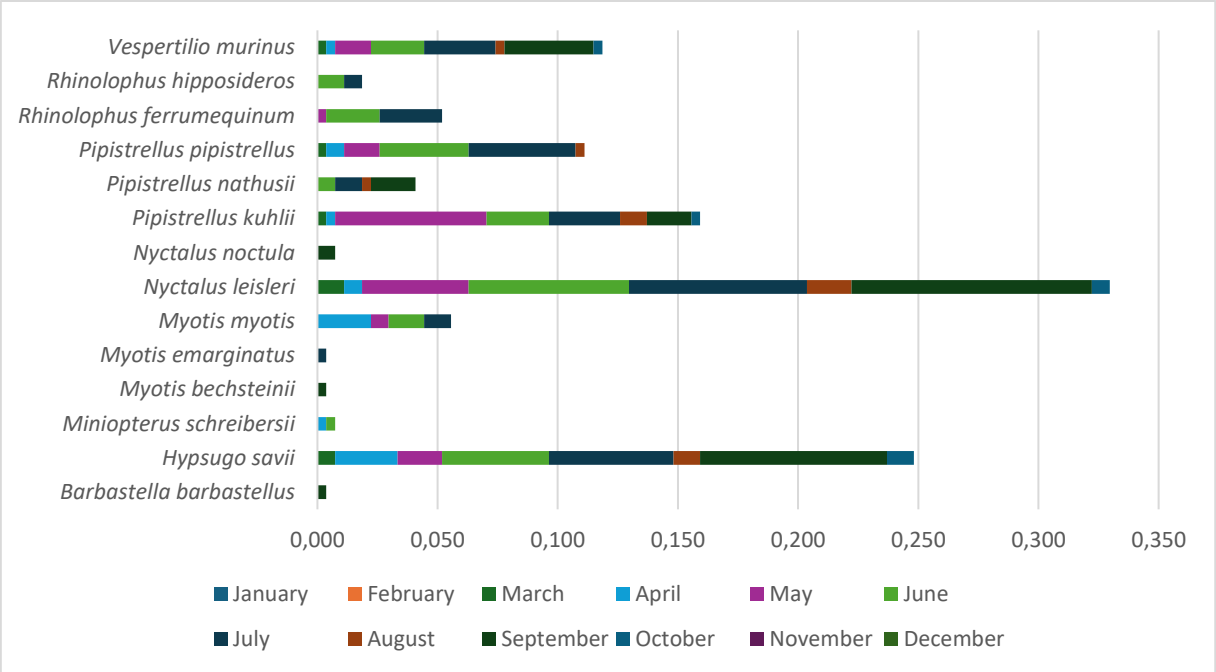


Figure 12: Graphical representation of the distribution of the number of records per hour of recording of cephalopods observed in the field survey area, by month of recording.

From the above data it is clear that the area is not used significantly by bats, which, although observed in a relatively significant number of species, do not seem to be very active in the area (low rate of records per hour of recording). For the most important species recorded (species listed in Annex II of Directive 92/43/EEC), their presence in the area is extremely low, with the number of crossings per hour of recording being: *Barbastellus barbastella* (0.004), *Myotis bechsteinii* (0.004), *Myotis schreibersii* (0.007), *Myotis emarginatus* (0.004) *Myotis myotis* (0.056), *Rhinolophus ferrumequinum* (0.052), *Rhinolophus hipposideros* (0.019).

The main characteristics of the above ten species of bats observed during the field survey are listed below. The data are based on reliable sources (Legakis, A. and Maragou, P. (eds.). 2009. *The Red Book of Endangered Animals of Greece. Hellenic Zoological Society, Athens, 528 p.*; Bakaloudis D. 2008. *Biology of Wild Fauna. Yachoudis Publications, Thessaloniki, p. 413*, *IUCN Red List of Threatened Species, www.iucnredlist.org available on 26/11/2024*.

Nyctalus leisleri

The species was recorded during the field survey during the months of March, April, May, June, July, August, September and October.

The species is protected by Directive 92/43/EEC (Annex IV) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Book in Greece and the IUCN red list at European level, the species is not classified as threatened (LC).

The species is widespread and abundant. It is widely distributed in Europe, from southern Scotland and Ireland, along the southern edge of the Baltic Sea and parts of the Mediterranean coast to western Russia. It is present in Madeira and the Canary Islands (only in Tenerife and La Palma) but absent from southwestern Italy and Sicily, eastern Spain. It occurs from sea level to 2 400 m.

The species feeds in woodlands, pastures and river valleys, where its diet consists of small flying insects (flies, mosquitoes, moths) and beetles. The species prefers old trees. Summer breeding colonies are found in tree holes, as well as in buildings and artificial bat boxes. Breeding colonies usually number 20-50 females, occasionally up to 1,000 (e.g. in Ireland: Stebbings and Griffith 1986). In winter they hibernate mainly in tree holes or occasionally in underground sites or buildings, often in large groups. Females migrate distances of up to 1,567 km (Ohlendorf et al. 2000).

According to the IUCN red list, threats include disturbance and destruction of roosting sites in trees and buildings, and loss or degradation of foraging habitat. In addition, wind turbine-induced mortality is another threat to the species, due to its migratory habits (Voigt et al. 2012).

Hypsugo savii

The species was recorded during the field survey during the months of March, April, May, June, July, August, September and October.

According to the Greek Red Book in Greece and the IUCN red list at European level, the species is not classified as threatened (LC). The species is protected by Directive 92/43/EEC (Annex IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

It has a wide distribution range, is considered abundant and there is no evidence of population decline at European level. The species occurs from sea level to 2 600 metres.

It is generally found at low densities and is limited by its habitat requirements, but is abundant in some European Mediterranean areas. Summer colonies of the species usually number 20-70 females.

The species feeds in open forests, grasslands and wetlands, and is often found feeding in agricultural fields near urban areas.

According to the IUCN red list, it is considered to be a species at high risk of mortality due to impact with wind turbines, particularly in the Mediterranean part of its distribution range. (Rodrigues et al. 2015).

Pipistrellus pipistrellus

The species was recorded during the field survey during the months of March, April, May, June, July and August.

According to the Greek Red Book in Greece the species is poorly known (DD), while according to the IUCN red list at the global level the species is not classified as threatened (LC). The species is protected by Directive 92/43/EEC (Annex IV) and the Bern (Annex III) and Bonn (Annex II) Conventions.

It is the most common bat species and is found throughout Europe. It also extends eastwards to China and Japan.

It is a versatile species that can be found hunting in a wide range of habitats: from urban centres to farmland and woodland or riparian areas. It feeds on small flying insects. Summer colonies are mainly found on buildings and trees and colonies often change their location during the breeding season. Most winter roosts in Europe are found in cracks in buildings, although cracks in cliffs and caves, as well as tree hollows, are also used. It is found up to 2,000 m altitude. It is a resident species, while in some areas of its range it migrates to distances of 10-25 km. It breeds from late August to late September. A nocturnal species that locates its prey using the sound signals it produces. The size of the endemic area of a colony is 16 km^2. Its diet consists mainly of mosquitoes, small moths and other insect species that it captures over ponds and gardens. It captures up to 3 000 insect individuals each night. It is considered a

beneficial species as it helps control harmful insects by keeping their population levels low.

Threats listed on the IUCN red list are loss of habitat for the species. Agricultural intensification is leading to the destruction of small-scale structured, insect-rich traditional rural landscapes and a reduction in prey availability (Kyheröinen et al. 2019). The species is vulnerable to timber processing and building renovation, such as renovation or insulation projects (Battersby 2005, Simon et al. 2012). It has a high risk of collision with vehicles (Fensome and Mathews 2016). It may also suffer from light pollution in roosting and foraging areas (Voigt et al. 2018).

Vespertilio murinus

This species was recorded during the field survey in March, April, May, June, July, August, September and October.

According to the Greek Red Data Book in Greece the species is poorly known (DD), while according to the IUCN red list at European level it is listed as a species of reduced concern (LC). The species is protected by Directive 92/43/EEC (Annex IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

The species is widespread and common in the Northern Palearctic, from France and the Netherlands in the west through Central, Northern and Eastern Europe and Siberia to the Pacific coast. The southern limit of its distribution range passes through the Balkan Peninsula, northern Iran, Central Asia, Afghanistan, northern Pakistan and China. Breeding in this migratory species is restricted to the northern part of its range. It occurs from sea level to over 3,000 m altitude.

Abundant in the northern parts of its European distribution range. Summer breeding colonies number 30-50 females (exceptionally 200). Males can also form large colonies in summer. The species usually occurs singly or in small groups (although groups of up to 30 individuals have been recorded).

The species forages in open areas in a variety of habitat types, including forests, urban areas, steppes, and agricultural land. It feeds on moths and beetles. Summer roosts are usually found in houses or other buildings and rarely in hollow trees, artificial bat boxes or rock crevices. Winter roost sites include rock crevices, cracks in tall buildings and occasionally holes in trees or cellars. Winter roost sites are usually in colder locations that are exposed to temperature changes. Migrations of up to 1,780 km

have been recorded (Markovets et al. 2004), although the species is resident throughout much of its range.

According to the IUCN red list, the species is affected by the loss or disturbance of hearths in buildings, although it is not a major threat.

Pipistrellus kuhlii

The species was recorded during the field survey during the months of March, April, May, June, July, August, September and October.

The species is protected by Directive 92/43/EEC (Annex IV) and the Bern (Annex II) and Bonn (Annex II) Conventions. According to the Greek Red Book in Greece and the IUCN red list at European level, the species is not classified as threatened (LC).

The species is widespread and abundant and there is evidence of a continuing population increase.

The species has a wide distribution range extending from the Iberian Peninsula through southern Europe via the Near East and the Caucasus to Kazakhstan, Pakistan and India. The northern limit of its range in Europe was formerly about 45°N, but the species is expanding northwards. It reached Vienna/Austria in 1994 (48°N), and more recently was recorded at 50°N in France and 51°N in Ukraine. It has been expanding northwards in Russia over the last half century from 46°N to about 53°N, with the highest record being at nearly 57°N. It occurs from sea level to 2,000 m elevation.

It is a relatively abundant species in the Mediterranean region and the Middle East. Summer colonies usually number 30-100 individuals. The northern limits of the species' range are also expanding.

The species forages in a variety of habitats, including agricultural and urban areas. It feeds on small insects. Summer breeding colonies are found in cracks in buildings. Winter roosting sites include rock crevices and cellars. It is usually a resident species (Hutterer et al. 2005).

According to the IUCN red list, there are no known significant threats.

Pipistrellus nathusii

The species was recorded during the field survey in March, April, May, June, July, August and September.

According to the Greek Red Data Book, the species is poorly known (DD) in Greece, while according to the IUCN red list at European level it is listed as a species of reduced concern (LC). The species is protected by Directive 92/43/EEC (Annex IV) and the Bern (Annex II) and Bonn (Annex II) Conventions.

The species is widespread and abundant, especially in the northern parts of its distribution range, and less common, but increasingly recorded in the southern and western parts of their distribution range. Summer breeding colonies of up to 200 individuals have been recorded, but large winter aggregations are not known.

Forages in a range of habitats, including woodlands, wetlands and open parks. Summer roosts are found in tree holes, buildings and artificial bat boxes, mainly in woodland. Winter roost sites include crevices in cliffs, buildings and around cave entrances, often in relatively cool, dry and exposed locations. It is a migratory species, with movements of up to 1,905 km recorded (Petersons 2004). Migrations usually follow a NE-SW route (Bogdanowicz 1999).

According to the IUCN red list, the species is affected by habitat fragmentation in its migratory corridors, loss and disturbance of roosting sites in buildings, loss of mature trees with cavities and/or loose bark, etc., and changes in water quality that may affect food supply. Wind turbines pose a significant threat to the species.

Barbastellus barbastella

The species was recorded during the field survey in September.

The main characteristics of the species, as well as the pressures and threats to it, have been reported in Section 5 (it is a species of interest) in the relevant subsection required.

Myotis emarginatus

The species was recorded during the field survey during the months of September and October.

The main characteristics of the species, as well as the pressures and threats affecting it, have been reported in Section 5 (species of interest), in the relevant subsection as required.

Myotis bechsteinii

The species was recorded during the field survey in July.

The main characteristics of the species, as well as the pressures and threats affecting it, have been reported in Section 5 (species of interest), in the relevant subsection as required.

Miniopterus schreibersii

The species was recorded during the field survey in the months of April and June.

The main characteristics of the species, as well as the pressures and threats affecting it, have been reported in Section 5 (species of interest), in the relevant subsection as required.

Rhinolophus ferrumequinum

The species was recorded during the field survey in May, June and July.

The main characteristics of the species, as well as the pressures and threats to it, have been reported in Section 5 (species of interest), in the relevant subsection as required.

Rhinolophus hipposideros

The species was recorded during the field survey in June and July.

The main characteristics of the species, as well as the pressures and threats to it, have been reported in Section 5 (species of interest) in the relevant subsection required.

Myotis myotis

The species was recorded during the field survey in April, May, June and July.

The main characteristics of the species, as well as the pressures and threats affecting it, have been reported in Section 5 (species of interest), in the relevant subsection as required.

Analysis of reptile records

Although Greece is a small country, its geographical position, the wide variety of different habitats, and the existence of more than 9,000 islands and rocky islets have contributed to the recording of many reptile species compared to other European countries (Legakis and Marangou 2009). During the field survey of the wider study area, eight reptile species (three lizard species, three snake species and two turtle species) were identified and recorded, of which, only two turtle species (*Testudo hermanni* and *Testudo graeca*), are included in Annex II of Directive 92/43/EEC (they are also included in Annex IV). The main characteristics of these reptile species observed during the field survey are listed below. The data are based on reliable sources (Legakis, A. and Maragou, P. (eds.). 2009. *The Red Book of Endangered Animals of Greece. Hellenic Zoological Society, Athens, 528 p.*; Bakaloudis D. 2008. *Biology of Wild Fauna.* Yachoudis *Publications, Thessaloniki, p 413*, *IUCN Red List of Threatened Species, www.iucnredlist.org available on 26/11/2024*.

Testudo hermanni

The species was recorded during the field survey in the month of April.

The main characteristics of the species, as well as the pressures and threats to it, have been reported in Section 5 (it is a species of interest) in the relevant subsection required.

Testudo graeca

The species was recorded during the field survey in the months of January, April, May and June.

The main characteristics of the species, as well as the pressures and threats affecting it, have been reported in Section 5 (species of interest), in the relevant subsection as required.

Lacerta viridis

The species was recorded during the field survey in the month of May.

The species occurs almost throughout Europe. In Greece it is found throughout the mainland, except in the Peloponnese. It is also found on some islands such as Evia, Thassos, Samothrace, Samothrace, Skiathos, Skyros, Paxos and Corfu. In the

southernmost parts of its distribution range the species is distributed up to 1 800 m altitude, and has been observed up to 2 130 m altitude.

The species is protected by Directive 92/43/EC (Annex IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as a threatened species (LC).

The species prefers open forest areas, (sparse broadleaf and coniferous forests), dense shrublands with several gaps, agricultural land (including orchards) with hedgerows and meadows. The female lays 5-10 yellowish eggs in the ground, which hatch after incubation of about 5-6 weeks. The diet consists mainly of invertebrates, but occasionally feeds on fruit, eggs and chicks of birds, smaller lizards and rarely small snakes. Young individuals prefer mainly insects and earthworms. In case of danger it cuts off (autonomously) the tail, which grows back again.

According to the IUCN red list, it seems that there are no major threats to the species. It is locally threatened in parts of its distribution range, especially in the north, by general habitat loss, deforestation of suitable sites and predation by cats.

Podarcis tauricus

The species was recorded during the field survey in April.

The species in Greece is distributed in the mainland east of the Pindos mountain range (eastern, central and western Macedonia, Thrace, Thessaly, Central Greece - *west of Pindos is replaced by Podarcis ionicus*), Evia, Thassopula.

The species is protected by Directive 92/43/EC (Annex IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified as a threatened species (LC).

The species is up to 8cm long, without the tail which is about twice as long as the body. Its preferred habitats vary. It prefers sunny areas and is found up to 2,350 m altitude, although it prefers altitudes of less than 800 m. Diurnal, agile, terrestrial lizard, rarely climbing. It feeds on invertebrates. Females lay 2-10 eggs, usually 2 times a year. It is found in a wide variety of habitats (Speybroeck et al. 2016). In arid areas, the species is largely found in wet or semi-wet habitats, although in the more northern parts of its range it is mostly found in drier areas. It can occur in rocky areas, scrubland, deciduous and coniferous woodland, orchards, vineyards, fields, stone walls and

buildings. It is often found in human settlements, including large towns and villages, and along railway lines.

According to the IUCN red list there appear to be no major threats to this adaptable and widespread species. It is locally threatened in parts of its distribution range. Several subpopulations, mainly in northern Europe, are threatened by loss of suitable habitat due to intensification of agriculture and excessive use of pesticides. The introduction of non-native subspecies may pose a threat to some localised subpopulations.

Pseudopus apodus

The species was recorded during the field survey in July.

Widely distributed species occurring in southeastern Europe (Balkan countries) and in areas of southwest Asia and Central Asia. In Greece it is found throughout the mainland, in Evia and on the islands of Corfu, Zakynthos, Zakynthos, Kefalonia, Lefkada, Thassos, Lemnos, Mytilini, Samos, Kos and Rhodes.

It is protected by the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, it is listed as a species of reduced concern (LC).

It looks like a snake, but it is a sedentary lizard. It prefers open habitat types, in dry areas, on rocky slopes of southern exposures, in open forests, on agricultural land and near inhabited areas. Its diet varies, but it usually feeds on large invertebrates, snails, insects, small lizards and small mammals. Females lay 6-12 eggs on the ground, which hatch after 2 months of incubation. It lives several years and in captive conditions can live up to 20 years. It is a diurnal species and is active early in the morning and late in the afternoon, especially after storms. It moves slowly and clumsily due to its stiff body. The tail is cut off (autonomy) with difficulty and grows new after incision.

There do not appear to be any significant threats to the species according to the IUCN red list throughout its distribution range. Locally, in parts of its distribution range it is threatened by habitat loss as a consequence of habitat conversion to agricultural land, and occasionally individuals of the species are killed due to misidentification with snakes.

Malpolon insignitus

The species was recorded during the field survey in the month of May.

Regarding its European distribution, the species is mainly found in southern Europe, in particular in the Balkan Peninsula, along the Adriatic coastal area from Slovenia and Croatia (including some Adriatic islands) to Albania and southern Bulgaria. In Greece, it is found throughout the mainland, in Evia and several islands of June (Corfu, Kefalonia, Zakynthos, Lefkada) and the Aegean Sea (Thassos, Samothrace, Skopelos, Skiathos, Salamina, Samos, Kos, Chios and Rhodes). In addition, there is an isolated population on the island of Lampedusa (Italy). The species is also present in Cyprus and a large part of Turkey.

The species is protected under the Bern Convention (Annex III). According to the Greek Red Data Book in Greece and to the IUCN at European level, the species is listed as a species of reduced concern (LC).

The species prefers dry, rocky and open areas with scattered vegetation, forests, shrublands, agricultural land, floodplains, meadows, coastal dunes and reedbeds in wetlands. It feeds on lizards, smaller snakes, small mammals and occasionally birds, chicks and eggs. It mates in April-May, and the female lays 4-20 eggs, which hatch after about 2 months of incubation. After hatching, the young are 20-28 cm long. The species lives up to 20 years. It is an agile and terrestrial species and rarely climbs trees or shrubs. It keeps its head high off the ground when searching for prey. Its length usually reaches up to 150 cm (rarely more). It varies in colouration. It has a characteristic head with pronounced arching curves between the forehead and the snout. It is usually found in areas with an altitude of 0 to 600 m, but can be found at higher altitudes. It bears large glands under the skin and between the eyes and nostrils, which secrete a liquid substance that spreads throughout the body, which makes it "waterproof", so that evaporation of body fluids is prevented, which helps the snake to be active in high temperatures. It will defend itself vigorously if threatened by hissing loudly, raising its head and craning its neck and feigning attack. It has haematoxic venom, which it channels into prey when ingested, from two teeth located at the back of the jaw (posteriorly). It is considered harmless to humans, but bites can cause sweating and fever, lasting a few hours (Arnold and Ovenden 2002).

According to the IUCN red list there are no significant threats to the species. On the island of Lampedusa (Italy) populations are heavily affected by road mortality.

In Egypt it is collected in large numbers for the international pet trade and is also threatened by land use conversion, overgrazing, firewood collection, quarrying and urbanisation.

Dolichophis caspius

The species was recorded during the field survey during the months of April and June.

The species spreads from southern Hungary, eastwards, to Romania, Moldova, southwestern Russia. It also spreads southwards, through the Balkans, from Croatia (the island of Lastavo and the eastern parts of the mainland (Ozimec 2005; Trocsanyi and Schafer 2008), Serbia, Montenegro, FYROM (where it occurs only below 1.500 m altitude), Albania (where it is widespread), Greece (it is absent from the Peloponnese, but occurs on many islands such as Andros, Tinos, Syros, Kythos, Kea, Serifos, Ikaria, Samos, Chios, Oinousses, Thassos, Samothrace and Lemones), Bulgaria and Turkey. The species occurs from sea level to 2 000 m altitude (Turkey).

The species is protected by Directive 92/43/EC (Annex IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified in a risk category (LC).

It is generally a common species throughout most of its distribution range. It is found in dry areas of open scrub and woodland, in steppes, meadows, rocky slopes, vineyards, olive groves, gardens and in stone buildings and ruins. The species hibernates in large groups. Hibernation starts in mid-September - October (sometimes the first ten days of November). It is usually active during the daytime, even in high temperatures in spring and summer. Females lay 6-18 eggs from mid-June to early July, with the young beginning to become active in the first ten days of September. It is a poisonous species. Its length rarely reaches up to two metres and extremely rarely longer. It often climbs high into bushes and trees to hunt. It feeds on rodents and lizards, as well as other snakes and birds.

Threats listed on the IUCN red list include direct killing on road networks by vehicle traffic.

Zamenis longissimus

The species was recorded during the field survey in May.

In Greece there are isolated populations in mainland Greece, Peloponnese, Corfu and Paxos.

The species is protected by Directive 92/43/EC (Annex IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is not classified in a risk category (LC).

Non-venomous snake. In Greece, the pheronimous subspecies *Zamenis longissimus longissimus longissimus* (Laurenti, 1768) is found. It is up to 200 cm long, but usually less than 1,5 m long. It occurs up to 2 000 m altitude in some areas. It is a diurnal snake that often climbs bushes and trees with dexterity. It feeds mainly on rodents, but also on chicks and lizards. Mates in late spring and females lay 2 - 18 eggs that hatch after about two months (Geniez 2018)... Likely to bite if caught. The Asclepius's doctor's apple or laffia has been associated with Asclepius, the ancient god of medicine who is depicted with a rod coiled by a snake. This symbol is still used today as a symbol of medicine. The species is one of the most typical European snakes of low- and mid-altitude forest habitats, such as open chestnut forests (Geniez 2018). It is relatively adaptable if the climate (relatively Mediterranean and without 'excessive variation' in temperature) is suitable and can be found along river banks, in marshy areas, in clearings, in areas with dense shrubs and along vegetation fences in farmland, as well as around abandoned buildings, dry stone walls or unused quarries (Geniez 2018). It can be found around people in rural areas and can enter houses or sheds (Edgar and Bird 2006).

According to the IUCN red list, the species may be most threatened by deforestation for intensive agriculture, conifer plantations or urban development. The intensification of agriculture within existing agricultural landscapes that removes traditional plant fences or dry stone walls also reduces the extent and quality of this snake's habitat (Edgar and Bird 2006). There may be additional impacts from general habitat degradation due to pesticide use and infrastructure development (Edgar and Bird 2006). Both males and females travel long distances to mate and road mortality from vehicles is likely to represent an increasing threat to this species, both because of this and its occurrence at low densities (Edgar and Bird 2006). As with many snakes, this

species is generally persecuted by humans. Eggs are deposited in piles of grass and other vegetation that are often cleared by humans.

Analysis of amphibian records

Amphibians are important indicators of ecosystem condition and occupy almost all habitat types in Greece (Valakos et al. 2008). Most amphibians exhibit both aquatic and terrestrial phases in their life cycle, and as a result are used to monitor changes in both terrestrial and aquatic ecosystems (Stebbins and Cohen 1995). As amphibians are highly dependent on environmental moisture, they are also indicators of large-scale environmental phenomena, such as global climate change (Beebee 1995; Stuart et al. 2004; Araujo et al. 2006; Wake 2007) (in: Legakis and Maragou 2009).

Many amphibians have life cycles that include movement from wintering sites to breeding ponds or wetlands in spring, post-breeding dispersal, and movement back to wintering sites (juveniles and adults). Under these conditions, breeding adults are highly vulnerable to accidents at least twice a year (to and from breeding and wintering sites), and yearling juveniles must also cross roads to wintering sites (Jackson 1996). Under extreme conditions, mortality and dispersal effects can result in loss of genetic diversity when local populations depend on gene flow resulting from dispersal (Jackson and Griffin 1998; Reh and Seitz 1990).

During the field survey, one amphibian species was identified, which is particularly common and is not listed in Annex II of Directive 92/43/EEC, nor under any threatened status. The main characteristics of this amphibian species observed during the field survey are listed below. The data are based on reliable sources (Legakis, A. and Maragou, P. (eds.). 2009. *The Red Book of Endangered Animals of Greece. Hellenic Zoological Society, Athens, 528 p.*; Bakaloudis D. 2008. *Biology of Wild Fauna. Yachoudis Publications, Thessaloniki, p. 413*, *IUCN Red List of Threatened Species, www.iucnredlist.org available on 26/11/2024*.

Bufotes viridis

The species was recorded during the field survey during the months of January and March.

The species is found in North Africa, Central and Southern Europe and West and Central Asia. In Greece it is found throughout the mainland and on some large islands (Evia, Crete, etc.).

The species is protected by Directive 92/43/EEC (Annex IV) and the Bern Convention (Annex II). According to the Greek Red Data Book in Greece and the IUCN at European level, the species is listed as a species of conservation concern (LC).

The species lives in uncultivated fields, gardens and urban parks, bushy areas, sparse forests and areas with fruit trees. During the breeding season (spring summer) the male heads to wetlands and follows the female with his call to mate. Spawning occurs in a wide range of temporary and permanent water bodies, including marshes, lakes, streams and rivers. The female lays 5,000 - 13,000 eggs, which incubate for 3-6 days. Tadpoles metamorphose 1-2 months after hatching (Capula 1990). They sexually mature at age three years. They live for about ten years. It is a nocturnal species. It emerges from its hiding place at dusk to hunt mainly arthropods. It is tolerant of human presence and is often seen in residential areas.

Threats listed on the IUCN red list are loss of breeding habitat through drainage and pollution (industrial and agricultural) of wetlands. Also, populations of the species may be locally declining due to mortality following collisions with vehicles.

General: Impact assessment

The development of renewable energy sources in recent years, and wind energy in particular, has been of great concern to many scientists because of the potential impact it may have on the environment, on fauna and especially on birds. There have been many studies and researches which have led the European Union to issue guidelines and reports on this growing activity. The effects of a wind farm are very varied and depend to a large extent on many factors such as the specificity of the area, the habitats found there and the species of fauna, but above all their numbers in the specific habitats within and near the installation sites. It is obvious that different categories of fauna species are affected to varying degrees by such projects, ranging from high to zero impact. Many wildlife species are particularly sensitive and affected by human activities (Frid and Dill, 2002). Human presence in natural areas can lead to displacement of fauna species, forcing them to expend available energy to move to other parts of the habitat or to move to new habitats that are not as suitable.

The installation of a wind farm carries the risk of increasing human presence at its installation site. However, this impact is limited only during the construction phase of the project, whereas afterwards, during the operational phase of the wind farm, human presence is considered to be negligible and the area largely regains its former character. In the case of this project, the existing road network in the wider area is an important positive factor, and therefore no major new roads will be required. As a result the accessibility of the site will not be burdened by the installation of the project and will not be any greater than before its construction. Also, in addition to the existing road network mentioned above, the pre-existing human activity in the area is evident from the land use of much of the area, with agricultural crops, which together with the existing rural road network forms an anthropogenically influenced landscape over a very large part of the field survey area.

The biggest problems (where they arise) from the installation and operation of wind farms have been identified in the avifauna, especially in sensitive areas such as areas which for some reason concentrate significant numbers of birds (wetlands, places of concentration or transit of migratory birds, etc.).etc.) or areas which are habitats for rare and sensitive species, without however overlooking the possible impact on other fauna (large mammals, mainly chimaeras, but possibly also reptiles and amphibians).

Studies and research to date have concluded that the main types of impact can be identified in four categories:

- Disturbance, which removes bird species from the A/P zone causing **indirect habitat loss** and is due to factors such as noise, visual disturbance, etc.
- Collision, which kills or injures individuals by direct contact with the turbine blades.
- **Creation of a** barrier effect (barrier effect) to the movement of bird species.
- Direct habitat loss or change in habitat structure due to destruction or occupation of habitat used by the species prior to the construction of the wind turbine.

Assessment of impacts on the main species of avifauna

Based on the assessment of the field records presented above, it is considered that the construction and operation of this project may, in theory, have an impact on avifauna species that are sensitive to such structures and projects. In order to assess the impacts on birds, the following table has been prepared which presents the estimates of the sensitivity of avifauna to wind farms based on the European Commission 2010 guidelines and data. Also presented in the table is the assessment of this study based on observations and field records. The assessment is derived from the field data set and its analyses as presented in the section "Analysis of Important Species Records - Impact Risk Assessment". The table below lists species that are included in the European Commission 2010 Guide and were observed during fieldwork, as well as other species of interest in the area that were observed during fieldwork by the study team and not included in the above guide.

Table 75. Impact assessment on the avifauna recorded on the site, in relation to the European Union (European Commission 2010) characterisation and data for those species present.

Species	EU characterisation.			Assessment in the project under consideration		
	Habitat loss	Impact	Barrier creation	Habitat loss	Impact	Barrier creation
Aquila chrysaetos	X	XXX		O	X	O
Hieraetus pennatus	-	-	-	O	O	O
Circus cyaneus	XX	X	O	O	X	O
Circus aeruginosus	X	O	O	O	O	O
Circus pygargus	X	XX		O	O	O
Circaetus gallicus	X	XXX	X	O	XX	O
Falco peregrinus	X	X	O	O	O	O

Species	EU characterisation.			Assessment in the project under consideration		
	Habitat loss	Impact	Barrier creation	Habitat loss	Impact	Barrier creation
Falco naumanni		O		O	O	O
Pelecanus onocrotalus	-	-	-	O	O	O
Caprimulgus europaeus	X	X		O	O	O
Lanius collurio	-	-	-	O	O	O
Lullula arborea	-	-	-	O	O	O
Alectoris graeca	-	-	-	O	O	O
Melanocorypha calandra	-	-	-	O	O	O
Leiopicus medius	-	-	-	O	O	O
Struciformes (Passeriformes)	-	X	X	Recorded by case		

Legend: *XXX = indications of significant risk of occurrence, XXX = indications of risk of occurrence , X = possible risk of occurrence, O = low or no significant risk of occurrence, Where there is a dash (-) the species is not mentioned in the EU guide*

The following conclusions can be drawn from the above table:

Of the raptor species observed in the study area during the field surveys, *Circaetus gallicus* is considered to face a theoretical risk of impact from an impact, as it appears to make use of the wider project site, possibly for foraging. The recorded flights of the species and the frequency of sightings per hour of observation are detailed in the preceding section. Based on the data derived from the analysis of the field recordings and combining them with the corresponding classifications in the first three columns of Table 75 derived from the EU Guide, *Circaetus gallicus* was classified, in terms of impact impact impact, in the risk category "evidence of impact risk". The above classification was also made given the importance of the wider area for the species, its existing presence in the study area and the use of the area (foraging), its size, and the fact that the above species, like most large predator-domestic birds, are K-selection species in terms of their evolutionary growth strategies. However, it should be stressed that for *Circaetus gallicus*, the number of strikes obtained per year was quite low. And it remained quite low, even after using the strictest possible variables in the calculation process, for example by making the assumptions that the total number of flights of each species were flights involving the use of the site and not simply passing through the study area, and by using as avoidance rate both the acceptable 98% and the much stricter 95%, due to the specificities mentioned for the study area. The above approach was considered more appropriate by the study team, who preferred to overestimate the impact rates of the above species, but in no way underestimate them.

With regard to *Aquila chrysaetos*, a more stringent classification of *Aquila chrysaetos* in the risk category 'potential risk of impact' was also followed, even though the species was recorded in only one individual crossing. However, the possibility of impingement on the wind turbines of this project cannot be ruled out by the study team, due to the presence of the species in the area (albeit minimal for the period of fieldwork of this project, but also recorded within Zone A), its size, and also, as noted above, the fact that the species, like most large raptor-drop-birds, is a K-selection species in terms of its evolutionary growth strategies. This is a possibility, especially if other factors in the area combine to increase the activity of this species, and possibly other necrophagous species, in the field survey area, even if only for a limited period of time, such as the presence of a dead animal in the vicinity of the wind farm site. For the above reasons, and in order to minimise the otherwise very low probability of risk to *Aquila chrysaetus* (but also *Circaetus gallicus* and other important species) from collision impacts, additional mitigation measures are proposed in the following section, the most important of which is the installation of an optical system for the automated stopping of wind turbines in the event of detection of a species of interest in the vicinity, in order to minimise the likelihood of collision.

With regard to *Circus cyaneus*, as for *Aquila chrysaetos* above, a more stringent classification of the species in the risk category "potential impact risk" was also followed, although the species was recorded in only three individual transects. However, the possibility of impact on the wind turbines of this project cannot be excluded by the study team, due to the presence of the species in the area (albeit minimal for the period of fieldwork here, but also due to the recording within Zone A and even crossing the project axis vertically).

With regard to the raptor species *Hieraaetus pennatus, Circus aeruginosus, Circus pygargus, Falco peregrinus, Falco naumanni*, the probability of collision with the wind turbines of the project under study, based on all observations, is zero, and their presence in the wider project area during all fieldwork was minimal (one record for *Hieraaetus pennatus*, *Falco naumanni*, two for *Falco peregrinus*, four for *Circus aeruginosus* and five for *Circus pygargus*, - none of which passed within Zone A). However, due to their presence in the area, the possibility of collision cannot be ruled out by the study team.

With regard to *Pelecanus onocrotalus*, due to the characteristics of their flights (no flights within Zones A and B), no evidence was found to substantiate the possibility

of significant impacts, although the possibility of an accidental collision event can always be excluded due to the importance of this species. However, even in this case, the installation of the above proposed automated stopping system would provide an additional safeguard in minimising the probability of collision with the turbines. It is also worth noting that the one record involving the crossing of 150 people (out of a total of two records throughout the fieldwork) was made outside the Zones of Effect with the wind turbines of the wind farm under study (distance greater than 2 km from the location of the nearest wind turbine of the project under study), on 11/4/2024, to the south and outside the Field Survey Area (Regional Zone 2 km from the boundaries of the project's production polygons). The flight altitude of this particular log exceeded approximately 400 meters.

With regard to the very important scavenger - raptor species of interest, *Neophron percnopterus*, which **was not** recorded during the entire duration of this fieldwork, very low impact impacts of impacts are expected, as accidental movements of the species cannot be excluded. This possibility is real, especially if other factors act in combination in the area to create the right conditions for its presence in the field survey area, even for a limited period of time, such as, for example, as mentioned above for the species of black-tailed godwit, golden eagle and vulture, the presence of a dead animal near the wind farm installation area, as these species show an increased risk probability in the above-mentioned impact in the literature. For *Neophron percnopterus*, no suitable nesting habitat was identified within the production polygons of the project under study, nor within the field survey area.

Specifically:

Regarding *Neophron percnopterus*, the species has suffered a dramatic and ongoing population decline in recent years, with the number of pairs of the species now (2018) amounting to five across Greece (Saravia et al. 2019). The species was not observed during fieldwork (although 38 field days were conducted). According to the National Action Plan for *Neophron percnopterus* in Greece (Government Gazette 3760/B/25-10-2017), and in particular according to Article 1.2 of Annex I of the same, it is stated that:

"ANNEX I

Measures to achieve the objectives

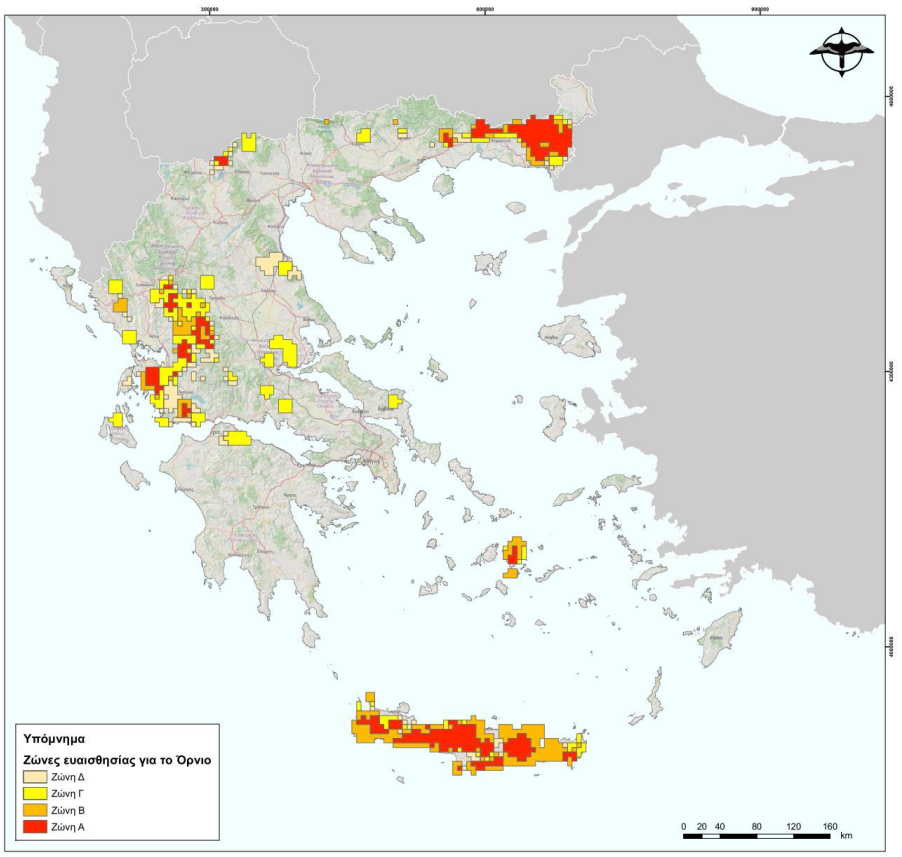
...

1.2 Reduction of the risk of collision with wind turbines through the establishment of exclusion zones

Even a small mortality rate of Neophron percnopterus, with or without breeding territory, due to wind turbine collisions can have a significant impact on the viability of the species' population. Therefore, in order to prevent and minimise the risk of mortality caused by wind turbines, ***exclusion zones for the installation and operation of wind farms within a radius of at least 5 km around existing nests of Neophron percnopterus*** *shall be established on specific maps."*

Also, with regard to the very important scavenging species of interest, *Gyps fulvus*, which **was not** recorded during the entire duration of the present fieldwork, very low impact impacts are expected, as accidental movements of the species cannot be excluded. The above also follows from the new sensitivity map of critical areas of *Gyps fulvus* in Greece, prepared through the LIFE IP 4 NATURA project (LIFE16 IPE/GR/000002) *"Identification of critical habitats (sensitivity mapping) of Gyps fulvus in Greece - Determination of management guidelines". Deliverable Action C.1. Hellenic* Ornithological *Society 2023, in the framework of the integrated actions for the conservation and management of Natura 2000 sites, species, habitats and ecosystems in Greece".* This work is of particular importance due to the high reliability of its results, which is due both to the use of data from *Gyps fulvus* population monitoring (in the framework of the LIFE IP 4 NATURA project and through recent literature sources), and mainly to the use of a significant amount of telemetry data from a large number (59) of satellite transmitters placed on individuals of the species. Also, in addition to the transmitter data, obtained from the LIFE IP 4 NATURA project, the mapping work used telemetry data provided by the Bulgarian Society for the Protection of Birds (BSPB)/BirdLife Bulgaria and Fund for Wild Flora and Fauna (FWFF), as well as by the University of Crete/Museum of Natural History of Crete (MFI). In parallel, the results of recent work to identify the habitat of *Gyps fulvus* in the Balkans (Peshev et al 2021) were also used.

Therefore, by applying the above, the sensitivity map of *Gyps fulvus* habitat in Greece was obtained, which is given below (Map 168).



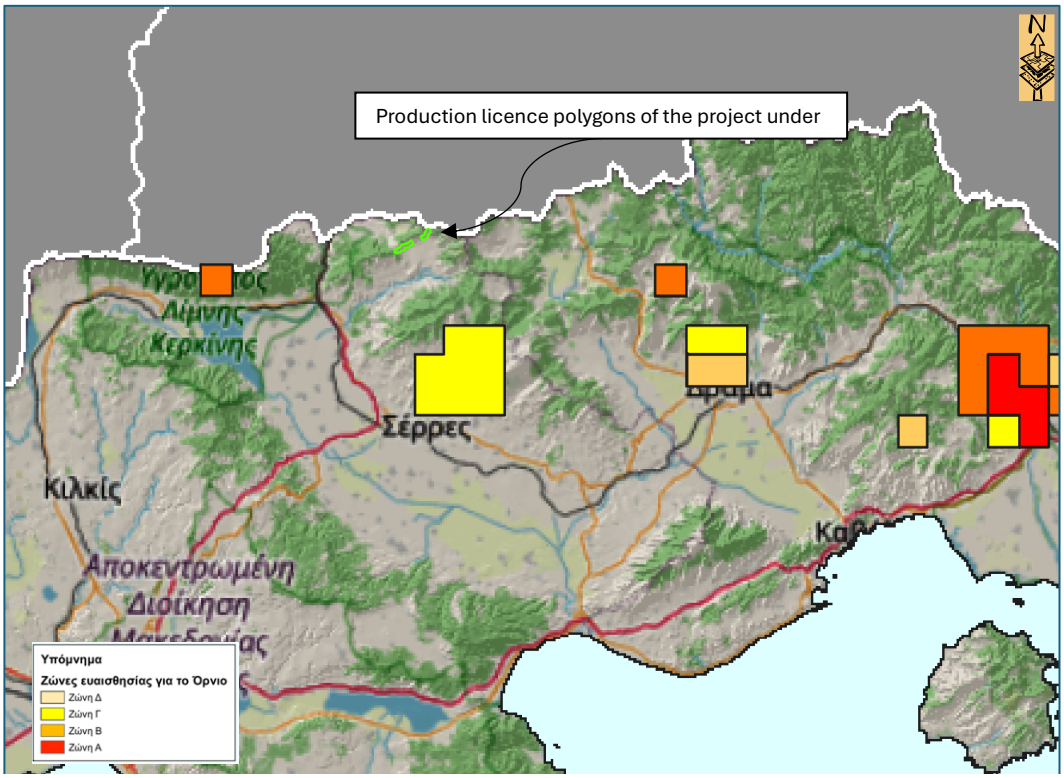
Map 168: Sensitivity map of critical areas of *Gyps fulvus* in Greece

According to the above sensitivity map of *Gyps fulvus* habitats in Greece, four sensitivity zones can be distinguished:

- **Sensitivity Zone A (Red colour) - Very High/Critical:** This is the core of *Gyps fulvus* activity in Greece. It mainly includes areas in the immediate vicinity of active breeding colonies, as well as the main roosting sites and critical summer feeding areas where high concentrations of Gyps *fulvus* are observed.
- **Sensitivity Zone B (Orange) - High:** This is the zone located peripheral to the critical core of the species' activity and includes areas of frequent and regular foraging, making it particularly important foraging areas.
- **Sensitivity Zone C (Yellow) - Medium:** This zone primarily includes areas on regular vulture routes between colonies and foraging areas, as well as the locations of recent historic colonies, which are expected to be the first areas of recolonization of the species as a result of natural population recovery and/or targeted actions to enhance natural populations.

➢ **Sensitivity Zone D - Low:** This zone basically includes areas within the habitat of the vulture, but mainly at a seasonal level.

A georeferenced section of the above map is given below, showing the production polygons of the project under study.



Map 169: Digitized part of the sensitivity map of the critical areas of *Gyps fulvus* in Greece, which also shows the production polygons of the project under study (green outline).

As shown in map 168 above, the production polygons of the project under study are located outside *Gyps fulvus* sensitivity zones. Zone C is located closest (includes primarily areas on regular *Gyps fulvus* routes between colonies and foraging areas).

For the other raptors of interest, which were also not recorded during the fieldwork (*Aquila fasciata*, *Falco eleonorae*, *Falco vespertinus*, *Falco columbarius, Buteo rufinus, Aquila fasciata, Milvus migrans, Accipiter brevipes, Clanga pomarina, Clanga clanga, Circus macrourus, Haliaeetus albicialla, Falco cherrug, Pernis apivorus, Falco biarmicus*), very low impact impacts of low significance are expected, as accidental movements of these species cannot be excluded.

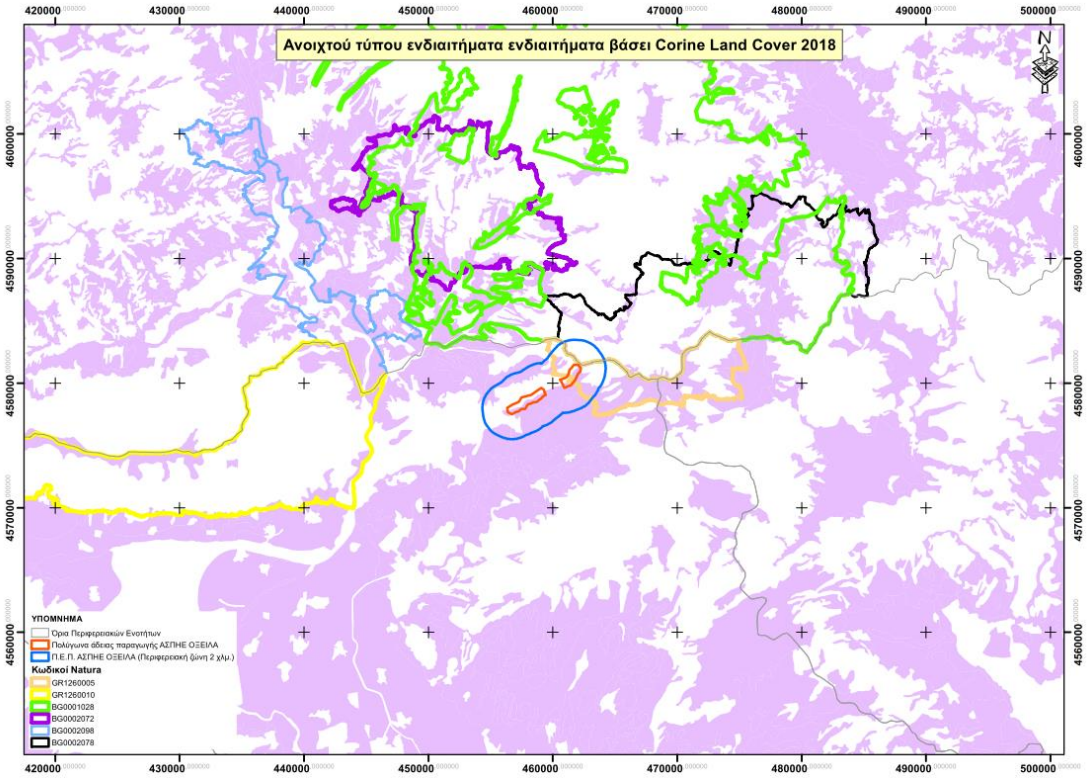
For the other important large species of interest, such as aquatic species (*Egretta garzetta, Ardea alba, Platalea leucorodia, Ardea purpurea, Pelecanus crispus* etc.) and

the species *Ciconia nigra* and *Ciconia ciconia*, which were also not recorded during the fieldwork, impacts are also expected to be of very low significance, as accidental movements of these species cannot be excluded. However, it is worth noting that these species (mainly aquatic) are directly linked to wetland ecosystems for foraging and/or nesting, either on floating emergent vegetation or in a riparian vegetation zone. These habitats are not found in the study area.

For the other important species of smaller sized birds (oystercatchers, goatbirds, oakleaf petrels, etc.) it is considered that no significant impacts are likely to occur as they are species that move short distances, usually making low flights. *Lullula arborea* showed the highest relative concentrations.

In terms of the impact of habitat loss on the important species of the area and other avifauna, the habitat types occupied by the wider area of the study project site are abundant in the neighbouring protected areas under study and beyond. Specific foraging habitats for the species concerned, in accordance with their ecological requirements (mainly open type suitable foraging habitats - Map 170). Therefore, it cannot be considered that the project under consideration will cause dispersal, fragmentation or any form of significant habitat loss.

Similarly, the impact of disturbance and barriers on movement is considered negligible as, based on the proposals to be derived from this report, it is anticipated that the wind farm installation works will cease during the breeding season of the birds, and the high availability of suitable habitat types in the area and the small size of the impact area preclude habitat fragmentation and habitat discontinuity due to the creation of barriers.



Map 170: Map of open habitat types in the area

One of the most important mitigation measures proposed herein to minimize the potential risk to the above species from collision impacts is the requirement for the project proponent to install an automated visual stopping system for all wind turbines in the event that a species of interest is detected in close proximity to minimize the potential for collision. However, due to the particularities of the study area, an important parameter for the correct use of the above system and the achievement of the objective, which is to minimize the probability of collision of the species of interest without causing other undesirable situations (e.g. disturbance during the breeding season, displacement of species, etc.) is the correct configuration of the above system.

At the specific location of the study project, given the importance of the site, the above proposed system is proposed to be configured to operate without bird deterrence (sound repulsion) during the breeding season and during the chick-plucking period, but only with the wind turbines stopped, so that there is no possibility of disturbance to the species and no possibility of displacement of species from the study area. Also, given the topography and the possibility of species of interest passing perpendicular to the axis of the study project from a low

altitude, which may be a "blind spot" for the detection system of the above-mentioned stopping system, it is proposed that it be mandatory for the promoter of the study project to install a second set of cameras (eight detection cameras on each wind turbine instead of four) on all the wind turbines, in order to fully cover the detection of species of interest from all directions of the horizon and from all possible heights, so that the case that a bird comes from a lower altitude than the level of the cameras, due to the morphology of the terrain, is also adequately covered by the correct choice of the angle of placement of the cameras. Other vital parameters that should be rigorously adjusted to achieve the objective of minimizing the probability of collision are the correct parameterization according to the biometric characteristics of the species in the area and the short response time from species detection to the complete stop of the wind turbine, data that are subject to modification in most of the commercial models of automated wind turbine stopping system. **It is also considered important that during the first breeding season, after the installation of the project under study, the above automated wind turbine shutdown system should operate with the simultaneous, daily and uninterrupted presence of two ground observers, who will also have the ability to shut down the wind turbines of the project under study in the event that dangerous flight of species of interest is detected.**

The correct setting of the above parameters is important in order to minimise the possibility of striking important species on the turbines not only of the project under study but also of all the wind farms where the above systems are installed, as it is not sufficient to simply install them to avoid incidents of strikes. The effectiveness of the above systems with the proper adjustment of their parameters, as described in detail, ensures to a large extent the limitation of the probability of impact, without, however, reducing it to zero. For this reason, other measures to deal with the probability of collision should also be taken to ensure an even greater probability of eliminating it. A number of other measures are proposed herein in combination, such as stopping the operation of the wind farm in conditions of limited visibility due to cloud cover and extremely adverse weather conditions, painting the blade of the wind turbines with black paint, considering the possibility of completely stopping the operation of the wind turbines during sensitive periods under certain conditions, etc, which are described later in this document in the relevant section, and which, if followed faithfully, are bound to achieve the objective of minimising any possibility of impact, since, as stated above, the Special Ecological

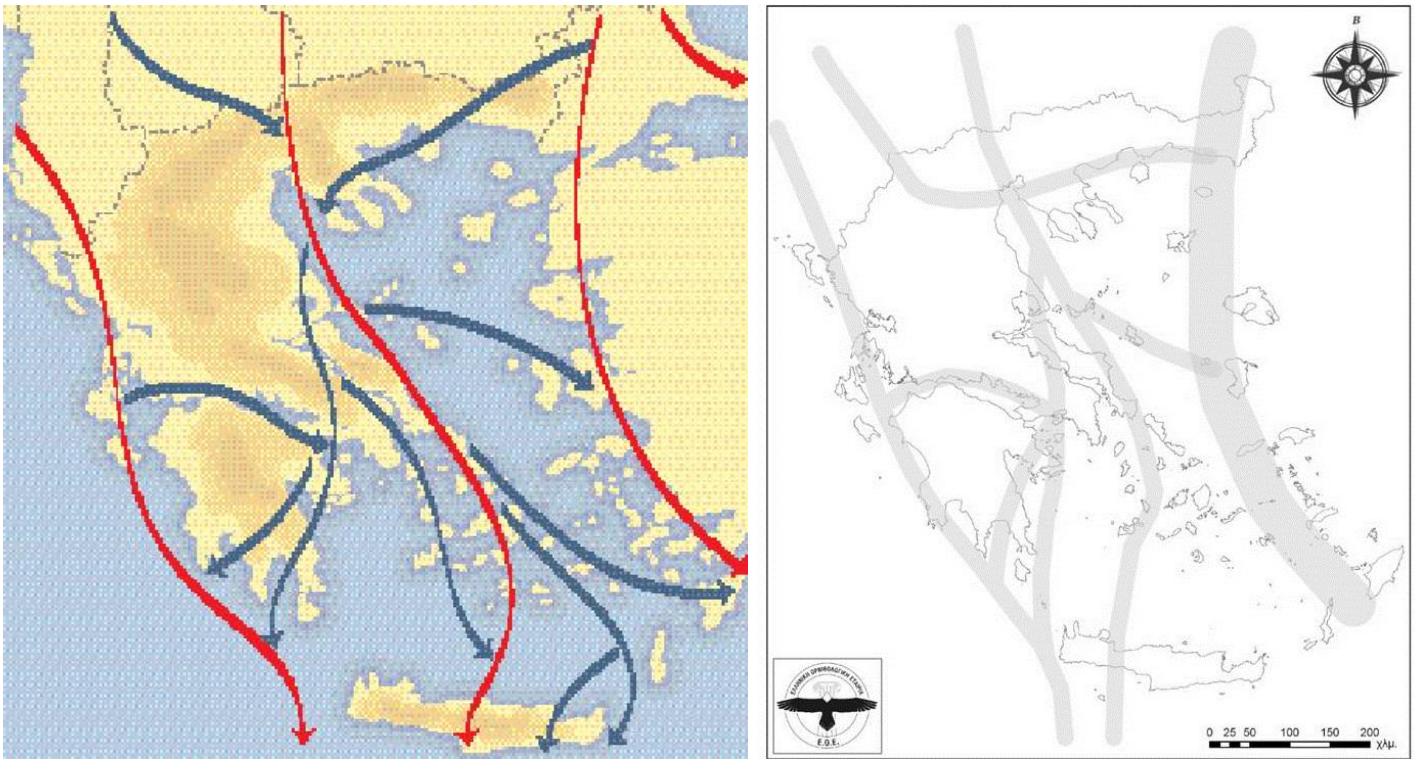
Assessment must, in the event of an assessment of possible significant adverse impacts, with appropriate documentation, propose the necessary measures to prevent and minimise them in order to ensure the integrity of the area.

During this study, and during the field months it was conducted (January 2024 - December 2024), no concentrations or significant group movements of migratory birds that could be affected by the presence of wind turbines were recorded. Although a methodological attempt was made to identify and record autumn and spring migration (night observations when the moon phase allowed and use of the bioacoustic station), it was not possible to record it. During this period of recordings in general, migration activity was not remarkable in terms of the number of species. A few observations of raptors were or may have been associated with migration in the autumn period, for example, one record of *Circaetus gallicus* and one record of *Hieraaetus pennatus* in early September, and three records of *Circus pygargus* (two in early September and one in late October). In terms of species activity during the spring migration, this too was limited, with one record of two individuals of *Falco naumanni* (in early April) and a record of 150 individuals of Pelecanus *crispus* (early April) outside the Field Survey Area.

Of the other species, relatively high concentrations of *Merops apiaster* (five records of 74 individuals in early September) *Hirudno rustica* (two records of 33 individuals in early September) and *Delichon urbicum* (ten records of 138 individuals in early April and early September) were observed during migration, while *Lanis colurio, Muscicapa striata, Cecropis daurica, Upupa epops, Coturnix coturnix* and *Caprimulgus europaeus* were very poorly represented during the migration months.

This fact of relatively low migratory activity (without implying that all records of the above species indicated migration movements) is also verified by the fact that the morphology of the area of the installation polygons, and of the field survey area, does not create narrow passages that could guide the species to cross from the installation site of the wind farm in question (i.e. to end up at the entrance or exit of the wind turbines of the project under study). The location of the production permit polygons of the study project in relation to the migration corridors in Greece is depicted on Map 171. According to Handrino (1984), no major migration corridor of the country passes through the project area, nor is there a secondary migration corridor. Furthermore, according to the map of the Hellenic Ornithological Society, the project under study is also outside a main and also outside a secondary migratory corridor.

Although it is not possible for anyone to assume that the above migration corridor alignments are strict geographical boundaries within which migration takes place, it appears that the study project site, according to the records (as well as the use of a bioacoustic station during the night during significant periods) does not receive significant migration flows. Therefore, although the proposed mitigation measures section takes into account the presence of migration in the study area (e.g., proposal to use special night lighting), the lack of observation of significant migratory flows during fieldwork, as well as the close proximity of settlements to the study project installation area and the existing road network, make the installation area an area in which installation of the project would not have a significant adverse impact on bird migration.



Map 171: Left: Map showing the corridors followed by migratory birds over Greece, according to Handrinos (1984). The three main corridors are marked in red and the secondary corridors in blue. **Right:** Migration corridors of Greece according to the Hellenic Ornithological Society.

Mammals

With regard to the mammal species observed and recorded in the survey area, it is considered that the construction and operation of the park cannot cause significant or permanent disturbance or adverse impact. Apart from the construction phase of the project and its accompanying roads (which will be limited in size due to the presence of the existing road network), where there will be temporary mobility and minor landscape reshaping, the wider area will be 'allocated' to fauna species for use without any particular change in its characteristics, taking into account the mitigation measures that will also be proposed for this fauna class in a subsequent section. The mammal species recorded are for the most part species that are highly adaptable to anthropogenic influences and it is considered certain that their activity or vital habitat will not be disturbed or lost to the extent that their presence, the population they maintain in the area or the integrity of their habitats will be affected. These species are found in most parts of Greece and are species with satisfactory (e.g. *Lepus europaeus*) or very large populations (e.g. *Vulpes vulpes*). However, species of particular interest are *Canis lupus* and *Ursus arctos.* This species is the only one of all the mammals observed (other than the cryptids) that is included in Annex II of the Directive (92/43/EEC), and is a priority species under Directive 92/43/EEC (*a species whose conservation requires the designation of Special Conservation Zones and indeed as a priority species* - it is also an Annex IV species). *Canis lupus* is a species listed in Annex V to Directive 92/43/EC (none of the mammals observed, except for cryptids, is listed in Annex II to the Directive, and only *Felis silvestris* is listed in Annex IV, except for cryptids).

According to the Greek Red Data Book, ***Canis lupus*** is classified as Vulnerable (VU) in Greece, while according to the IUCN red list at European level it is listed as a species of reduced concern (LC). This species is a species listed in Annex V of Directive 92/42/EEC (Annex II: Greek populations only south of the 39thparallel, Annex IV: outside the Greek populations north of the 39thparallel, Annex V: Greek populations north of the 39thparallel). The species, one of the top predators in Greek nature, lives in small family groups (herds), usually consisting of the breeding pair and offspring of the same or previous years, which maintain their own territories. The latest population estimates made in Greece for the species (concerning counts made in 2014, and updated with additional data in 2016, in the framework of the implementation of the horizontal

monitoring programme for species of interest included in Directive 92/43/EEC, using data from the application of different primary data collection methodologies according to Iliopoulos 2018), put the population at 1,020 individuals (189 packs), without counting the number of lone wolves corresponding to This number appears to have increased compared to previous years (population counts in 1998-1999) by 31 % to 40 %, while its range increased by 6,000 square kilometres (Iliopoulos 2018). The species moves within very large territories (average territory area in Greece 338 square kilometres), and in a wide range of habitats, preferring mainly forested areas with developed livestock and high density of pens. Therefore, the presence of the species in the area does not necessarily indicate its close association with the area. The presence of the wolf in areas with livestock activity often increases conflicts between the species and livestock farmers, as it often attacks livestock.

According to Iliopoulos (2018), the pressures and threats to the species in Greece based on the six-year national report for the period 2006-2014, and following their standardization and codification under Article 17 of Directive 92/43, are as follows:

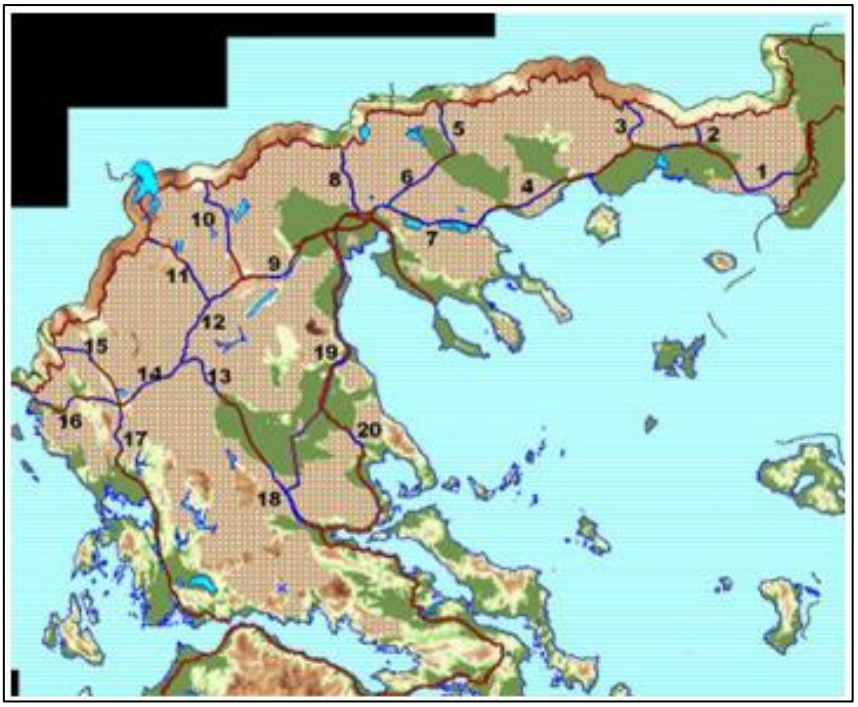
- Anthropogenic deliberate mortality of wolf individuals (F03.02.03.: trapping poisoning, poaching). It concerns the killing of wolf individuals, the main causes being (a) poaching during the hunting of wild boar, (b) the use of poisoned baits, (c) killing during attacks on livestock using a weapon or an ice-axe.
- Abandonment of extensive livestock farming (A04.03: abandonment of pastoral grazing systems, lack of grazing). The presence of livestock is a major food source for wolves in Greece, but their numbers are gradually decreasing in the species' habitats. The recovery of wild ungulates recorded in Greece, which is to some extent favoured by the reduction of livestock (Chirichella et al. 2010) and the recovery of young and dense vegetation (bush restoration), cannot possibly compensate for the large declines observed in recent years throughout the species' range. Densities of wild boar and roe deer, key potential food sources for wolves, have either not been counted or are still low in several areas of the wolf's distribution (Tsakalidis and Hatjisterkotis 2009; Ntolka et al. 2016), as they are found in most areas at densities sufficiently lower than the minimum indicative density of 10 individuals/km^{2}required for wolves to feed

on wild prey (Imbert et al. 2016) to functionally compensate for the observed decline in forage.

- Reduction in food availability (J03.01.01: Reduction in prey availability-including carcasses). This refers to the reduction of mountain livestock farming but also to the closure of open dumping areas for dead animals (ODA) from which wolves often feed in Greece (Ilioupolos 2008a).
- Low availability of wild ungulates and lack of proper hunting management of wild ungulates (F03.01: Hunting). Reported as a pressure in the past and as a threat in the future at local level. It is related to the lack of hunt management of huntable species (wild boar) so far, as annual hunting regulations are not specified and documented in detail by area based on game densities. The result can be overpopulation, local reductions or extinction of wild boar and, conversely, overpopulation in other areas. Although the recovery of wild boar and roe deer appears to be significant in many areas of the wolf distribution they still remain low relative to their functional role over much of their distribution or at least have not been assessed at a large scale.
- Habitat fragmentation and fragmentation (D01.02: roads, highways, J03.02: anthropogenic reduction of habitat connectivity). Multiple fragmentation of the species' distribution due to the construction of high-speed linear transport infrastructure or large artificial lakes is reported as a threat. Highways and high-speed railways impede the movement of wolf individuals especially when combined with each other (Iliopoulos et al. 2012c). This does not only affect wolves as negative demographic consequences of fragmentation have been documented in many wildlife species which may include changes in population structure, degradation of genetic diversity and increased threat of extinction (Forman and Alexander 1998). According to Iliopoulos (2018), the impact of wind farm construction on wolf reproductive success is also significant, as the opening of roads in previously roadless areas, where wolves primarily choose to breed (Iliopoulos et al. 2014), significantly reduces the suitability of an area for breeding, in combination with the accompanying sound and visual disturbance during the operational phase. The wolf is one of the few large mammal species in which a significant negative effect of wind farm construction during the construction and operation phase has been documented

on the reproductive success of wolf packs, expressed by displacement of breeding areas up to 4 km away from wind turbines (Alvares et al. 2011).

- Wolf-dog hybridisation (I03.01: Genetic infection - animals). Cases of identification of wolf-dog hybrids based on morphological criteria have been recorded and confirmed in the field in recent years in at least six different areas and packs of the wolf distribution in Greece. Wolf packs with individuals showing distinct morphological hybridization traits were studied for the first time E.P. Kerkini in 2014 (Iliopoulos et al. 2014). However, morphological criteria are not always a reliable indicator of hybridization and animals showing very different morphological patterns (e.g. black wolves) may not be genetically differentiated from the rest of the population, or animals that are hybrids may not always show a distinct morphological pattern. A recent genetic analysis of wolf tissue samples from central and northern Greece showed that there is evidence for the presence of hybridization in 8 out of 48 wolf samples (Karamanlidis et al. 2016). The phenomenon of wolf-dog hybridization has been observed in many European countries with the proportion ranging between 5 - 9.8 % of wolf samples examined (Godinho et al. 2011; Randi and Lucchini 2002; Verardi et al. 2006). A significant rate of hybridization has so far occurred in neighbouring Bulgaria in a wolf population i.e. intensively hunted (Moura et al. 2013). However, in real time, the rates of hybridization and integration of dog genes in the wolf population may be lower (Pacheco et al. 2017). Hybridization between wild and domesticated related species results in a reduction in genetic diversity and an increase in genetic homogenization (Randi 2008). Thus, evolutionary adaptations such as the ability to survive in changing environments are rapidly altered (Rhymer and Simberloff 1996), particularly when the integration of genes from the domesticated species (dog) is frequent and/or it is found in the wild at densities several orders of magnitude greater than the wild species (wolf) (Verardi et al. 2006), as in Greece and southern Europe.



Map 172. Completion of construction of modern linear transportation infrastructure will result in the segmentation of the wolf's distribution into 20 different locations of the species' distribution (Source: Mertzanis et al. 2008 in Iliopoulos 2018)

Regarding the threat referred to the impact of wind farms, due to the opening of roads for access to the wind turbines, in the case of this project, a significant positive fact is that most of the roads that will be required for access to the project's permit polygon already exist, due to the existing forest network of the study area and the only requirement is to improve them, as well as the opening of the internal roads and the access road that connects the wind farms to the wind turbines. Also, although the effects of wind farms on the breeding areas of the species are mentioned, this is not mentioned as a main threat (C03.03: wind farms), and also the anthropogenic mortality of the wolf in Greece remains one of the main pressures and threats to the species, as it remains high and is continuous throughout the distribution area of the species. The wolf is not in practice a protected species, not even in areas where international conventions define its protection as a priority. Actual rates of illegal poaching as a percentage of the total population are unknown and very difficult to estimate, as most poaching is not recorded or underestimated as a percentage of the population (Liberg et al. 2012, Treves et al. 2017) and goes unpunished. In some areas of the species' distribution in Greece,

anthropogenic mortality of up to 40% of the total local population has been observed (Iliopoulos 2005), which can lead to temporary local extinctions in a short period of time, as recently observed in a part of Prespes National Park (Iliopoulos and Petridou 2017). In many areas of the country, wolves are hunted illegally and almost systematically (indicatively: Evritania, western Fthiotida, Evros), either with organised traps aimed at killing local packs, or by using poisoned baits, or occasionally during hunting for other species (e.g. wild boar). In addition to anthropogenic mortality associated with gun and poisoned bait use, a significant number of wolves are killed each year due to individuals of the species colliding with vehicles on the national and provincial highway network in the country, or killed by herding dogs in scuffles to protect herds. The wolf population is mainly influenced by food availability, competition and aggression between packs and human activity.

The above species can often and seasonally occur at long distances from its most suitable habitat, even near populated and anthropogenically influenced areas. The present site of the wind farm under study is one such anthropogenically influenced habitat, where the existing road network of the area, consisting of forest and rural roads and cultivated land, attests to this. It is not expected that the installation of the wind farm under study will have a significant impact on the area in this respect. Therefore, it is not expected that the presence of the wind farm under study will be a deterrent factor in reducing the occasional presence of the species in the area, with whatever consequences this may have, as the presence of the wolf in an area with a strong human element (existing even before the installation of the wind farm under study) can often have a negative impact on the species due to the 'conflict' with humans (attacks on livestock, collisions with vehicles on the road, etc.).ά.).

***Ursus arctos**,* according to the Greek Red Data Book in Greece, is classified as endangered (EN), while according to the IUCN red list it is listed as a species of reduced concern (LC) at European level. This species is a priority species in Annex II of Directive 92/43/EEC. It is a species whose conservation requires the designation of Special Conservation Zones, and indeed as a priority species. The presence of the bear in Greece today is mainly identified with the three major mountain ranges and mountain complexes of the country: a) the Pindos mountain range, b) the Peristeri mountain range and c) the Central Rhodope mountain range. The total geographical area of the species in Greece today, with permanent presence in the two distinct geographical cores (Pindus

Mountains and Rhodope Mountains) is estimated at 24,105 square kilometres, while the total with the areas of recolonization and potentially suitable habitat amounts to 32,000 square km (Mertzanis et al. 2020). The total minimum population of the species in Greece was initially estimated to be approximately 190-260 individuals (Mertzanis et al. Red data book 2009), while more recently it was estimated more accurately at 350-400 individuals (2012) and 500 individuals (2021) respectively (Arktouros 2010, Karamanlidis 2015, Pilidis et al. 2021). The most recently estimated conservation status of the species is U1+ (insufficient but improved, 2015). The bear population in Greece seems to show an upward trend (or recovery trend) over the last 20 years, at a local (sectoral) scale, as well as a geographic dynamic recolonization of areas of either historical presence of the species or new areas (Mertzanis et al. 2021). More specifically, the central population of North and South Pindos shows dispersal to the southernmost extremities of Pindos (Agrafa, Mountain Nafpaktia, Valtos Mountains) (Mertzanis et al. 2009, Mertzanis et al. 2020), while the population core of the Peristeri mountain range seems to feed a meta-population on Mount Voras (Savvadoglou 2016, Mertzanis et. al. 2018). At the same time in Central Macedonia there are the first solid indications (2019-20) of a reappearance stream of the species on Mount Beles, probably fed by individuals from the west (Jena, Voras), or from the eastern core (Mount Brontus, Lailia, Menoikio which is confirmed by Pilidis et al. 2021, resulting in the first occurrences in the last (2) years even further south in Central Macedonia towards the Kruscia, Vertisko and Kerdyllia Mountains. Bear presence was also recently recorded on Mount Paggaio and in the Basin Mountains (Kavala) with the most likely core dispersal area being the wider area of the National Paros Mountains of Rhodope. The appearance of the bear is also noteworthy with the maximum geographical dispersal up to the mountainous areas of eastern Thessaly and Central Greece (Mavrovouni and Pelion Mountains) with the most likely source of origin being Mount Olympus and Ossa. This spatial dynamics of the species' distribution creates new conditions in terms of strategies and management measures for its conservation, which is crystallized with the necessary documentation in the recently updated National Action Plan for the Bear, prepared in the framework of the LIFE project "IP 4 Natura" (LIFE16 IPE/GR/000002).

It is also stated, as it is clear from the National Action Plan for the species (Mertzanis et al. 2020), that the project under consideration is located within the species' range, in accordance with the range map.

Map 173: Range and changes in the range of the brown bear in Greece according to the report of the 4th National Report on Article 17 of Directive 92/43/EEC and primary data for the period 2015 - 2020.

According to the 4th National Report under Article 17 of Directive 92/43/EEC for the period 2013-2018 1 , the conservation status of the brown bear (*Ursus arctos*) (species code: 1354) was assessed as "Unfavourable - Inadequate" (U1) and the overall trend of the conservation status as "Improving" (+). The total population size nationally was estimated at 400 - 500 individuals (of which 200 - 300 are within Special Conservation Zones) with an increasing trend. The assessment of population size is considered moderate as it was based on expert opinion with limited field data available. Regarding habitat status, no information is provided in the 4th National Report, while the trend of habitat status is reported as "Increasing" [I - Increasing (+)]. The area of suitable habitat was estimated at 16,825 square kilometres, while the area of available habitat was estimated at 17,850 square kilometres.

According to the form of the 4th Six-Yearly Report based on Article 17 of Directive 92/43, there are two distinct High Intensity Pressures/Threats to the brown bear in Greece recorded:

- B09: Deforestation, removal of all trees
- G10: Illegal hunting/killing.

There are also eleven distinct Pressures/Threats of moderate intensity for the brown bear in Greece, which are mainly related to energy production processes and the development of related infrastructure, as well as the construction and operation of transport systems.

- D01: Wind, wave and tidal energy, including infrastructure
- D02: Hydropower including infrastructure (dams, buffer dams, dam spillways)
- D03: Solar energy, including infrastructure
- D07 Oil or gas transmission pipelines
- E01: Roads, paths, railways and related infrastructure (e.g. bridges, viaducts, tunnels)
- F05: Creation or development of sports, tourism and recreation infrastructure (other than in urban or recreational areas)
- G12: Accidental killing (due to fishing and hunting activities)
- G13: Animal poisoning (excluding lead poisoning)
- H04: Vandalism or arson
- H06: No entry or restricted access to protected area/habitat
- N06: Desynchronisation of biological/ecological processes due to climate change

However, after a thorough re-evaluation of the pressures/threats, it was considered appropriate to add some more categories and to update the hierarchy of some pressures/threats based on the new conditions that have emerged in the five-year period 2015-2020, as follows:

Additional pressures/threats:

- (A01) Conversion of natural or semi-natural areas to intensive crops
- (A07) Abandonment of sustainable use practices of agricultural and agroforestry systems
- (B10) Illegal logging
- (B15) Forestry practices/short rotation time
- (B16) Timber transport/road opening

According to the National Action Plan, seven of the Pressures/Threats listed in the 4th Six-Yearly Report form based on Article 17 of Directive 92/43 and five added after the reassessment of the species' status in the country are related to the alteration, loss and fragmentation of available, suitable habitat for the brown bear in Greece. This Threat/Pressure is one of the most common for the species across its range (Lortkipanidze 2010; Kaczensky et al. 2013; McLellan et al. 2017). In Greece, the brown bear habitat is primarily threatened by human interventions, whether these take the form of illegal logging, forest fires, the reckless opening of forest roads, the construction of large-scale transportation infrastructure or the construction of wind turbines and Y.H.E. dams. The alteration, loss and fragmentation of available, suitable habitat for the brown bear in Greece, regardless of where it originates, is a complex, multidimensional Threat/Pressure, or must be assessed in conjunction with other, more or less intense and significant threats/pressures.

With regard to the moderate-intensity Pressure/Threat of the construction and operation of wind farms (DO1), this is analysed within the Action Plan as a typical example and applies also to Threats/Pressures such as high-intensity B09 and moderate-intensity D02, D03, D07, E01, F05 mentioned for the brown bear in Greece. Therefore, according to the National Action Plan, with regard to the medium intensity Threat/Pressure D01 the following are mentioned:

- **Impacts from general disturbance during the construction phase of a wind farm:** The construction of a wind farm is often directly linked to a general direct/indirect increase in human presence in an area. Examples include an increase in human presence during the construction phase (with accompanying large-scale works and extensive habitat occupation), an increase in heavy vehicle traffic, a general increase in human presence in remote/disturbed areas and, as collateral pressures/threats, an increase in logging and hunting. For large terrestrial mammals, including bears, the impacts of such interventions are usually negative. For example, the construction of a wind farm was considered one of the reasons for the decline in black bear presence in some areas of the U.S. (Wallin 1998). These negative effects may be reversed during the operation of a wind farm (i.e., animals may return) (Colman et al. 2008), but given that the construction phase of a wind farm can take years, the effects on wildlife behavior may be significant and irreversible (e.g., abandonment of breeding sites and important habitat fragments (da Costa et al. 2018). It is evident that

this disturbance will also recur during the decommissioning of a wind farm after the end of its operation (average lifetime of a wind farm is 15-25 years).

- **Effects of noise disturbance during the construction and operation of a wind farm:** Sound disturbance is a factor affecting wildlife in areas near wind farms, both during the construction phase (i.e., noise generated by construction operations, construction sites) and during operation (i.e., noise generated by the three-wing wind turbines). This sound can disturb animals in their communication or prevent them from detecting upcoming danger (Rabin et al. 2006). More generally, changes in polar bear behavior due to increased noise have been observed in the U.S. (Andersen and Aars 2008). The effects of construction site noise on the spatial behaviour of brown bears in the construction area of the Egnatia Highway were assessed for the first time in Greece in 2005-2009 using telemetry (Giannakopoulos et al. 2007, Mertzanis and Giannakopoulos 2009). Specifically, in the entire study area and during the night, it was found that the highest percentage (78.95%) of telemetric detections and activity of bears in the vicinity of the project construction area was detected at noise levels of 25 - 47 dB. In contrast, a fairly low percentage of 0.81% of nighttime satellite tracking locations and animal activity occurred at noise levels of 65 - 76 dB, generated by the night shift (6:30 - 3:30 am) of construction site operations. Also, 16.52% of detections were recorded at noise levels ranging from 47 - 59 dB, while 2.66% and 1.05% were detected at noise levels of 53 - 59 dB and 59 - 65 dB, respectively. Although the operating noise of a wind turbine is usually lower than 60 - 75 dB, during the operation of a wind farm, impacts are theoretically expected at least with regard to brown bear. Noise levels above 60 - 75 dB are also expected during construction, which could have further negative impacts on brown bear behaviour in a particular area, e.g. avoidance of important feeding areas and/or areas important for hibernation and movement corridors.
- **Impacts from the construction of accompanying road works to transport material and access to wind farms:** The creation of a road network to access a wind farm, combined with the general increase in heavy vehicle traffic and resulting human activity, can have a variety of impacts, most notably, the alteration, loss, and fragmentation of significant portions of brown bear habitat.

Although the effects of increased vehicle traffic on bears are well known (Kaczensky et al. 2003; Van Manen et al. 2012), traffic volumes on access roads associated with the operation of a wind farm are expected to be so low (possibly a few cars per day) that they are not expected to have any effect on brown bear behavior in a site. In contrast, the presence of brown bears near secondary roads at night in Greece appears to be increased and associated with the use of these roads as travel corridors (Ordiz et al. 2011; De Gabriel Hernando et al. 2020). The main impact of the wind farms' accompanying projects is the opening of new or widening of existing roads with geometric characteristics such as to facilitate the transport of the huge equipment to the installation sites. The end result is the forcible fragmentation/dispersal of habitat and the alteration of the natural landscape, which is directly linked to the movement routes of wildlife (including brown bears). In particular, the mountainous terrain in which road widening is often planned (especially in ridges) will create an additional anthropogenic barrier in terms of 'landscape resistance', making it more difficult for individual bears to move to and from attractive habitat fragments on the one hand, and longer range movements to recolonization areas on the other. It has been observed that bear movement paths follow features of the natural terrain that minimize energy consumption [Least Cost Path, (Sgardelis and Mazaris 2009)]. As a general finding, the fragmentation of bear habitat by the road network forces bears to use a smaller area of suitable habitat or to shift to habitat of lower ecological value. At the same time, the impacts of using a new access road to a wind farm for recreational purposes and increased accessibility to areas with typically very low human activity are much more significant than the impacts associated with using the access road for wind farm operation (Helldin and Alvares 2011). Even if access roads are blocked with barriers, this does not usually prevent their use by pedestrians, cyclists and off-road wheeled vehicle users, giving them access to undisturbed areas that were previously only accessible to wildlife. Increased accessibility to areas associated with a wind farm is expected to have negative impacts on brown bears, as the species typically prefers as habitat inaccessible areas with steep terrain and low human presence (Theuerkauf et al. 2003; Johnson et al. 2005; George and Crooks 2006; Elfström et al. 2008; May et al. 2008), which it uses as foraging areas or for winter hibernation. These are precisely the areas that are usually preferred for

the operation of a wind farm (also applies to Greece). In these cases, negative effects on wildlife can be either short-lived [i.e., only a few hours (Andersen et al. 1996; Olsson et al. 2007; Naylor et al, 2008)], or long-term and may ultimately affect the viability of a species (Gill et al. 2001, Frair et al. 2008). In the brown bear, human disturbance is one of the most important factors negatively affecting the behaviour of the species (McLellan and Shackleton 1989, Nellemann et al. 2007, Martin et al., 2010). Bears in Scandinavia avoid areas <1 km from major and moderate roads or settlements when searching for a wintering site (Swenson et al. 1996). Similar behaviour has been documented in grizzly bears in North America (Gibeau et al. 2002). Studies have also shown that bears sometimes avoid forest roads, which has been associated with increased hunting pressure (Mace et al. 1996). Finally, many bear species may abandon their dens during winter hibernation when disturbed by humans in the open. Nest abandonment in winter can lead to weight loss and increased mortality (Linnell et al. 2000). Similar behaviours have been observed for bears in Greece (ARCTUROS, unpublished data). The construction/opening of an access road to a wind farm may also lead to an increase in hunting pressure in an area. In the case of the brown bear in Greece, this can have dramatic consequences due to the continued illegal hunting of the species (Mertzanis et al., 2009a).

- **Impacts from overall habitat alteration:** The loss of habitat associated with the installation and operation of wind farms is permanent, but usually relatively small compared to the total amount of habitat available. For this reason, impacts on species with large habitat and long distances to travel, such as the brown bear, should be considered of lower intensity (Arnett et al. 2007, Kuvlesky et al. 2007). However, it is important that wind farms are not sited in areas of vital importance for a species, such as important foraging areas (Walter et al. 2006), areas important for winter hibernation or areas that ensure the (genetic) connectivity of populations. A recent study in Croatia and in order to protect important areas of bear habitat from wind farm construction/installation resulted in the mapping and calibration of exclusion zones for wind farm installation (Kusak and Huber 2016). The development of a similar study in Greece is considered an absolute priority.

- **The impacts of operating a wind farm from a broader perspective:** The operation of a wind farm is only one of many anthropogenic activities that can affect the population status and behaviour of a species in a region. For this reason it is essential that the effects of the operation of a wind farm are not studied in isolation, but in combination with all other anthropogenic activities in an area. From the point of view of biodiversity protection, it is the cumulative effects, i.e. the effects of anthropogenic activities combined with the effects of past, present or future forms of exploitation of an area, that are of greatest interest. Although key bear population parameters are usually determined by other factors (e.g., species management practices, carrying capacity of an ecosystem), any new pressure, such as the operation of a wind farm, can have disproportionate impacts on an already stressed area, or on an area that is in a fluid and changing state. This is even more true for subpopulations that are in a transitional state, such as the recovery phase of the brown bear population in Greece and the recolonization of new areas. The density of planned wind farms in Greece within the bear's spatial distribution zone and within Natura 2000 sites foresees negative consequences for the population and habitat of the species, unless a re-design from scratch with strict criteria and an update of the NAPA for wind farms is carried out immediately.

In conclusion, the above species is mainly a forest-dwelling species, which often and seasonally can occur at long distances from its most suitable habitat, even near populated and anthropogenically influenced areas. With regard to the pressure/threat of the construction and operation of wind farms, it is stated that in the current wider area of the project site, such anthropogenically influenced habitat exists, where the existing road network in the area, consisting of forest and rural roads, as well as cultivated land, attests to this. This is reinforced by the fact that only a very small part of the planned new road will be located within the protected Special Conservation Area, and that it is essentially the access road between the three wind turbines located within the Special Conservation Area, without passing through any type of priority habitat. It is not expected that the installation of the wind farm under consideration will have a significant impact on the area in this respect. Therefore, as mentioned for the wolf above, it is not expected that the presence of the wind farm will be a deterrent to

the occasional presence of the bear in the area, with whatever consequences this may have, as the presence of the bear in an area with a strong human element (existing before the wind farm was installed) can often have negative effects on the species due to the 'conflict' with humans (destruction of crops, attacks on livestock, damage to crops, attacks on livestock, etc.).

However, in the section on additional measures to address potential impacts, measures are proposed to further reduce any small potential negative impact on wolf and bear species.

It is worth noting here that the species of wild goose (*Rupicapra rupicapra*) is listed as a species of importance for fauna, the subspecies *balcanica* (which is found in the Balkan Peninsula) is a species listed in Annex II of Directive 92/43/EC (as well as Annex IV). The activity of the project under consideration is, inter alia, listed as a threat to the species in the Deliverable of the National Action Plan for the Wildebeest.

The species was not observed during the present fieldwork (45 man-days of fieldwork, within the period January 2024 - December 2024), while the wider project site, due to its relatively low altitude (according to the IUCN red list, the lowest altitude limit for the species is 500 m) and the habitats it consists of, both the project site and the field survey area (there are also altitudes below 500 m within the CIP), is not an endemic area for the species. According to the National Action Plan for the Balkan Wildebeest (*Rupicapra rupicapra balcanica)* (Action deliverable A.1Ministry of Environment 2021) we can find populations of the species both at high altitudes (e.g. 2,500 m) and at very low altitudes, such as 400-500 m (Tosi et al. 1996, Papaioannou 2015a, b, c, d, e, f, 2016). In general, according to this deliverable, altitude (and due to the large altitudinal variation where the species occurs) is not a major factor in determining the habitat of the species. What is certainly required for an area to be considered to have suitable habitat for the species is the existence of steep slopes with many small valleys, which can provide tranquility and escape potential, and thus protection in case of danger (Elser - Schank 1985). In the specific case of the project under study, no suitable habitat for the species exists both within the project production polygon and in the field survey area. According to the land cover database and mapping (Corine land cover 2018), as reported and in previous sections, the production polygon area of the study project is located within broadleaf forest, sparse vegetation and transitional woodland and shrubland. (see map documentation section, Map 6). In

addition to the three habitats mentioned above, the field survey area of the project study area is covered by hardwood vegetation, non-irrigated arable land, coniferous forest, mixed forest and land used primarily for agriculture along with significant portions of natural vegetation.

Furthermore, the project activity is not listed as a threat to the species in the ESF, among other things. According to the 4th Six-Yearly Report form under Article 17 of Directive 92/43/EEC, there are ten distinct Pressures/Threats to the species recorded, as well as two cases of Pressures originating from outside the Greek territory. The most important high intensity Pressures/Threats include the following three: Illegal Hunting - Pressure/ Threat (G10), Road Opening - Pressure/ Threat (E01), Hunting - Pressure (G07). Table 76 is presented below with the recorded threats related to the populations of wild geese in Greece, according to the above report, as well as an analysis of the Pressure/ Threat related to the activity of the project under study.

Table 76. Recorded pressures and threats associated with grouse populations in Greece, according to the 4th National Report.

PRESSURE - THREAT	PRESSURE - THREAT ACCORDING TO 92/43/EEOC	CODE	TYPE	INTENSITY	CAUSE
Illegal hunting	Illegal shooting/ killing	G10	Pressure/threat	High	Anthropogenic
Road opening	Roads, paths, railroads and related infrastructure (e. g. bridges, viaducts, tunnels)	E01	Pressure/threat	High	Anthropogenic
Thera	Hunting	G07	Pressure	High	Anthropogenic
Intensive grazing or overgrazing by livestock	Intensive grazing or overgrazing by livestock	A09	Pressure/threat	Moderate	Anthropogenic
Tourism activities and mountain sports	Sports, tourism and leisure activities	F07	Pressure/threat	Moderate	Anthropogenic
Climate change	Temperature changes due to climate changes	N01	Threat	Moderate	Natural
Mineral extraction	Extraction of minerals (e. g. rock, metal ores, gravel, sand, shell)	C01	Pressure/threat	Moderate	Anthropogenic
Genetic isolation	Reduced fecundity / genetic depression (e. g. inbreeding or endogamy)	L05	Threat	Moderate	Natural and anthropogenic
Threats and pressures outside the state Member	Threats and pressures from outside the Member State	X0	Pressure	Moderate	Anthropogenic
Threats and pressures outside EU territory	Threats and pressures from outside the EU territory	Xe	Pressure	Medium	Anthropogenic
Extensive grazing or undergrazing by livestock	Extensive grazing or undergrazing by livestock	A19	Threat	Moderate	Anthropogenic
Animal poisoning	Poisoning of animals (excluding lead poisoning)	G07	Pressure	High	Anthropogenic

Regarding the threat of road opening:

Road opening (G10)

Despite the significant benefits of having a usable road network, roads are associated with the top five causes of biodiversity loss globally, which are in descending order of severity: land use change, direct exploitation of natural resources, climate change, pollution and invasive species (IPBES, 2019). Roads are considered one of the main causes of biodiversity loss and degradation of ecosystem function worldwide, especially when they enter natural ecosystems and formerly undisturbed areas (Hoffmann et al. 2020; Ibisch et al. 2016; Laurance 2017; Laurance and Arrea 2017; Selva et al. 2015).

The road network that runs inside or in close proximity to the critical habitat of the grouse is a particularly negative factor for grouse populations, as it leads to an increased level of disturbance associated with legal hunting and other human activities and especially with the facilitation of poaching activity (Papaioannou 1991, 2015; Adamakopoulos et al. 1997, Papaioannou 2003, 2005, 2015a, 2015b, 2015c, 2015d, 2015e, 2016, Papaioannou and Kati 2003, Papaioannou and Kati, 2007, Papaioannou et al. 2014a, Kati et al, 2020a). The construction of a road in a previously inaccessible area, done for a variety of reasons, such as to serve livestock, forest management, tourism promotion, and the installation and operation of wind farms, means providing quick and convenient access to wildebeest habitats for all, including poachers, as well as an immediate removal of them from there. The situation is certainly exacerbated by the inability of the Forest Service to provide comprehensive wildlife conservation and hunting control by the Forest Service and the lack of competence in this matter by the staff of the National Park Management Agencies, as well as the limited effectiveness, in the inaccessible habitats of the grouse, of the action of the game wardens of the hunting associations.

In general, the negative impacts of roads as a factor of biodiversity disturbance are well documented (e.g. Selva et al. 2011, Morgan et al. 2019) and wild ungulates clearly tend to avoid areas with roads (Bleich et al. 2009, Lian et al. 2012), as is the case for roe deer in neighbouring Italy (Grignolio et al., 2011) and France (Bonnot et al. 2012).

In Greece, there are 1,115 PADs (Roadless Areas) left, i.e. sections of land with an area of more than 1 km 2 and at the same time more than 1 km from the nearest road, making the probability of being found in a PAD in the country less than 5% (Kati et al. 2020b). It is worth mentioning that of the six largest PAs in the country, three of them, located in mainland Greece (excluding the Peloponnese), are home to significant populations of wild geese (Tymfi, Olympos, Smolikas). Recent scientific research has shown that the wild goat clearly avoids areas with roads as well as areas where hunting is allowed (Kati et al. 2020a). In other words, the wild goat intensively uses PADs, where there are no roads, as well as Wildlife Refuges (WRs), where hunting is prohibited. Obviously, the existence of roads, in addition to poaching and the disturbance caused by legal hunting, multiplies the intensity of other disturbance factors towards the wild goat, which may come from productive activities (e.g. livestock farming, logging) or from recreational activities (e.g. 4X4 or enduro motorbike touring).

With regard to the specific Pressure/Threat of road widening, in the case of the project under study, as has been mentioned above, a significant positive fact is the existence of an existing road network in the wider installation area, consisting of forest and rural roads, which means that very large new road widenings are not required. As a result, the accessibility of the site will not be burdened by the installation of the project and will not be greater than before construction. In conclusion, there will be no loss of habitat for the species because, as stated above, the habitats occupied by both the project production polygons and the field survey area are not suitable habitat for the species.

According to the above-mentioned ESD of the wild goose, the geographical range of the Balkan wild goose (*Rupicapra rupicapra balcanica*) extends over almost the entire Balkan Peninsula. Scattered isolated populations, or larger population groups, exist in some mountains, as well as in large mountain ranges in the Balkans. It is found in almost all Balkan countries (Albania, Bosnia and Herzegovina, Bulgaria, Bulgaria, Greece, Kosovo, Croatia, Montenegro, Montenegro, North Macedonia, Serbia) (Aulagnier et al. 2008, Corlatti et al. 2011), where it numbers around 10,000 individuals (Damn and Franco 2014).

The current geographical distribution of the Balkan wild goat in Greece includes 30 populations in various mountainous areas of mainland Greece. The total population

of the Balkan harrier in Greece is grouped into six distinct population groups, with little or no communication between individuals of the populations belonging to these different groups. The exception is probably the case between the populations of Group A (Northern Pindos) and the populations of Group B (Central and Southern Pindos), where movements of individual individuals may take place in the connection zone between these two different population groups. The following is a description of the Group B-NW mountain ranges as analysed within the ESD.

Northern - North-Western mountain ranges

The Jena and Pinovo Mountains (F30) maintain a single population of wild geese, which uses the lands on both sides of the border zone with Skopje (cross-border population) (Papaioannou and Kati 2007; Papaioannou 2005, 2015c, 2016). This population continues to remain consistently small and does not exceed 10- 15 persons (Papaioannou 2015c, 2016, SDF 4th Semi-Annual Report), presenting the same picture as in 1999 (Papaioannou and Kati 2007).

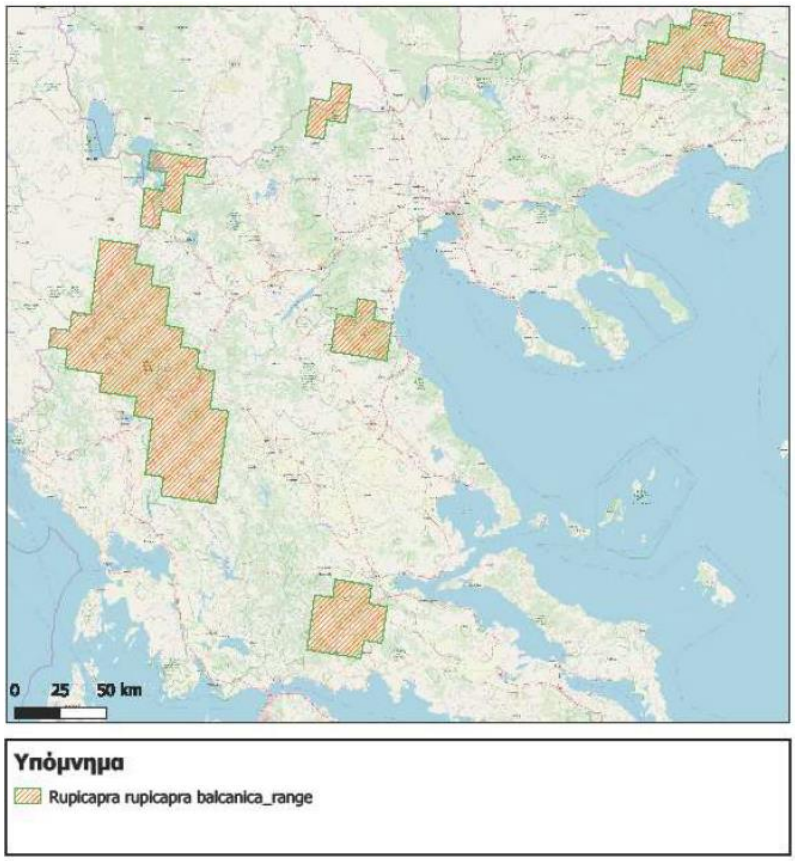
In the wider area there is evidence of -at least occasional- occurrence of individuals of the species in the mountains of Voras, Varnountas and Orvilos (E i-m). Most probably these individuals originate from wild goat populations of the neighbouring countries, as is the case at least in Orvilos, where there is a recorded wild goat population exactly in the border zone on the Bulgarian side.

Table 77 below presents a part of "*Table 3 - The populations of wild geese in Greece today. Their classification into distinct population groups and the estimation of their population size*", given at the end of Annex I of the NAP for wild geese, which concerns the distinct population group of the northern - north-western mountain ranges.

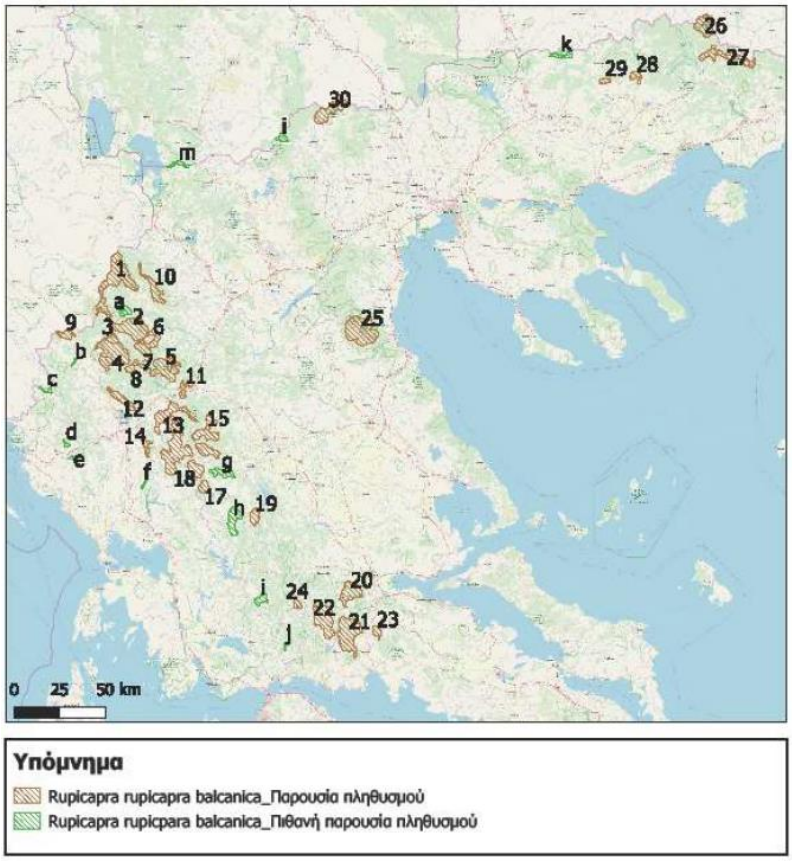
Table 77. Part of "*Table 3 - Populations of the wild goat in Greece today. Their classification into distinct population groups and the estimation of their population size*", where the distinct group of the north-northwest mountain ranges has been isolated.

Population group	a/a	Name area	Population (min)	Population (max)
F. N-NW mountain ranges	**30**	Jena / Pinovo	10	15
	k	Orbital	?	?
	i	Barnoudas	?	?
	m	Voras	?	?
		Total	**10**	**15**

The following is map 174 within which the distribution range of the grouse is given, according to the basis of the 4th national reference and Article 17 of Directive 92/43/EEC. Map 175 is also provided, showing the distribution of the wild geese in Greece and the dispersion of their populations, Recorded populations: 1 - 30. Possible populations: a - m (within this map, as mentioned above and given in the table above, 30 populations are shown for the distinct group of N-NW mountain ranges).

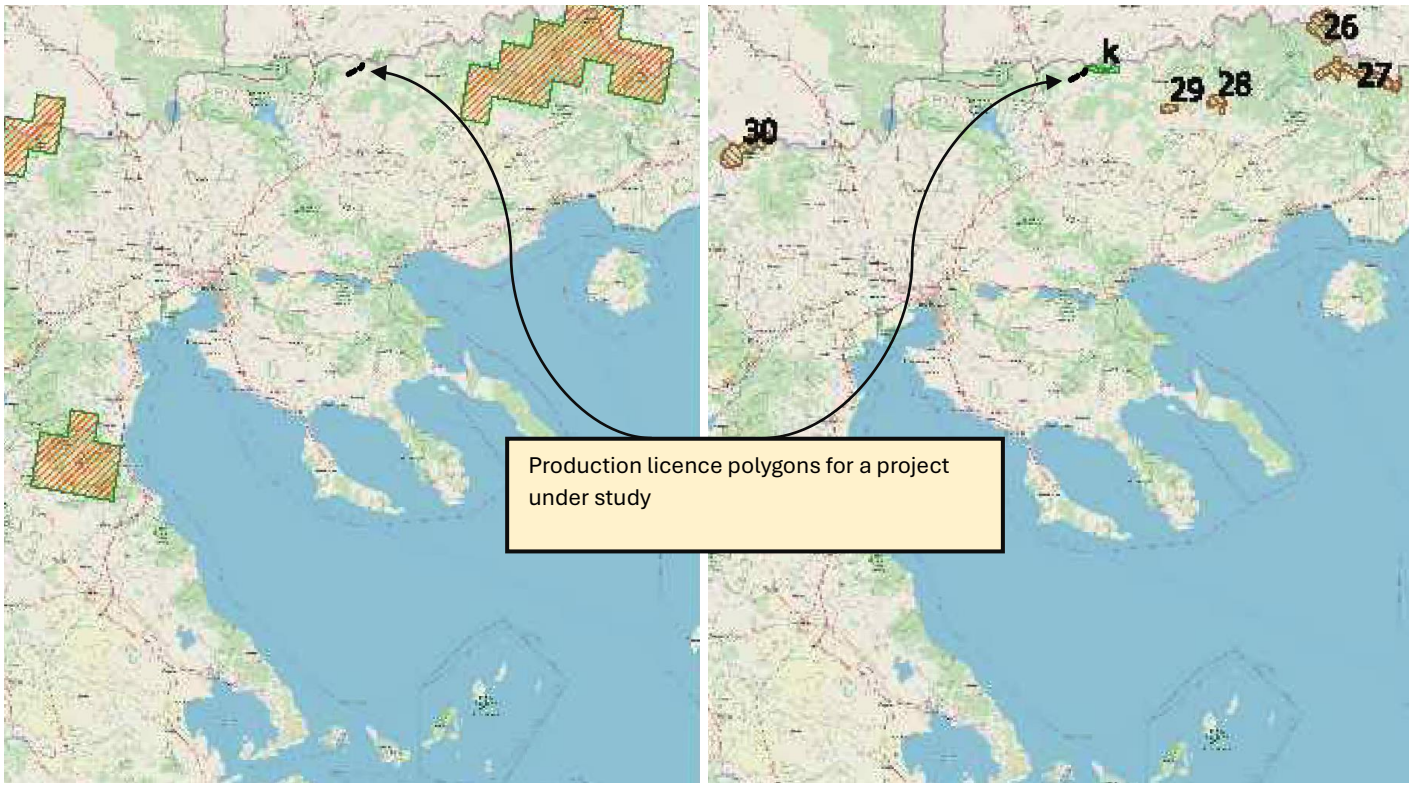


Map 174: Range of distribution of wild geese, according to the basis of the 4th national reference and Article 17 of Directive 92/43/EEC



Map 175: The distribution of the wild geese in Greece and the dispersal of their populations, recorded populations: 1 - 30. Possible populations: a - m

According to the above two maps (Map 174 and Map 175), the area where the production licence blocks of the study project are installed is located outside the distribution range of the species in the study area, while it is located at the limits of its distribution, specifically the distribution of the distinct group of N-NW mountain ranges (Population k). Map 176 follows, where the two above mentioned cartographic backgrounds of distribution and range-dispersal of the species' populations in Greece are georeferenced alongside the production polygons under study.



Map 176: ***Right***: Georeferenced map of the production polygon under study outside the distribution range of the wild goose, according to the basis of the 4th National Reference and Article 17 of Directive 92/43/EEC. ***Left:*** Georeferenced map of the production polygon under study outside the range of the wild goose in Greece (at the boundary of population K concerning the distinct group B-NW mountain ranges).

As mentioned above, and reported within the Action Plan, in the wider area of the discrete group B-NW mountain ranges, there is evidence of - at least occasional - occurrence of individuals of the species in the mountains Voras, Varnountas and Orvilos (E i-m). These individuals probably originate from populations of wild geese from neighbouring countries, as is the case at least in the case of Orvilos, where there is a recorded population of wild geese exactly in the border zone on the Bulgarian side.

Bats

Of the mammals, bats are treated with particular care in cases of wind farm construction and installation. The reason is that losses of individuals have been observed due to impacts on wind turbine blades or support columns. Research on the effects of wind farms on handrails is very limited and no conclusions can be drawn with certainty, but the negative effects of wind farms seem to be real, at least under certain conditions. According to the review of the literature, it appears that the project under study is located both outside areas with significant bat cavities and outside the wider feeding area of bats. According to the LIFE GRECABATS project, the 230 most

important bat sanctuaries in Greece (caves, mines, buildings, etc.) and caves as habitats of Directive 92/43/EEC (8310: Caves which are not exploited for tourism) were selected to be proposed as protection sites by the specific Environmental Studies and the following Management Plans. The main criteria for their selection were the number of species and colony sizes of cephalopods and the number of typical species and narrowly endemic species of invertebrates for the 8310 habitat. The proper management of most of the Annex II species of bats of the Habitats Directive, but also of cave colonies and their other typical and important species, requires proper management of the surrounding area. This space feeds the bats, but also determines the availability and quality of organic matter and water inside the bedrock and caves, and plays a decisive role in their microclimate. Based on the above, protection areas around each significant cave site or wider feeding areas were designed and proposed by the above project based on the initial assessments made by the study team of the above project, and the polygons drawn as an auxiliary file for the preparation of the Environmental Impact Assessments of Greece and the definition of the Ecosystem Spatial Units of Handicapped Areas (08/10/2019), both the area of the production license polygons of the study project and the entire field survey area of this study were located outside of the significant handicapped areas. Subsequently, it was chosen by the study team of the above project to significantly expand the above areas, increasing the extent of the significant areas of the bats (their feeding areas) to multiple degrees. And in this case, both the production polygons of the studied project. and its field survey area are located outside the above mentioned wider feeding areas. The nearest wider feeding area would be the location of 'Kataraktes, Tristomo and Warm Water Cave'. More specifically, this wider protection area (kurnia and wider feeding area) is, as mentioned above, located approximately 5.40 km south of the production polygons of the project (Map 165). Furthermore, the production polygon area of the study project is not located within a mature broadleaf forest that would from the outset negatively predict potential negative impacts of the project on bats due to high mortality (Dürr 2007, Kelm et al. 2014) and the severe habitat impacts that such placements can cause to all bat species. Contributing to this was the fact that no other habitats of particular importance to bats, wetlands, water bodies and streams, are sited within at least 200 m (and much further) (Limpens et al. 1989, Limpens and Kapteyn 1991, de Jong 1995, Verboom and Huitema 1997, Walsh and Harris 1996a, b, Kelm et al. 2014).

The seasonal presence of 14 species of bats was found in the survey area. Of these 14 species recorded seasonally in the area, seven are Annex II species of Directive 92/43/EEC (but also belong to Annex IV), while *Barbastella barbastellus*: VU (Vulnerable), *Myotis bechsteinii*: VU (Vulnerable) and *Myotis schreibersii*: VU (Vulnerable) are classified as threatened according to the IUCN. For the most important species recorded (species listed in Annex II of Directive 92/43/EEC), their presence in the area is extremely low, with the number of crossings per hour of recording being: *Barbastellus barbastella* (0.004), *Myotis bechsteinii* (0.004), *Myotis schreibersii* (0.007), *Myotis emarginatus* (0.004) *Myotis myotis* (0.056), *Rhinolophus ferrumequinum* (0.052), *Rhinolophus hipposideros* (0.019).

However, in the section on additional measures to address potential impacts, measures are also proposed for bats to further reduce any small potential for negative impacts.

Amphibians

Due to the absence of water bodies, the survey area does not appear to have any amphibians, particularly species requiring attention or protection. One species of frog was identified, recorded in the area, which is particularly common and abundant in Greece (*Bufotes viridis*), which is not an Annex II species of Directive 92/43/EEC (it is an Annex IV species). Due to their very low presence, it is not considered that these common amphibian species will be affected by the construction and operation of the project under study.

Reptiles

During the field survey of the wider study area eight reptile species (three lizard species, three snake species and two turtle species) were identified and recorded, of which only two turtle species (*Testudo hermanni* and *Testudo graeca*) are listed in Annex II of Directive 92/43/EEC (they are also listed in Annex IV). The two turtle species are also protected under the Bern Convention (Annex II). They are also protected under the CITES International Convention (Annex II). According to both the Greek Red Data Book in Greece and the IUCN at the European level, *Testudo hermanni* is classified as Vulnerable (VU), respectively according to the Hellenic Red Data Book. in Greece, *Testudo graeca* is listed as a species of reduced concern (LC), while according to the IUCN red list at European level the species is classified as Near

Threatened (NT). Also, two lizard species and two snake species observed belong to Annex IV of the Directive. One lizard species and one snake species observed do not belong to any of the above mentioned Annexes.

With regard to the Mediterranean turtle (*Testudo hermanni*) and the gray turtle (*Testudo graeca*), even the unlikely, accidental loss of individuals of these species, which may occur during the installation and construction of the wind farm, will be negligible compared to the losses suffered by these species from other anthropogenic activities such as the traffic of cars on all the roads of the national network of the area and the entire area of their distribution. Apart from this, the populations of the species are not likely to suffer any kind of disturbance from such accidental loss. Also, due primarily to the fact that the study project site is not expected to host significant populations of the species (due to its limited extent), and that the construction of the study project will use a portion of the existing road network, it is not considered that the installation and operation of the project and associated works may affect the existing presence of these turtle species, and reptiles in general, to the extent that it may cause problems. However, **in the additional mitigation measures section, measures are proposed that would limit any minor potential for an adverse impact to this class of fauna species as well.**

Other species

With regard to invertebrate species, it is considered that the construction and operation of the wind farm is unlikely to have any impact on their populations or conservation status.

Habitat types and flora species

The project under consideration, as mentioned above, is partially located within Special Conservation Area GR1260005 , with Annex II fauna and flora species and habitat types listed in Annex I to Directive 92/43/EEC as protected species. As a result, part of the one production licence block of the project under study, covering 86,08 ha out of a total of 366,76 ha of production licence blocks, is located within GR1260005. The aforementioned part of the one production licence block of the project under consideration is located within habitat types 62A0, 9150, 925A, 9530, of which 62A0 and 9150 are habitat types of Annex I of Directive 92/43/EEC and 9530* is a priority habitat of the above mentioned Directive. It is worth noting that of the 86.08 ha of

habitat types occupied by a part of one of the production licence blocks of the project under consideration, 70.81 ha cover habitat type 925A, which is not included in the habitat types of Directive 92/43/EEC, 0,73 and 14,27 ha cover habitat types 62A0 and 9150, which are Annex I habitat types, while only 0,27 ha cover priority habitat 9530, which is located on the boundary of the production licence polygon (Map 1). Of the total area of priority habitat 9530 within the protected area, only 0,04 % is covered by the production licence polygon of the project. Finally, only three of the 14 wind turbine sites of the project under study are located within the Special Conservation Area, while none of the three are located within either of the two habitat types listed in Annex I to Directive 92/43/EEC or within the only priority type of the area. Only a very small part of the access road between turbines 13 and 14, as well as the squares of these turbines, is located within habitat type 9150, covering less than 1 ha (approximately 0.7 ha) of this Annex I habitat type, covering approximately 5% of the 14.27 ha of this habitat type located within the part of the one production licence block of the projected project. It is worth noting that of the total 268.5 ha covered by habitat 9150 within the Special Conservation Area under study, the percentage covered by a very small section of the access road between turbines 13 and 14 and their plazas is much smaller, amounting to only 0.26%.

With regard to the floral composition of the project site, this has been presented in detail in the previous relevant sections of this report. From the flora species sampling operations in the field survey area 283 plant species were recorded. Of the 283 species and subspecies recorded in the flora sampling from plots 01 - 14 (see documentation maps and documentation photographs of the fieldwork) only two are species of Directive 92/43/EEC (*Gladiolus palustris* and *Fritillaria drenovskii*), and only one of them, *Gladiolus palustris,* is listed in Annex II (*Fritillaria drenovskii,* is listed in Annex IV). In addition, seven species are included in the list of species of Decree 67/81 'On the protection of native flora and wild fauna and on the establishment of a procedure for the coordination and control of research on them'. Seven taxa of the ornithological family are covered by an international convention (CITES). One (*Allium melanogyne*) is a Greek endemic, occurring exclusively in the phytogeographic region of northeastern Greece (NE) and 41 taxa are endemic to the Balkan Peninsula, of which nineteen are classified as rare.

It should be noted that 106 of the recorded species are included in the National Red Data Book (RDB) of 2023, while none of them are included in the two previous

Red Data Books of Rare and Threatened Plants of Greece (1995, 2009). Of the 107 taxa, 97% (104 taxa) were assessed as Least Concern (LC) species according to the International Union for Conservation of Nature (IUCN) criteria, i.e. species that do not meet any of the criteria to be considered threatened or near threatened. A small percentage (3%) of the species assessed, *Onobrychis alba, Onobrychis montana subsp. scardica* and *Ajuga laxmannii*, were classified as Near Threatened (NT), as they do not meet any of the criteria to be considered threatened, but are not far from meeting or likely to meet the criteria in the near future.

Of the total number of 283 taxa recorded in the study area, 14.5% of these are found exclusively in the Balkan Peninsula (mainly in Greece and Bulgaria). All the Balkan endemic species recorded are found in limestone cliffs, rocky soils, rocky slopes, rock crevices - fissures, in habitats similar to those described at the sampling sites. Some of these taxa also inhabit subalpine meadows, forest clearings and places with anthropogenic pressure - roadsides.

The current status of the study area was included in the work on the habitat type inventory. The area shows a tendency of shrinking of open places on the slopes of northern exposure, while on the stony, steeply sloping slopes south of the ridge, woody species of bushy form have been established. The presence of the protected species listed in Table 46 in the study area is rare with occurrence limited to some sample plots. Also, their occurrence is limited to small numbers of individuals (<5-10), primarily due to limited open space within the study area, species competition, the predominance of mainly perennial grasses, and, the gradual establishment of woody species with further reduction of existing open space.

The species recorded in most of the 14 sampling plots occur -according to the literature sources- both in numerous locations on Mount Orvilos and in different areas of Greece and countries of the Balkan Peninsula. Their presence is therefore not uncommon. These species are *Anthyllis aurea, Centaurea stoebe subsp. serbica, Anthemis pindicola, Genista subcapitata, Cerastium decalvans subsp. orbelicum, Dianthus gracilis subsp. drenowskianus.*

Some Balkan endemics were recorded in the study area exclusively on plots 13 and 14. The understory at these sites was destroyed by the fire that occurred on 18 July 2024. Post-fire succession of plots is a process of self-succession in which the burned community maintains its floral identity over time. The occurrence or non-occurrence of specific important taxa, as well as the timing of their occurrence on currently burned

lands will be determined by numerous factors and is expected to be determined in the future. These species are *Campanula orphanidea, Fritillaria drenovskii, Linum elegan, Scrophularia laciniata, Asperula aristata subsp. nesti, Silene flavescens subsp. Thessalonica, Viola perinensis, Centaurea napulifera, Platanthera chlorantha.*

Table 46 also includes seven species of orchids, which also have a wide geographical distribution. In particular: The other species in Table 46 that have not been reported occur on a few plots and in small numbers of individuals. Their numbers are small and their occurrence within the surface was rare. The only exception reported is *Gymnadenia conopsea*, where 14 individuals were counted on 1 of the 4 plots (Sample plot 08).

The results and the analysis of the floral records as a whole show an area of the mountain with a taxa rich flora, several of which are Balkan endemics, but not restricted to this area or to Mount Orvilos. Most of the 52 important species recorded in the study area have a wide distribution in the Balkan area and a small, fragmented presence in the study area in small numbers. In addition, the trend of habitat shrinkage by deforestation of open sites poses a further risk of their decline or extinction from these sites. The presence of most of them on the stony slopes south of the ridge requires, when opening the road connecting the wind turbine plazas, that ditching of embankments south of the ridge be avoided.

Assessment of the impact of the accompanying works

With regard to the accompanying works, the works that are placed within the project construction polygons, such as the control centre to be built on the site of the turbine installation polygons, it is considered that no particular reference is required since the important structure on the site is the turbines themselves and any impacts reported in the literature relate to them.

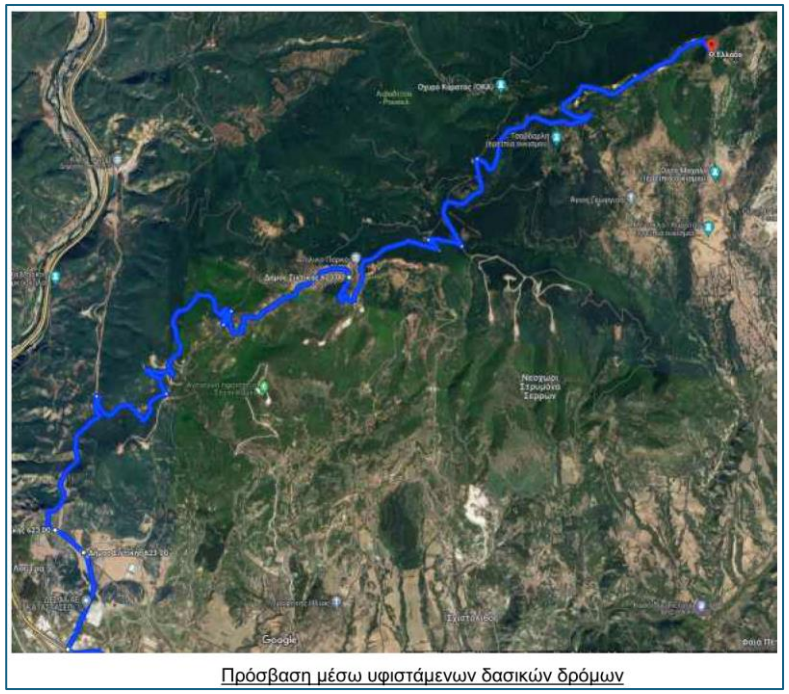
For the most part, of the accompanying wind farm projects that are usually considered for potential environmental impacts are the wiring and power transmission lines, which can be obstacles to the movement and flight of various species of birdlife and can cause impacts. There are many records in the international literature of accidents and losses of individuals of bird species due to impacts on power lines. Almost all of the incidents concern cases of impacts on high-voltage cables or impacts on high-voltage cable pylons rather than on medium-voltage cables. In this project, **an underground connection to the grid is proposed to eliminate all the above negative impacts.** The undergrounding of the cables is always proposed as a measure to prevent impacts on birdlife and the environment in general.

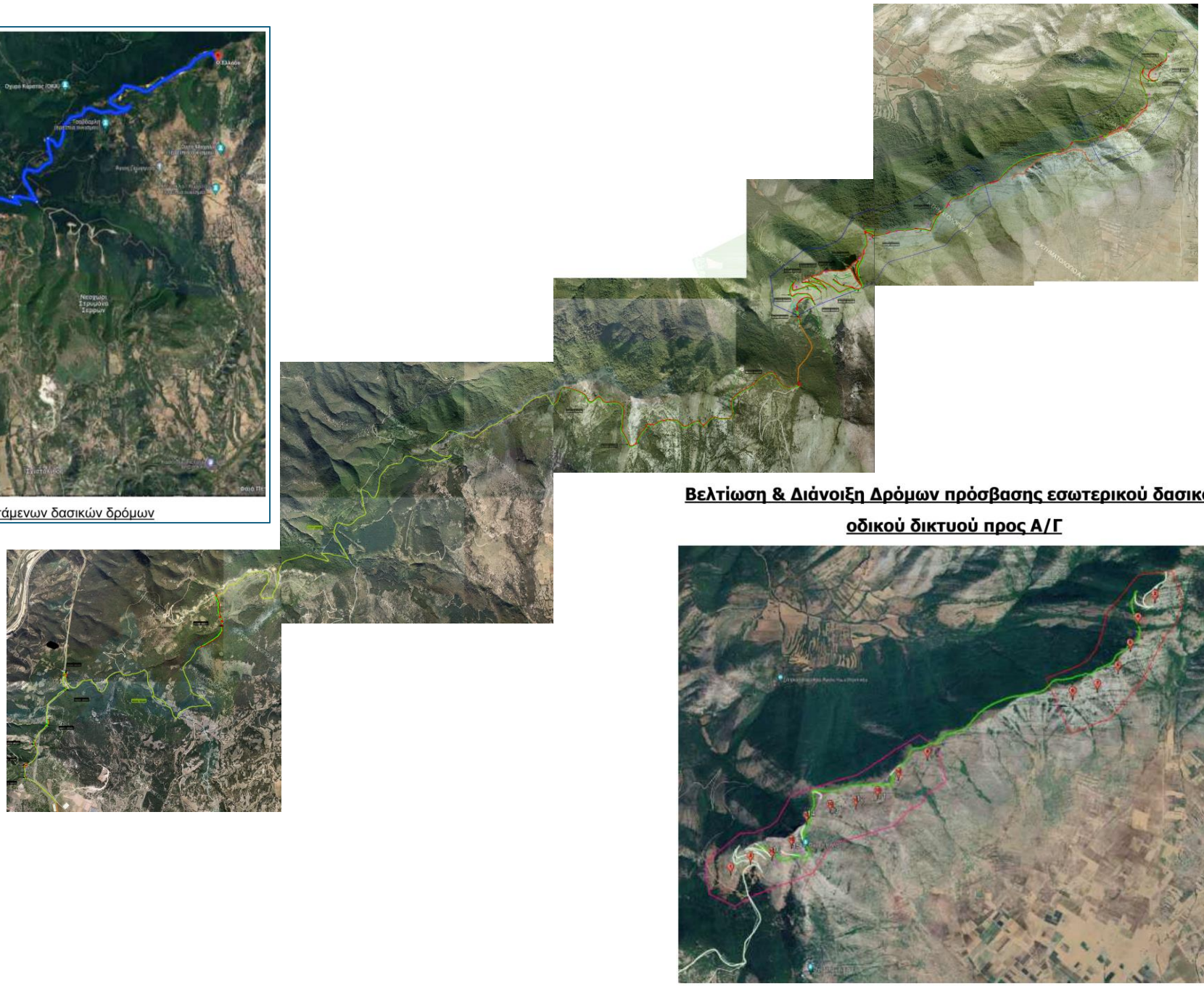
In view of the above, it is considered that this type of cabling for the transmission of the electricity generated does not pose any risk to the avifauna of the installation site and its constituent species and will not harm the conservation objectives of the site and its integrity.

In the case of this project, an important positive fact is the existence of an existing road network in the wider area, resulting in a low requirement for extensive, very large new openings within the study area, but only new openings that will connect the existing road network with the installation squares, where the wind turbines of the project under study will be placed. As a result, site accessibility will not be significantly impacted by the installation of the project and will be no greater than it was prior to construction. The above is reinforced by the fact that only a very small part of the planned new opening will be located within the protected Special Conservation Area , and is essentially the access road between the three wind turbines, which are located within it, and indeed without passing through any type of priority habitat. In the wider installation area, there have been anthropogenic activities (settlements, agricultural crops, etc.) for many years. **Measures will be proposed for the new sections of boreholes required to connect the wind turbines to the existing network, in order**

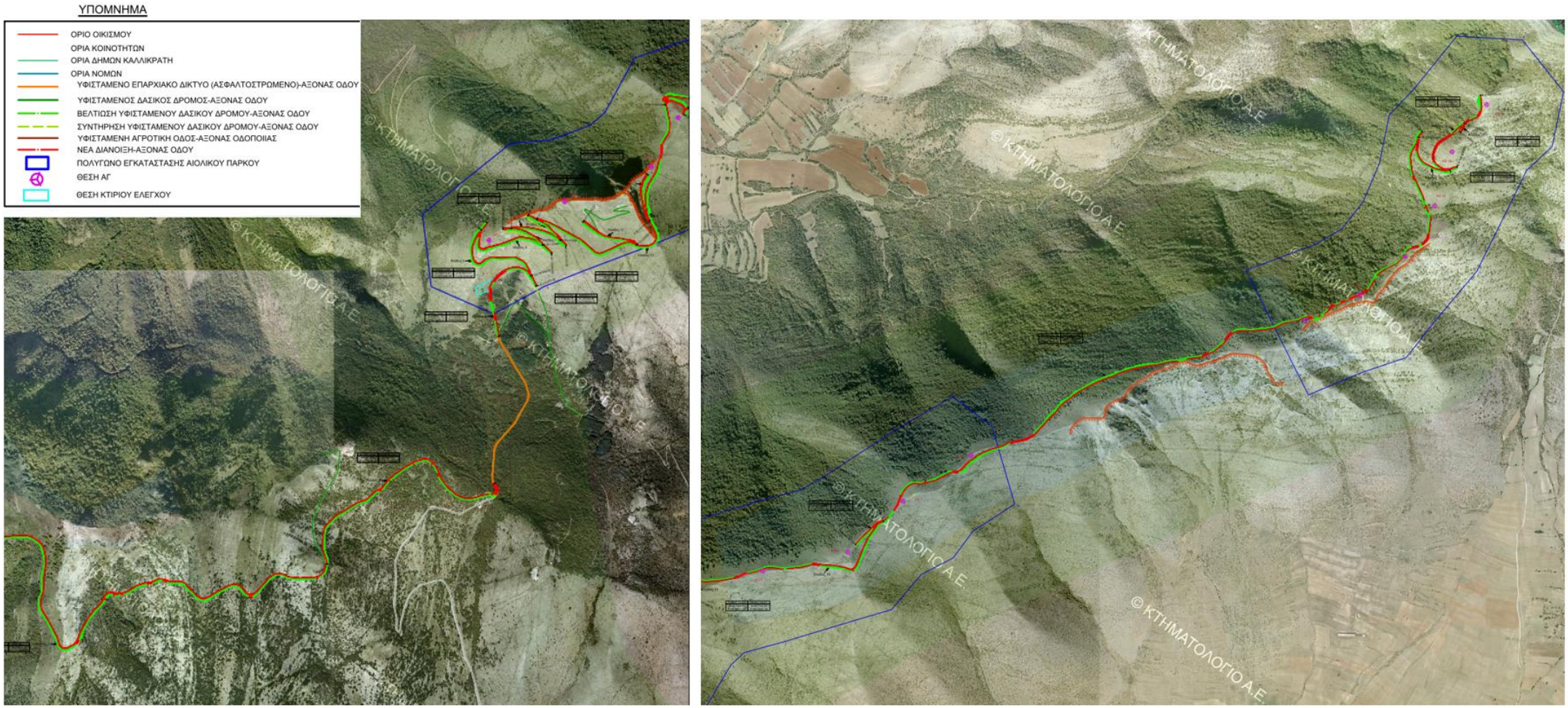
to avoid any additional burden on the general public, which includes any person without a significant reason for working in the area.

For all the new access road openings, those locations have been selected which, in addition to being suitable in terms of the geometric characteristics of the road to achieve safe access, will result in the least possible impact on the environment of the area. The total length of road widening and improvement is approximately 17,92 km, of which approximately 13,35 km are new widenings and approximately 4,57 km are improvements to the existing network.

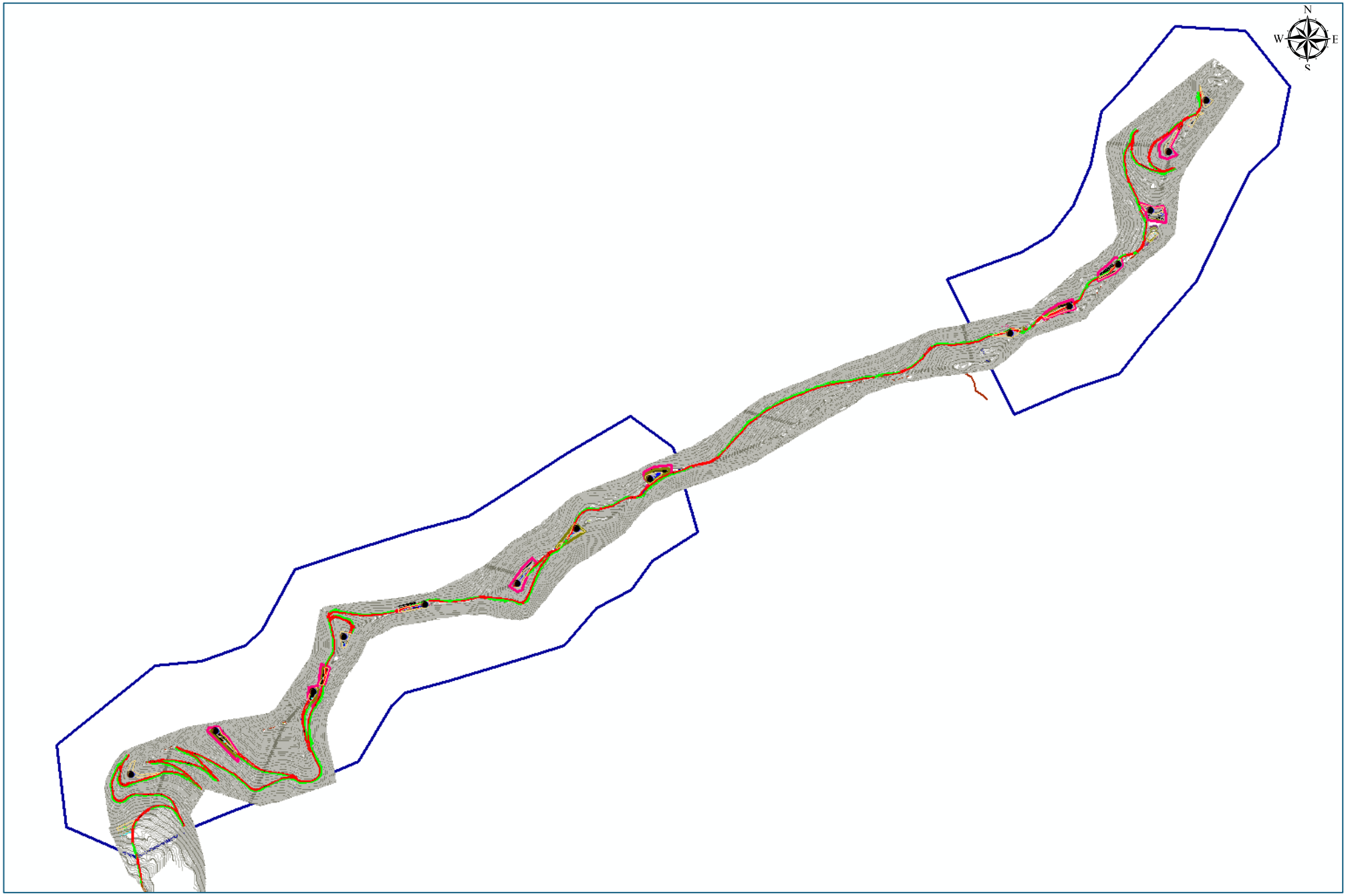




Map 177: Orthophoto map of the wind farm under study at the location "OXILA", within which the route of the access road is shown (access through existing forest roads, improvement and opening of access roads of internal forest roads to the wind turbines).



Map 178: Orthophoto map of the wind farm under study at the 'OXILA' site, showing the route of the access road.



Map 179: Map of the accompanying works within the production licence polygons of the projected project (production polygons outlined in blue, the A/C squares outlined in pink, and the wind turbine installation sites outlined in black).

Examination of alternatives

The siting of a wind farm is mainly determined by the locations where the wind potential occurs, i.e. factors outside the possibility of human intervention. For this reason, the alternative siting of the project in question, i.e. the siting of the turbines in other locations, can be carried out under conditions of energy efficiency of the project. The determination of the wind potential for the needs of a wind farm is based on the analysis of measurement results from wind stations located at key points in the area under study, with the parallel use of meteorological mathematical models to predict the distribution of wind flow at a specific height above the given topographical relief and with the aim of a comparative assessment of neighbouring areas. In addition, the siting of the project took into account elements such as the suitability of the land, the morphology of the site, local gradients and foundation potential, as well as the safety of residential areas to minimise acoustic and visual disturbance. With regard to the selection of wind turbine locations, it was based on criteria such as:

- The optimal wind potential of the area.
- The energy efficiency of the wind turbines.
- The energy efficiency of the wind turbines.
- The local terrain slope and the suitability of in-ground foundations.
- The prevailing wind directions based on statistical analysis of wind data.

The above criteria led to the selection of the optimal location of the wind turbines, which contributes to the maximum exploitation of the wind potential of the area and the maximum possible energy production. This particular location was chosen as an optimal result of the combination of many parameters and constraints required for the implementation of a wind farm. These parameters and constraints are technical, economic, environmental and social. Of decisive importance for the siting of such a project is the wind potential that varies spatially and an important parameter for the design of a wind farm is the occurrence rate of winds from different directions. The optimum location for the placement and operation of wind turbines are the ridges where the highest wind potential is found and they should be placed in a specific arrangement so that there are no problems of shading during the operation of the wind turbines. Taking all the above into account, it is estimated that the area under study meets all the requirements defined by Greek legislation and is considered suitable for the siting of a wind farm.

In the case of our study area, all of the above characteristics have been combined from the outset with the selection of a location that will ensure the least possible environmental impact from the construction and operation of the project. Thus the site chosen:

- It is in a location that can easily and with the least possible environmental burden provide access for project servicing needs from existing roads in the area, without the requirement of opening very long, new forest roads. This is reinforced by the fact that only a very small part of the planned new road will be located within the Special Area of Conservation under study, and will essentially be the access road between the three wind turbines located within the Special Area of Conservation, without passing through any type of priority habitat.
- It is outside National Parks
- It is outside Special Protection Areas
- It is outside Important Bird Areas of Greece
- It is outside Wildlife Refuges
- The habitat types located within the study project site are also abundant in the wider study area.
- The production blocks are located outside the critical habitat of important species of interest of all adjacent Natura 2000 sites
- The project under consideration, as mentioned above, is partially located within Special Conservation Area GR1260005. As a result, part of the one production licence block of the project under study, covering 86,08 ha out of a total of 366,76 ha of production licence blocks, is located within GR1260005. The aforementioned part of the one production licence block of the project under consideration is located within habitat types 62A0, 9150, 925A, 9530, of which 62A0 and 9150 are habitat types of Annex I of Directive 92/43/EEC and 9530* is a priority habitat of the above mentioned Directive. It is worth noting that of the 86,08 ha of habitat types occupied by a part of one of the production licence blocks of the project under consideration, 70,81 ha cover habitat type 925A, which is not included in the habitat types of Directive 92/43/EEC, 0,73 and 14,27 ha cover habitat types 62A0 and

9150, which are Annex I habitat types, while only 0,27 ha cover priority habitat 9530, which is located on the boundary of the production licence polygon (Map 1). Of the total area of priority habitat 9530 within the protected area, only 0,04 % is covered by the production licence polygon of the project. Finally, only three of the 14 wind turbine sites of the project under study are located within the Special Conservation Area, while none of the three are located within either of the two habitat types listed in Annex I to Directive 92/43/EEC or within the only priority type of the area. Only a very small part of the access road between turbines 13 and 14, as well as the squares of the turbines in question, is located within habitat type 9150, covering less than 1 ha (approximately 0.7 ha) of this Annex I habitat type, covering approximately 5% of the 14.27 ha of this habitat type located within the part of the one production licence block of the project under consideration. It is worth noting that of the total 268.5 ha covered by habitat type 9150 within the Special Conservation Area under study, the percentage covered by a very small portion of the access road between wind turbines 13 and 14 and their plazas is much smaller, amounting to only 0.26%.

The review of the literature highlights the significant differences in the impact of wind farms on avifauna depending on the density of the wind turbines installed. An important factor influencing the risk of bird collision is the number of turbines and their layout (Langston and Pullan 2003, Percival 2003) increasing the above risk with increasing number of turbines. A high density of sited turbines may leave less space for birds to manoeuvre between them (Hunt 2002, Percival 2005). This project consists of 14 turbines with adequate spacing between them.

- **Alternative solution**

Other polygons were initially considered in the wider project area, within which both the wind potential of the area and the local terrain slope and prevailing wind directions favoured the siting of the project. However, as a whole, the above mentioned sites were rejected during the initial planning process, as they were located either within critical habitat for species of interest, in areas with limited accessibility and therefore

requiring long new boreholes, within Special Protection Areas, or in a combination of more than one of the above.

- **Zero option**

In addition to the above, and given that the promoter of the project under study has proceeded with an investment plan in power generation, the zero option, i.e. not creating the investment, was ruled out. The benefits of wind farms have already been mentioned herein, and from the analysis of all the data provided and the mitigation measures proposed herein, the integrity of the area is ensured after the installation and operation of the project under study.

8. MITIGATION MEASURES FOR POTENTIAL IMPACTS

Given that any anthropogenic impact on the environment causes impacts of a smaller or larger scale, it is appropriate that mitigation measures are taken. The so far known and scientifically documented impacts of wind farms relate in the majority of cases to impacts on the avifauna of the region, as mentioned in the section above, and possibly also on the populations of passerines, without however excluding impacts on other classes of wildlife. According to the recent manual "Good Practice Guide for mitigating the impacts of wind farms on biodiversity using modern technologies" (Fric et al. 2018) "if during the preparation of the Environmental Impact Assessment/Special Ecological Assessment it is assessed that negative impacts of the wind farm on the environment may occur, and which cannot be avoided, measures are required to be taken, in accordance with the mitigation hierarchy, either (a) to investigate and implement feasible alternatives that will minimize the impacts, or (b) to implement appropriate mitigation measures that will eliminate the impacts or at least reduce them to an insignificant level." In this Special Ecological Assessment from all of the above analyses it is considered that the project under study may cause adverse impacts in the study area and therefore a number of measures are proposed that can act positively to minimise any impacts that may be caused. These measures (measures, conditions or constraints) are currently divided into three categories: a) Measures proposed for implementation and b) Measures whose feasibility of implementation will be examined in the subsequent monitoring stages and c) Mitigation measures for possible future cumulative impacts.

List of measures, conditions or restrictions proposed

(a) Measures proposed for implementation

During installation and operation of the project, it is proposed to adopt and implement various measures that will minimize or eliminate any potential impacts to the protected features of the site. These measures are listed below:

- **Installation of an optical system for automated wind turbine shutdown:** Optical systems are based on high-resolution image analysis and target identification. These systems have the capability of visually covering the entire airspace of the wind turbine on which they are installed. Optical systems can be

mounted on the wind turbine tower without any interference with the tower and with high-resolution cameras to cover a 360° surveillance area around the wind turbine. These systems have a range of a few tens to a few hundred metres, depending on the size of the bird species being monitored. A system can typically cover from one to three turbines depending on the wind farm siting and the type of turbines. Operation is continuous and powered by the wind turbine. The system allows monitoring of the airspace it covers during the day and under good visibility conditions. The detectability of flying fauna can be improved by adjusting the detection criteria based on additional information about the area in question. The system allows the monitoring of bird activity near wind turbines and can therefore be a complementary method to GPS telemetry and ornithological radar for determining flying fauna habitat use in wind farms. Monitoring is carried out using an automated recording system and the subsequent evaluation - processing of the video recordings collected, both for species identification and for the rejection of other flying targets such as aircraft and insects. Mitigation in the case of using an optical system is related to the repelling of birds and/or the immobilisation of one or more wind turbines in cases where birds are on a collision course with them. This requires real-time recording of the movement of flying birds and immediate decision-making. This is accomplished using decision making software and directly connected to a SCADA system for activation of the wind turbine immobilization, and for the repulsion command it is connected to a loudspeaker system that emits sound signals of varying intensity depending on the estimated risk of impact. It should also be pointed out here that this system can be set to operate even without bird deterrence but only when the wind turbine is stopped, and the problems that may arise due to the topography of the terrain can be overcome by the correct choice of the angle at which the cameras are positioned so that the case of a bird coming from a lower altitude than the level of the cameras is adequately covered due to the topography of the terrain.

In this project it is proposed that the installation of the above system should be mandatory from the start of operation of the project, mainly due to the importance of the wider study area. The above proposed system is proposed to be configured to operate without bird deterrence (sound repulsion) during the breeding season and during the chick feathering

period, but only by stopping the wind turbines to avoid the possibility of disturbance to the species and the possibility of displacement of the species from the study area. Furthermore, given the topography of the terrain and the possibility of the passage of species of interest perpendicular to the axis of the study project from a low altitude, which is likely to be a 'blind spot' for the detection system of the above-mentioned stopping system, it is proposed that the project promoter should be obliged to install a second set of cameras (eight detection cameras on each wind turbine instead of four) on all the wind turbines, in order to fully cover the detection of species of interest from all directions of the horizon and from all possible heights, so that the case that a bird comes from a lower altitude than the level of the cameras, due to the morphology of the terrain, is also adequately covered by the correct choice of the camera placement angle. Other vital parameters that should be rigorously adjusted to achieve the goal of minimizing the probability of collision are the correct parameterization according to the biometric characteristics of the species in the area and the short response time from species detection to the complete stop of the wind turbine, data that are subject to modification in most of the commercial models of automated wind turbine stopping system. **It is also considered important during the first breeding season, after the installation of the project under study, that the above automated wind turbine shutdown system be operated with the simultaneous, daily and uninterrupted presence of two ground observers** (*foresters or biological ornithologists), or other relevant expertise, with proven knowledge in the identification of birdlife*)**, who will also have the possibility of stopping the operation of the wind turbines of the project under study in the event that dangerous flight of species of interest is detected.** This is considered necessary in view of the technical difficulties that may arise, and also because of the regulation requirements of the systems in question, based on the characteristics of the area in which they are installed and the species of birdlife in each area. Therefore, it is proposed that the entire period of the first breeding season be designated as a trial period for the automated wind turbine shutdown system and therefore require the simultaneous presence of both the automated shutdown system and field observers who will also have the ability to shut down the project.

- **Resting or observation areas:** No ponding structures that allow birds to perch or congregate should be used in any installation.
- **Shutdown of the wind farm during conditions of limited visibility due to cloud cover and extremely adverse weather conditions:** This measure is considered necessary due to the low visibility conditions in the project area. To implement the measure, visibility monitors will be installed at the project site and when visibility is below the range of the range of the cameras of the automated collision avoidance system, the operation of the wind turbines will be interrupted until visibility conditions are restored.
- **Lighting at the wind farm:** Constant lighting of wind turbines should be avoided to reduce the risk of collision. If this is unavoidable, flashing white strobe lighting could be considered as less attractive to birds. This measure, with its irregular strobe lighting, is now used in almost all new technology wind turbines, such as the turbines in the project under study. The relatively small size of the project under study, combined with the use of the above proposed lighting (if it cannot be completely excluded for safety reasons, i.e. no lighting), and the fact that the above installation site is located within an anthropogenically influenced landscape with the presence of a road network and the nearby presence of settlements, is not considered to significantly affect species likely to use the area during their migration, given the characteristics that most such flights
- **Undergrounding of cables:** Structures such as electricity transmission cables should be sited after very careful planning. Electricity transmission infrastructure (in general, but also in the case of wind farms) should be underground, or if this is not technically possible it may be above ground, but care should be taken to ensure that it is properly insulated and marked to minimise the risk of electrocution and birds striking it. **An underground connection** to the grid **is proposed** at this wind farm.
- **Removal of dead animals subject to conditions**: One of the most important measures to be provided is the obligation to immediately remove dead animals (dogs, sheep, goats, horses, cows, etc.) found within a radius of at least 500 meters from the base of the wind turbines. **These dead animals should be transported to safe locations away from the project (for example to**

organised supplementary feeding areas with permission), while remaining available for scavenging birds. This will reduce the risk of scavengers colliding with the turbines when they spot each dead animal, while not affecting the availability of their food. The responsibility for the collection and transport of dead animals should be the responsibility of the wind farm construction and operation company and the personnel employed on a daily basis will have, as part of their duties, the responsibility for the removal of such potential food source, which could attract predators, particularly scavenging species, causing a higher concentration than that recorded in the area (reference is made in the impact assessment to the vulture and black vulture in particular, but also to the screech-owl and golden eagle). Suitable disposal sites should be identified by the competent authorities following a scientific study and authorisation, and the costs of design, construction and proper operation should be borne by the competent regional bodies.

- At the same time, particular care should be taken during the construction and installation period of the project to ensure that **the work does not coincide with critical periods for the fauna of the area**, regardless of the importance of the species, in order to avoid disturbance at this critical stage of their biological cycle (the period of reproduction of fauna species or nesting and rearing of young birds).
- **Taking additional measures for the operation of the wind farm during sensitive periods:** in the event that the processing of the recording data from the automated wind turbine shutdown system or the simultaneous presence of field observers during the first breeding season after the installation of the project under study shows (from the analysis of the recorded videos or from the observations of the field observers) that the risk of impact during a period is critically high, the risk of the wind turbine being hit during the first breeding season shall be considered to be critically high.
- **Restoration of the surrounding area:** Following the completion of construction activities, it is proposed that all unnecessary roads and encroachments be rehabilitated to limit access to the area resulting in reduced disturbance. No amount of excess material resulting from road widening should remain in the project area, but all of it should be removed to an adjacent,

appropriately licensed, equivalent site. **Furthermore,** given that the increase in the number of visitors to an area is positively related to the creation of a new road network, it is proposed for the study area that, following the necessary consultation with the competent authorities, the new road opening that will result, despite its limited length, **should not be in common use for all.** In particular, it is proposed that a barrier be placed at the beginning of the new opening, after the construction of the project, and that only those involved in the maintenance and operation of the project and, of course, the competent authorities responsible for the study area should be able to access the access road. Furthermore, given that the needs of the project after construction are much smaller than during the construction phase, it is proposed that the width of the road deck after construction be reduced to the minimum required for the maintenance and operation of the project. Given the occasional presence of the bear and wolf, in the vicinity of the wind farm under study, it is proposed that the project proponent be required to post warning signs warning of their presence on access roads, in order to reduce the speed of passing vehicles and avoid accidents that could result in both deaths of the species and loss of life.

- **Provision to limit mortality of herpetofauna during the construction phase:** Given the fact that individuals of the gray turtle (*Testudo* graeca) and the Mediterranean tortoise (*Testudo hermanni*), which are species listed in Annex II of Directive 92/43/EEC and at the same time species with limited ability to avoid anthropogenic hazards due to their low speed of movement, were observed in the construction area of the project under study, it is recommended that during the construction phase of the project and its accompanying works, a daily scanning by a specialist of the areas to be affected by earthworks (e.g.(e.g. of new sections of openings) and the movement of individuals of the above-mentioned species, which are likely to be found, outside the occupation zone of the above-mentioned works. This will also prevent the accidental mortality of individuals of the above species during the construction phase of the project.
- **Monitoring of possible impacts on avifauna:** There should be an explicit obligation to monitor the impact of the project, especially on avifauna species and other terrestrial fauna, after construction and during the pre-construction and construction period, for a period of **at least four years** (in total). The

method of monitoring should meet specific requirements to be defined by the competent Ministry of the Environment or the consultative bodies or suggested by international literature. Monitoring is proposed to be carried out by a team of expert scientists, following a specific monitoring protocol. This way can ensure that data is obtained continuously and can be made available to all stakeholders and interested parties.

In addition to the above measures and monitoring, which is discussed further below, no other type of monitoring is proposed, using technical or other equipment (but only as an adjunct), which cannot replace the experience and judgement of specialist observers and can easily lead to underestimation or overestimation of situations and impacts.

(b) Measures whose feasibility will be examined in the subsequent monitoring stages

If during the subsequent monitoring stages (wind farm installation and wind farm operation) a change in the frequency of passage of important bird species is observed and it is considered that, based on the new data obtained, there is an increased risk of collision - causing an accident, then the following proposed measures are proposed to be considered and, after documenting them, to propose those measures which are assessed as the most effective (without rejecting the documented proposal of other measures not mentioned here).

Therefore, after the construction of the project, it may be necessary to actively manage the habitats in and around the project, so that birds are not attracted to the zone of influence of the turbines and are removed to locations that do not pose an impact risk. The responsibility for the design and implementation of these management measures lies with the project operator.

- **Active management of habitats under the turbines:** In those cases where post-construction monitoring identifies some impacts (increased concentration or mobility of species on site, incidents of impact of specific species) on specific turbines, it is proposed to design active management actions for the areas under the turbines (creation of undesirable habitats for birds) after appropriate studies.

These studies should also take into account the other flora and fauna species in the area.

- **Active management of habitats around the periphery of the wind farm:** It is possible that in cases where a wind farm is located in an area where there is a need for bird protection measures, active habitat management around the periphery of the wind farm may be required to create suitable habitats to attract birds away from the turbines. Such management actions could for example include ploughing and seeding of abandoned fields and clearing of forested fields after appropriate studies, so that species of interest likely to be affected by the wind farm are driven to safe alternative sites and indirectly favoured. These studies should necessarily take into account the potential impacts that will be assessed during the first period of operation of the park as well as other flora and fauna species in the area.

  Monitoring of potential impacts on bats: if a significant impact on bats occurs as a result of the installation and operation of the project under study, and as soon as it is identified, it is proposed to monitor the potential impacts on avifauna and other terrestrial fauna, and to monitor the potential impacts on bats, despite the fact that the site of the project under study is not located within a significant area of presence or feeding of bats. Monitoring in this case should also be carried out by expert scientists in order to ensure the proper selection of monitoring methods based on the standards of relevant international/national research programmes, the proper assessment of impacts and, by extension, the proper selection of any additional mitigation measures required (if any), e.g. avoidance of noisy construction activities during the periods when bats are most sensitive to disturbance (e.g. breeding, hibernation), as well as during transits and

(c) Mitigation measures to address potential future cumulative impacts

This section presents a proposal concerning mitigation measures for potential cumulative impacts of energy production and transmission projects in the project area, and concerns actions that can be adopted in the event that all of the planned wind farms are located adjacent to or within the protected areas under study.

As part of this SEA, relatively high intensity impacts were assessed in the event that all of the wind farms currently being licensed are constructed within the entire synergistic impact study area, however the contribution of the project under consideration is assessed as relatively minor. However, in order for both this and the other projects under licensing to mitigate any negative impact on the ecologically sensitive areas of the protected areas under study, it is proposed that they contribute to a broader action plan of cumulative impact mitigation interventions in line with the recommendations of the National Scavenger Species Action Plan (Xirouhakis 2019).

As stated in the above deliverable "*The most recent and up-to-date CPs for vulture species are the European ones (EuroSAPs), with references to the threats facing the species and proposed actions to address them by country (Andevski & Tavares 2017, Izquierdo 2017). The purpose of these SDs is to restore vultures to their previous distribution ("original distribution range") and maintain their populations at a favourable conservation status ("favourable conservation status"). The (spatial and temporal) reference points are the distribution and population size of the species before their collapse, i.e. mid-20th century, with the ultimate aim of listing them as 'Least Concern' (LC) on the IUCN Red List of Threatened Species (IUCN Red List of Threatened Species, Birdlife International 2016). The immediate objectives to be achieved to fulfil the purpose of the European LCs are a) to eliminate the threats that caused the decline of the species, b) to increase their population size, breeding range (breeding range) and productivity, c) to ensure good quality breeding and foraging habitat, and d) to increase connectivity and communication of existing metapopulations through the creation of secure corridors (population corridors and links). All of the above is practically assumed to be achieved in Europe by 2028 with 10 individual specific objectives:*

1. Improving our knowledge of vulture species (accurate information on their distribution and population size).

2. Eliminate or at least drastically reduce poisonings through consumption of poisoned animals or baits (better understanding of human-wildlife interactions , especially with carnivorous mammals, informing land users about the risks of poisons, reducing vulture mortality by 50% compared to previous decades e.g. 2000-2015).

3. Reduce mortality due to consumption of veterinary drugs (NSAIDs) (understanding and assessing the problem, banning dangerous drugs).

4. Reduce mortality due to lead poisoning (assessment of the problem, ban on the use of lead in hunting ammunition and implementation of alternatives).
5. Improve food sources for vultures in terms of quality and quantity (artificial food supply, halting the decline of extensive livestock farming, increasing wild ungulate populations, better management of available dead biomass in the countryside).
6. Eliminate or at least drastically reduce the impact of energy infrastructure on vultures (assess mortality due to impact with power lines and wind turbines or electrocution and implement mitigation techniques).
7. Improving the breeding success and sustainability of vultures (protection of nesting habitat, reduction of poaching and disturbance, control of human activities in breeding areas)
8. Reduce direct anthropogenic mortality (institutional and legislative measures to control poaching, taxidermy and vulture trade).
9. Promote communication of metapopulations (reintroduction of species, enrichment of existing ones with individuals born in captivity or from Care Centres, increase of genetic diversity through the creation of corridors, facilitation of metapopulation connectivity through the operation of HTAPs).
10. coordination and implementation of the SD (implementation, assessment and revision of the SD by country)'.

For all of the above specific objectives, corresponding measures/actions are proposed (see in detail in Annex III List of measures and protection actions of the above deliverable) for the implementation of which each wind farm, which will be implemented within the wider study area, can contribute for actions to be implemented in their entire area, following the establishment of a special voluntary financial instrument, under the auspices of the Ministry of Environment and Energy, with each wind farm contributing proportionally to the implementation of the measures/actions.

9. MONITORING PROGRAMME

During the operation of the project, it is proposed to assign the monitoring and recording of its operational impacts to qualified personnel who will be regularly on site and can act as a source of baseline information and ongoing baseline observation. This staff should consist of qualified scientists who will monitor the accuracy of the predictions of this study, possible variations in the use of the field study area by the important bird species in the area that may be due to random or currently unforeseeable factors (e.g., the occurrence of a forest fire in the area that would create "open areas" varying the degree of use by the different bird species, the effectiveness of the proposed During the monitoring programme for avifauna, it is proposed that an appropriate corresponding programme for chimpanzees (limited in time to the period during which the mammal group in question is active, both during the 24-hour period and throughout the year) be implemented in parallel.

It is recommended that the monitoring and recording of impacts carried out be at least 4 years and be carried out during both the pre-construction and construction phases, as well as during the first two years of operation of the project, and include the following:

- Regular logging (proposed every 15 days (2 times per month) during critical periods and every 20 days (3 times per 2 months) the rest of the time) related to impact risk and nest detection in the area.
- Recording of project area use data and recording of flights of important species in the project area and their interaction with wind turbines.
- Visualization of the above on a map for assessment of the situation.
- Monitoring and recording of possible mortality in a special protocol to be maintained by the company and available to the relevant departments - agencies for the control of incidents of impacts in the area.
- Training of workers at the wind farms to deal with incidents of injured birds and immediate notification of the competent services - agencies.
- Training of wind farm workers to scan the wind turbine area for dead birds and checking the correct implementation of the procedure with inspections.
- Assessment of the situation based on the information gathered.
- If, during the implementation of the proposed monitoring program, an impact from the installation and operation of the project under study on hand gliders

occurs, and as soon as it is identified (e.g., discovery of a hand glider fatality from project operation), it is recommended that the implementation of the measure to increase the wind turbine starting speed be studied. In the above case, it is proposed that recorders of the hand glider activity remain for at least ten consecutive 24 hours within each month in the zone of influence of the wind turbines of the wind farm, in order to obtain satisfactory results to directly determine the timing of the above measure seasonally, as described in the relevant section herein.

Based on the above program, which is proposed to follow the recording methodology of this Special Ecological Assessment to obtain comparable results, it will be possible to assess the progress of the project operation and determine the necessity or otherwise of taking additional measures or modifying the proposed ones in order to minimize any potential impacts.

10. SUMMARY OF CONCLUSIONS

The project under study is partially located within the Natura 2000 Special Conservation Area GR1260005.

Throughout this study, following a literature review and field observations for the period January 2024 - December 2024, all necessary records and assessments were carried out in order to make a specific ecological assessment of the project under study in relation to the protected area in question (as well as to the nearby Special Protection Areas and the neighbouring Bulgarian Special Conservation Area), based on the standards set by the legislation. Based on these, **and subject to the condition of implementing all the mitigation measures for potential impacts identified in this Special Ecological Assessment**, it is assessed that the proposed project:

- It is not likely to cause a delay or interrupt the progress in achieving the conservation objectives of the relevant Natura 2000 sites .
- It is not likely to reduce the extent or fragment the habitat types of the Natura 2000 network sites or affect the representativeness and degree of conservation of their structure and functions.
- It is not likely to reduce the population size of species or affect the degree of conservation of their habitats or fragment them or affect the balance between species or affect their degree of isolation.
- It is not likely to cause changes to vital parameters (e.g. nutrient balance, soil degradation from potential erosion, dynamics of relationships between biotic and abiotic parameters) that determine how the Natura 2000 sites concerned function.
- It is unlikely to interact with predicted or expected natural changes to the Natura 2000 network sites concerned and the wider area.

The associated works of this wind farm are not considered to have an adverse impact on the site and its integrity, nor on the species living therein, due to the proposed undergrounding of the cabling for the transmission of the electricity generated, but also due to the care taken to ensure that the sections of the new road are properly laid out, and the proposed mitigation measures mentioned above.

The additive impact of the project synergistically with other related projects in the area **is considered to be less than significant given that appropriate mitigation**

measures will be implemented to address the potential impacts identified in this Special Ecological Assessment.

11. BIBLIOGRAPHY

- (AWWI) American Wind Wildlife Institute. 2014. Wind turbine interactions with wildlife and their habitats: asummary of research results and priority questions. Washington, DC. Available online at www.awwi.org.
- (EC) European Commission, (2007). Guidance document on the strict protection of species of Community interest under the Habitats Directive. Brussels: European Commission. Available at: https://ec.europa.eu/environment/nature/conservation/species/guidance/pdf/guidance_en.pdf
- (EC) European Commission, (2007). Wind energy integration in the urban environment (WINEUR). [online] European Commission. Available at: https://ec.europa.eu/energy/intelligent/projects/en/projects/wineur
- (EC) European Commission. 2010. "Risk Assessment and Mapping Guidelines for Disaster Management", COMMISSION STAFF WORKING PAPER, SEC (2010) 1626 final, Brussels, 21.12.2010.
- (EC) Ευρωπαϊκή Επιτροπή 2020. «Έγγραφο Καθοδήγησης για τα Έργα Αιολικής Ενέργειας και τη Νομοθεσία της Ε.Ε. για την προστασία της φύσης». C(2020) 7730 final, Βρυξέλλες, 18.11.2020
- (NAS) National Academies of Science. 2007.Environmental Impacts of Wind-Energy Projects, In Marris E and Fairless D. 2007. Wind farms' deadly reputation hard to shift Nature international journals of science volume447,126.
- Adamakopoulos, P., Adamakopoulos, T., Bousbouras, D., Giannatos, G., Hatzirvassanis, V., Ioannidis, Y., Papaioannou, H. & Sfougaris, A. 1991. Les grands mammif□res de Grece (Carnivores et Artiodactyles): Situation actuelle, répartition, habitat - Les especes menacés, Perspectives de protection. Biologia Gallo-hellenica 18(1): 107-127.
- Adamakopoulos, T., Gatzoyannis, S. and Poirazidis, C. (Eds). (1995) Special Environmental Study of Dadia Forest. WWF Greece, Athens.
- Agnew R., Smith V & Fowkes R., Wind turbines cause chronic stress in badgers (Meles meles) in Great Britain; J. of Wildlife Diseases, 52(3):459-467 (2016). https://doi.org/10.7589/2015-09-231, https://bioone.org/journals/Journal-of-Wildlife-Diseases/volume-52/issue-3/2015-09-231/WIND-TURBINES-CAUSE-CHRONIC-STRESS-IN-BADGERS-MELES-MELES-IN/10.7589/2015-09-231.short
- Agostini, N., Cardelli, C. & M. Gustin (2007) Factors shaping pathways of European Honey-buzzards (*Pernis apivorus*) during spring migration in the central Mediterranean basin. Journal of Raptor Research 41: 57-61.
- Alekperov A.M., 1978. Amphibians and reptiles of Azerbaijan. Baku, Elm, 262 p. (in Russian).
- Alexei Tikhonov, Paulo Cavallini, Tiit Maran, Andreas Kranz, Juan Herrero, Giorgos Giannatos, Michael Stubbe, Roland Libois, Margarida Fernandes, Alexei Abramov, Chris Wozencraft. 2007. *Martes foina*. *The IUCN Red List of Threatened Species* 2007: Accessed on 11 December 2024.

- Alexei Tikhonov, Paulo Cavallini, Tiit Maran, Andreas Kranz, Juan Herrero, Giorgos Giannatos, Michael Stubbe, Jim Conroy, Boris Krystufek, Alexei Abramov, Chris Wozencraft. 2007. *Vormela peregusna (Europe assessment)*. *The IUCN Red List of Threatened Species* 2007: e.T29680A9526036. Accessed on 11 December 2024.
- Alivizatos, H. & S. Bourdakis (2002) Diet and Breeding Success of the Bonelli's Eagle (*Hieraaetus fasciatus*) in Greece: Preliminary Data. International Hawkwatcher No 5: 3-6.
- Alivizatos, H., and V. Goutner. (1997) Feeding habits of the Long-legged Buzzard (*Buteo rufinus*) during breeding in northeastern Greece. Israel Journal of Zoology 43:257-266.
- Alivizatos, H., Goutner., V. & S. Zogaris (2005) Contribution to the diet of four owl species (Aves, Strigiformes), from mainland and island areas of Greece. Belg. J. Zool., 135(2): 109-118.
- Alivizatos, H., Papandropoulos D., & Zogaris, S. 2004. Winter diet of the Greater Spotted Eagle (*Aquila clanga*) in the Amvrakikos wetlands, Greece. Journal of Raptor Research 38: 371-374.
- Alonso, J. C.; Alonso, J. A.; Bautista, L. M. 1994. Carrying Capacity of Staging Areas and Facultative Migration Extension in Common Cranes. *Journal of Applied Ecology* 31: 212-222.
- Amcoff, M., Tjernberg, M. & A. Berg (1994) Nest site choice of honey buzzard (*Pernis apivorus)*. Ornis Svecica 4: 145-158.VOSKAMP, P. (2000) Population biology and landscape use of the Honey Buzzard *Pernis apivorus* in Salland. Limosa 73: 67-76. BirdLife International, 2004. Birds in Europe: population estimates, trends, and conservation status. BirdLife Conservation series No. 12. BirdLife International. Cambridge.
- Ancillotto, L., Venturi, G. and Russo, D. 2019. Presence of humans and domestic cats affects bat behaviour in an urban nursery of greater horseshoe bats (*Rhinolophus ferrumequinum*). *Behavioural Processes* 164: 4-9.
- Andreas Kranz, Alexei Tikhonov, Jim Conroy, Paulo Cavallini, Juan Herrero, Michael Stubbe, Tiit Maran, Margarida Fernandes. 2007. *Vulpes vulpes*. *The IUCN Red List of Threatened Species* 2007: Accessed on 11 December 2024.
- Andren, H. 1994. Effects of habitat fragmentation on birds and mammals in landscapes with different propotions of suitable habitat: review. – Oikos 71: 355 – 366.
- Andreu, A.C. 2003. Testudo graeca Linnaeus 1758, Tortuga mora. *Ficha Libro Rojo*, Ministerio de Medio Ambiente.
- Aneva Y., D.St. Dimitrov & Vutov V.M. 2015. Flora and vegetation of Slavyanka mountain. *Bulgarian Journal of Agricultural Science*, 21 (No 5), 926-934.
- Angelstam, P. (1990) Factors determining the composition and persistence of local woodpecker's assemblages in taiga forest in Sweden – case for landscape ecological studies In: Carlson, A. & G. Aulen (eds) Conservation and Management of Woodpecker Populations, Report No. 17. Dept. of Wildlife Ecology, Swedish University of Agricultural Sciences, Uppsala.
- Antoniou, V., Tsoukali, H. & Mertzanis, G. 1998. Toxic substances and the brown bear. Bull. Int. Assoc. For. Toxicologists 18(4): 7.

- Aram Agasyan, Aziz Avci, Boris Tuniyev, Jelka Crnobrnja Isailovic, Petros Lymberakis, Claes Andrén, Dan Cogalniceanu, John Wilkinson, Natalia Ananjeva, Nazan Üzüm, Nikolai Orlov, Richard Podloucky, Sako Tuniyev, Uğur Kaya, Matthias Stöck, Muhammad Sharif Khan, Sergius Kuzmin, David Tarkhnishvili, Vladimir Ishchenko, Theodore Papenfuss, Gad Degani, Ismail H. Ugurtas, Nasrullah Rastegar-Pouyani, Ahmad Mohammed Mousa Disi, Steven Anderson, Trevor Beebee, Franco Andreone. 2015. *Bufotes viridis*. *The IUCN Red List of Threatened Species* 2015: Accessed on 11 December 2024.
- Araujo et al. 2011 Climate change threatens European conservation areas. Ecology letters 14: 484-492
- Araujo, M. B., et al. 2004. Would climate change drive species out of reserves? An assessment of existing reserve-selection methods. - Global Change Biology 10: 1618-1626.
- Araujo, M.B., Thuiller, W. & Pearson, R.G., 2006. Climate warming and the decline of amphibians and reptiles in Europe. Journal of Biogeography 33: 1712-1728.
- Archibald, G. W. 1996. Siberian Cranes. *Environmental Awareness* 18: 154-155.
- Arnett, E.B., C.D. Hein, M.R. Schirmacher, M.M.P. Huso & J.M. Szewczak (2013): Evaluating the Effective-ness of an Ultrasonic Acoustic Deterrent for Reducing Bat Fatalities at Wind Turbines. PLoS ONE 8(6): e65794. doi: 10.1371/journal.pone.0065794
- Arnett, E.B., W.K. Brown, W.P. Erickson, J.K. Fiedler, B.I. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. kerns, R.R. Koford, C.P. Nicholson, T.J. O´ Connel, M.D. Piorkowski & R.D. Tankersley (2008): Patterns of bat fatalities at wind energy facilities in North America. J. Wildl. Manag. 72(1): 61-78.
- Arnold, E.N. 2003. *Reptiles and amphibians of Europe*. Princeton University Press.
- Arroyo, B., Amar, A., Leckie, F., Buchanan, G.M., Wilson, J.D. S. Redpath (2009) Hunting habitat selection by hen harriers on moorland: Implications for conservation management. Biological Conservation 142: 586-596.
- Atatur, M.K. 1995. A preliminary report on the present status of Turkey's terrestrial and fresh-water turtles from the viewpoint of conservation. In: Ballasina, Donato (ed.), *Red Data Book on Mediterranean Chelonians*, pp. 183-190. Edagricole, Bologna, Italy.
- Aulagnier, S., Giannatos, G. & Herrero, J. (2008). *Rupicapra rupicapra*. In IUCN (2013). IUCN Red List of Threatened Species. Version 2013.1.
- Baagøe, H. 2001. *Myotis bechsteinii* (Kuhl, 1818) - Bechsteinfledermaus. In: F. Krapp (ed.), Handbuch der Saugetiere Europas*, Band 4: Fledertiere, Tiel I: Chiroptera 1: Rhinolophidae, Vespertilionidae I*, pp. 443-471. AULA-Verlag, Wiebelsheim, Germany.
- Baerwald, E.F. & R. Barclay (2014): Science-based strategies can save bats at wind farms. Bats 32 (2): 2-4.
- Baerwald, E.F., G.H. D' Amours, B.J. Klug & R.M.R. Barclay (2008): Barotrauma is a significant cause of bat fatalities at wind turbines. Current Biology 18 (16): pR 695-696.
- Bagchi R., Hole D.G., Butchart S.H.M., Collingham Y.C., Fishpool, L.D., Plumptre A.J., Owiunji I., Mugabe, H., Willis, S.G. 2018. 'Forecasting potential routes for movement of

endemic birds among important sites for biodiversity in the Albertine Rift under projected climate change.', Ecography., 41 (2). 401-413.

- Bagchi, R., et al. 2013. Evaluating the effectiveness of conservation site networks under climate change: accounting for uncertainty. - Global Change Biology 19: 1236-1248.
- Bailey, T.; Launay, F.; Sullivan, T. 2001. Health issues of the international trade of falcons and bustards in the Middle East: the need for regional monitoring and regulation? In: Potapov, S.; Banzragch, S.; Fox, N.; Barton, N. (ed.), *Saker Falcon in Mongolia: research and conservation (Proceedings of II International Conference on Saker Falcon and Houbara Bustard, Ulaanbaatar, Mongolia, 1-4 July 2000)*, pp. 185-195. Ministry of Nature and Environment, Ulaanbaatar.
- Bakaloudis D. E., Vlachos C. G. & G. J. Holloway (1998) Habitat use by the Short-toed Eagle *Circaetus gallicus* and theur reptilian prey during the breeding season in Dadia forest (North-Eastern Greece). J. Ap. Ecology 35: 821-828.
- Bakaloudis D. E., Vlachos C. G. & G. J. Holloway (2005) Nest spacing and breeding performance in Short-toed Eagle Circaetus
- Bakaloudis, D.E. 2000. The Ecology of Short-toed Eagle (*Circaetus gallicus*) in Dadia – Lefkimi-Soufli Forest Complex. Thrace, Greece, Ph.D. Thesis in Reading University, UK. 162 pp.
- Bakaloudis, D.E., Vlachos C., Papageorgiou, N., Holloway, G.J. (2001) Nest-site habitat selected by Short-toed Eagles *Circaetus gallicus* in Dadia forest (northeastern Greece). Ibis 143: 391-401.
- Baker, D. J., et al. 2015. Assessing climate change impacts for vertebrate fauna across the West African protected area network using regionally appropriate climate projections. - Divers. Distrib. 21: 991–1003.
- Balian, L. V.; Ghasabian, M. G.; Adamian, M. S.; Klem Jr, D. 2002. Changes in the waterbird community of the Lake Sevan-Lake Gilli area, Republic of Armenia: a case for restoration. *Biological Conservation* 106(2): 157-163.
- Balmaki, B. and Barati, A. 2006. Harvesting status of migratory waterfowl in northern Iran: a case study from Gilan Province. In: Boere, G., Galbraith, C. and Stroud, D. (eds), *Waterbirds around the world*, pp. 868-869. The Stationary Office, Edinburgh, UK.
- Band, W. 2012. Using a collision risk model to assess bird collision risks for offshore wind farms. Report to Strategic Ornithological Support Services programme, project SOSS-02. http://www.bto.org/sites/default/files/u28/downloads/Projects/Final_Report_SOSS02_Band1 ModelGuidance.pdf (accessed 8/01/2019).
- Band, W., Madders, M., and Whitfield, D.P. 2007. Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G.F.E. & Ferrer, 20 M. (eds.) Birds and Wind Farms: Risk Assessment and Mitigation, pp. 259-275. Quercus, Madrid.
- Barbraud, C.; Lepley, M.; Mathevet, R.; Mauchamp, A. 2000. Reedbed selection and colony size of breeding purple herons *Ardea purpurea* in southern France. *Ibis* 144(2): 227-235.

- Barilani, M., Bernard-Laurent, A., Mucci, N., Tabarroni, C., Kark, S., Garrido, J.A.P. and Randi, E. 2007. Hybridisation with introduced chukars (*Alectoris chukar*) threatens the gene pool integrity of native Rock (*A. graeca*) and Red-legged (*A. rufa*) Partridge populations. *Biological Conservation* 137(1): 57-69.
- Barov, B. & Derha, M. 2011. Review of the implementation of species action plans of threatened birds in the European Union (2004–2010). BirdLife International for the European Commission.
- Barrios, L. & Rodriguez, A. 2004. Behavioural and environmental correlates of soaring-bird mortality at on-shore wind turbines. J. Appl. Ecol. 41: 72–81.
- Barter, M. A. 2006. The Yellow Sea - a vitally important staging region for migratory shorebirds. In: Boere, G.; Galbraith, C., Stroud, D. (ed.), *Waterbirds around the world*, pp. 663-667. The Stationary Office, Edinburgh, UK
- Barton, N. W. H. 2000. Trapping estimates for Saker and Peregrine Falcons used for falconry in the United Arab Emirates. *Journal of Raptor Research* 34: 53-55.
- Bartoszewicz, M.; Zalewski, A. 2003. American mink, *Mustela vison* diet and predation on waterfowl in the Slonsk Reserve, western Poland. *Folia Zoologica* 52(3): 225-238.
- Bastos, R., Pinhancos, A., Santos, M., Fernandes, R., Vicente, J.R., Morinha, F., Honrado P.J., Travassos, P., Barros, P., Cabral, J.A. 2016. Evaluating the regional cumulative impact of wind farms on birds: how can spatially explicit dynamic modelling improve impact assessments and monitoring? https://doi.org/10.1111/1365-2664.12451
- Batten, L. A., Bibby, C. J., Clement, P., Elliott, G. D., and Porter, R. F. 1990. *Red data birds in Britain: action for rare, threatened and important species*. T. and A. D. Poyser, London.
- Battersby, J. 2005. *UK Mammals: Species Status and Population Trends. First Report by the Tracking Mammals Partnership. JNCC / The Tracking Mammals Partnership*.
- Battersby, J. 2005. *UK Mammals: Species Status and Population Trends. First Report by the Tracking Mammals Partnership. JNCC / The Tracking Mammals Partnership*.
- Battisti, C., Fortunati, L., Ferri, V., Dallari, D., Lucatello, G. 2016. Lack of evidence for short – term structural changes in bird assemblages breeding in Mediterranean mosaics moderately perforated by a wind farm. https://doi.org/10.1016/j.gecco.2016.03.012
- Battisti, C., Franco, D., Norsciac, C., Santoned, P., Soccinie, C. & V. Ferrie. 2014. Estimating the indirec impact of wind farms on breeding bird assemblages: a case study in the central Apennines. Israel Journal of Ecology & Evolution. https://doi.org/10.1080/15659801.2013.832017
- Bauer, H.G., Bezzel, E. and Fiedler, W. 2006. Das Kompendium der Vögel Mitteleuropas. Aula Verlag, Wiesbaden.
- Baumgart W. (1991). Saker falcon. Brehm Bucherei. Germany. Pp. 85-90 (In German).
- Beebee, T. J. C. (1995). Tadpole growth: is there an interference effect in nature? Herpetological Journal 5, 204-205.
- Bellebaum, J., Korner-Nievergelt, F., Durr, T. & U. Mammen. 2013. Wind turbine fatalities approach a level 0f concern in a raptor population. Journal for Nature Conservatio, 21 394-400.

- Benda P., Ivanova T., Horáček I., Hanák I., Červený J, Gaisler J., Gueorguieva A., Petrov B. & Vohralík V. 2003. Bats (Mammalia: Chiroptera) of the Eastern Mediterranean. Part 3. Review of bat distribution in Bulgaria. Acta Soc. Zool. Bohem. 67 245 – 357, 2003. ISSN 1211 – 376X. Department of Zoology, National Museum, Václavské nám., CZ–115 79 Praha 1, Czech Republic, National Museum of Natural History, blvd. Tzar Osvoboditel 1, Sofia, BG–1000, Bulgaria, Department of Zoology, Charles University, Viničná 7, CZ–128 44 Praha 2, Czech Republic, Institute of Vertebrate Biology AS CR, Květná 8, CZ–603 65 Brno, Czech Republic, Department of Zoology and Ecology, Masaryk University, Kotlářská 2, CZ–611 37 Brno, Czech Republic, corresponding author: petr.benda@nm.cz
- Benda, P., Ruedi, M. and Uhrin, M. 2003. First record of *Myotis alcathoe* (Chiroptera: Vespertilionidae) in Slovakia. Folia Zoologica, 52: 359-365.
- Bennett, V.J. & A.M. Hale (2014): Red aviation lights on wind turbines do not increase bat–turbine collisions. Animal Conservation. doi: 10.1111/acv.12102
- Benzal, J. and de Paz, O. 1991. *Los murcielagos de España y Portugal. Icona, Coll. Tecnica, Madrid, 1-330.*.
- Bergmanis U, Petrinš A, Strazds M, Krams I. 1997. Possible case of hybridization of the Lesser Spotted eagle and the Greater Spotted eagle in Eastern Latvia. *Putni Daba* 3: 2-6.
- Bergmeier E., Petermann J., Schröder E. 2010. Geobotanical survey of wood-pasture habitats in Europe: diversity, threats and conservation. Biodivers Conserv (2010) 19:2995–3014.
- Bernardino, J., Marques, T., Silvia, M., Mascarenhas, M. & H. Costa. 2011. Attesting bird displacement in Portuguese windfarms. In: May, R. & K. Bevanger (eds.). Proceedings, Conference on wind energy and wildlife impacts, 2-5 May 2011, Trondheim, Norway.
- Bernard-Laurent A. and Leonard Y. 2000. Vulnerability of an alpine population of rock partridge (*Alectoris graeca saxatilis*) to climatic events: evaluation with deterministic and stochastic models. *Game and Wildlife Science* 17(2): 63-79.
- Bernard-Laurent, A. and de Franceschi, P. F. 1994. Status, trends, and limiting factors of Rock Partridge (*Alectoris graeca saxatilis*) populations. *Game and Wildlife* 11: 267-307.
- Bevanger, K., Berntsen, F., Clausen, S., Dahl, E., Flagstad, O., Halley, D., Hanssen, F., Johnsen, L., Kvaloy, P., Lund-Hoel, P., May, R., Nygard, T., Pedersen, H., Reitan, O., Roskaft, E., Steinheim, Y., Stokke, B., Vang, R. 2010. Pre- and post-construction studies of conflicts between birds and wind turbines in coastal Norway. Report on findings 2007-2010. NINA report 620. 152pp.
- Billerman, S.M., Keeney, B.K., Rodewald, P.G. and Schulenberg, T.S. (eds). 2020. *Birds of the World*. Cornell Laboratory of Ornithology, Ithaca.
- Bilz M, Kell S, Maxted N, Lansdown R 2011. *European Red List of Vascular Plants*. Publications Office of the European Union, Luxembourg.
- Bilz, M. 2011. *Gladiolus palustris*. *The IUCN Red List of Threatened Species* 2011: e.T162188A5555329. https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T162188A5555329.en. Accessed on 11 December 2024.

- BirdLife International (2017) European birds of conservation concern: populations, trends and national responsibilities Cambridge, UK: BirdLife International.
- BirdLife International (2021) European Red List of Birds. Luxembourg: Publications Office of the European Union.
- BirdLife International. 2004. Birds in Europe: population estimates, trends and conservation status. BirdLife Conservation series No. 12. BirdLife International. Cambridge
- BirdLife International. 2015. European Red List of Birds. Office for Official Publications of the European Communities, Luxembourg.
- Blanco, G. (1997) Role of refuse as food for migrant, floater and breeding Black Kites (*Milvus migrans*). Journal of Raptor Research 31: 71-76.
- Bleich, V., Davis, J., Marshal, J., Torres, S. & Gonzales, B. (2009). Mining activity and habitat use by mountain sheep (Ovis Canadensis). European Journal of Wildlife Research 55: 183-191.
- Blew, J., Hoffmann, M., Nehls G., (2007) Collision risks at sea: Species composition and altitude distributions of birds in Danish offshore wind farms, 2nd Scientific Conference on the Use of Offshore Wind Energy, Federal Ministry for the Environment, 20-21/2, Berlin.
- Bogdanowicz, W. 1999. *Pipistrellus nathusii*. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.
- Bohnenstengel T., Krättli H., Obrist M.K., Bontadina F., Jaberg C., Ruedi M., Moeschler P. 2014. *Liste rouge Chauves-souris. Espèces menacées en Suisse, état 2011.* Office fédéral de l'environnement, Berne;Centre Suisse de Cartographie de la Faune, Neuchâtel;Centres suisses de coordination pour l'étude et la protection des chauves-souris, Genève et Zurich; Institut fédéral de recherches sur la forêt, la neige et le paysage, Birmensdorf. (16) (PDF) Liste rouge Chauves-souris, Espèces menacées en Suisse, état 2011. Available from: https://www.researchgate.net/publication/309462966_Liste_rouge_Chauvessouris_Especes_menacees_en_Suisse_etat_2011 [accessed Jun 04, 2019]., Berne.
- Boitani, L., Phillips, M. & Jhala, Y. 2023. *Canis lupus* (amended version of 2018 assessment). *The IUCN Red List of Threatened Species* 2023: e.T3746A247624660. https://dx.doi.org/10.2305/IUCN.UK.2023-1.RLTS.T3746A247624660.en
- Bonetti, A. & Παπακωνσταντίνου, K. 2000. Τα πουλιά στην Λιμνοθάλασσα Γιάλοβα και την
- Bonnot, N., Morellet, N., Verheyden, H., Cargnelutti, B., Lourtet, B., Klein, F. & Hewison, A. (2012). Habitat use under predation risk: Hunting, roads and human dwellings influence the spatial behaviour of roe deer. European Journal of Wildlife Research. 59. 10.1007/s10344-012-0665-8.
- Boris Kryštufek. 2007. *Erinaceus roumanicus*. *The IUCN Red List of Threatened Species* 2007: Accessed on 11 December 2024.
- Bosch, J. (2003) Phenology and breeding parameters of Booted Eagle *Hieraaetus pennatus* in central Catalonia (Spain). Ardeola 50: 181-189.

- Bosch, J., Borras, A. & J. Freixas (2005) Nesting habitat selection of Booted Eagle *Hieraaetus pennatus* in central Catalonia. Ardeola 52: 225-233.
- Both, C., and te Marvelde, L. 2007. Climate change and timing of avian breeding and migration throughout Europe. Climate Research, 35, 93 –105. https://doi.org/10.3354/cr00716
- Both, C., Turnhout, C. A. M. V., Bijlsma, R. G., Siepel, H., Strien, A. J. V., & Foppen, R. P. B. 2009. Avian population consequences of climate change are most severe for long-distance migrants in seasonal habitats. Proceedings of the Royal Society of London B: Biological Sciences, 277, 1259 – 1266.
- Bounas A., Vasilakis D., Kret E., Zakkak S., Chatzinikolaou Y., Kapsalis E., Arkumarev V., Dobrev D., Stamenov A., Stoychev S., Skartsi T., Sidiropoulos L., Halley M.J. 2025. Cumulative collision risk and population- level consequences of industrial wind-power plant development for two vulture species: A quantitative warning. Environmental Impact Assessment Review https://doi.org/10.1016/j.eiar.2024.107669
- Bourdakis, E. 2003. Monitoring of Egyptian vulture and Black Kite in the Special Protection Area: Antichasia Ori - Meteora . Technical Report, Arcturos - Hellenic Ornithological Society - Ministry of Environment, Physical Planning & Public Works. Thessalonica.
- Bourdakis, S. & S.M. Xirouchakis (2009) The Bonelli's eagle (*Hieraaetus fasciatus*) in Greece. In: V. Hernadez (ed). The Bonelli′s eagle. Ecology, behaviour and conservation. (in press).
- Bourdakis, S. Alivizatos, H., Azmanis, P., Hallmann, B., Panayotopoulou, M., Papakonstantinou, C., Probonas, N. Rousopoulos, Y. Skartsi, D., Stara, K. Tsiakiris, R. & Xirouchakis, S. 2004. The situation of Griffon Vulture in Greece. In: Slotta-Bachmayr L, Bögel R, Camina C.A., (edits). The Eurasian Griffon Vulture (*Gyps fulvus*) in Europe and the Mediterranean. Status report and Action plan, EGVWG, pp. 48-56.
- Bourdakis, S., Xirouchakis, S., Skartsi, T., Tsougrakis, Y., Panayotopoulou, M., Tsiakiris, R., Bousbouras, D. & Rousopoulos, Y. 2006 Overview of vultures of Greece: Distribution, population status and conservation issues during the period 1994- 2005. Abstract of the 10th International Congress on Zoogeography and Ecology of Greece and the Adjacent Regions 26-30 June 2006, Patras, Greece.
- Bousbouras, D., Georgiadis, L., Giannatos, G. & Pilides, C. 2006. Developing preventive measures for large carnivore - human conflict by a non-governmental organization and state agencies for brown bear (*Ursus arctos*) in Greece. Book of Abstracts, 1st European Congress of Conservation Biology, Eger, Hungary, p. 100.
- Bowles, P. & Corti, C. 2024. *Malpolon insignitus* (Europe assessment). The IUCN Red List of Threatened Species 2024: e.T157253A207992632. Accessed on 11 December 2024.
- Bowles, P. 2024. *Dolichophis caspius (Europe assessment)*. *The IUCN Red List of Threatened Species* 2024: e.T157267A204916174. Accessed on 11 December 2024.
- Bowles, P. 2024. *Elaphe quatuorlineata*. *The IUCN Red List of Threatened Species* 2024: e.T157264A204978521. Accessed on 11 December 2024.
- Bowles, P. 2024. *Podarcis tauricus (Europe assessment)*. *The IUCN Red List of Threatened Species* 2024: e.T204829909A204830613. Accessed on 11 December 2024.

- Bowles, P. 2024. *Pseudopus apodus (Europe assessment)*. *The IUCN Red List of Threatened Species* 2024: e.T157263A204911476. Accessed on 11 December 2024.
- Bowles, P. 2024. *Zamenis longissimus (Europe assessment)*. *The IUCN Red List of Threatened Species* 2024: e.T157266A205826427. Accessed on 11 December 2024.
- Brabant, R., Y. Laurent, U. Dolap, S. Degraer & B.J. Poerink (2018) Comparing the results of four used automated bat identification software programs to identify nine bat species in coastal Western Europe. Belgium Journal of Zoology, 148, 119-128.
- Brambilla, M., Rubolini, D. & F. Guidali (2004) Rock climbing and Raven Corvus corax occurrence depress breeding success of cliff-nesting Peregrines *Falco peregrinus*. Ardeola 51: 425-430.
- Brambilla, M., Rubolini, D., Guidali, F. (2007) Between land abandonment and agricultural intensification: Habitat preferences of Red-backed Shrikes *Lanius collurio* in low-intensity farming conditions. Bird Study 54 (2), 160-167.
- Bright, J., Langston, R. & S. Anthony. 2009. Mapped and written guidance in relation to birds and onshore wind energy development in England. RSPB Research report no 35.
- Brinkmann, R., O. Behr, I. Niermann & M. Reich (ed.) (2011): Entwicklung von Methoden zur Untersuchung und Reduktion des Kollisionsrisikos von Fledermäusen an Onshore-Windenergieanlagen. Umwelt und Raum 4, 457 pp.
- Broekhuizen, S. 1999. *Martes foina. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.*
- Brosset, A., Barbe, L., Beaucournu, J.-C., Faugier, C., Salvayre, H. and Tupinier, Y. 1988. *La raréfaction du rhinolophe euryale (Rhinolophus euryale Blasius) en France. Recherche d'une explication. Mammalia 52: 101-122.*
- Brotons, L.,Wolff, A., Paulus, G. & Martin, J.M. (2005) Effect of adjacent agricultural habitat on the distribution of passerines in natural grasslands. Biological Conservation 124, 407–414
- Brown, J. L., Li, S.-H., & Bhagabati, N. 1999. Long-term trend toward earlier breeding in an American bird: A response to global warming? Proceedings of the National Academy of Sciences of the United States of America, 96, 5565 – 5569. https://doi.org/10.1073/pnas.96.10.5565
- Brown, L.H., Urban, E.K. and Newman, K. 1982. *The Birds of Africa, Volume I*. Academic Press, London.
- Brown, M.J., Linton, E. & Rees, E.C. 1992. Causes of mortality among wild swans in Britain. Wildfowl 43: 70–79.
- Bücs S.-L., I. Csősz, L. Barti, T.-A. Sinculeț, E.-A. Telea, G. Crețu, I. Gönczi-Vass, C. Jére. The cave-dwelling bats of Romania: research and conservation in key European sites. *National Bat Conference, 7-9 September 2018, University of Nottingham*: 6.
- Budinski, I., Čulina, A., Mikulić, K. and Jurinović, L. 2010. Bird species that have significantly changed breeding range on Croatian coastal area: comparison of 30 years old data and recent knowledge. *Bird Census News* 23: 49-58.

- Bülbül, U., Kurnaz, M., Eroğlu, A.I.,Koç, H. and Kutrup, B. 2018. Restricted distribution area, threat conditions and additional two new localities of *Bombina variegata* (L., 1758) (Anura: Bombinatoridae) in Turkey. *Russian Journal of Herpetology* 25: 236-238.
- Buskirk, J.R., Keller, C. and Andreu, A.C. 2001. *Testudo graeca* Linnaeus, 1758 - Maurische Landschildkroete. *Handbuch der Reptilien und Amphibien Europas [Band 3/IIIa] - Schildkroten (Testudines) I*, pp. 125-178. Aula Verlag, Wiebelsheim, Germany.
- Cabral, M.J. 2005. *Livro Vermelho dos Vertebrados de Portugal*. Instituto da Conservação da Natureza, Lisboa.
- Cabrera-Cruz, S.A., Villegas Patraca, R. 2016. Response of migrating raptors to an increasing number of wind farms. https://doi.org/10.1111/1365-2664.12673
- Capper, S. 1998. The predation of Testudo spp. By golden eagles *Aquila chrysaetos* in the Dadia Forest Reserve, NE Greece. MSc Dissertation in 1 – 120 Reading University. 60pp.
- Capula, M. 1990. *The Macdonald Encyclopedia of Amphibians and Reptiles*. Macdonald and Co. London, UK. 256 pp.
- Carcamo, B., Kret, E., Ζωγράφου, Χ., Βασιλάκης, Δ. 2011. Αξιολόγηση των επιπτώσεων εννέα αιολικών πάρκων της Θράκης στα αρπακτικά πουλιά. Τεχνική έκθεση, 2011. Σελ. 96. WWF Ελλάς, Αθήνα.
- Carcamo, B., Zografou, C., Vasilakis, D. 2009. Assessing the impact on birds of prey of seven established wind farms in Thrace. International Congress on the Zoogeography, Ecology and Evolution of Eastern Mediterranean, Irakleio Greece, 21-25 September 2009.
- Carrete, M., Grande, J.M., Tella, J.L., Sánchez-Zapata, J.A., Donazar, J.A., Díaz-Delgado R. and Romo, A. 2007. Habitat, human pressure, and social behavior: Partialling out factors affecting large-scale territory extinction in an endangered vulture. *Biological Conservation* 136(1): 143-154.
- Carrete, M., Sanchez-Zapata, J., Benitez, J., Lobon, M., Montoya, F. and J. Donazar. 2011. Mortality at wind farms is positively related to large-scale distribution and aggregation in griffon vultures. Biological Conservation 145: 102- 108.
- Carrete, M., Sanchez-Zapata, J.A., Martinez, J.E. & J.E. Calvo (2002) Predicting the implications of conservation management: A territorial occupancy model of Bonelli′s eagle in Murcia, Spain. ORYX 36: 349-356.
- Carrete, M., Sαnchez-Zapata, J.A., Benλtez, J.R., Lobn, M. and Donαzar J. 2009. Large scale risk-assessment of windfarms on population viability of a globally endangered long-lived raptor. Biological Conservation. 142. pp. 2954-2961.
- Ceballos, O. Donazar, J.A. (1989) Factors influencing the breeding density and nest-site selection of the Egyptian Vulture (*Neophron percnopterus*). J. Ornithology 130: 353-359.
- Cederlund, G. 1983. Home range, dynamics, and habitat selection by roe deer in a boreal area in central Sweden. Acta Therilogica, 28, 443-460.
- Chamberlain, D.E., Wilson, A.M., Browne, S.J. & Vickery, J.A. (1999) Effects of habitat type and management on the abundance of skylarks in the breeding season. Journal of Applied Ecology 36, 856-870.

- Charmantier A., and Gienapp P. 2014. Climate change and timing of avian breeding and migration: Evolutionary versus plastic changes. Evolutionary Applications, 7, 15 – 28. https://doi.org/10.1111/eva.12126
- Çoraman E., Çelik E. 2012. Identification and Protection of Important Bat Caves in Turkey. Boğaziçi University Institute of Environmental Sciences, Istanbul.
- Corlatti, L., Lorenzini, R. & Lovari, S. (2011). The conservation of the chamois Rupicapra spp. Mammal rev 41: 163-174.
- Corso, A. 2018. Updated status of European Lanner Falcon, *Falco biarmicus* feldeggii (Schlegel, 1843) (Aves Falconiformes): a taxon on the verge of extinction, with brief comments on the North African Lanner, F. biarmicus erlangeri (Kleinschimdt, 1901). *Biodiversity Journal* 9(1): 35-44.
- Cortés-Avizanda, A., Ceballos, O., Donázar, J. A. 2009. Long-term trends in population size and breeding success in the Egyptian Vulture (*Neophron percnopterus*) in northern Spain. *Journal of Raptor Research* 43(1): 43-49.
- Cramp S. 1998. The Complete Birds of the Western Palearctic. CD-Rom Version 1. Oxford University Press.
- Cramp, S. & Perrins, C.M. (eds) (1993) Handbook of the birds of Europe, the Middle East and Africa. The birds of the Western Palearctic. Oxford University Press.
- Cramp, S. (ed). 1985. Handbook of birds of Europe, the Middle East and the North Africa. The birds of Western Palearctic, Vol. 4. OUP, Oxford.
- Cramp, S. and Simmons, K. E. L. 1980. The birds of the western Palearctic. Vol. 2. – Oxford Univ. Press.
- Cramp, S.; Simmons, K. E. L. 1977. *Handbook of the birds of Europe, the Middle East and Africa. The birds of the western Palearctic, vol. I: ostriches to ducks*. Oxford University Press, Oxford.
- Cramp, S.; Simmons, K. E. L. 1983. *Handbook of the birds of Europe, the Middle East and Africa. The birds of the western Palearctic vol. III: waders to gulls*. Oxford University Press, Oxford.
- Crick H.Q.P., Dudley C., Glue D.E., Thomson D. L. 1997. UK birds are laying eggs earlier. Nature, 388, 526. https://doi.org/10.1038/41453
- Crivelli, A. 1994. The importance of the former USSR for the conservation of pelican populations nesting in the Palaeartic. In: Crivelli, A.J.; Krivenko, V.G.; Vinogradov, V.G. (ed.), *Pelicans in the former USSR*, pp. 1-4. International Waterfowl and Wetlands Research Bureau, Slimbridge, UK.
- Crivelli, A. J., G. Catsadorakis, & T. Naziridis (1997b) *Pelecanus onocrotalus* Great White Pelican. BWP (Birds of Western Palearctic) Update 1: 144-148
- Crivelli, A. J.; Catsadorakis, G.; Hatzilacou, D.; Nazirides, T. 1997. *Pelicanus crispus* Dalmatian Pelican. *Birds of the Western Palearctic Update* 1(3): 149-153.

- Crivelli, A. J.; Catsadorakis, G.; Jerrentrup, H.; Hatzilacos, D.; Michev, T. 1991. Conservation and management of pelicans nesting in the Palearctic. In: Salathé, T. (ed.), *Conservation of migratory birds*, pp. 137-152. International Council for Bird Preservation, Cambridge, U.
- Crivelli, A. J.; Marsili, L.; Focardi, S.; Renzoni, A. 1999. Organochlorine compounds in pelicans (*Pelecanus crispus* and *Pelecanus onocrotalus*) nesting at Lake Mikri Prespa, north-western Greece. *Bulletin of Environmental Contamination and Toxicology* 62: 383-389.
- Crivelli, A. J.; Nazirides, T.; Catsadorakis, G.; Hulea, D.; Malakou, M.; Marinov, M.; Shogolev, I. 2000. Status and population development of Pygmy Cormorant *Phalacrocorax pygmaeus* breeding in the Palearctic. In: Yesou, P.; Sultana, J. (ed.), *Monitoring and conservation of birds, mammals and sea turtles in the Mediterranean and Black Seas: Proceedings of the 5th Medmaravis Symposium, Gozo, Malta, 29 September - 3 October 1998*, pp. 49-60. Environment Protection Department, Valetta.
- Crivelli, A.J., Jerrentrup, H. & Hallmann, B. 1988. Preliminary results of a complete census of breeding colonial waterbirds in Greece, 1985-1986. Hellenic Ornith. Soc. Newsletter 4: 31-33.
- Crozier, L. G., Hendry, A. P., Lawson, P. W., Quinn, T. P., Mantua, N. J., Battin, J., Huey, R. B. 2008. Potential responses to climate change in organisms with complex life histories: Evolution and plasticity in Pacific salmon. Evolutionary Applications, 1, 252 – 270. https://doi.org/10.1111/j.1752-4571.2008.00033.x
- Cushman, S. A., et al. 2013. Biological corridors and connectivity. - Key Topics in Conservation Biology 2 384-404.
- Custer, T. W. 2000. Environmental contaminants. In: Kushlan, J. A., Hafner, H. (ed.), *Heron conservation*, pp. 251-267. Academic Press, San Diego.
- Dahl, E., Bevanger, K., Nygard, T., Roskaft, E. and B. Stokke. 2011. Reduced breeding success in white-tailed eagles at Smola windfarm, western Norway, is caused by mortality and displacement. Biological conservation
- Damn, G., Franco, N. (2014). Chamois. In: The CIC Caprinae Atlas of the World. CIC International Council for Game and Wildlife Conservation. Budakeszi, Hungary in cooperation with Rowald Ward Publications RSA (Pty) Ltd. Johannesburg, South Africa. Vol.II. Pp.143-233.
- Danko, S., A. Daralova & A. Kristin (eds). 2002. Rozsirenie vtakov na Slovensku (Bird distribution in Slovakia). Veda, Bratislava.
- Davy, C.M., Russo D., Fenton M.B. (2007). Use of native woodlands and traditional olive groves by foraging bats on a Mediterranean island: consequences for conservation. J. Zool. (Lond) 273:397–405.
- Davygora, A.V. 1998. Factors limiting area and numbers of lesser kestrel *Falco naumanni* in the South Ural steppes. 5th World Conference on Birds of Prey and Owls, Johannesburg, South Africa.
- De Jong, J. (1995): Habitat use and species richness of bats in a patchy landscape. Acta Theriologica 40: 237-248.

- de Juana, E. and Kirwan, G.M. 2013. Hazel Grouse (*Bonasa bonasia*). In: J. del Hoyo, A. Elliott, J. Sargatal, D.A. Christie and E. de Juana (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- de Juana, E. and Suárez, F. 2004. Calandra Lark (*Melanocorypha calandra*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- De Lucas, M, Janss, G. and Ferrer M. 2004. The effects of a wind farm on birds in a migration point: The Strait of Gibraltar: Biodiversity Conservation 13: 395-407
- de Lucas, M. & Perrow, M., (2017). Birds: collision. In: Perrow, M.R., ed., 2017. Wildlife and Wind Farms, Conflicts and Solutions. Volume 1 Onshore: Potential Effects. Exeter: Pelagic Publishing. Ch 8.
- de Lucas, M., Janss, G.F.E., Whitfield, D.P. & Ferrer, M., (2008). Collision fatality of raptors in wind farms does not depend on raptor abundance. Journal of Applied Ecology, 45: 1695-1703. https://doi:10.1111/j.1365-2664.2008.01549.x
- De Rosa, D., Di Febbraro, M., De Lisio, L., De Sanctis, A. and Loy, A. 2019. The decline of the lanner falcon in Mediterranean landscapes: competition displacement or habitat loss? *Animal Conservation* 22: 24-34.
- del Hoyo, J., Elliott, A., and Sargatal, J. 1996. *Handbook of the Birds of the World, vol. 3: Hoatzin to Auks*. Lynx Edicions, Barcelona, Spain
- Delforge, P. 1995. *Orchids of Britain and Europe*. Delachaux et Niestlé SA, Lausanne.
- Devereux, C.L., Denny, M.J.H. & Whittingham, M.J. 2008. Minimal effects of wind turbines on the distribution of wintering farmland birds. – Journal of Applied Ecology 45: 1968-1694: doi: 10.1111/j.1365-2664.2008.01560.x.
- Diagana, C. H.; Dodman, T., Sylla, S. I. 2006. Conservation action plans for the Black Crowned Crane *Balearica pavonina* and Black Stork *Ciconia nigra* in Africa. In: Boere, G.; Galbraith, C., Stroud, D. (ed.), *Waterbirds around the world*, pp. 608-612. The Stationary Office, Edinburgh, UK.
- Dietz, C., and Kiefer, A. 2016. Bats of Britain and Europe. Bloomsbury Publishing, pp 398.
- Dietz, C., von Helversen, O. and Nill, D. 2009. Bats of Britain, Europe and Northwest Africa. A C Black, London
- Dimalexis, A., Xirouchakis, S., Latsoudis, P., Portolou, D., Karris, G., Georgiakakis P., Fric, J., Barboutis, C., Bourdakis, S., Kakalis, E., Ivovič, M. & T. Kominos (2007) Breeding distribution and population status of the Eleonora's falcon (*Falco eleonorae*) in Greece. Journal of Ornithology 149: 23-30.
- Dimopoulos P., Raus T., Bergmeier E., Constantinidis Th., Iatrou G., Kokkini S., Strid A. & D. Tzanoudakis. 2016. Vascular plants of Greece – an annotated checklist. Supplement. *Willdenowia* 46: 301-347.doi:http://dx.doi.org/10.3372/wi.46.46303.
- Dimopoulos P., Raus Th., Bergmeier E., Constantinidis Th., Iatrou G., Kokkini S., Strid A. & Tzanoudakis D. 2013. Vascular plants of Greece: An annotated checklist. *Englera* 31: 1-372. –

Berlin: Botanic Garden and Botanical Museum Berlin-Dahlem; Athens: Hellenic Botanical Society, 372 pages, including text, 15 figures, 10 tables, 24 colour plates. 26 November 2013.

- Dombrovski, V. C. 2002. Hybridization of Lesser and Greater Spotted Eagles - (*Aquila pomarina et A. clanga*) in Belarus: rules or exception? *Subbuteo* 5(1): 23-31.
- Donald, P. 2004. Woodlark (*Lullula arborea*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Donázar, J. A., Palacios, C. J., Gangoso, L., Ceballos, O., González, M. J., Hiraldo, F. 2002. Conservation status and limiting factors in the endangered population of Egyptian vulture (*Neophron percnopterus*) in the Canary Islands. *Biological Conservation* 107: 89-97.
- Donazar, J.A. (1993) Los Buitres Ibericos, Biologia y Conservacion. Reyero, J.M. (ed.) Madrid.
- Donázar, J.A., Cortés-Avizanda, A., Carrete, M. 2010. Dietary shifts in two vultures after the demise of supplementary feeding stations: consequences of the EU sanitary legislation. *European Journal of Wildlife Research* 56: 613-621.
- Donazar, J.A., Palacios, C.J., Gangoso, L., Ceballos, O., Gonzalez, M.J. and Hiraldo, F. 2007. Conservation status and limiting factors in the endangered population of Egyptian vulture (Neophron percnopterus) in the Canary Islands. *Biological Conservation* 107(1): 89-97.
- Donázar, J.A., Serrano, D. y Urmeneta, A. 2010b. Amenaza eólica sobre las aves rapaces de bardenas reales. *Quercus* 296(60-61).
- Doutau, B., Καυκαλέτου-Ντιεζ, Α., Carcamo, B., Βασιλάκης, Δ., Kret, E. 2011. Επιπτώσεις των αιολικών πάρκων στα αρπακτικά πουλιά στη Θράκη. Ετήσια τεχνική αναφορά: Αύγουστος 2009- Αύγουστος 2010. Σελ. 45, WWF Ελλάς, Αθήνα.
- Drewitt, A.L. & Langston, R.H.W. 2008. Collision effects of wind-power generators and other obstacles on birds. – Annals of the New York Academy of Sciences 1134: 233-266; doi: 10.1196/annals.1439.015.
- Drewitt, A.L. & Langston, RH.W. 2006. Assessing the impacts of wind farms on birds. https://doi.org/10.1111/j.1474-919X.2006.00516.x
- Dunkel Fr. & Gottschlich G. 2018. Notes on some taxa of *Hieracium* and *Pilosella* (*Asteraceae*), new for the Greek flora στο *Phytologia Balcanica* 24 (2): 217 – 224, Sofia.
- Dürr, T. & I. Bach (2004): Fledermäuse als Schlagopfer von Windenergieanlagen - Stand der Erfahrungen mit Einblick in die bundesweite Fundkartei. Bremer Beiträge für Naturkunde und Naturschutz Band 7: 253-264.
- Dürr, T. (2007): Möglichkeiten zur Reduzierung von Fledermausverlusten an Windenergieanlagen in Brandenburg. Nyctalus (N.F.) 12 (2-3): 238-252.
- Dzhamirzoev, G. S., Bukreev, S. A. 2009. Status of Egyptian Vulture *Neophron percnopterus* in the North Caucasus, Russian Federation. *Sandgrouse* 31(2): 128-133.
- Easterling, D. R., Horton, B., Jones, P. D., Peterson, T. C., Karl, T. R., Parker, D. E., Folland, C. K. 1997. Maximum and minimum temperature trends for the globe. Science, 277, 364 – 367. https://doi.org/10.1126/science.277.5324.364

- Eastham, C. P.; Quinn, J. L.; Fox, N. C. 2000. Saker *Falco cherrug* and Peregrine *Falco peregrinus* Falcons in Asia: determining migration routes and trapping pressure. In: Chancellor, R.D.; Meyburg, B.U. (ed.), *Raptors at risk: world working group on birds of prey and owls*, pp. 247-258. Hancock House, Surrey, British Columbia.
- EBCC. 2015. Pan-European Common Bird Monitoring Scheme. Available at: http://www.ebcc.info/index.php?ID=587.
- EC (European Commission), 2011. Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (Document 32011 L0092). http://eur-lex. europa.eu/legal content/EN/TXT/?qid=1450371392486&uri=CELEX:32011L0092
- Edgar, P. and Bird, D.R. 2006. Action Plan for the Conservation of the Aesculapian Snake (*Zamenis longissimus*) in Europe. Council of Europe document no. T-PVS/Inf (2006) 19.
- Eichhorn, G., van der Jeugd, H. P., Meijer, H. A. J., & Drent, R. H. 2010. Fueling incubation: Differential use of body stores in arctic- and temperate-breeding barnacle geese (Branta leucopsis). The Auk, 127, 162 – 172. https://doi.org/10.1525/auk.2009.09057
- Eichhorn, M., K. Johst, R. Seppelt, and M. Drechsler. 2012. Model-based estimation of collision risks of predatory birds with wind turbines. Ecology and Society 17(2): 1.
- Eken, G.; Magnin, G. 1999. *A preliminary biodiversity atlas of the Konya Basin, Central Turkey*. Dogal Hayat Koruma Dernegi, Istanbul.
- Ellenberg, H. 1988. *Vegetation Ecology of Central Europe*. 4th Edition, Cambridge University Press, Cambridge.
- Elliott, A., E. F. J. Garcia, and P. F. D. Boesman. 2020. White Stork (*Ciconia ciconia*), version 1.0. In: (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana) (eds), *Birds of the World*, Cornell Lab of Ornithology, Ithaca, NY, USA.
- Elliott, A., Garcia, E.F.J. & Boesman, P. (2014). Black Stork (*Ciconia nigra*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.) (2014). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona.
- Ellis, T. M.; Bousfield, R. B.; Bissett, L. A.; Dyrting, K. C.; Luk, G. S. M.; Tsim, S. T.; Sturm-Ramirez, K.; Webster, R. G.; Guan, Y.; Peris, J. S. M. 2004. Investigation of outbreaks of highly pathogenic H5N1 avian influenza in waterfowl and wild birds in Hong Kong in late 2002. *Avian Pathology* 33(5): 492-505.
- Ens, B. J. 2006. The conflict between shellfisheries and migratory waterbirds in the Dutch Wadden Sea. In: Boere, G.; Galbraith, C., Stroud, D. (ed.), *Waterbirds around the world*, pp. 806-811. The Stationary Office, Edinburgh, UK.
- Erickson W.P., Johnson G.D., and Young D.P. 2006. A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191.
- Erickson, W. 2009. A summary of avian and bat fatalities in the U.S. In: PNWWRM VII. Proceedings of the NWCC Wind Wildlife Research Meeting VII. Milwaukee, WI October 28-29, 2008.

- Erickson, W.P., Johnson, G.D., Strickland, M.D., Young, D.P., Jr Sernja, K.J. & Good, R.E. 2001. Avian collisions with wind turbines: a summary of existing studies and comparisons to other sources of avian collision mortality in the United States. Western EcoSystems Technology Inc. National Wind Coordinating Committee Resource Document.
- Erickson, W.P., Wolfe, M.M., Bay, K.J., Johnson, D.H., Gehring, J.L. 2014. A comprehensive Analysis of Small – Passerine Fatalities from Collision with Turbines at Wind Energy Facilities. https://doi.org/10.1371/journal.pone.0107491
- ERWDA. 2003. *The status of the Saker Falcon (Falcon cherrug) and assessment of trade*. Environmental Research and Wildlife Development Agency, Abu Dhabi, UAE.
- Evans, D.M. and Day, K.R. 2002. Hunting disturbance on a large shallow lake: the effectiveness of waterfowl refuges. *Ibis* 144(1): 2-8
- Everaert, J., and Stienen, E.W. M. 2008. Impact of wind turbines on birds in Zeebrugge, Belgium: significant effect on breeding tern colony due to collisions. Biodiversity and Conservation 16:3345–3359 Research Institute for Nature and Forest, Kliniekstraat 25, B-1070 Brussels, Belgium
- Fairon, J., Gilson, R., Jooris, R., Faber, T. and Meisch, C. 1982. *Cartographie provisoire de la faune chiroptérologique belgo-luxembourgeoise. Bulletin de l' Institut Royal des Sciences Naturelles de Belgique 7:1-125.*.
- Fairon, J., Gilson, R., Jooris, R., Faber, T. and Meisch, C. 1982. *Cartographie provisoire de la faune chiroptérologique belgo-luxembourgeoise. Bulletin de l' Institut Royal des Sciences Naturelles de Belgique 7:1-125.*.
- Farfán, M. A.,Vargas, J. M.,Duarte, J.Real, R.2009. What is the impact of wind farms on birds? A case study in southern Spain
- Fasola, M.; Alieri, R. 1992. Conservation of heronry Ardeidae sites in North Italian agricultural landscapes. *Biological Conservation* 62: 219-228.
- Fensome, A.G. and Mathews, F. 2016. Roads and bats: a meta-analysis and review of the evidence on vehicle collisions and barrier effects. *Mammal Review* 46: 311-323.
- Ferguson-Lees, J. & Christie, D.A. 2001. *Raptors of the world*. Helm. London, 992 pp
- Fernandez – Bellon, D., Wilson, W.M., Irwin, S., O'Halloran, J. 2018. Effects of development of wind energy and associated changes in land use on bird densities in upland areas. https://doi.org/10.1111/cobi.13239
- Ferreira, S., Grosso-Silva, J.M., Lohr, M., Weihrauch, F., Jödicke, R. 2006. A critical checklist of the Odonata of Portugal. *International Journal of Odonatology* 9(2): 133-150.
- Fielding, A. & P. Haworth. 2010. Golden eagles and wind farms. A report created under an SNH Call-of-Contract Arrangement.
- Fielding, A. & P. Haworth. 2013. Edinbane Windfarm: Ornithological Monitoring - A review of the spatial use of the area by birds of prey. Haworth Conservation Ltd.
- Fielding, A.H. & Haworth P.F. 2015a. Farr wind farm: A review of displacement disturbance on dunlin arising from operational turbines 2002 – 2015. Haworth Conservation Ltd.

- Fielding, A.H. & Haworth P.F. 2015b. Farr wind farm: A review of displacement disturbance on golden plover arising from operational turbines 2002 – 2015. Haworth Conservation Ltd
- Fjeldså, J. 2004. *The grebes*. Oxford University Press, Oxford, U.K.
- Flint, V.E.; Boehme, R.L.; Kostin, Y.V.; Kuznetsov, A.A. 1984. *A field guide to birds of the USSR*. Princeton University Press, Princeton, New Jersey.
- Flux, J. E. C. and Angermann, R. 1990. *Chapter 4: The Hares and Jackrabbits. Rabbits, Hares and Pikas: Status Survey and Conservation Action Plan. J. A. Chapman and J. E. C. Flux. Gland, The World Conservation Union: 61-94.*.
- Foo, C.F., Bennett, V.J., Hale, A.M., Korstian, J.M., Schildt, A.J., & Williams, D.A., (2017). Increasing evidence that bats actively forage at wind turbines. PeerJ.
- Forrest, J., Robinson, C., Hommel, C. & J. Craib. 2011. Flight activity and breeding success of hen harrier at Paul's hill wind farm in north east Scotland. In: May, R. & K. Bevanger (eds.). Proceedings, Conference on wind energy and wildlife impacts, 2-5 May 2011, Trondheim, Norway.
- Fox, A. D.; Jones, T. A.; Singleton, R.; Agnew, A. D. Q. 1994. Food supply and the effects of recreational disturbance on the abundance and distribution of wintering Pochard on a gravel pit complex in southern Britain. *Hydrobiologia* 279/280: 253-262.
- Fox, A.D., Desholm, M., Kahlert, J., Christensen, T.K. & Krag Petersen, I.B. 2006. Information needs to support environmental impact assessments of the effects of European marine offshore wind farms on birds. In Wind, Fire and Water: Renewable Energy and Birds. Ibis 148 (Suppl. 1): 129–144.
- Fox, N. 2002. *The conservation of the Saker Falcon (*Falcon cherrug*) and the role of CITES in UAE 2002*. Environmental Research and Wildlife Development Agency, Abu Dhabi, UAE.
- Fox, T. (A.D.), Desholm, M., Kahlert, J., Petersen, K., & Christensen, T., K.., (2007) Avian avoidance behaviour and collision risk: Results from post construction monitoring of the Danish offshore wind farms at Horns Rev and Nysted, 2nd Scientific Conference on the Use of Offshore Wind Energy, Federal Ministry for the Environment, 20-21/2, Berlin.
- Franco, A. and Rodrigues de los Santos, M. (coord.). 2001. *Libro Rojo de los Vertebrados Amenazados de Andalucia. Consejería de Medio Ambiente, Junta de Andalucía.*
- Fric J., Τζεν Ε. & Τζάλη Μ., 2018. Οδηγός καλής πρακτικής για τον μετριασμό των επιπτώσεων των αιολικών πάρκων στη βιοποικιλότητα με χρήση σύγχρονων τεχνολογιών. LIFE12 BIO/GR/000554, σελ. 73.
- Frid, A. and L. M. Dill. 2002. Human-caused disturbance stimuli as a form of predation risk. Conservation Ecology **6**(1): 11.
- Fuller, R.J., Gregory, R.D., Gibbons, D.W., Marchant, J.H., Wilson, J.D., Baillie, S.R. & Carter, N. (1995) Population declines and range contractions among lowland farmland birds in Britain. Conservation Biology, 9, 1425-1441.
- Gaidet, N., Dodman, T., Caron, A., Balanca, G., Desvaux, S., Goutard, F., Cattoli, G., Lamarque, F., Hagemeijer, W. and Monicat, F. 2007. Avian Influenza Viruses in Water Birds, Africa. *Emerging Infectious Diseases* 13(4): 626-629.

- Galushin, V.; Clarke, R.; Davygora, A. 2003. *International Action Plan for the Pallid Harrier (Circus macrourus*)
- Garcia, A. D., Bruschi, D. 2015. A risk assessment tool for improving safety standards and emergency management in Italian onshore wind farms. https://doi.org/10.1016/j.seta.2016.09.009
- Garcia-Dios, I.S. (2006) Diet of the booted eagle *Hieraaetus pennatus* in the south of Avila: Importance of the songbirds. Ardeola 53: 39-54.
- Garvin, J., Jennelle, C., Drake, D., Grodsky, S. 2011. Response of raptors to a windfarm. Journal of applied ecology 48: 199-209.
- Gasperetti, J., Stimson, A. F., Miller, J. D., Ross, J. P., & Gasperetti, P. R. (1993). Turtles of Arabia. Fauna of Saudi Arabia, 13, 170– 367.
- Gauthreaux, S. A., and C. G. Belser. 2006. Effects of artificial night lighting on migrating birds. Pages 67–93 in C. Rich and T. Longcore, editors. Ecological consequences of artificial night lighting. Island Press, Washington, D.C., USA
- Gazaryan, S., Bücs, S. & Çoraman, E. 2020. *Miniopterus schreibersii* (errata version published in 2021). *The IUCN Red List of Threatened Species* 2020: https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T81633057A195856522.en. Accessed on 11 December 2024.
- Gazzard, A. 2024. *Sciurus vulgaris (Europe assessment)*. *The IUCN Red List of Threatened Species* 2024: e.T221730864A221731815. Accessed on 11 December 2024.
- Geniez, P. 2018. *Snakes of Europe, North Africa & the Middle East: A Photographic Guide*. Princeton University Press, Princeton, New Jersey.
- Gensbol, B. & Thiede, W. (2008) Birds of Prey. Collins
- Gerngross, P., Ambarli, H., Angelici, F.M., Anile, S., Campbell, R., Ferreras de Andres, P., Gil-Sanchez, J.M., Götz, M., Jerosch, S., Mengüllüoglu, D., Monterroso, P. & Zlatanova, D. 2023. *Felis silvestris* (amended version of 2022 assessment). *The IUCN Red List of Threatened Species* 2023: e.T181049859A224982454. https://dx.doi.org/10.2305/IUCN.UK.2023-1.RLTS.T181049859A224982454.en. Accessed on 11 December 2024.
- Gibson L., Wilman E.N. & Lawrance W.F. 2017. How Green is 'Green' Energy? TREE, 32(12): 922-935.
- Gill, J. A.; Langston, R. H. W.; Alves, J. A.; Atkinson, P. W.; Bocher, P.; Vieria, N. C.; Crockford, N. J.; Gélinaud, G.; Groen, N.; Gunnarsson, T. G.; Hayhow, B.; Hooijmeijer, J.; Kentie, R.; Kleijn, D.; Lourenco, P. M.; Masero, J. A.; Meunier, F. 2007. Contrasting trends in two Black-tailed Godwit populations: a review of causes and recommendations. *Wader Study Group Bulletin*: 43-50.
- Gillman LN, Wright SD, Cusens J, McBride PD, Malhi Y, Whittaker RJ 2015. Latitude, productivity and species richness. *Glob. Ecol. Biogeogr*. 24:107–117.

- Giovanni Amori, Jan Zima, Heikki Henttonen, Andrew Smith, Charlotte Johnston. 2007. *Lepus europaeus*. *The IUCN Red List of Threatened Species* 2007: e.T41280A10431866. Accessed on 11 December 2024.
- Godlevska, L., Bücs, S., Kruskop, S.V., Gazaryan, S., Benda, P. & Paunović, M. 2020. *Pipistrellus pipistrellus* (errata version published in 2021). *The IUCN Red List of Threatened Species* 2020: https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T85333513A196581936.en. Accessed on 11 December 2024.
- Goławski, A., Goławska, S. (2008) Habitat preference in territories of the red-backed shrike *Lanius collurio* and their food richness in an extensive agriculture landscape. Acta Zoologica Academiae Scientiarum Hungaricae 54 (1), 89-97.
- Golawski, A., Meissner, W. (2008) The influence of territory characteristics and food supply on the breeding performance of the Red-Backed Shrike (*Lanius collurio*) in an extensively farmed region of eastern Poland. Ecol. Res. 23, 347-353.
- Golemanski, V. 2011. *Red Data Book of Bulgaria.* . IBER – BAS, Sofia.
- Goodman, S.M. & Haynes, C.V. (1992) The diet of the lanner (*Falco biarmicus*) in a hyper-arid region of the eastern Sahara. Journal of Arid Environments, 22: 93-98.
- Goriup, P.; Schulz, H. 1990. Conservation management of the White Stork: an international opportunity. International Council for Bird Preservation, Cambridge, U.K.
- Gorman G. 2004. Woodpeckers of Europe: A Study of the European Picidae. B. Coleman, Bucks, Great Britain
- Goutner, V., Skartsi, T., Konstantinou, I.K., Sakellarides, T.M., Albanis, T.A., Vasilakis, D., Elorriaga, 480 J., and Poirazidis, K. 2011. Organochlorine residues in blood of cinereous vultures and Eurasian griffon 481 vultures in a northeastern Mediterranean area of nature conservation. Environ. Monit. Assess. 183, 259–271.
- Gove, B., Langston, R.H.W., McCluskie, A., Pullan, J.D., Scrase, I. 2013. Wind farms and birds: an updated analysis of the effects of wind farms on birds, and best practice guidance on integrated planning and impact assessment, ed. B. International, p. 89. Bern Convention, Strasbourg.
- Griffin, C. 2011. Rock Partridge *Alectoris graeca* population assessment. Methodology for Bird Species Recovery Planning in the European Union. Final Report to the European Commission. FACE and BirdLife International for the European Commission, Cambridge, UK.
- Grignolio, S., Merli, E., Bongi, P., Ciuti, S., & Apollonio, M. (2011). Effects of hunting with hounds on a non-target species living on the edge of a protected area. Biological Conservation 144 (1): 641-649.
- Grimmett, R.; Inskipp, C.; Inskipp, T. 1998. *Birds of the Indian Subcontinent*. Christopher Helm, London.
- Grishanov, D. 2006. Conservation problems of migratory waterfowl and shorebirds and their habitats in the Kaliningrad region of Russia. In: G. Boere, C. Galbraith and D Stroud (eds), *Waterbirds around the world*, pp. 356. The Stationary Office, Edinburgh, U.K.

- Grodsky, S.M., M.J. Behr, A. Gendler, D. Drake, B.D. Dieterle, R.J. Rudd & N.I. Walrath (2011): Investigating the causes of death for wind turbine-associated bat fatalities. Journal of Mammalogy 92(5): 917-925.
- Grubač, B. 1997. The present status of vultures Aegypiinae in central Balkans. Proc. II International carrion birds congress, pp: 1-13. Canizares, Spain.
- Grubač, B. 1998 Population status and conservation problems of the Black Vulture in the Former Yugoslavian Republic of Macedonia. In: Tewes, E., Sanchez, J.J. & Heredia, B (eds.). International Symposium on the Black Vulture in Southeastern Europe and adjacent regions. Black Vulture Conservation Foundation - Frankfurt Zoological Society. Dadia. Pp. 63-68.
- Grünkorn, Thomas & Rönn, Jan & Blew, Jan & Nehls, Georg & Weitekamp, Sabrina & Timmermann, Hanna & Reichenbach, Marc & Coppack, Timothy & Potiek, Astrid & Krüger, Oliver. (2016). Ermittlung der Kollisionsraten von (Greif-)Vögeln und Schaffung planungsbezogener Grundlagen für die Prognose und Bewertung des Kollisionsrisikos durch Windenergieanlagen (PROGRESS). 10.13140/RG.2.1.2902.6800.
- Gudmundsson, F. 1979. The past status and exploitation of the Myvatn waterfowl populations. *Oikos* 32(1-2): 232-249.
- Guerrieri, G., Pietrelli, L., Biondi, M. (1996) Status and reproductive habitat selection of three species of Shrikes, Lanius collurio, L. senator and L. minor in a Mediterranean area. (Proc. of the First Intern. Shrike Symposium) Found. Vert. Zool. 6, 167-171.
- Gunnarsson, T. G.; Gill, J. A.; Appleton, G. F.; Gíslason, H.; Gardarsson, A.; Watkinson, A. R.; W.J. Sutherland, W. J. 2006. Large-scale habitat associations of birds in lowland Iceland: Implications for conservation. *Biological Conservation* 128: 265-275.
- Gunnarsson, T. G.; Gill, J. A.; Newton, J.; Potts, P.M.; Sutherland, W.J. 2005. Seasonal matching of habitat quality and fitness in migratory birds. *Proceedings of the Royal Society of London Series B* 272: 2319-2323.
- Guo Q, Kelt DA, Sun Z, Liu H, Hu L, Ren H, Wen J 2013. Global variation in elevational diversity patterns. *Sci. Rep*. 3:3007.
- Gurnell, J. and Wauters, L. 1999. Sciurus vulgaris. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.
- Gustin, M., Palumbo, G. and Corso, A. 2000. International Action Plan for the Lanner Falcon *Falco biarmicus*. BirdLife International.
- Hafner, H.; Didner, E. 1997. *Ardeola ralloides* Squacco Heron. *Birds of the Western Palearctic Update* 1: 166-174.
- Hagemeijer, E.J.M. & Blair, M.J. 1997. The EBCC Atlas of European Breeding Birds: their distribution and abudance. T & A.D. Poyser, London, 904 pp.
- Hailey, A. & Willemsen, R.E. 2003. Changes in the status of tortoise populations in Greece 1984-2001. Biodiversity and Conservation 12: 991-1000.
- Hailey, A. 2000. The effects of the fire and mechanical habitat destruction on survival of the tortoise *Testudo hermanni* in northern Greece. Biological Conservation 92: 321-332.

- Haines, G. 2002. *An assessment of the impact of trade on the Saker Falcon*.
- Hale, A., Hatchett, E.S., Meyer, J.A., Bennet, V. 2014. No evidence of displacement due to wind turbines in breeding grassland songbirds. https://doi.org/10.1650/CONDOR-14-41.1
- Hallmann, B. 1980. Guidelines for the conservation of birds of prey in Evros. Ministry of Coordination / IUCN, Athens. Unpublished report.
- Hallmann, B. 1985. Status and conservation problems of birds of prey in Greece. In: Newton, I. & Chancellor, R. (eds.). Conservation Studies of Raptors. ICBP Technical Publication No 5. ICBP. Cambridge. Pp: 55-59.
- Hallmann, B. 1989. Status and distribution of the Aquila in Greece. Biol. Gallo-hellenica 15: 171-176.
- Hallmann, B. 1996. Τα Απειλούμενα Αρπακτικά Πουλιά της Ελλάδας, η 11 η ώρα για 10 είδη. Τεχνική Αναφορά. WWF–Ελλάδα. Αθήνα. \
- Hanák V., Benda P., Ruedi M., Horacek I. and Sofianidou T.S. (2001). Bats (Mammalia: Chiroptera) of the Eastern Mediterranean. Part 2. New records and review of distribution of bats in Greece. Acta Soc. Zool. Bohem. 65: 279-346.
- Hancock, J. A.; Kushlan, J. A.; Kahl, M. P. 1992. *Storks, ibises and spoonbills of the world*. Academic Press, London.
- Hancock, J.; Kushlan, J. 1984. *The herons handbook*. Croom Helm, London.
- Hancock, P. 2008. Black-tailed Godwit. In: Hancock, P. (ed.), *The status of globally and nationally threatened birds in Botswana, 2008.*, pp. 25. BirdLife Botswana.
- Handrinos, G. 1985. The status of vultures in Greece. Στο: Newton, I. & Chancellor R. (eds): Conservation Studies of Raptors. ICBP Technical Publication No 5. ICBP. Cambridge. pp. 103-115.
- Handrinos, G. 1987. The Golden Eagle in Greece. Actes 1er Coll. Intern. Aigle Royal en Europe, Arvieux, June 1986, pp. 18-22.
- Handrinos, G. 1989. The IWRB midwinter waterfowl counts in Greece. 1967-1987: A preliminary analysis of the populations of Anatidae. 4e Congres International de Zoogeographie et Ecologie de la Grece et des Regions Avoisinantes. Kammena Vourla, 1987. Biol. Gallo-hellenica 15: 219-236.
- Handrinos, G. Akriotis T. 1997. Birds of Greece. Cromwell Press Ltd., Melksham, Great Britain.
- Hannah, L., et al. 2007. Protected area needs in a changing climate. - Frontiers in Ecology and the Environment 5: 131-138.
- Harris T., Franklin K. 2000. Shrikes and Bush-shrikes. Christopher Helm, London.
- Harrje, C. 1994. *Fledermaus-Massenwinterquartier in der Levensauer Kanalhochbrücke bei Kiel. - Nyctalus (N.F.) 5: 274 - 276.*.
- Hatzilacou, D. 1993. *The distribution of the globally endangered Dalmatian Pelican Pelecanus crispus in Greece: threats pertaining to its habitats and recommendations for protection*. Royal Society for the Protection of Birds, Sandy, U.K.
- Hayhow, B. 2008. Food for the gods. *I-Webs News*: 2.

- Hayman, P.; Marchant, J.; Prater, A. J. 1986. *Shorebirds*. Croom Helm, London.
- Heinze, J. 1994. Bemerkungen zu den Lautauserrungen und zum Verhalten des Mittelspechts Dendrocopos medius. Limicola 8: 298-313.
- Helldin, J. O., Jung, J., Neumann, W., Olsson, M., Skarin, A., & Widemo, F., (2012). The impact of wind power on terrestrial mammals. A synthesis. Stockholm: The Swedish Environmental Protection Agency.
- Helldin, J. O., Skarin, A., Neumann, W., Olsson, M., Jung, J., Kindberg, J., & Widemo, F., (2017). The effects of wind power on terrestrial mammals - predicting impacts and identifying areas for future research. In Martin Perrow (Ed.), Wildlife and wind farms - Conflicts and solutions (pp. 222–240) Exeter: Pelagic Publishing.
- Heller, N. E. and E. S. Zavaleta. 2009. "Biodiversity management in the face of climate change: A review of 22 years of recommendations", Biological Conservation, 142, pp. 14-32
- Helversen, O. von & Weid, R. 1990. Die Verbreitung einiger Fledermausarten in Griechenland. Bonn. Zool. Beitr. 41: 9-22.
- Heneberg, P. (2008) Soil penetrability as a key factor affecting the nesting of burrowing birds. Ecological Research, 1-7.
- Hernández, A. E., and Margalida, A. 2009. Poison-related mortality effects in the endangered Egyptian Vulture (*Neophron percnopterus*) population in Spain.*European Journal of Wildlife Research* 55: 415-423.
- Heuck, Christian.Herrmann, Christof, Levers, Christian.Leitão, Pedro J.,Krone, Oliver.Brandl, Roland.Albrecht, Jörg.2019. Wind turbines in high quality habitat cause disproportionate increases in collision mortality of the white-tailed eagle
- Higgins, P. J.; Davies, S. J. J. F. 1996. *Handbook of Australian, New Zealand and Antarctic birds vol 3: snipe to pigeons*. Oxford University Press, Oxford.
- Hockey, P., Kirwan, G.M. and Boesman, P. 2013. Eurasian Oystercatcher (*Haematopus ostralegus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Hockey, P.A.R., Dean, W.R.J. and Ryan, P.G. 2005. *Roberts birds of southern Africa*. Trustees of the John Voelcker Bird Book Fund, Cape Town, South Africa.
- Hoffmann MT, Kreft S, Kati V, Ibisch PL. Roadless Areas as Key Approach to Conservation of Functional Forest Ecosystems. In: Goldstein MI, DellaSala DA, editors. Encyclopedia of the World's Biomes. Oxford: Elsevier; 2020. p. 237-48.
- Hole, D. G., et al. 2009. Projected impacts of climate change on a continent-wide protected area network. - Ecol. Lett. 12: 420-431.
- Holm, T. E.; Laursen, K. 2009. Experimental disturbance by walkers affects behaviour and territory density of nesting Black-tailed Godwit *Limosa limosa*. *Ibis* 151(1): 77-87.
- Holt, D.W., Berkley, R. Deppe, C. Enríquez-Rocha, P.L. Olsen, P.D. Petersen, J.L. Rangel-Salazar, J.L. Segars, K.P. and Wood. K.L. 1999. Strigidae species accounts. Pages 153– 243 in del Hoyo, J. Elliott, A. and Sargatal J. [Eds.], Handbook of the birds of the world, Vol. 5. Lynx Edicions, Barcelona, Spain.

- Holt, D.W., Berkley, R., Deppe, C., Enríquez Rocha, P., Petersen, J.L., Rangel Salazar, J.L., Segars, K.P., Wood, K.L. and de Juana, E. 2013. Eurasian Eagle-owl (*Bubo bubo*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Hölzinger, J. (1987) Bird of Baden Württemberg, 1: threat and conservation. Ulmer Verlag, Karlsruhe.
- Homolka, M. and Zima, J. 1999. *Lepus europaeus*. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.
- Horn, J.W., E.B. Arnett & T.H. Kunz (2008): Behavioral responses of bats to operating wind turbines. The Journal of Wildlife Management 72(1): 123-132.
- Horvat, I., Glavač, V. & Ellenberg, H. 1974. Vegetation Sudosteuropas. Gustav Fischer Verlag. Stuttgart.
- Hötker, H., Thomsen, K.-M., Jeromin, H., 2006. Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats. Facts, gaps in knowledge, demands for further research, and ornithological guidelines for the development of renewable energy exploitation.
- Howell, J.A. & DiDonato, J.E. 1991. Assessment of avian use and mortality related to wind turbine operations: Altamont Pass, Alameda and Contra Costa Counties, California, September 1988 Through August 1989. Final report prepared for Kenentech Windpower.
- Huber, D. 2018. *Ursus arctos* (errata version published in 2019). *The IUCN Red List of Threatened Species* 2018: Accessed on 11 December 2024.
- Hunt, G. 2002. Golden Eagles in a perilous landscape:predicting the effects of mitigation for wind turbine bladestrike mortality. Consultant Report 500-02-043F, PIER –Environmental Area. Prepared for: California Energy Commision, Sacramento, California, USA.
- Huntley, B., Green, R., Collingham, Y. & S. Willis. 2007. A climatic atlas of european breeding birds. Durham, Sandy and Barcelona. Durham University, RSPB and Lynx edicions.
- Hutson, A.M., Mickleburgh, S.P. and Racey, P.A. 2001. *Microchiropteran Bats - global status survey and conservation action plan. IUCN, Gland.*.
- Hutson, A.M., Mickleburgh, S.P. and Racey, P.A. 2001. *Microchiropteran Bats - global status survey and conservation action plan. IUCN, Gland.*
- Hutterer, R., Ivanova, T., Meyer-Cord, Ch. and Rodrigues, L. 2005. *Bat Migrations in Europe. Naturschutz und Biologische Vielfalt, 28, 162 pp*.
- Ibisch PL, Hoffmann MT, Kreft S, Pe'er G, Kati V, Biber-Freudenberger L, et al. A global map of roadless areas and their conservation status. Science. 2016;354(6318):1423-7. doi: http://doi.org/10.1126/science.aaf7166.
- Iliopoulos Y, Petridou M, Giannakopoulos A, Aravidis I, Pilides H, Selinides K, Mertzanis Y, 2012c. Habitat use of wolves in relation to linear infrastructure disturbance zones and other secondary artificial and natural barriers. IENE 2012 International Conference, 21-24 October 2012, Potsdam-Berlin, Germany.

- Iliopoulos Y., 2005. "Linkage areas of wolf distribution in the alignment of EGNATIA highway - section 4.1- Grevena", Pp.198-287 in: "Monitoring and evaluation of Egnatia highway construction (section 4.1.) on large mammals and their habitats". Project final report (Arcturos NGO- EGNATIA S.A.), 120pp. + GIS maps. (in greek).
- Iliopoulos Y., 2008a. "Effects of Egnatia construction on local wolf population in the alignment of EGNATIA highway - section 4.1- Grevena", in: "Monitoring and evaluation of Egnatia highway construction (section 4.1.) on large mammals and their habitats - PHASE II". Project final report (Callisto NGO- EGNATIA S.A.), 100pp. + GIS maps (in Greek).
- Iliopoulos Y., Petridou M. (2017). Assessment of wolf and bear conflicts with livestock farming in Prespes national Park. Management body of Prespes National Park., pp 150 (in Greek)
- Iliopoulos Y., Petridou M., Lazarou Y., 2014. Wolf-dog hybridization in Kerkini National Park. National Park. Management authority of Kerkini NP, Kallisto NGO (in Greek)
- Iliopoulos, Y. 2000. First results by the project considering the situation of the wolf in Greece and the relevant conservation problems of the species - Notes and comments for the "Final Draft Plan for the Conservation of Wolves in Europe"-LCIE. Project LIFE97 NAT/GR/004249, Arcturos, Greek Ministry of Agriculture, 44 pp.
- Iliopoulos, Y., Sgardelis, S., Koutis, V. & Savaris, D. 2009. Wolf depredation on livestock in Central Greece. Acta Theriologica 54(1): 11-22.
- Iliopoulos, Y., Youlatos, D., & Sgardelis, S. (2014). Wolf pack rendezvous site selection in Greece is mainly affected by anthropogenic landscape features. European journal of wildlife research, 60(1), 23-34.
- Iliopoulos,Y. 1999. *Distribution, population estimates and conservation of the wolf in Greece- Arcturos, Thessaloniki, Greece - Project LIFE "Lycos" NAT97-GR04249: Conservation of the wolf (Canis lupus L.) and its habitats in Greece (Arcturos, EC DGEnv, Greek Ministry of Agriculture).*
- Imbert, C., Caniglia, R., Fabbri, E., Milanesi, P., Randi, E., Serafini, M., Torretta, E., and Meriggi, A. (2016). Why do wolves eat livestock?: Factors influencing wolf diet in northern Italy. Biological Conservation 195, 156-168.
- IPBES. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Bonn, Germany: 2019.
- Jackson, S. D., and C. R. Griffin. 1998. Toward a practical strategy for mitigating highway impacts on wildlife. In G. J. Evink, P. Garrett, D. Zeigler, and J. Berry (eds.), Proceedings of the International Conference on Wildlife Ecology and Transportation. United States Department of Transportation Federal Highway Administration. Washington D.C. HEPN-30/7-99(1M)EW.
- Jackson, S.D., 1996. Underpass systems for amphibians. In: Evink, G.L., Garrett, P., Zeigler, D., Berry, J. (Eds.), Proceedings of the International Conference on Wildlife Ecology and Transportation. FL-ER-69-98. Florida Department of Transportation, Tallahassee, FL, pp. 240–244.

- Jacobs, J. D., and Wingfield, J. C. 2000. Endocrine control of life-cycle stages: A constraint on response to the environment? The Condor, 102, 35 – 51. https://doi.org/10.1650/0010-5422(2000)102[0035: ECOLCS]2.0.CO;2
- Janss G 2000. Bird Behaviour in and near a wind farm at Tarifa Spain: Management considerations. Proceedings of National Avian Wind Power Planning Meeting III, San Diego, California, May 1998, prepared of the Avian Subcommittee of the National Wind Coordinating Committee by LGL Ltd, King City (Ontario), 202 p.
- Jdeidi, T., Masseti, M., Nader, I., de Smet, K., & Cuzin, F. 2010. *Canis lupus (Mediterranean assessment)*. *The IUCN Red List of Threatened Species* 2010: e.T3746A10048228. Accessed on 11 December 2024.
- Jelka Crnobrnja Isailovic, Milan Vogrin, Claudia Corti, Valentin Pérez Mellado, Paulo Sá-Sousa, Marc Cheylan, Juan Pleguezuelos, Hans Konrad Nettmann, Bogoljub Sterijovski, Petros Lymberakis, Richard Podloucky, Dan Cogalniceanu, Aziz Avci. 2009. *Lacerta viridis*. *The IUCN Red List of Threatened Species* 2009: Accessed on 11 December 2024..
- Jenkins, A.R., Avery, G.M. (1999) Diets of breeding Peregrine and Lanner Falcons in South Africa J. Rap.Research, 33: 190-206
- Jerrentrup, H. & Efthimiou G. 2006. Conservation and Management of the fauna of the Nestos Delta and Nestos Gorge in the frame of the LIFE-Nature. In: Proceedings: The contribution of the LIFE- Nature III projects to the integrated management of the NATURA 2000 sites: The case of Greece. Prefecture of Drama-Kavala-Xanthi (Ed.): 104-110. Xanthi. (In Greek).
- Jiguet, F.; Villarubias, S. 2004. Satellite tracking of breeding black storks *Ciconia nigra*: new incomes for spatial conservation issues. *Biological Conservation* 120: 153-160
- Jim Conroy, Andreas Kranz, Paulo Cavallini, Margarida Fernandes, Alexei Tikhonov, Juan Herrero, Michael Stubbe, Tiit Maran. 2007. *Lutra lutra (Europe assessment)*. *The IUCN Red List of Threatened Species* 2007: e.T12419A3343999. Accessed on 11 December 2024.
- Jiménez-Alfaro B, Girardello M, Chytrý M, Svenning JC, Willner W, Gégout JC, Agrillo E, Campos JA, Jandt U, Kacki Z et al. 2018. History and environment shape species pools and community diversity in European beech forests. *Nat. Ecol. Evol*. 2:483–490.
- Johnsgard, P. A. 1981. *The plovers, sandpipers and snipes of the world*. University of Nebraska Press, Lincoln, U.S.A. and London.
- Johnsgard, P. A. 1993. *Cormorants, darters, and pelicans of the world*. Smithsonian Institution Press, Washington.
- Johnsgard, P.A. 1978. *Ducks, geese and swans of the World*. University of Nebraska Press, Lincoln and London.
- Johnston, N., Bradley, J. & K. Otter. 2014. Increased Flight Altitudes among Migrating Golden Eagles Suggest Turbine Avoidance at a Rocky Mountain Wind Installation. PLOS One 9: e93030.
- Joris E., & Stienen E., (2009) Impact of wind Turbines on Terns in Zeebrugge, Belgium in Stienen Eric, Norman Ratcliffe, Jan Seys, Jurgen Tack, Jan Mees and Ingrid Dobbelaere (eds.) 2009. Seabird Group 10th International Conference. Provincial Court, Brugge, 27-30 March

2009. VLIZ Special Publication 42. Communications of the Research Institute for Nature and Forest- INBO.M.2009.1. Research Institute for Nature and Forest (INBO), Brussels, Belgium- Flanders Marine institute (VLIZ). Oostende, Belgium. Viii+68 p.

- Juan Herrero, Giorgos Giannatos, Andreas Kranz, Jim Conroy. 2007. *Sus scrofa*. *The IUCN Red List of Threatened Species* 2007: Accessed on 11 December 2024.
- Juan Herrero, Jim Conroy, Tiit Maran, Giorgos Giannatos, Michael Stubbe, Stéphane Aulagnier. 2007. *Capreolus capreolus*. *The IUCN Red List of Threatened Species* 2007: Accessed on 11 December 2024.
- Juste, J. & Paunović, M. 2016. *Nyctalus leisleri*. *The IUCN Red List of Threatened Species* 2016: https://dx.doi.org/10.2305/IUCN.UK.2016-2.RLTS.T14919A22016159.en. Accessed on 11 December 2024.
- K. Mullarney, Svensson, L., Zetterstrom, D. & Grant, P.J. 2007. Τα πουλιά της Ελλάδας, της Κύπρου και της Ευρώπης. Albert Bonniers Forlag, Ελληνική Ορνιθολογική Εταιρεία.
- Kaisanlahti-Jokim ä ki, M.-L., Jokim ä ki, J., Huhta, E., Ukkola, M., Helle, P., Ollila, T. (2008) Territory occupancy and breeding successof the Golden Eagle (*Aquila chrysaetos*) around tourist destinations in northern Finland. Ornis Fennica 85: 2-12.
- Karagiannakidou, V., M. Konstantinou and K. Papademetriou. 1995. Floristic and phytogeographical research on the upper montane and the subalpine grassland flora of East Macedonia, Greece. *Feddes Repertorium*, 106 (3-4): 193-213.
- Karagiannakidou, V., M. Konstantinou and K. Papademetriou. 1999. Analysis of the upper montane and the subalpine grassland flora of East Macedonia, Greece. *Candollea*, 54: 453-472.
- Karakiev T. & Tzonev R. 2011. *Saxifrago ferdinandi-coburgi-Seslerietum actarovii* – a new association from the subalpine belt of the Slavianka (Orvilos) Mts. (Bulgaria). *Hacquetia* 10/1 (49–71).
- Karamanlidis AA, de Gabriel Hernando M, Krambokoukis L, Gimenez O. 2015. Evidence of a large carnivore population recovery: counting bears in Greece. Journal for Nature Conservation 27:10-17.
- Karamanlidis, A., Mertzanis, Y. & Skouras, Z. 2004b. Strange marking behaviour of brown bears in Greece. Poster presented at the 15th International Conference on Bear Research & Management, International Bear Association (IBA), San Diego, California, 8-13 February 2004.
- Karamanlidis, A., Mertzanis, Y., Skouras, Z. 2004a. Evaluating a field method for assessing brown bear distribution and population status in Greece. Poster presented at the 15th International Conference on Bear Research & Management, International Bear Association (IBA), San Diego, California, 8-13 February 2004.
- Karapandža, B., Mulaomerović, J., Paunović, M., Pašić, J., Presetnik, P., Zagmajster, M. 2014. The overview of bat fauna (Chiroptera) of Bosnia and Herzegovina with first record of *Pipistrellus nathusii*. *13th European Bat Research Symposium* Book of Abstracts: 90.
- Karlsson, J. 1983. Faglar och vindkraft. Lund, Sweden: Ekologihuset. Ketzenberg, C., Exo, K.-M., Reichenbach, M. & Castor, M. 2002. Einfluss von Windkraftanlagen auf brutende Wiesenvogel. Natur Landsch. 77: 144–153.

- Käsermann, C. and Moser, D.M. 1999. *Datasheets for conservation. Flowering plants and ferns (original title in French: Fiches Pratiques pour la Conservation. Plantes à Fleurs et Fougères.)*. Ed. OFEFP, Berne.
- Kati, V., Kassara, Ch., Psaralexi, M., Tzortzakaki, O., Petridou, M., Galani, A., Hoffmann, M.T. 2020b. Conservation policy under a roadless perspective: minimizing fragmentation in Greece. Biological Conservation. (V) 252. https://doi.org/10.1016/j.biocon.2020.108828.
- Kati, V., Kassara, Ch., Vassilakis, D. & Papaioannou, H. 2020a. Balkan Chamois (*Rupicapra rupicapra balcanica*) Avoids Roads, Settlements, and Hunting Grounds: An Ecological Overview from Timfi Mountain, Greece. Diversity, 12 (4), pp 124. https://doi.org/10.3390/d12040124
- Katzner, T. E., Brandes, D., Miller, T., Lanzone, M., Maisonneuve, C., Tremblay, J. A., Mulvihill, R., Merovich Jr, G. T. 2012. Topography drives migratory flight altitude of golden eagles: implications for on-shore wind energy development. *Journal of Applied Ecology* 49: 1178–1186.
- Katzner, T. E., Smith, B. W., Miller, T. A., Brandes, D., Cooper, J., Lanzone, M., Brauning, D., Farmer, C., Harding, S., Kramar, D. E., Koppie, C., Maisonneuve, C., Martell, M., Mojica, E. K., Todd, C., Tremblay, J. A., Wheeler, M., Brinker, D. F., Chubbs, T. E., Gubler, R., O'Malley, K., Mehus, S., Porter, B., Brooks, R. P., Watts, B. D., Bildstein, K. L. 2012. Status, biology, and conservation priorities for North America's eastern Golden Eagle (*Aquila chrysaetos*) population. *The Auk* 129: 168-176.
- Kazantzidis S., Goutner V. (2008) Abundance and habitat use by herons (Ardeidae) in the Axios Delta, northern Greece JOURNAL OF BIOLOGICAL RESEARCH-THESSALONIKI 10: 129-138
- Kazantzidis, S. 2000. Breeding ecology of the little egret (*Egretta garzetta garzetta*) at the Axios Delta, Macedonia, Greece. Bios, 5, 83 – 85.
- Kazantzidis, S.; Nazirides, T. 1999. *National Action Plan for the Pygmy Cormorant (Phalacrocorax pygmaeus), Pallas 1993*. WWF/HOS/Society for the Protection of Prespes, Athens.
- Kear, J. (2003) Cavity-nesting ducks: Why woodpeckers matter. British Birds 96: 217-233
- Kear, J. 2005. *Ducks, geese and swans volume 2: species accounts (*Cairina *to* Mergus*)*. Oxford University Press, Oxford, U.K.
- Keller, V., Herrando, S., Voříšek, P., Franch, M., Kipson, M., Milanesi, P., Martí, D., Anton, M., Klvaňová, A., Kalyakin, M.V., Bauer, H.-G. and Foppen, R.P.B. 2020. *European Breeding Bird Atlas 2: Distribution, Abundance and Change*. European Bird Census Council & Lynx Edicions, Barcelona.
- Kelm, D.H., J. Lenski, V. Kelm, U. Toelch & F. Dziock (2014): Seasonal Bat Activity in Relation to Distance to Hedgerows in an Agricultural Landscape in Central Europe and Implications for Wind Energy Development. Acta Chiropterologica 16 (1): 65-73. doi:10.3161/150811014X683273

- Kemenesi G., K. Kurucz, B. Dallos, B. Zana, F. Földes, S. Boldogh, T. Görföl, M. W. Carroll, F. Jakab. 2018. Re-emergence of Lloviu virus in *Miniopterus schreibersii* bats, Hungary, 2016. *Emerging Microbes & Infections* 7(66).
- Kemp, A. C. and J. S. Marks. 2020. Lanner Falcon (*Falco biarmicus*), version 1.0. In: J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana (eds), *Birds of the World*, Cornell Lab of Ornithology, Ithaca, NY, USA.
- Kemp, A.C. 1994. Lanner Falcon (*Falco biarmicus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Kent, M., & Coker, P. 1992. Vegetation Description and Analysis A Practical Approach (pp. 167-169). New York John Wiley and Sons.
- Kerlinger, P. 2001: Avian issues and potential impacts associated with wind power development of nearshore waters of Long Island, New York. Unpublished report for B. Bailey, AWS Scientific. 20 p. www.winergyllc.com/reports/report_16.pdf
- Kirkpartrick, l., D. Dent, S. Bailey & K.J. Park (2014): Bats in "ecological desert": Activity and abundance of bats in commercial coniferous plantations. Book of abstracts, XIIIth European Bat Research Symposium, 1–5 September 2014, Šibenik, Croatia: 92.
- Kitano, M., Shiraki, S. 2013. Estimation of bird fatalities at wind farms with complex topography and vegetation in Hokkaido, Japan. https://doi.org/10.1002/wsb.255
- Klotz, S., Kühn, I. and Durka, W. 2002. BIOLFLOR - Eine Datenbank zu biologisch-ökologischen Merkmalen der Gefäßpflanzen in Deutschland. *Schriftenreihe für Vegetationskunde* 38.
- Koni, D., Iyenguet, F., & Sanz, C. (2019). Impacts of Selective Logging and Associated Anthropogenic
- König, C. and Weick, F. 2008. Owls of the World. Christopher Helm, London.
- Konter, A. 2001. *Grebes of our world*. Lynx Edicions, Barcelona.
- Košir P., Andraž C. and Di Pietro R. 2008. Classification and phytogeographical differentiation of broad-leaved ravine forests in southeastern Europe. *J. Veg. Sci.* 19:331–342.
- Kostadinova, I.; Gramatikov, M. 2007. *Important Bird Areas in Bulgaria and Natura 2000*. Bulgarian Society for the Protection of Birds, Sofia.
- Kramer, T. 1995. Tortoises and Terrapins on Mallorca. In: Ballasina, Donato (ed.), *Red Data Book on Mediterranean Chelonians*, pp. 35-40. Edagricole, Bologna, Italy.
- Kranz, A., Abramov, A.V., Herrero, J. & Maran, T. 2016. *Meles meles*. *The IUCN Red List of Threatened Species* 2016: e.T29673A45203002. https://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T29673A45203002.en. Accessed on 11 December 2024.
- Kret, E., Carcamo, B., Zografou, C., Vasilakis, D. 2011. Assessing the impact of nine established wind farms on birds of prey in Thrace, Greece. In: May, R. & K. Bevanger (eds.). Proceedings, Conference on wind energy and wildlife impacts, 2-5 May 2011, Trondheim, Norway.

- Kruckenberg, H. & Jaene, J. 1999. Zum Einfluss eines Wind-parks auf die Verteilung weidender Bla.ganse im Rheiderland (Landkreis Leer, Niedersachsen). Natur Landsch. 74: 420–427.
- Kunz, T.K., Arnett, E.B., Cooper, B.M., Erickson, W.P., Larkin, R.P., Mabee, T., Morrison, M.L., Strickland, M.D. & Szewczak, J.M. 2007. Assessing impacts of wind-energy developments on nocturnally active birds and bats: a guidance document. – Journal of Wildlife Management 71: 2449-2486; doi: 10.2193/2007-270.
- Kurtev, M., Angelov, I., Yankov, P. (2008): Action plan for the Egyptian vulture in Bulgaria. BSPB, Sofia. [in Bulgarian].
- Kusch, J. & F. Schotte (2007): Effects of fine-scale foraging habitat selection on bat community structure and diversity in a temperate low mountain range forest. Folia Zoologica 56 (3):
- Kusch, J., C. Weber, S. Idelberger & T. Koob (2004): For-aging habitat preferences of bats in relation to food supply and spatial vegetation structures in a western European low mountain range forest. Folia Zoologica 53 (2): 113-128.
- Kushlan, J.A. and Hancock, J.A. 2005. *The herons*. Oxford University Press, Oxford, U.K.
- Kuzmin, S.L. 2002. *The Turtles of Russia and other Ex-Soviet Republics*. Edition Chimaira, Frankfurt am Main, Germany
- Kwon, Y.K., Wee, S.H. and Kim, J.H. 2004. Pesticide Poisoning Events in Wild Birds in Korea from 1998 to 2002. *Journal of Wildlife Diseases* 40(4): 737-740.
- Kyheröinen, E.M., S. Aulagnier, J. Dekker, M.-J. Dubourg-Savage, B. Ferrer, S. Gazaryan, P. Georgiakakis, D. Hamidovic, C. Harbusch, K. Haysom, H. Jahelková, T. Kervyn, M. Koch, M. Lundy, F. Marnell, A. Mitchell-Jones, J. Pir, D. Russo, H. Schofield, P.O. Syvertsen, A. Tsoar. 2019. *Guidance on the conservation and management of critical feeding areas and commuting routes for bats*. UNEP/EUROBATS Secretariat, Bonn.
- Lambert, M.R.K. 1995. Tortoise Situation in northern Africa. In: Ballasina, D. (ed.), *Red Data Book on Mediterranean Chelonians*, pp. 1-19. Edagricole - Edizioni Agricole, Bologna.
- Langrand, O. 1990. *Guide to the birds of Madagascar*. Yale University Press, New Haven, USA.
- Langston, R.H.W. and Pullan, J.D. 2003. Windfarms and Birds: an Analysis of the Effects of Wind Farms on Birds, and Guidance on Environmental Assessment Criteria and Site Selection Issues. [online] Report T PVS/Int (2003) 12, by BirdLife International to the Council of Europe, Bern Convention on the Conservation of European Wildlife and Natural Habitats. RSPB/BirdLife in the UK.
- Lapini, L. 1999. *Erinaceus concolor*. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.
- Larivière, S. and Pasitschniak-Arts, M. 1996. *Vulpes vulpes*. Mammalian Species 537: 1-11.
- Larsen, J.K. & Madsen, J. 2000. Effects of wind turbines and other physical elements on field utilization by pink-footed geese (*Anser brachyrhynchus*): A landscape perspective. Landscape Ecol. 15: 755–764.

- Larsen, JK & Clausen, P 2002, 'Potential Wind Park Impacts on Whooper Swans in Winter: The Risk of Collision' Waterbirds, vol. 25, no. Special Publication 1, pp. 327-330.
- Laurance WF, Arrea IB. Roads to riches or ruin? Science. 2017;358(6362):442-4. doi: http://doi.org/10.1126/science.aao0312.
- Laurance WF. The global road-building explosion is shattering nature. The conservation. 2017.
- Lazo, A., Brana, S. & G. Janss. 2012. Predictive value of risk assessment studies: a problem of scale? In: Edited. I Congreso Iberico sobre Energia eolica y Conservacion de la fauna. Congress Proceedings. Jerez 12-14 January 2012.
- Leckie, F.M., Arroyo, B.E., Thirgood, S.J. & S.M. Redpath (2008) Parental differences in brood provisioning by Hen Harriers *Circus cyaneus*. Bird Study 55: 209-215.
- Leddy, K.L., Higgins, K.F. & Naugle, D.E. 1999. Effects of Wind Turbines on Upland Nesting Birds in Conservation Reserve Program Grasslands. Wilson Bull. 111: 100–104.
- Lefranc, N.; Worfolk, T. 1997. *Shrikes: a guide to the shrikes of the world*. Pica Press, Mountfield, U.K.
- Lehnert, l.S., S. Kramer - Schadt, S. Schönborn, O. Lindecke, I. Niermann & C.C. Voigt (2014): Wind Farm Facilities in Germany Kill Noctule Bats from Near and Far. PLoS ONE 9 (8): e103106. doi:10.1371/journal.pone.0103106
- Lekuona, J. & C. Ursua. 2007. Avian mortality in wind power plants of Navarra (northern Spain). In: De Lucas, M., G.F.E. Janss and M. Ferrer (editors). Birds and windfarms: Risk assessment and mitigation. Quercus, Madrid. 275 pp.
- Lemus, J.A., Blanco, G., Grande, J., Arroyo, B., García-Montijano, M. and Martínez, F. 2008. Antibiotics threaten wildlife: circulating quinolone residues and disease in avian scavengers. PLoS ONE: 1-6.
- Lian, X. & Li, X. (2012). Avoidance distances of four ungulates from roads in Kekexili and related protection suggestions. Chinese Journal of Ecology 31: 81-86.
- Limpens, H.J.G.A., & K. Kapteyn (1991): Bats, their behaviour and linear landscape elements. Myotis 29: 39-48.
- Limpens, H.J.G.A., W. Helmer, A. Van Winden & K. Mostert (1989): Bats (Chiroptera) and linear landscape elements: a review of our present knowledge of the importance of linear landscape elements to bats. Lutra 32 (1): 1-20.
- Linnell, J., Salvatori, V. and Boitani, L. 2008. Guidelines for population level management plans for large carnivores in Europe. A Large Carnivore Initiative for Europe report prepared for the European Commission, Rome.
- Lõhmus A, Väli Ü. 2001. Interbreeding of the Greater *Aquila clanga and Lesser Spotted Eagle A. pomarina. Acta Ornithoecologica 4: 377–384.*
- Lohmus, A. (2005) Are timber harvesting and conservation of nest sites of forest-dwelling raptors always mutually exclusive? Animal Conservation 8: 443-450.
- Lohmus, A.; Sellis, U. 2003. Nest trees - a limiting factor for the Black Stork *Ciconia nigra* populations in Estonia. *Aves Liege* 40(1-4): 84-91.

- Long, C. V., J.A. Flint & P.A. Lepper & S.A. Dible (2009): Wind turbines and bat mortality: Interactions of bat echolocation pulses with moving turbine rotor blades. Proceedings of the Institute of Acoustics 31: 185-192.
- Long, C. V., J.A. Flint & P.A. Lepper (2010a): Wind turbines and bat mortality: Doppler shift profiles and ultrasonic bat-like pulse reflection from moving turbine blades. J. Acoust. Soc. Am. 128 (4): 2238-2245.
- Long, C. V., J.A. Flint & P.A. Lepper (2011): Insect attraction to wind turbines: does colour play a role? European Journal of Wildlife Research 57 (2), 323-331.
- Lopez-López, P., García-Ripollés, C. & V. Urios (2007) Population size, breeding performance and territory quality of Bonelli′s Eagle *Hieraaetus fasciatus* in eastern Spain. Bird Study 54: 335-342.
- Łopucki, R., & Mróz, I. (2016). An assessment of non-volant terrestrial vertebrates response to wind farms—a study of small mammals. Environmental Monitoring and Assessment, 188, 122.
- Łopucki, Rafał & Klich, Daniel & Gielarek, Sylwia. (2017) Do terrestrial animals avoid areas close to turbines in functioning wind farms in agricultural landscapes?. Environmental Monitoring and Assessment. 189. 343. 10.1007/s10661-017-6018-z.
- Łopuckia R, Klichb D, Ścibiorc A, Gołębiowskac D. (2018) Living in habitats affected by wind turbines may result in an increase in corticosterone levels in ground dwelling animals. Ecological Indicators, 84,165–171.
- Lovich, Jeff & Agha, Mickey & Ennen, Joshua & Arundel, Terence & Austin, Meaghan. (2018). Agassiz's desert tortoise (Gopherus agassizii) activity areas are little changed after wind turbine induced fires in California. International Journal of Wildland Fire. 10.1071/WF18147.
- Lozano, J., Moleón, M. and Virgós, E. 2006. Biogeographical patterns in the diet of the wildcat, *Felis silvestris* Schreber, in Eurasia: factors affecting the trophic diversity. *Journal of Biogeography* 33(6): 1076-1085.
- Luiselli, L. & Vamberger, M. 2024. *Emys orbicularis (Europe assessment)*. *The IUCN Red List of Threatened Species* 2024: e.T7717A207667247. Accessed on 11 December 2024.
- Luiselli, L. 2024. *Testudo graeca (Europe assessment)*. *The IUCN Red List of Threatened Species* 2024: e.T21646A207669215. Accessed on 11 December 2024.
- MacDonald, D. & P. Barret. 1993. Mammals of Britain and Europe. Harper Collins Publishers. New York, USA.
- Maciorowski G., Mizera T. 2010. Conservations and studies on Greater Spotted Eagle in Poland - LIFE project. Studia i materiały CEPL w Rogowie. 25: 181-190 (in Polish with English summary).
- Madge, S.; Burn, H. 1988. *Wildfowl*. Christopher Helm, London.
- Madge, S.; McGowan, P. 2002. *Pheasants, partridges and grouse: including buttonquails, sandgrouse and allies*. Christopher Helm, London.
- Madsen, J., Boertmann, D. Animal behavioral adaptation to changing landscapes: spring-staging geese habituate to wind farms. *Landscape Ecol* **23,** 1007–1011 (2008). https://doi.org/10.1007/s10980-008-9269-9

- Malik, J.; Prange, H. 1995. Management of the nature reserve "Kremmener Luch" and its effects on crane resting. In: Prange, H. (ed.), *Crane research and protection in Europe*, pp. 24-35. Naturschutzbund Deutschland and Umweltstiftung WWF Deutschland, Frankfurt.
- Mamuris, Z., Sfougaris, A.I., et al. 2001. *Genetic structure of Greek brown hare (Lepus europaeus) populations as revealed by mtDBNA RFLP-PCR analysis: Implications for conserving genetic diversity. Biological Conservation 101(2): 187-196.*
- Manios, N., Papazahariadou, M., Frydas, S., Papageorgiou, N., Tsachalidis, E. and Gergopoulou, J. 2002. Tetrathyridium as a mortality factor of rock partridge (*Alectoris graeca graeca*) in Central Greece. *European Journal of Wildlife Research* 48: 378-382.
- Marchant, S.; Higgins, P. J. 1990. *Handbook of Australian, New Zealand and Antarctic birds,* 1*: ratites to ducks*. Oxford University Press, Melbourne.
- Marion, L.; Ulenaers, P.; van Vessem, J. 2000. Herons in Europe. In: Kushlan, J. A.; Hafner, H. (ed.), *Heron conservation*, pp. 1-31. Academic Press, San Diego.
- Markovets, M.J., Zelenova, N.P., Shapoval, A.P. 2004. *Beringung von Fledermausen in der Biologischen Station Rybachy, 1957-2001. Nyctalus (N.F.) 9:259-268.*
- Marques J., L. Rodrigues, M.J. Silva, J. Santos, R. Bispo & J. Bernardino. (2018). Estimating Bird and Bat Fatality at Wind Farms: From Formula-Based Methods to Models to Assess Impact Significance. In Mascarenhas, M., Marques, A.T., Ramalho, R., Santos, D., Bernardino, J. & Fonseca C. (editors). Biodiversity and Wind Farms in Portugal: Current knowledge and insights for an integrated impact assessment process. Springer. pp.151-204.
- Marques, A.T., Batalha, H., Rodrigues, S., Costa, H., Pereira, M.J.R., Fonseca, C., Mascarenhas, M., Bernardino, J., 2014. Understanding bird collisions at wind farms. An updated review on the causes and possible mitigation strategies. Biol. Conserv. 179, 40–52.
- Martí, R. and del Moral, J.C. 2004. Atlas de las aves reproductoras de España. Parques Nacionales.
- Martin, G., Portugal, S., Murn, C. 2012. Visual fields, foraging and collision vulnerability in Gyps vultures. Ibis 154, 626–631
- Martinez, J.E., Pagan, I. & J.F. Calvo (2006) Factors influencing territorial occupancy and reproductive output in the Booted Eagle *Hieraaetus pennatus*. Ibis 148: 807-819.
- Martinez-Lopez, E., Maria-Mofjica, P., Martinez, J.E., Calvo, J.F., Wright, J., Shore, R.F., Romero, D. & A.J. Garcia-Fernandez (2007) Organochlorine residues in booted eagle (*Hieraaetus pennatus*) and goshawk (*Accipiter gentilis*) eggs from southeastern Spain. Environmental Toxicology and Chemistry 26: 2373-2378.
- Martinez-Lopez, E., Romero, D., Maria-Mojica, P., Martínez, J.E., Calvo, J.F. & A.J. Garcia-Fernandez (2009) Changes in blood pesticide levels in booted eagle (*Hieraaetus pennatus*) associated with agricultural land practices. Ecotoxicology and Environmental Safety 72: 45-50.
- Martinez-Vilalta, A., Motis, A., and Kirwan, G. M. 2020. Japanese Night-heron (*Gorsachius goisagi*), version 1.0. In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A., and de Juana, E. (eds), *Birds of the World*, Cornell Lab of Ornithology, Ithaca, NY, USA.

- Mascort, R. 1998. Distribution and status of the Europena pond turtle, *Emys orbicularis*, in Catalonia. *Mertensiella* 10: 177-186.
- Mateo, R., Belliure, J., Dolz, J.C., Aguilar-Serrano, J.M. and Guitart, R. 1998. High prevalences of lead poisoning in wintering waterfowl in Spain. *Archives of Environmental Contamination and Toxicology* 35: 342-347.
- Mcconnell, S., O′Connell, T.J. & D.M. Leslie JR (2008) Land cover associations of nesting territories of three sympatric buteos in shortgrass prairie. Wilson Journal of Ornithology 120: 708-716.
- McGowan, P.J.K. and Kirwan, G.M. 2014. Rock Partridge (*Alectoris graeca*). In: J. del Hoyo, A. Elliott, J. Sargatal, D.A. Christie and E. de Juana (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Médail F and Diadema K 2009. Glacial refugia influence plant diversity patterns in the Mediterranean Basin. *J. Biogeogr*. 36:1333–1345.
- Meine, C. D. and Archibald, G. W. 1996. *The cranes - status survey and conservation action plan*. International Union for Conservation of Nature and Natural Resources, Gland, Switzerland, and Cambridge, U.K.
- Melville, D.S. and Shortridge, K.F. 2006. Migratory waterbirds and avian influenza in the East Asian-Australasian Flyway with particular reference to the 2003-2004 H5N1 outbreak. In: G. Boere, C. Galbraith and D. Stroud (eds), *Waterbirds around the world*, pp. 432-438. The Stationery Office, Edinburgh, U.K.
- Mereďa, P. and Hodálová, I. 2011. Cievnaté rastliny [Vascular plants]. *Atlas chranenych druhov Slovenska v ramci uzemi NATURA 2000*, Bratislava.
- Mertzanis G., Psaroudas Sp., Karamanlidis A.A. 2020. Action Plan for the brown bear (Ursus arctos) in Greece. Deliverable Action A.1. LIFE-IP 4NATURA: (LIFE16 IPE/GR/000002). 136 pp. & 7 Annexes.
- Mertzanis Y., Giannakopoulos Al. , Pilidis Ch. (2009). Brown Bear status, Pp: 387-389, in: Greek Red Data Book. Greek Zoological society, (Legakis and Maragou, eds), 525 pp.
- Mertzanis, G. & Vogiatzis, M. 1997. Brown bear (Ursus arctos L.) radiotelemetry in Greece: first results - LIFE "ARCTOS" project. Poster presentation 11th International Conference on Bear Research and Management, Gratz, Αυστρία.
- Mertzanis, G. 1990. The brown bear in Greece. Aquilo Ser.Zool. 27: 67-70.
- Mertzanis, G. 1991. Donnees nouvelles sur l'etat des populations et le regime alimentaire de l'ours brun (Ursus arctos) en Greece. Biologia Gallo-hellenica 18: 81-98.
- Mertzanis, G. 1994. Brown bear in Greece: distribution, present status-ecology of a northern Pindus subpopulation. Int. Conf. Bear Res. and Manage. 9(1): 187-197.
- Mertzanis, G., Grivas, C., Ioannidis, Y., Bousbouras, D., Giannatos, G., Papaioannou, H., Poirazidis, C. & Gaetlich, M. 1994. The status of brown bear (Ursus arctos L.), in Greece. Biologia Gallo-hellenica 22: 225-232.

- Mertzanis, Y., Ioannis, I., Mavridis, A., Nikolaou, O., Riegler, S., Riegler, A. & Tragos, A. 2005. Movements, activity patterns and home range of the brown bear (Ursus arctos L.) in Rodopi mountain range, Greece. Belg. J. Zool. 135(2):217-221.
- Meschede, A. & K.G. Heller (2000): Ökologie und Schutz von Fledermäusen in Wäldern. Schriftenreihe für Landschaftspflege und Naturschutz 66, 374 pp.
- Meunier, F.D., Verheyden, C. & P. Jouventin (2000) Use of roadsides by diurnal raptors in agricultural landscapes. Biological Conservation 92: 291-298.
- Meyburg, B.U., Boesman, P. and Marks, J.S. 2014. Lesser Spotted Eagle (*Clanga pomarina*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Mikkola, H. (1983) The Owls of Europe. T & AD Poyser, London.
- Mitchell-Jones, A.J., Amori, G., Bogdanowicz, W., Kryštufek, B., Rejinders, P.J.H., Spitzenberger, F., Stubbe, M., Thissen, J.B.M., Vohralík, J. and Zima, J. (eds). 1999. *Atlas of European mammals*. Academic Press, London, U.K.
- Mix, H. M.; Bräunlich, A. 2000. Dalmatian Pelican. In: Reading, R.P.; Miller, B. (ed.), *Endangered animals: a reference guide to conflicting issues*, pp. 78-83. Greenwood Press, London.
- Morgan, D., Strindberg, S., Winston, W., Stephens, C., Traub, C., Ayina, CE., Ebica, STN., Mayoukou, W., Disturbance on Intact Forest Landscapes and Apes of Northern Congo Frontiers in Forests and Global Change. https://doi.org/10.3389/ffgc.2019.00028
- Moriguchi, S., Mukai, H., Komachi, R. & Sekijima, T. 2019. Wind farm effects on migratory flight of swans and foraging distribution at their stopover site. In R. Bispo, J. Bernardino, H. Coelho & J.L. Costa (eds.), Wind Energy and Wildlife Impacts, pp. 125–133. Springer, Cham, Switzerland.
- Morimadno, F., Pezzo, F., Draghi, A. 1997. Food habits of the Lanner Falcon (*Falco biarmicus feldeggii*) in Central Italy. The Raptor Research Foundation, Inc. J. Raptor Res. 31 (1): 40 – 43.
- Morrison, C. A., Baillie, S. R., Clark, J. A., Johnston, A., Leech, D. I., & Robinson, R. A. 2015. Flexibility in the timing of post-breeding moult in passerines in the UK. Ibis, 157, 340 – 350. https://doi.org/10.1111/ibi.12234
- Moskat, C., Fuisz, T.I. (2002) Habitat segregation among the woodchat shrike *Lanius senator*, the red-backed shrike, *Lanius collurio*, and the masked shrike, *Lanius nubicus*, in NE Greece. Folia Zool. 51 (2), 103-111.
- Movalli, P.A. (2000) Heavy metal and other residues in feathers of laggar falcon *Falco biarmicus* jugger from six districts of Pakistan Env. Pollution, 109: 267-275.
- Moyes, K., Nussey, D. H., Clements, M. N., Guinness, F. E., Morris, A., Morris, S., Clutton-Brock, T. H. 2011. Advancing breeding phenology in response to environmental change in a wild red deer population. Global Change Biology, 17, 2455 – 2469. https://doi.org/10.1111/j.1365-2486.2010.02382.x

- Müller, J., R. Brandl, J. Buchner, H. Pretzsch, S. Seifert, C. Strätz, M. Veith & B. Fenton (2013): From ground to above canopy – bat activity in mature forests is driven by vegetation density and height. Forest Ecology and Management 306: 179-184.
- Muller, M., Pasinelli G., Schiegg K., Spaar R., Jenni L., (2005) Ecological and social effects on reproduction and local recruitment in the red-backed shrike. Oecologia 143, 37-50.
- Mundy PJ, Butchart D, Ledger J, Piper S. 1992. The Vultures of Africa. Academic Press, London.
- N2K GR1260005 dataforms 2024 (30/8/24, 12:09 μ.μ.)
- Natural Environment and Climate Change Agency (NECCA) (2024). The Greek Red List of Threatened Species. Athens, Greece. Available at redlist.necca.gov.gr, accessed 17/08/2024
- Nawaz, M.; Nawaz, Y.; Malik, M. F.; Shahabuddin. 2006. Hunting pressure and impact of Afghan refugees on migratory cranes in Pakistan. *Zoos' Print Journal* 21(7): 2333-2334.
- Naziridis, T, Jerrentrup, H. & Crivelli, A.J. 1992. Wintering herons in Greece (1964-1991). Στο: Finlayson, C.M., Hollis, G.E. & Davies T.J. (eds) Managing Mediterranean Wetlands and their Birds. Proc. Symp. Grado, Italy, 1991. IWRB Spec. Publ. No 20, pp. 73-75.
- Nelson, J. B. 2005. *Pelicans, cormorants and their relatives.* Pelecanidae, Sulidae, Phalacrocoracidae, Anhingidae, Fregatidae, Phaethontidae. Oxford University Press, Oxford, U.K.
- Newbery P., Schäffer & N. Smith K. European Union Action Plan for Bittern (*Botaurus stellaris*) European Union Action Plans for 8 Priority Birds Species – Bittern
- Newbery, P.; Schäffer, N.; Smith, K. 1996. *European Union Bittern* Botarus stellaris *Action Plan*.
- Newton, I. (1979) Population Ecology of Raptors. Buteo Books, Vermillion.
- Nilsson, S. G., O. Olsson, S. Svensson & U. Wiktander (1992) Population trends and fluctuations in Swedish woodpeckers. Ornis Svecica 2: 13-21
- Nittinger, F.; Gamauf, A.; Pinsker, W.; Wink, M.; Haring, E. 2007. Phylogeography and population structure of the Saker Falcon (*Falco cherrug*) and the influence of hybridization: mitochondrial and microsatellite data. *Molecular Ecology* 16: 1497-1517.
- Nowak, R.M. 1999. *Walker's Mammals of the World*. The Johns Hopkins University Press, Baltimore, USA and London, UK.
- Nowell, K. and Jackson, P. 1996. *Wild Cats. Status Survey and Conservation Action Plan*. IUCN/SSC Cat Specialist Group, Gland, Switzerland and Cambridge, UK.
- Oberdorfer, E. 1990. *Pflanzensoziologische Exkursionsflora*. Ulmer, Stuttgart.
- Ogrodowczyk, A., Krása, A., Schmidt, B., Naumov, B., Anthony, B.P., Cogălniceanu, D., Tarkhnishvili, D., Najafi-Majd, E., Sacdanaku, E., Ficetola, F., Andreone, F., Popgeorgiev, G., Kiss, I., Vörös, J., Poboljšaj, K, Coppari, L., Ogielska, M., Denoel, M., Manenti, R., Kovács, T., Kaya, U., Üzüm, N., Litvinchuk, S., Romano, A., Halpern, B. & Kornilev, Y. 2024. *Bombina variegata*. *The IUCN Red List of Threatened Species* 2024: e.T77970289A228179967. Accessed on 11 December 2024.

- Ohlendorf, B. 1997. *Arbeitskreis Fledermäuse Sachsen-Anhalts e. v.: Tagungsband „Zur Situation der Hufeisennasen in Europa".Nebra 1995, IFA Verlag, Berlin 182 pp.*.
- Ohlendorf, B., Hecht, B., Stassburg, D. and Aggirre-Mendi, P. T. 2000. Fernfund eines Kleinabendseglers (*Nyctalus leisleri*) in Spanien. *Nyctalus (N.F.)* 7: 239-242.
- Oliver, W.L.R. 1993. *Pigs, Peccaries, and Hippos: Status Survey and Conservation Action Plan. IUCN, Gland, Switzerland.*
- Orloff, S. & Flannery, A. 1992. Wind turbine effects on avian activity, habitat use and mortality in Altamont Pass and Solano County Wind Resource Areas, 1989–91. California. Energy Commission.
- Orta, J. and Boesman, P. 2013. Booted Eagle (*Hieraaetus pennatus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Orta, J. and Kirwan, G.M. 2020. Lesser Kestrel (*Falco naumanni*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Orta, J. and Marks, J.S. 2014. Levant Sparrowhawk (*Accipiter brevipes*). In: J. del Hoyo, A. Elliott, J. Sargatal, D.A. Christie, and E. de Juana (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Orta, J., E. de Juana, P. F. D. Boesman, J. S. Marks, and E. F. J. Garcia. 2020. Montagu's Harrier (*Circus pygargus*), version 1.0. In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E (eds), *Handbook of the Birds of the World Alive*, Cornell Lab of Ornithology,, Ithaca, NY, USA.
- Orta, J., Kirwan, G.M., Boesman, P., Marks, J.S., Garcia, E.F.J. and Sharpe, C.J. 2014. Hen Harrier (*Circus cyaneus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Orta, J., Kirwan, G.M., Christie, D.A., Boesman, P. and Marks, J.S. 2016. Bonelli's Eagle (*Aquila fasciata*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Orta, J., Marks, J.S., and Kirwan, G.M. 2020. Oriental Honey-buzzard (*Pernis ptilorhynchus*), version 1.0.In: J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana (eds), Cornell Lab of Ornithology, Ithaca, NY, USA.
- Orta, J., Marks, J.S., Garcia, E.F.J. & Kirwan, G.M. 2020. Black Kite (*Milvus migrans*). In: J. del Hoyo, A. Elliott, J. Sargatal, D.A. Christie, and E. de Juana (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Orta, J., P. F. D. Boesman, J. S. Marks, E.F.J. Garcia, and G. M. Kirwan. 2020. Western Marsh-harrier (*Circus aeruginosus*), version 1.0. In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Birds of the World*, Cornell Lab of Ornithology, Ithaca, NY, USA.
- Ozgul, A., Childs, D. Z., Oli, M. K., Armitage, K. B., Blumstein, D. T., Olson, L. E., Coulson, T. 2010. Coupled dynamics of body mass and population growth in response to environmental change. Nature, 466, 482 – 485. https://doi.org/10.1038/nature09210

- Pacifici, M., Santini, L., Di Marco, M., Baisero, D., Francucci, L., Grottolo Marasini, G., Visconti, P. and Rondinini, C. 2013. Generation length for mammals. *Nature Conservation* 5: 87–94.
- Paksuz S., Özkan, B. 2012. The protection of the bat community in the Dupnisa Cave System, Turkey, following opening for tourism. *Oryx* 46(1): 130-136.
- Palatitz, P., P. Fehérvári, S. Solt and B. Barov. 2009. *European Species Action Plan for the Red-footed Falcon* Falco vespertinus. BirdLife International for the European Commission.
- Palomino, D. & L.M. Carrascal (2007) Habitat associations of a raptor community in a mosaic landscape of Central Spain under urban development. Landscape and Urban Planning 83: 268-274.
- Palomo, L.J., Gisbert, J., and Blanco J.C. 2007. Atlas y Libro rojo de los mamíferos terrestres de España. Dirección General para la Biodiversidad, Sociedad Española para la Conservación y Estudio de los Mamíferos - Asociación Española para la Conservación y el Estudio de los Murciélagos, Madrid, Spain.
- Papageorgiou, N.K., Vlachos, C.G. & Bakaloudis, D. 1993. Diet and nest site characteristics of Eagle Owl (*Bubo bubo*) breeding in two different habitats in north-eastern Greece. Avocetta 17: 49-54.
- Papaioannou, H. (1991). The chamois (*Rupicapra rupicapra*) in the Epirus Mountains. Biologia GalloHellenica 17: 53-66.
- Papaioannou, H. (2003). Habitat Use, Population Status and Conservation of the Balkan Chamois (*Rupicapra rupicapra*) on Mt Timfi and in the Vikos-Aoos National Park. M.Sc. Thesis, Manchester Metropolitan University, UK.
- Papaioannou, H. (2015). Current status and conservation management of Balkan chamois (R.r. balcanica) in Greece. In: Antonucci A, Di Domenico G (eds) Chamois international congress. Lama dei Peligni, Majella National Park, Italy, pp 111–122.
- Papaioannou, H., Sgardelis, S., Chondropoulos, B., Vassilakis, D., Kati, V. & Dimopoulos, P. (2013). Demographic characteristics, seasonal range and habitat topography of the Balkan chamois (*Rupicapra rupicapra balcanica*) in its southernmost limit of distribution in Europe (Mt. Giona, Greece). Journal of Natural History, DOI:10.1080/00222933.2013.869365.
- Papp, T.; Fântâna, C. 2008. *Ariile de Importanta Avifaunistica din România (Important Bird Areas in Romania)*. Societatea Ornitologica Româna, Bucharest.
- Parker, M. & Mac Nally R. 2002. Habitat loss and the habitat fragmentation threshold: an experimental evaluation of impacts on richness and total abundances using grassland invertebrates. https://doi.org/10.1016/S0006-3207(01)00184-7
- Parmesan, C. 2006. Ecological and evolutionary responses to recent climate change. Annual Review of Ecology, Evolution, and Systematics, 37, 637 – 669. https://doi.org/10.1146/annurev.ecolsys.37.091305.110100
- Parmesan, C. 2007. Influences of species, latitudes and methodologies on estimates of phenological response to global warming. Global Change Biology, 13, 1860 – 1872. https://doi.org/10.1111/j.1365-2486.2007.01404.x

- Parmesan, C., & Yohe, G. 2003. A globally coherent fingerprint of climate change impacts across natural systems. Nature, 421, 37 – 42. https://doi.org/10.1038/nature01286
- Pasinelli G. 2006. Population biology of European woodpecker species: A review. *Annales Zoologici Fennici* 43(2).
- Pasinelli, G. & J. Hegelbach. 1997. Characteristics of trees preferred by Middle Spotted Woodpeckers *Dendrocopos medius* in Northern Switzerland. Ardea 85: 203-209.
- Pasinelli, G. 2000a. Sexual dimorphism and foraging niche partitioning in the Middle Spotted Woodpecker *Dendrocopos medius*. Ibis 142: 635-644.
- Pasinelli, G. 2000b. Oaks (Querqus sp) and only oaks? Relations between habitat structure and home range size of the Middle Spotted Woodpecker (*Dendrocopos medius*) Biol. Conserv. 9: 227-235.
- Paunović, M. 2004. Pećina Vernjikica – značajno zimsko skloniste slepih miševa (Mammalia, Chiroptera) u Srbiji [Pećina Vernjikica cave – the significant winter roost of bats in Serbia]. Zbornik radova Odbora za kras i speleologiju. *SANU* 8(2): 105-118.
- Pavón-Jordán, D., Fox, A.D., Clausen, P., Dagys, M., Deceuninck, B., Devos, K., Hearn, R.D., Holt, C.A., Hornman, M., Keller, V., Langendoen, T., Ławicki, Ł., Lorentsen, S.H., Luigujõe, L., Meissner, W., Musil, P., Nilsson, L., Paquet, J.-Y., Stipniece, A., Stroud, D.A., Wahl, J., Zenatello, M. and Lehikoinen, A. 2015. Climate-driven changes in winter abundance of a migratory waterbird in relation to EU protected areas. . *Diversity and Distributions* 21(5): 571-582.
- Pearce-Higgins, J., Leigh, S., Douse, A. and R. Langston. 2012. Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology https://doi.org/10.1111/j.1365-2664.2012.02110.x
- Pearce-Higgins, J., Stephen, L., Langston, R., Bainbridge, I., Bullman, R. 2009. The distribution of breeding birds around upland wind farms. Journal of Applied Ecology 46: 1323-1331.
- Pedersen, M.B. & Poulsen, E. 1991. Impact of a 90 m/2MW wind turbine on birds. Avian responses to the implementation of the Tjaereborg wind turbine at the Danish Wadden Sea. Danske Vildtunderogelser Haefte 47. Ronde, Denmark: Danmarks Miljoundersogelser.
- Peja, N.; Sarigul, G.; Siki, M.; Crivelli, A. J. 1996. The Dalmatian Pelican, *Pelecanus crispus*, nesting in Mediterranean lagoons in Albania and Turkey. *Colonial Waterbirds* 19: 184-189.
- Pejić B., Budinski I., Karapandža B., Paunović M. 2018. More than 60 years of ringing Miniopterus schreibersii (Kuhl, 1817) in Serbia: Movements and longevity data. *Conservation Status of Bats in the Central Europe and western Balkans" Sarajevo, 31.5.–1.6.2018*: 26.
- Percival S, M 2001. Assessment of the effects offshore wind farms on birds, report ETSU, W/13/00565/REP TI/Pub URN 01/1434
- Percival S.M., 2003, Birds and Wind Farms in Ireland: A review of Potential Issues and Impact Assessment, Ecology Consulting
- Percival, S. M. 2000. Birds and wind turbines in Britain. British Wildlife 12:8–15.
- Percival, S. M. 2005. Birds and wind farms: what are the real issues? British Birds 98:194–204.

- Perrins, C. M. 2009. *The encyclopedia of birds*. Oxford University Press, Oxford, UK.
- Peshev H., Grozdanov A., Kmetova–Biro E., Ivanov I., Stoyanov G., Tsiakiris R., Marin S., Marinković S., Sušić G., Lisichanets E., Hribšek I., Karić Z., Kapelj S., Bonchev L., Stoynov E. 2021. New insight into spatial ecology of Griffon Vulture (*Gypsfulvus*) on the Balkans provides opportunity for focusing conservation actions for a threatened social scavenger. Biodiversity Data Journal, 9.
- Petersons, G. 2004. *Seasonal migrations of north-eastern populations of Nathusius bat Pipistrellus nathusii (Chiroptera). Myotis 41-42: 29-56.*.
- Pettersson, J. 2005. The Impact of Offshore Wind Farms on Bird Life in Southern Kalmar Sound, Sweden. A final report based on studies 1999–2003. Report for the Swedish Energy Agency. Lund, Sweden: Lund University
- Phitos, D., Strid, A., Snogerup, S. and Greuter, W. (eds). 1995. *The Red Data Book of Rare and Threatened Plants of Greece.* WWF-Greece, Athens.
- Phytos, D., Strid, A., Snogerup, S., & Greuter, W. (1995). *The Red Data Book of rare and threatened plants of Greece*. WWF, 527 p.
- Pieper, H. (1981) Zur säugertiernahrung des Uhus (*Bubo bubo*) auf der griechischen Insel Lesbos. Vogelwelt 102: 55-56.
- Poirazidis, k., Skartsi, t., Pistolas, k. & Babakas, p. 1997 Greek Black Vulture population report for the period 1993- 1995. In: Tewes, E. Sanchez J.J. & M. Bijleveld (eds.). Black Vulture Conservation in Europe. Progress Report 1993-1995. Black Vulture Conservation Foundation. Mallorca. Pp. 35-43
- Porter, R. F. and Aspinall, S. 2010. Birds of the Middle East. Christopher Helm, London, 384pp
- Pylidis, Ch.; Anijalg P.; Saarma Ur.; Dawson D.A.; Karaiskou N.; Butlin R.; Mertzanis Y.; Giannakopoulos Al.; Iliopoulos Y.; Krupa And.;Burke, T. (2021) "Multi-source non-invasive genetics of brown bears (*Ursus arctos*) in Greece reveals a highly structured population and a newmatrilineal contact zone in southern Europe" Ecology and Evolution. 11(11):1-17
- Pyrovetsi, M. 1997. Integrated management to create new breeding habitat for Dalmatian Pelicans (*Pelecanus crispus*) in Greece. *Environmental Management* 21: 657-667.
- Randi, E. 2008. Detecting hybridization between wild species and their domesticated relatives. *Molecular Ecology* 17: 285–293.
- Rankou, H. 2011. *Dactylorhiza kalopissii*. *The IUCN Red List of Threatened Species* 2011: e.T162053A5543496. https://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T162053A5543496.en. Accessed on 11 December 2024.
- Ratcliffe, D. (1993) The peregrin falcon . T & AD Poyser, London.
- Reh, W. & Seitz, A. (1990). The influence of land use on the genetic structure of populations of the common frog Rana temporaria. Biol. Conserv., 54, 239--49.
- Reichenbach M, Steinborn H (2011) Wind turbines and meadow birds in germany—results of a 7 year baci-study and a literature review. Presentation held at the “conference on wind energy and wildlife impacts”, Trondheim, Norway, 2–5 May 2011. Available via http://www.cww2011.nina.no/linkclick.aspx?fileticket=5vx5zl4qyqa%3d&tabid=3989

- Reichlin, T., Klansek, E. et al. 2006. *Diet selection by hares (Lepus europaeus) in arable land and its implications for habitat management. European Journal of Wildlife Research 52(2): 109-118.*.
- Reuther, C. & Hilton-Taylor, C. 2004. *Lutra lutra. In: IUCN 2006. 2006 IUCN Red List of Threatened Species. . Downloaded on 07 December 2006.*.
- Richards, A. 1990. *Seabirds of the northern hemisphere*. Dragon's World Ltd, Limpsfield, U.K.
- Richards, A. 1990. *Seabirds of the northern hemisphere*. Dragon's World Ltd, Limpsfield, U.K.
- Richardson, W.J. 2000. Bird Migration and Wind Turbines: Migration Timing, Flight Behaviour, and Collision Risk. Proceedings of National Avian-Wind Power Planning Meeting II, 132–140.
- Riddle, K. E.; Remple, J. D. 1994. Use of the Saker and other large falcons in Middle East falconry. In: Meyburg, B.U.; Chancellor, R.D. (ed.), *Raptor conservation today*, pp. 415-420. Pica Press, Robertsbridge, U.K.
- Ristow D, Feldmann F, Scharlau W, Wink C, & M. Wink (1991) Population dynamics of Cory′s Shearwater (*Calonectris diomedea*) and Eleonora′s falcon (*Falco eleonorae*) in Eastern Mediterranean. In: Seitz A, Loeschcke V (eds) Species conservation: A Population-Biological Approach. Birkhauser Verlag, Basel, pp 199-212.
- Ristow D., Conrad B., Wink C. & M. Wink (1980) Pesticide residues of failed eggs of Eleonora′s Falco (*Falco eleonorae*) from Aegean colony. Ibis 122: 74-76.
- Ristow, D. & Xirouchakis, S. (2000) What is killing Eleonora's Falcons? World Bird Watch 22: 14-15
- Ristow, D. (2001) Poison is causing the sudden population decline of Eleonora's Falcon. Intern Hawkwatcher 3: 10- 17
- Ristow, D., Wink C., Wink M. (1986) Assessment of Mediterranean Autumn Migration by Prey Analysis of Eleonora′s Falcon. Proc. 1st Conf. on Birds wintering in the Mediterranean Region, Aulla Feb. 1984. Supplemento alle Ricerche di Biologia della Selvaggina 10(1), 285-295.
- Rizzolli, F., Sergio, F., Marchesi, L. & P. Pedrini (2005) Density, productivity, diet and population status of the Peregrine Falcon Falco peregrinus in the Italian Alps. Bird Study 52: 188-192.
- Rocke, T. E. 2006. The global importance of avian botulism. In: Boere, G.; Galbraith, C., Stroud, D. (ed.), *Waterbirds around the world*, pp. 422-426. The Stationary Office, Edinburgh, UK.
- Rodrigues, L. Bach, M.-J. Dubourg-Savage, B. Karapandža, D. Kovac˘, T. Kervyn, J. Dekker, A. Kepel, P. Bach, J. Collins, C. Harbusch, K. Park, B. Micevski, J. Minderman (2017): Κατευθυντήριες οδηγίες για την εξέταση των νυχτερίδων σε αιολικά πάρκα – Αναθεώρηση 2014. EUROBATS Publication Series No. 6 (Ελληνική Έκδοση). Γραμματεία UNEP/EUROBATS, Βόννη, Γερμανία, 138 σελ.
- Rodrigues, L., Bach, L., Dubourg-Savage, M.- J., Karapandža, B., Kovač, D., Kervyn, T., Dekker, J., Kepel, A., Bach, P., Collins, J., Harbusch, C., Park, K., Micevski, B., & Minderman,

J. 2015. *Guidelines for consideration of bats in wind farm projects – Revision 2014*. UNEP/EUROBATS Secretariat,, Bonn.

- Rodrigues, L., Rebelo, H. and Palmeirim, J.M. 2003. *Avaliação da tendência populacional de algumas espécies de morcegos cavernícolas. Relatório técnico final. Estudo integrado no Projecto do Instituto de Canservacao da Natureza "Livro Vermelho dos Vertebrados de Portugal - Revisao". Lisboa, 38 pp.*
- Rodrigues, Luisa & Bach, Lothar & Dubourg-Savage, Marie-Jo & Karapandža, Branko & Rnjak, Dina & Kervyn, Thierry & Dekker, Jasja & Kepel, Andrzej & Bach, Petra & Collins, J. & Harbusch, C. & Park, Kirsty & Micevski, Branko & Minderman, J., 2015. Guidelines for consideration of bats in wind farm projects Revision 2014.
- Rollan, A.; Real, J.; Bosch, R.; Tintó, A.; Hernández-Matías, A. 2010. Modelling the risk of collision with power lines in Bonelli's Eagle *Hieraaetus fasciatus* and its conservation implication. *Bird Conservation International* 20(3): 279-294.
- Rollins, K.E., D.K. Meyerholz, G.D. Johnson, A.P. Carpparella & S.S. Loew (2012): A Forensic Investigation Into the Etiology of Bat Mortality at a Wind Farm: Barotrauma or Traumatic Injury? Veterinary Pathology 49 (2): 362-371.
- Rosà, R., Bolzoni, L., Rosso, F., Pugliese, A., Hudson, P. J. and Rizzoli, A. 2011. Effect of *Ascaridia* infection on rock partridge population dynamics: empirical and theoretical investigations. *Oikos* 120: 1557–1567.
- Rosin, Z. M., Skórka, P., Szymański, P., Tobolka, M., Luczak, A., Tryjanowski, P. 2016. Constant and seasonal drivers of birds communities in a wind farms: implications for conservation. PeerJ 4:e2105 https://doi.org/10.7717/peerj.2105
- Roué, S. Y. and Némoz, M. 2002. *Mortalité exceptionnelle du Minioptère de Schreibers en France lors de l'année 2002*. Bilan national S.F.E.P.M., Paris, France.
- Roué, S.Y. and Groupe Chiroptères S.F.E.P.M. 1997. *Les chauves-souris disparaissent-elles ? Vingt ans après. Arvicola 9(1):19-24.*
- Rudolini D., Gustin M., Bogliani G., Garavaglia R. (2005) Birds and powerlines in Italy: an assessment BIRD CONSERVATION INTERNATIONAL 15 (2): 131-145
- Ruiz, C., Schindler, S. & Poirazidis, K. 2005. Impact of wind farms on birds in Thrace, Greece. Technical Report, 2005. WWF Greece, Athens. 43 pp.
- Russo, D. & Cistrone, L. 2023. *Barbastella barbastellus (Europe assessment)* (errata version published in 2024). *The IUCN Red List of Threatened Species* 2023: e.T2553A253986248. Accessed on 11 December 2024.
- Russo, D. & Cistrone, L. 2023. *Myotis bechsteinii (Europe assessment)* (errata version published in 2024). *The IUCN Red List of Threatened Species* 2023: e.T14123A254039732. Accessed on 11 December 2024.
- Russo, D. & Cistrone, L. 2023. *Myotis blythii (Europe assessment)*. *The IUCN Red List of Threatened Species* 2023: e.T14124A216723705. Accessed on 11 December 2024.
- Russo, D. & Cistrone, L. 2023. *Myotis emarginatus (Europe assessment)*. *The IUCN Red List of Threatened Species* 2023: e.T14129A216724547. Accessed on 11 December 2024.

- Russo, D. & Cistrone, L. 2023. *Myotis myotis (Europe assessment)*. *The IUCN Red List of Threatened Species* 2023: e.T14133A216724842. Accessed on 11 December 2024.
- Russo, D. & Cistrone, L. 2023. *Rhinolophus euryale (Europe assessment)*. *The IUCN Red List of Threatened Species* 2023: e.T19516A216726945. Accessed on 11 December 2024.
- Russo, D. & Cistrone, L. 2023. *Rhinolophus ferrumequinum (Europe assessment)*. *The IUCN Red List of Threatened Species* 2023: e.T19517A216727156. Accessed on 11 December 2024.
- Russo, D. & G. Jones (2003): Use of foraging habitats by bats in a Mediterranean area determined by acoustic surveys: conservation implications. Ecography 26: 197-209.
- Russo, D., Salinas-Ramos, V.B. and Ancillotto, L. 2020. Barbastelle Bat *Barbastella barbastellus* (Schreber, 1774). In: D. Russo (ed.), *Chiroptera - Handbook of the Mammals of Europe*, Springer, Cham.
- Rydell, J., Engstrom, H., Hedenstrom, A., Larsen, J., Pettersson, J. & M. Green. 2012. The effect of wind power on birds and bats – A synthesis. Report 6511, Swedish Environmental Protection Agency.
- Rydell, J., l. Bach, M.-J. Dubourg - Savage, M. Green, l. Rodrigues & A. Hedenström (2010a): Bat mortality at wind turbines in northwestern Europe. Acta Chiropterologica 12(2): 261-274.
- Rydell, J., l. Bach, M.-J. Dubourg - Savage, M. Green, l. Rodrigues & A. Hedenström (2010b): Mortality of bats at wind turbines links to nocturnal insect migration? Eur. J. Wildl. Res. 56: 823-827.
- Sakoulis, A. 2000. The local extiction of the Bearded vulture due to the anti-wolf campaign at central and eastern Sterea Ellada, Central Greece. Στο: Probonas, M., Sakoulis, & Xirouchakis, S. (eds) Proceedings of the 4th Bearded Vulture workshop. Heraklio, Greece. pp. 7-12
- San-Miguel-Ayanz, J., Camia, A., Liberta, G. and Boca, R. 2009. Analysis of forest fire damages in Natura 2000 sites during the 2007 fire season.
- Sansom, A., Pearce – Higgins J.W., Douglas, D.J.T. 2016. Negative impact of wind energy development on a breeding shorebird assessed with a BACI study design. https://doi.org/10.1111/ibi.12364
- Sanz-Aguilar, A., Sánchez-Zapata, J.A., Carrete, M., Benítez, J.R., Ávila, E., Arenas, R, Donázar, J.A., 2015. Action on multiple fronts, illegal poisoning and wind farm planning, is required to reverse the decline of the Egyptian vulture in southern Spain.Biol. Conserv. 187, 10–18.
- Sara, M.; Grenci, S.; Di Vittorio, M. 2009. Status of Egyptian Vulture (*Neophron percnopterus*) in Sicily. Journal of Raptor Research 43(1): 66-69.
- Saravia, V., Bounas, A., Kret, E., & Vavylis, D. 2019. Status of the Egyptian Vulture (*Neophron percnopterus*) in Greece. 2012-2018. 10.13140/RG.2.2.18763.64803.
- Schäublin, S. and Bollmann, K. 2011. Winter habitat selection and conservation of Hazel Grouse (*Bonasa bonasia*) in mountain forests. *Journal of Ornithology* 152(1): 179-192.
- Schmitz, L. 1993. Distribution et habitat du Pic Mar (D. medius) en Belgique. Aves 30 (3-4): 145-166.

- Schofield, H.W. 1999. *Rhinolophus hipposideros. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.*.
- Schulenberg, J. 2005. Säugetiere (Mammalia). In: A. Gunther, U. Nigmann and R. Achtziger (eds), *Analyse der Gefährdungsursachen von planungsrelevanten Tiergruppen in Deutschland zur Ergänzung der bestehenden Roten Listen gefährdeter Tiere.- Schriftenr*, pp. 70-112. Biol Vielfalt, BfN, Bonn-Bad Godesberg.
- Schuster E, Bulling L, Koppel J. 2015. Consolidating the state of knowledge: a synoptical review of wind energy's wildlife effects. Environmental Management 56:300–331.
- Scott, D. A.; Rose, P. M. 1996. *Atlas of Anatidae populations in Africa and western Eurasia*. Wetlands International, Wageningen, Netherlands.
- Selva N, Switalski A, Kreft S, Ibisch PL. Why keep areas road-free? The importance of roadless areas. In: Van Der Ree R, Smith DJ, Grilo C, editors. Handbook of road ecology: Wiley Blackwell; 2015. p. 10-26.
- Selva, N., Kreft, S., Kati, V., Schluck, M., Jonsson, B.G., Mihok, B., Okarma, H. & Ibisch, P. (2011). Roadless and Low-Traffic Areas as Conservation Targets in Europe. Environmental Management 48: 865-877.
- Sempéré, A.J., Sokolov, V.E. and Danilkin, A.A. 1996. *Capreolus capreolus*. Mammalian species 538: 1-9.
- Sergio, F., Boto, A. 1999. Nest dispersion, diet, and breeding success of black kites (*Milvus migrans*) in the Italian pre – Alps. The Raptor Research Foundation. Inc. j. Raptor Res. 33(3):207-217
- Serreze, M. C., & Francis, J. A. 2006. The Arctic amplification debate. Climatic Change, 76, 241 – 264. https://doi.org/10.1007/s10584-005-9017-y
- Servan, J. 1995. Emys orbicularis en France. In: Ballasina, Donato (ed.), *Red Data Book on Mediterranean Chelonians*, pp. 59-68. Edagricole, Bologna, Italy.
- Sfougaris A., Alivizatos, C., Giannakopoulos, A. & Weight, C. 2004. Conservation of a raptor in an intensively cultivated agroecosystem: the case of the Lesser Kestrel (*Falco naumanni*) in Thessaly plain, Central Greece. Proceedings of MEDECOS 2004 - 10th International Conference on Mediterranean Climate Ecosystems, Rhodes Island, Greece.
- Shaffer, J.A., Buhl, D.A. 2015. Effects of wind – energy facilities on breeding grassland bird distributions https://doi.org/10.1111/cobi.12569
- Shamoun-Baranes, J., Van Loon, E., Alon, D., Alpert, P., Yom-Tov, Y. & Y. Leshem (2006) Is there a connection between weather at departure sites, onset of migration and timing of soaring-bird autumn migration in Israel? Global Ecology and Biogeography 15:
- Sielicki, J. & T. Mizera (eds) (2009) Peregrine Falcon populations - status and perspectives in the 21st century. European Peregrin Falcon Group - Society for the Protection of Wild Animals „Falcon". Turul, Warsaw.
- Silva MR, Passos I (2017) Vegetation. In: Perrow M (ed) Wildlife and wind farms: conflicts and solutions, vol 1. Pelagic, Exeter, UK, pp 40–62

- Simmons, N. B. and Conway T. M. 2003. Evolution of Ecological Diversity in Bats. In Bat Ecology, Eds: T. H. Kunz and M. B. Fenton, 798. Chigago and London: The University of Chicago Press.
- Simon M., Gießelmann K., Köstermeyer H., Brand S. 2012. Managementempfehlungen für Arten des Anhangs IV der FFH-Richtlinie (Internethandbuch): Breitflügelfledermaus (Eptesicus serotinus). Available at: https://ffh-anhang4.bfn.de/arten-anhang-iv-ffh-richtlinie/saeugetiere-fledermaeuse/breitfluegelfledermaus-eptesicus-serotinus.html. (Accessed: 01.04.2019).
- Simon, M., Hüttenbügel, S. and Smit-Viergutz, J. 2004. *Ecology and conservation of bats in villages and towns. Schriftenr. Landschaftspfl. Naturschutz 77:1-264.*
- Skartsi, T., Elorriaga, J. & Vasilakis, D. 2008. Population size, breeding rates and conservation status of Eurasian Black Vulture in the Dadia National Park, Thrace, NE Greece. – Journal of Natural History 42: 345-353.
- Skartsi, T., Elorriaga, J. & Vasiliakis, D. 2010a. Eurasian Black Vulture: the focal species of the Dadia- Lefkimi-Soufli Forest National Park, 195-206. In: Catsadorakis, G. & Källander, H. (eds.). The Dadia – Lefkimi – Soufli Forest National Park, Greece: Biodiversity, Management and Conservation. WWF Greece, Athens.
- Skartsi, T., Elorriaga, J. & Vasiliakis, D., 2010b. Population trends and conservation of vultures in the Dadia-Lefkimi-Soufli Forest National Park, 183-194. In: Catsadorakis, G. & Kallander, H. (eds.). The Dadia – Lefkimi – Soufli Forest National Park, Greece: Biodiversity, Management and Conservation. WWF Greece, Athens.
- Skov and Heinänen. 2015. Predicting the weather dependent collision risk for Birds at Wind Farms. Wind & Wildlife Proc. Springer Science
- SlottaBachmayr, L. Bögel, R. & Camina, C.A. (Eds) (2004) The situation of Griffon Vulture in Greece. In: The Eurasian Griffon Vulture (*Gyps fulvus*) in Europe and the Mediterranean. Status report and Action plan.
- Smallwood, K. S, L. Rugge M.L Morrison 2009. Influence of Behavior on Bird Mortality In Wind Energy Developments. The Journal of Wildlife Management. Volume 73, Issue 7, 1082-1098, September 2009
- Smallwood, K. S. & Karas, B. 2009. Avian and bat fatality rates at old-generation and repowered wind turbines in California. – Journal of Wildlife Management 73: 1062-1071; doi: 10.2193/2008-464.
- Smallwood, K.S. 2007. Estimating Wind Turbine-Caused Bird Mortality, The Journal of Wildlife Management, 71(8): 2781-2791.
- Smallwood, K.S. Thelander, C. 2004, Developing Methods to Reduce Bird Mortality in the Altamont Pass Wind Resource Area, California Energy Commission
- Smith, R. K.,Jennings, N. V., et al. 2005. *A quantitative analysis of the abundance and demography of European hares Lepus europaeus in relation to habitat type, intensity of agriculture and climate. Mammal Review 35(1): 1-24.*.

- Snow, D.W. & Perrins, C.M. (1998) The Birds of the Western Palearctic. Concise Edition. Volume 2 Passerines. Oxford University Press, Oxford.
- Spehn E.M. and Körner C. 2005. A Global Assessment of Mountain Biodiversity and its Function. In: *Global Change and Mountain Regions: An Overview of Current Knowledge*. Huber UM, Bugmann HKM and Reasoner MA (eds), Springer Netherlands, Dordrecht, pp. 393–400.
- Speybroeck, J., Beukema, W., Bok, B., and van der Woort, J. 2016. *Field Guide to the Amphibians & Reptiles of Britain and Europe*. Bloomsbury, London.
- Spitz, F. 1999. *Sus scrofa*. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.
- Spitzangel, A. (1990) The influence of forest management on woodpecker density and habitat use in floodplain forests of the Upper Rhine Valey. In Carlson, A. & G. Aulen (eds) Conservation and Management of Woodpecker Populations, Report No. 17. Dept. of Wildlife Ecology, Swedish University of Agricultural Sciences, Uppsala.
- Spitzenberger F. 2002. *Die Säugetierfauna Österreichs. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Band 13.*
- Stebbings, R. E. and Griffith, F. 1986. *Distribution and status of bats in Europe*. Institue of Terrestrial Ecology, Huntington.
- Stebbins, R. C., and N. W. Cohen. 1995. A natural history of amphibians. Princeton University Press, Princeton, New Jersey
- Steffens R., Zöphel U., Brockmann D. 2007. *40th Anniversary Bat Marking Centre Dresden – Evaluation of Methods and Overview of Results*. Landesamt für Umwelt, Landwirtschaft und Geologie, Dresden.
- Stephens, P. A., et al. 2016. Consistent response of bird populations to climate change on two continents. - Science 352: 84-87.
- Stevanović V. 1996. Analysis of the Central European and Mediterranean orophytic element on the mountain of the W. and Central Balkan Peninsula, with special reference to endemics. *Bocconea* 5(1): 77-97.
- Stevanović V., Vukojičić S., Šinžar-Sekulić J., Lazarević M., Tomović G. & Tan K. 2009. Distribution and diversity of Arctic-Alpine species in the Balkans. *Plant Systematics and Evolution* 283 (3-4): 219-235.
- Stocker, T. F., Qin, D., Plattner, G. K., Tignor, M., Allen, S. K., Boschung, J.,Midgley, B. M. 2013. IPCC, 2013: Climate change 2013: The physical science basis. Contribution of working group I to the fifth assessment report of the intergovernmental panel on climate change. Cambridge, UK: Cambridge University Press.
- Stoychev, S., Demerdzhiev, D., Angelov, I. Hristov, H. & Minchev, J. 2005. Conservation of the large vultures in the Eastern Rhodopes. – BSPB/Birdlife Bulgaria.
- Straka, T.M., Greif, S., Schultz, S., Goerlitz, H.R. and Voigt, C.C. 2020. The effect of cave illumination on bats. *Global Ecology and Conservation* 21: e00808.

- Strickland, M., Arnett, W., Erickson, D., Johnson, G., Johnson, M., Morrison, J., Shaffer, J. & W. Warren-Hicks. 2011. Comprehensive guide to studying wind energy/wildlife interactions. Prepared for the National Wind Coordinating Collaborative, Washington D.C., USA.
- Strid, A. 1986 (ed.): *Mountain Flora of Greece*, vol. 1. – Cambridge: Cambridge. University Press, xxx + 822 pp
- Strid, A. Tan, Kit (eds.) 1991: *Mountain Flora of Greece*, vol. 2. – Edinburgh: Edinburgh University Press, xxv + 974 pp.
- Strid, A., & Tan, K. 1997. *Flora Hellenica*, vol. I. Koeltz Scientific Books. Königstein, Germany.
- STRIX. 2012. Developing and testing the methodology for assessing and mapping the sensitivity of migratory birds to wind energy development. BirdLife International, Cambridge.
- Stuart, S.N., Chanson, J.S., Cox, N.A., Young, B.E., Rodrigues, A.S.L., Fischman, D.L. & Waller, R.W., 2004. Status and trends of amphibian declines and extinctions worldwide. Science 306: 1783-1786.
- Stubbe, C. 1999. *Capreolus capreolus*. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.
- Stubbe, M. 1999. *Vulpes vulpes*. In: A.J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P.J.H. Reijnders, F. Spitzenberger, M. Stubbe, J.B.M. Thissen, V. Vohralík, and J. Zima (eds), The Atlas of European Mammals. Academic Press, London.
- Stubbs, D. & I.R. Swingland. 1985. The ecology of a Mediterranean tortoise (*Testudo hermanni*): a declining population. Can. J. Zool., 63, 169 – 180.
- Stubbs, D. 1989b. Testudo hermanni, Hermann's Tortoise. In: Swingland & Klemens (ed.), *The Conservation Biology of Tortoises*, pp. 34-36. iucn, Gland, Switzerland.
- Stutz, H.P. and Haffner, M. 1984. *Arealverlust und Bertandesrückgang der Kleinen Hufeisennase Rhinolophus hipposideros (Bechstein, 1800) (Mammalia: Chiroptera) in der Schweitz. -Jber. Naturf. Ges. Graubünden N.F. 101. 169-178.*.
- Suarez, S., Balbontín, J. & M. Ferrer (2000) Nesting habitat selection by booted eagles *Hieraaetus pennatus* and implications for management. Journal of Applied Ecology 37: 215-223.
- Svehlik, J., Meyburg, B U. (1979) Clutch size and breeding success of the Lesser Spotted Eagle (*Aquila pomarina*) and the Imperial Eagle (*Aquila heliaca*) in the Carpathians of Eastern Slovakia 1966-1978. Journal of Ornithology 120: 406-415.
- Tan K., Kofinas G. & Zieliński J. 2021. *Reports 86–87.* New floristic records in the Balkans στο *Phytologia Balcanica* 27(1): 127 – 150, Sofia.
- Tan K., Kofinas G. 2022. Reports 265–273. New floristic records in the Balkans στο *Phytologia Balcanica* 28(3): 399-446, Sofia.
- Tashev A., Dimitrov D. & Delcheva M. 2016.R*eports 151–159.* New floristic records in the Balkans στο *Phytologia Balcanica* 22 (2): 259 – 292, Sofia.

- Tewes E. 1994. Situation of the European Black vulture (*Aegypius monachus*) and the Eurasian Griffon vulture (*Gyps fulvus*) in the Mediterranean. In: Mayol, J. (ed.) Proceedings of the VI Congress on the Biology and Conservation of the Mediterranean Raptors, pp: 35-51. SEO/ BirdLife.
- Thackeray, S. J., Henrys, P. A., Hemming, D., Bell, J. R., Botham, M. S., Burthe, S., Mackay, E. B. (2016). Phenological sensitivity to climate across taxa and trophic levels. Nature, 535, 241 – 245. https://doi.org/10.1038/nature18608
- Thaker, Maria & Zambre, Amod & Bhosale, Harshal. (2018). Wind farms have cascading impacts on ecosystems across trophic levels. Nature Ecology & Evolution. 2. 10.1038/s41559-018-0707-z.
- Tomé, R., Canário, F., Leitão, A., Pires, N. & Repas, M. (2017) Radar Assisted Shutdown on Demand Ensures Zero Soaring Bird Mortality at a Wind Farm Located in a Migratory Flyway. Wind Energy and Wildlife Interactions (pp. 119-133). Springer.
- Tome, R., Canario, F., Leitao, A., Pires, N., Teixeira, I., Cardoso, P. & M. Repas. 2011. Radar detection and turbine stoppage: reducing soaring bird mortality at wind farms. In: May, R. & K. Bevanger. (eds.). Proceedings, Conference on wind energy and wildlife impacts, 2-5 May 2011, Trondheim, Norway.
- Tome, R., Leitao, A., Canario, F., Pires, N., Rosario, I. & P. Cardoso. 2011. Species-specific reactions of migrating raptors towards wind turbines: a case study from southern europe. In: 8 th conference of the european ornithologists' union, 27-30 august 2011, Riga Latvia.
- Tony Hutson, Friederike Spitzenberger, Stéphane Aulagnier, Ioan Coroiu. 2007. *Pipistrellus nathusii*. *The IUCN Red List of Threatened Species* 2007: Accessed on 11 December 2024.
- Tony Hutson, Friederike Spitzenberger, Stéphane Aulagnier, Ioan Coroiu. 2007. *Pipistrellus kuhlii*. *The IUCN Red List of Threatened Species* 2007: e.T17314A6964114. Accessed on 11 December 2024.
- Tony Hutson, Friederike Spitzenberger, Stéphane Aulagnier, Ioan Coroiu, Michael Stubbe. 2007. *Vespertilio murinus*. *The IUCN Red List of Threatened Species* 2007: Accessed on 11 December 2024.
- Tony Hutson, Friederike Spitzenberger, Stéphane Aulagnier. 2007. *Hypsugo savii*. *The IUCN Red List of Threatened Species* 2007: e.T44856A10955628. Accessed on 11 December 2024.
- Tosi, G., Pedrotti, L., Monaco, A. & Scherini, G. (1996). Progetto Camoscio Monte Baldo. Universita degli studi di Milano. Varese. 276pp.
- Trierweiler, C. 2010. Travels to feed and food to breed: The annual cycle of a migratory raptor, Montagu's harrier, in a modern world. University of Groningen.
- Triplet, P.; Overdijk, O.; Smart, M.; Nagy, S.; Schneider-Jacoby, M.; Karauz, E. S.; Pigniczki, C.; Baha el Din, S.; Kralj, J.; Sandor, A.; Navedo, J. G. 2008. *International single species Action Plan for the conservation of the Eurasian Spoonbill Platalea leucorodia*. AEWA, Bonn, Germany.
- Tsatsakis, A., Christakis-Hampsas, M., Xirouchakis, S., Baum, F. & Ristow, D. (2001) Whodunit? The case of the disappearing Eleonora's Falcons. World Bird Watch 23: 25-27

- Tsiftsis S. & Antonopoulos Z. 2011. *Pseudorchis albida*: an enigmatic orchid of the Greek flora. *J. Eur. Orch*. 43 (4): 795–806.
- Tucker, G.M. and Heath, M.F. 1994. Birds in Europe: their conservation status. BirdLife International, Cambridge, U.K.
- Turner, D. 2000. Herons in Africa and the Malagasy Region. In: Kushlan, J. A.; Hafner, H. (ed.), *Heron Conservation*, pp. 99-122. Academic Press, San Diego.
- Uhrin, M., Benda, P., Lučan, R., Miková, E., Rendoš, M. and Horáček, I. 2014. Noteworthy bat records from Romania. *Vespertilio* 17: 197-213.
- Urbanczyk, Z. 1994. *Current situation of bat protection in Poland. Abstract, Symp. "Current problems of bat protection in Central and eastern Europe". Bonn, 1994.*.
- Vagliano, C. 1981. Contributions au statut des rapaces diurnes et nocturnes nicheurs en Crete. Rapaces Méditerranéens, Annales du C.R.O.P., 1: 14–18
- Valakos, E.D., Pafilis, P., Sotiropoulos, K., Lymberakis, P., Maragou, P. & Foufopoulos, J., (2008). The Amphibians and Reptiles of Greece. Chimaira Editions, Frankfurt am Main, 463 pp.
- Väli Ü. 2011. Numbers and hybrydization of spotted eagles in Estonia as revealed by country-wide field observations and genetic analysis. *Estonian Journal of Ecology* 60: 143-154.
- Väli Ü., Dombrovski V., Treinys R., Bergmanis U., Daróczi S., Dravecky M., Ivanovsky V., Lontkowski J., Maciorowski G., Meyburg B.U., Mizera T., Zeitz R., Ellegren H. 2010. Wide-spread hybridization between the Greater Spotted Eagle *Aquila clanga* and the Lesser Spotted Eagle *Aquila pomarina* (Aves: Accipitriformes) in Europe. *Biol. J. Linn. Soc.* 100: 725-736.
- Valtonen, A., Latja, R., Leinonen, R., & Poys a, H. (2016). Arrival and onset of breeding of three passerine birds in Eastern Finland tracks climatic variation and phenology of insects. Journal of Avian Biology, 48(6), 785 – 795.
- Van der Jeugd, H. P., Eichhorn, G., Litvin, K. E., Stahl, J., Larsson, K., Van Der Graaf, A. J., & Drent, R. H. 2009. Keeping up with early springs: Rapid range expansion in an avian herbivore incurs a mismatch between reproductive timing and food supply. Global Change Biology, 15, 1057 – 1071. https://doi.org/10.1111/j.1365-2486.2008.01804.x
- Van der Meij, T., Van Strien, A.J., Haysom, K.A., Dekker, J., Russ, J., Biala, K., Bihari, Z., Jansen, E., Langton, S., Kurali, A. and Limpens, H. 2015. Return of the bats? A prototype indicator of trends in European bat populations in underground hibernacula. *Mammalian Biology* 80: 170-177.
- van Dijk, P.P., Corti, C., Mellado, V.P. & Cheylan, M. 2004. *Testudo hermanni* (errata version published in 2020). *The IUCN Red List of Threatened Species* 2004: https://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T21648A176604335.en. Accessed on 11 December 2024.
- Vanhinsbergh, D., Evans, A., (2002) Habitat associations of the Red-backed Shrike (*Lanius collurio*) in Carinthia, Austria. J. Ornithol. 143, 405-415.

- Vasilakis D.P., Whitfield D.P., Kati V. 2017. A balanced solution to the cumulative threat of industrialized wind farm development on cinereous vultures (*Aegypius monachus*) in south-eastern Europe. PLOSone https://doi.org/10.1371/journal.pone.0172685
- Vasilakis DP, Whitfield DP, Schindler S, Poirazidis KS, Kati V. 2016. Reconciling endangered species conservation with wind farm development: Cinereous vultures (*Aegypius monachus*) in south-eastern Europe. Biol Conserv 196: 10–17.
- Vasilakis, D., Schindler, S., Whitfield, P., Ruiz, C., Poirazidis, K. 2009. Remote control monitoring techniques to assess the impact of wind farms on raptors: a case study from Thrace, NE Greece. Raptor research foundation 2009 annual conference. Pitlochry, Scotland. 29 September – 4 October 2009.
- Végvári, Zs. 2002. Autumn staging and habitat selection by common cranes Grus grus in the Hortobágy National Park, Hungary. *Folia Zoologica* 51(3): 221-225.
- Verboom, B. & H. Huitema (1997): The importance of linear landscape elements for the pipistrelle *Pipistrellus pipistrellus* and the serotine bat Eptesicus serotinus. Landscape Ecology 12 (2): 117-125.
- Virgos E. & F. Garcia. 2002. Patch occupancy by stone martens *Martes foina* in fragment size, isolation and habitat structure. *Acta Oecologica*, 23(4). 231-237.
- Visser, M. E. 2008. Keeping up with a warming world; assessing the rate of adaptation to climate change. Proceedings of the Royal Society of London B: Biological Sciences, 275, 649 – 659. https://doi.org/10.1098/ rspb.2007.0997
- Visser, M. E., Holleman, L. J. M., and Gienapp, P. 2006. Shifts in caterpillar biomass phenology due to climate change and its impact on the breeding biology of an insectivorous bird. Oecologia, 147, 164 – 172. https://doi.org/10.1007/s00442-005-0299-6
- Vlachos, C., Bakaloudis, D. & E. Chatzinikos (2004) Unusual nesting of the Lesser Kestrel (*Falco naumanni*) in Thessaly, Greece. J. Rap. Research 38: 161-163.
- Vose, R. S., Easterling, D. R., & Gleason, B. 2005. Maximum and minimum temperature trends for the globe: An update through 2004. Geophysical Research Letters, 32, L23822. https://doi.org/10.1029/2005GL024379
- Voskamp, P. 2000. Populatiebiologie en landschapsgebruik van de Wespendief *Pernis apivorus* in Salland. pia Oude Binnenweg 28 7391 JE Twello
- Wake, D.B., 2007. Climate change implicated in amphibian and lizard declines. Proc. Natl. Acad. Sci. USA 104: 8201-8202.
- Walsh, A.I. & S. Harris (1996a): Foraging habitat preferences of Vespertilionid bats in Britain. Journal of Applied Ecology 33: 508-518.
- Walsh, A.I. & S. Harris (1996b): Factors determining the abundance of Vespertilionid bats in Britain: Geographical, land class and local habitat relationships. Journal of Applied Ecology 33: 519-529.
- Walter, H. (1979) Eleonora′s Falcon: adaptations to prey and habitat in a social raptor. University of Chicago Press, Chicago and London

- Walther, G. R., Post, E., Convey, P., Menzel, A., Parmesan, C., Beebee, T.J. Bairlein, F. (2002). Ecological responses to recent climate change. Nature, 416, 389 – 395. https://doi.org/10.1038/416389a
- Watson J. (1997) The Golden Eagle. T and A.D. Poyser, London, U.K.
- Watson J., Leitch A.F. and Rae S.R. (1993) The diet of the Golden Eagle *Aquila chrysaetos* in Scotland. Ibis 135: 387-393
- Watson, J. 2010. *The Golden Eagle*. T. & A.D. Poyser, London.
- Wauters, L.A., Currado, I., Mazzoglio, P.J. and Gurnell, J. 1997. *Replacement of red squirrels by introduced grey squirrels in Italy: evidence from a distribution survey. In: Gurnell, J. and Lurz, P.W.W. (eds) The Conservation of Red Squirrels, Sciurus vulgaris L. . People's Trust for Endangered Species, pp. 79-88.*
- White G., Purps J., & Alsbury S. (2006) The Bittern in Europe: a guide to species and habitat management. The RSPB, Sandy
- White, C.M., Christie, D.A. and de Juana, E. 2013. Peregrine Falcon (*Falco peregrinus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Willemsen, R.E. & Hailey, A. 2001. Effects of spraying the herbicides 2,4-D and 2,4,5-T on a population of the tortoise *Testudo hermanni* in southern Greece. Environmental Pollution 113: 71-78.
- Willemsen, R.E. 1995. Status of *Testudo hermanni* in Greece. In: Ballasian, Donato (ed.), Red Data Book on Mediterranean Chelonians, pp. 110-118. Edagricole - Edizioni Agricoli, Bologna, Italy.
- Wilson, D. E., Mittermeier R. A. (Eds.), 2019. Handbook of the Mammals of the World. Vol. 9: Bats, Lynx Edicions, Barcelona. pp 1008.
- Wilson, D.E. and Reeder, D.M. 2005. *Mammal Species of the World*. Johns Hopkins University Press, Baltimore.
- Wingfield, J. C. 2008. Organization of vertebrate annual cycles: Implications for control mechanisms. Philosophical Transactions of the Royal Society of London B: Biological Sciences, 363, 425 – 441. https://doi. org/10.1098/rstb.2007.2149
- Winkelman, J.E. 1992b. The impact of the Sep wind park near Oosterbierum, the Netherlands on birds 2: nocturnal collision risks. RIN rapport 92/3 Arnhem: Rijksintituut voor Natuurbeheer.
- Winkler, H., Christie, D.A., Kirwan, G.M. and de Juana, E. 2014. Middle Spotted Woodpecker (*Leiopicus medius*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.
- Winkler, H., D. Christie & D. Nurney. 1995. Woodpeckers: A guide to the Woodpeckers, Piculets and Wrynecks of the World, Pica Press, Robertsbridge.
- Wojciuch - Ploskonka, M. & B. Bobek (2014): The effect of forest habitat-types and age classes of tree stands on the population densities of bats and nocturnal insects in the Niepolomice Forest, Southern Poland. Book of abstracts, XIIIth European Bat Research Symposium, 1–5 September 2014, Šibenik, Croatia: 169.

- Wolfgang Böhme, Petros Lymberakis, Rastko Ajtic, Varol Tok, Ismail H. Ugurtas, Murat Sevinç, Pierre-André Crochet, Claudia Corti, Idriz Haxhiu, Roberto Sindaco, Aziz Avci, Jelka Crnobrnja Isailovic, Yusuf Kumluta?. 2009. *Zamenis situla (Europe assessment)*. *The IUCN Red List of Threatened Species* 2009: e.T61444A12485966. Accessed on 11 December 2024.
- Wright, J., E. Steer & A. Hailey. 1988. Habitat separation in tortoises and the consequences for activity and thermoregulation. Can. J. Zool., 66, 1537 – 1544.
- WWF Ελλάς (2008). Πρόταση για την ορθή χωροθέτηση αιολικών πάρκων στη Θράκη. Κείμενο θέσης. Δαδιά – Αθήνα: Οκτώβριος 2008.
- WWF Ελλάς. 2013. Αιολικά πάρκα στη Θράκη: Αναθεωρημένη πρόταση ορθής χωροθέτησης του WWF Ελλάς. Δαδιά – Αθήνα: Ιούλιος 2013.
- Xirouchakis S.M. and Andreou, G. 2009. Foraging behaviour and flight characteristics of griffon vultures (*Gyps fulvus*) in the island of Crete (Greece) Wildlife Biology 15 (1) 37-52(16
- Xirouchakis, S. 2001. The Golden eagle (*Aquila chrysaetos*) in Crete. Distribution, population status and conservation problems. Avocetta 25: 275-281.
- Xirouchakis, S. 2003. Population trends and aspects of breeding biology of the Bearded Vulture Gypaetus barbatus in Crete (1996-2002). In: Sarrazin, F. & Thiollay, J-M. (Eds): Proceedings of the international meeting. Conservation and management of Bearded Vulture populations. Ligue pour la protection des Oiseaux (LPO), Tende, France, pp. 61-67.
- Xirouchakis, S. and Grivas, C. 2002. Age at first breeding of the Bearded Vulture (*Gypaetus barbatus*). Sandgrouse 24: 130-134.\
- Xirouchakis, S. and Mylonas, M. 2004. Griffon Vulture (*Gyps fulvus*) distribution and density in Crete. Israel Journal of Zoology 50: 341-354.
- Xirouchakis, S. and Mylonas, M. 2005a. Selection of breeding cliffs by the Griffon Vulture (*Gyps fulvus*) in Crete (Greece). Acta Ornithologica 40: 155-161.
- Xirouchakis, S. and Mylonas, M. 2005b. Status and structure of the Griffon Vulture (*Gyps fulvus*) population in Crete. European Journal of Wildlife Research 51: 223-231.
- Xirouchakis, S. and Tsiakiris, R. 2008. Status and population trends of vultures in Greece. Στο: Donazar J.A. & Margalida, A. (eds). Vulture conservation and carcass management. Munibe Natural Sciences (suppl.).
- Xirouchakis, S.M. & P. Tsiakiris 2009. Status and population trends of vultures in Greece. In: Donázar, J.A., Margalida, A. & A. Gampion (Eds.). Vultures feeding stations & sanitary legislation: a conflict and its consequences from the perspective of conservation biology. Munibe (suppl), 29: 154-171.
- Yosef, R., International Shrike Working Group and Christie, D.A. 2012. Red-backed Shrike (*Lanius collurio*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona
- Zahn, A., Rainho, A. and Kiefer, A. in press. Greater Mouse-Eared Bat *Myotis myotis* (Borkhausen, 1797). In: Russo D. (ed.), *Chiroptera - The Handbook of the Mammals of Europe*, Springer, Cham.

- Zehtindjiev, P. & P. Whitfield. 2009. Bird Saint Nikola Wind Farm: bird migration monitoring in autumn 2009. Report to AES Geo Energy OOD, Chervena Stena 38, 1421 Sofia, Bulgaria.
- Zhelezov, G. 2010. *Sustainable Development in Mountain Regions: Southeastern Europe*. Springer, New York.
- Zimmerling, J., Pomeroy, A., d'Entremont, M. & C. Francis. 2013. Canadian estimate of bird mortality due to collisions and direct habitat loss associated with wind turbine developments. Avian Conservation and Ecology 8(2): 10.
- Zimova, M., Mills, L. S., & Nowak, J. J. 2016. High fitness costs of climate change-induced camouflage mismatch. Ecology Letters, 19, 299 – 307. https://doi.org/10.1111/ele.12568
- Zuberogoitia, I., Zabala, J., Martínez, J. A., Martínez, J. E., Azkona, A. 2008. Effect of human activities on Egyptian Vulture breeding. *Animal Conservation* 11(4): 313-320.
- Zwart, M.; McKenzie, A.; Minderman, J.; Whittingham, M. (2016) Conflicts Between Birds and On-Shore Wind Farms. Pp. 489-504. In: F.M. Angelici (ed.), Problematic Wildlife: A Cross-Disciplinary Approach. Springer International Publishing Switzerland.
- Ακριώτης Τ., Ρήγας Ι., (1999) Επιπτώσεις των βαρέων μετάλλων και των ιχνοστοιχείων στην Ορνιθοπανίδα στο Χατζηλάκου Δ.. (Επιμέλεια). Συνοπτικός Οδηγός.. Επιπτώσεις έργων και δραστηριοτήτων στα πουλιά και τους βιοτόπους τους. Διαχείριση βιοτόπων της ορνιθοπανίδας. Αθήνα. Ελληνική Ορνιθολογική Εταιρεία.
- Ακριώτης, Τ. και Χανδρινός, Γ. 2004. Επανευρέσεις δακτυλιωμένων πουλιών στην Ελλάδα (1985-2004). Ελληνικό Κέντρο Δακτυλίωσης Πουλιών, Μυτιλήνη, 164 σ.
- Αλεξάνδρου Ο., Κατσαδωράκης Γ., Μαλακού Μ., Παπανούση Φ. και Β. Ρουμελιώτου. 2021. Χωροθέτηση πολλαπλών ΑΣΠΗΕ εντός διαδρόμων μετακίνησης πελεκάνων στη Δυτική και Κεντρική Μακεδονία. Εταιρία Προστασίας Πρεσπών, Άγιος Γερμανός Πρεσπών.
- Αλιβιζάτος, Χ. Π. (1996) Βιολογία και οικολογία της Αετογερακίνας (*Buteo rufinus* CR.) στο Νομό Έβρου. Διδακτορικη διατριβή. Γεωπονικό Πανεπιστήμιο Αθηνών, Τμήμα Φυτικής Παραγωγής, Εργαστήριο Οικολογίας και Προστασίας Περιβάλλοντος. Αθήνα.
- Αλιβιζάτος, Χ., Γκούτνερ, Β., Ρήγας, Ι., Αθανασιάδης, Α. & Ζόγκαρης, Σ. 2006. Χειμερινή οικολογία του Στικταετού (*Aquila clanga*) στο Δέλτα Έβρου και στους υγροτόπους Αμβρακικού. Πρακτικά 3ου Συνεδρίου Ελληνικής Οικολογικής Εταιρείας & Ελληνικής Ζωολογικής Εταιρείας, Ιωάννινα, σελ. 14-21.
- Αντωνόπουλος Ζ. και Σ. Τσιφτσής. 2017. *Άτλας των Ελληνικών Ορχεοειδών*. Τόμος ΙΙ. Mediterraneo Editions, Ρέθυμνο.
- Αραμπατζής Θ.Ι. 1998. *Θάμνοι και δέντρα στην Ελλάδα*. Τόμος 1. Οικολογική Κίνηση Δράμας, ΤΕΙ Καβάλας, Δράμα.
- Βλάχος Χ., Μποντζώρλος Β., Χατζηνίκος Ε., Δεδουσοπούλου Ε., Μπραζιώτης Σ., Μπίρτσας Π, Θωμαϊδης Χ. και Κόντος Κ. (Συντονιστές έκδοσης). 2014. Πρωτόκολλα καταγραφής για τα είδη της Ελληνικής ορνιθοπανίδας Α' Φάσηςτης Μελέτης 9 «Εποπτεία και Αξιολόγηση της Κατάστασης Διατήρησης Ειδών Ορνιθοπανίδας στην Ελλάδα» ΥΠΕΚΑ, Αθήνα, Σύμπραξη Γραφείων Μελετών «ΦΑΣΟΥΛΑΣ-Ν.ΜΑΝΤΖΙΟΣ Ε.Ε.-ΡΟΔΟΥΛΑ ΚΩΝΣΤΑΝΤΙΝΙΔΟΥ ΤΟΥ ΓΕΩΡΓΙΟΥ – ΑΘ. ΤΖΑΚΟΠΟΥΛΟΣ ΚΑΙ ΣΙΑ Ε.Ε.», Θεσσαλονίκη, 171 σελ.

- Βλάχος, Χ. 1989. Η οικολογία του Κραυγαετού (*Aquila pomarina*) στο δάσος Δαδιάς του Νομού Έβρου. Διδακτορική Διατριβή, Τμήμα Δασολογίας κα Φυσικού Περιβάλλοντος, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης, 119 σελίδες.
- Γεωργιακάκης Π., Καυκαλέτου-Ντιέζ Α. 2021. Εθνικό Σχέδιο Δράσης για 10 είδη Χειροπτέρων. Έργο LIFE GRECABAT (LIFE17 NAT/GR/000522) - «Ελληνικά Σπήλαια και Χειρόπτερα: Διαχειριστικές Δράσεις και Αλλαγή Συμπεριφοράς». Παραδοτέο Δράσης Α3. Πανεπιστήμιο Κρήτης, Μουσείο Φυσικής Ιστορίας Κρήτης.
- Γεωργιακάκης, Π, Παπαμιχαήλ, Γ. 2020. Καθορισμός Στόχων Διατήρησης (Conservation Objectives) για τα είδη θηλαστικών του Παραρτήματος ΙΙ της Οδηγίας 92/43/ΕΕ. Επιστημονικός Υπεύθυνος: Δημόπουλος Π., Παν. Πατρών. Έργο LIFE IP 4 NATURA (LIFE16 IPE/GR/000002), Δράση C.7: Establishment of conservation objectives and measures for SACs. γύρω προστατευόμενη περιοχή. Στο: Καρδακαρη Ν. (επιμ.) Τα πουλιά στο Διβάρι της Μεσσηνίας. Ελληνική Ορνιθολογική Εταιρεία, Αθήνα.
- Δαμιανίδης, Χρ., Ελευθεριάδου, Ε., Σαμαράς, Δ.,Θεοδωρόπουλος, Κ. 2015. Η Ξυλώδης Χλωρίδα του Όρους Όρβηλος (Β. Ελλάδα) στο *Η Συμβολή της Σύγχρονης Δασοπονίας και των Προστατευόμενων Περιοχών στη Βιώσιμη Ανάπτυξη.* 17ο Πανελλήνιο Δασολογικό Συνέδριο, Αργοστόλι.
- Δημαλέξης, Α., Καστρίτης, Θ., Μανωλόπουλος, Α., Κορμπέτη, Μ., Φριτς, Γ., Saravia Mullin, V., Ξηρουχάκης, Σ. και Μπούσμπουρας Δ. 2010. Προσδιορισμός και χαρτογράφηση των ορνιθολογικά ευαίσθητων στα αιολικά πάρκα περιοχών της Ελλάδας. Ελληνική Ορνιθολογική Εταιρεία, Αθήνα. 126 σελ.
- Δημαλέξης, Τ. (γραφείο μελετών). 2009. Οδηγός οικολογικών απαιτήσεων, απειλών και ενδεδειγμένων μέτρων για τα είδη χαρακτηρισμού. Παραδοτέο στο πλαίσιο του έργου «Προσδιορισμός συμβατών δραστηριοτήτων σε σχέση με τα είδη χαρακτηρισμού των Ζωνών Ειδικής Προστασίας της ορνιθοπανίδας» (αναθέτουσα αρχή: Υ.ΠΕ.ΧΩ.Δ.Ε. - Δ/νση Περιβαλλοντικού Σχεδιασμού Τμήμα Διαχείρισης Φυσικού Περιβάλλοντος).
- Δημαλέξης, Τ. (γραφείο μελετών). 2009. Παραδοτέο 2 Ομαδοποίηση ειδών χαρακτηρισμού ανάλογα με τις οικολογικές τους απαιτήσεις στο πλαίσιο του έργου «Προσδιορισμός συμβατών δραστηριοτήτων σε σχέση με τα είδη χαρακτηρισμού των Ζωνών Ειδικής Προστασίας της ορνιθοπανίδας» (Αναθέτουσα αρχή: Υ.ΠΕ.ΧΩ.Δ.Ε. – Δ/νση Περιβαλλοντικού Σχεδιασμού Τμήμα Διαχείρισης Φυσικού Περιβάλλοντος).
- Δημαλέξης, Τ. (γραφείο μελετών). 2009. Παραδοτέο 3 Κατάλογος απειλών των ειδών χαρακτηρισμού στο πλαίσιο του έργου «Προσδιορισμός συμβατών δραστηριοτήτων σε σχέση με τα είδη χαρακτηρισμού των Ζωνών Ειδικής Προστασίας της ορνιθοπανίδας» (Αναθέτουσα αρχή: Υ.ΠΕ.ΧΩ.Δ.Ε. – Δ/νση Περιβαλλοντικού Σχεδιασμού Τμήμα Διαχείρισης Φυσικού Περιβάλλοντος).
- Δημαλέξης, Τ. (γραφείο μελετών). 2009. Παραδοτέο 8 Οδηγός οικολογικών απαιτήσεων, απειλών και ενδεδειγμένων μέτρων για τα είδη χαρακτηρισμού στο πλαίσιο του έργου «Προσδιορισμός συμβατών δραστηριοτήτων σε σχέση με τα είδη χαρακτηρισμού των Ζωνών

Ειδικής Προστασίας της ορνιθοπανίδας» (Αναθέτουσα αρχή: Υ.ΠΕ.ΧΩ.Δ.Ε. – Δ/νση Περιβαλλοντικού Σχεδιασμού Τμήμα Διαχείρισης Φυσικού Περιβάλλοντος)

- Δημαλέξης, Τ. (γραφείο μελετών). 2010. Εθνικός κατάλογος ειδών χαρακτηρισμού ΖΕΠ. Παραδοτέο στο πλαίσιο του έργου «Προσδιορισμός συμβατών δραστηριοτήτων σε σχέση με τα είδη χαρακτηρισμού των Ζωνών Ειδικής Προστασίας της ορνιθοπανίδας» (αναθέτουσα αρχή: Υ.ΠΕ.ΧΩ.Δ.Ε. - Δ/νση Περιβαλλοντικού Σχεδιασμού Τμήμα Διαχείρισης Φυσικού Περιβάλλοντος).
- Δημόπουλος Π., E. Bergmeier, Κ. Θεοδωρόπουλος, P. Fischer & Μ. Τσιαφούλη. 2005. *Οδηγός Παρακολούθησης Τύπων Οικοτόπων και Φυτικών Ειδών στις περιοχές του Δικτύου Natura 2000 με Φορείς Διαχείρισης*. Πανεπιστήμιο Ιωαννίνων, Υ.ΠΕ.ΧΩ.Δ.Ε., 172 σελ.
- Δημόπουλος Π., Ι. Τσιριπίδης, Φ. Ξυστράκης, Α. Καλλιμάνης, Μ. Πανίτσα. 2018. *Μεθοδολογία παρακολούθησης και αξιολόγησης της κατάστασης διατήρησης οικοτόπων στην Ελλάδα*. Εθνικό Κέντρο Περιβάλλοντος & Αειφόρου Ανάπτυξης, 128 σελ. Αθήνα.
- ΕΕΑ 2019. Εθνική υποβολή της 31ης Ιουλίου 2019 (αφορά στοιχεία ως το 2018) για την εφαρμογή του
- Ζόγκαρης, Σ. 2000. Απειλούμενα είδη: Ο Ήταυρος. Οιωνός 15: 18-19.
- Ζόγκαρης, Σ., Παπανδρόπουλος, Δ., Αλιβιζάτος, Χ., Ρήγας, Ι., Χατζηρβασάνης, Β. και Καρδακάρη, Ν. 2003. Απειλούμενα πουλιά στον Αμβρακικό. ΟΙΚΟΣ ΕΠΕ, ΕΤΑΝΑΜ ΑΕ.
- Ηλιόπουλος Γιώργος, 2018. Η κατάσταση διατήρησης του λύκου στην Ελλάδα, ζητήματα σύγκρουσης και τρόποι αντιμετώπισης.σ.78. Καλλιστώ Π.Ο
- Ηλιόπουλος, Γ. 1999a. Κατανομή, πληθυσμιακή εκτίμηση και τάσεις του πληθυσμού του λύκου στην Ελλάδα. Ενδιάμεση Αναφορά, Πρόγραμμα "ΛΥΚΟΣ", LIFE97 NAT/GR/004249, Αρκτούρος, Υπ. Γεωργίας-ΓΓΔ & ΦΠ, 55 σελ.
- Ηλιόπουλος, Γ. 1999b. Παρακολούθηση πληθυσμού λύκου στην Κεντρική Ελλάδα-πληθυσμιακές εκτιμήσεις-ανθρωπογενής θνησιμότητα. Ενδιάμεση αναφορά έτους 1999. Πρόγραμμα "ΛΥΚΟΣ", LIFE97 NAT/GR/004249, Αρκτούρος, Υπ. Γεωργίας-ΓΓΔ & ΦΠ.
- Ηλιόπουλος, Γ. 1999c. Χρήση βιοτόπου από ραδιοσημασμένη αγέλη λύκου και επίδραση στο κτηνοτροφικό κεφάλαιο. Ενδιάμεση Αναφορά, Πρόγραμμα "ΛΥΚΟΣ", LIFE97 NAT. GR/004249, Αρκτούρος, Υπ. Γεωργίας-ΓΓΔ & ΦΠ, 18 σελ.
- Ηλιόπουλος, Γ. 1999d. Χρήση ποιμενικών σκύλων φύλαξης για την πρόληψη των επιθέσεων από λύκους. Ενδιάμεση Αναφορά, Πρόγραμμα "ΛΥΚΟΣ", LIFE97 NAT/GR/004249, Αρκτούρος, Υπ. Γεωργίας-ΓΓΔ & ΦΠ, σελ. 35.
- Ηλιόπουλος, Γ. 2000. Παρακολούθηση πληθυσμού λύκου στην Κεντρική Ελλάδα-πληθυσμιακές εκτιμήσεις-ανθρωπογενής θνησιμότητα. Ενδιάμεση αναφορά έτους 2000. Πρόγραμμα "ΛΥΚΟΣ", LIFE97 NAT/GR/004249, Αρκτούρος, Υπ. Γεωργίας-ΓΓΔ & ΦΠ.
- Ηλιόπουλος, Γ. 2003. Κατανομή και πληθυσμιακά δεδομένα του λύκου (Canis lupus) στα Αντιχάσια όρη. Πρόγραμμα ΕΤΕΡΠΣ, Αρκτούρος, ΥΠΕΧΩΔΕ, Ε.Ο.Ε.
- Ηλιόπουλος, Γ. 2005a. Ζώνες διέλευσης του λύκου, στη χάραξη της Εγνατίας οδού (Παναγία-Γρεβενά 4.1). Προτάσεις για τη διατήρηση της γεωγραφικής συνέχειας του πληθυσμού του είδους. Τελική αναφορά. Πρόγραμμα παρακολούθησης των επιπτώσεων στα μεγάλα θηλαστικά

και τα ενδιαιτήματα τους από τη κατασκευή και λειτουργία της Εγνατίας οδού στο τμήμα Παναγία- Γρεβενά 4.1- Φάση Α'. Αρκτούρος, Εγνατία οδός Α.Ε.

- Ηλιόπουλος, Γ. 2005b. Πληθυσμιακές πυκνότητες, κατανομή και χρήση βιοτόπου για 4 είδη μεγάλων θηλαστικών (αρκούδα, λύκος, αγριόχοιρος, ζαρκάδι) στο Ε.Π Τζουμέρκων. Αναφορά στο πλαίσιο της Ειδικής Περιβαλλοντικής Μελέτης, Περιφέρεια Ηπείρου, Ήπειρος Α.Ε.
- Ηλιόπουλος, Γ. 2005b. Πληθυσμιακές πυκνότητες, κατανομή και χρήση βιοτόπου για 4 είδη μεγάλων θηλαστικών (αρκούδα, λύκος, αγριόχοιρος, ζαρκάδι) στο Ε.Π Τζουμέρκων. Αναφορά στο πλαίσιο της Ειδικής Περιβαλλοντικής Μελέτης, Περιφέρεια Ηπείρου, Ήπειρος Α.Ε.
- Ηλιόπουλος, Γ. 2005b. Πληθυσμιακές πυκνότητες, κατανομή και χρήση βιοτόπου για 4 είδη μεγάλων θηλαστικών (αρκούδα, λύκος, αγριόχοιρος, ζαρκάδι) στο Ε.Π Τζουμέρκων. Αναφορά στο πλαίσιο της Ειδικής Περιβαλλοντικής Μελέτης, Περιφέρεια Ηπείρου, Ήπειρος Α.Ε.
- Ηλιόπουλος, Γ. 2005b. Πληθυσμιακές πυκνότητες, κατανομή και χρήση βιοτόπου για 4 είδη μεγάλων θηλαστικών (αρκούδα, λύκος, αγριόχοιρος, ζαρκάδι) στο Ε.Π Τζουμέρκων. Αναφορά στο πλαίσιο της Ειδικής Περιβαλλοντικής Μελέτης, Περιφέρεια Ηπείρου, Ήπειρος Α.Ε.
- Ηλιόπουλος, Γ. 2008. Παρακολούθηση πληθυσμού του λύκου στη χάραξη της Εγνατίας οδού (Παναγία-Γρεβενά 4.1). Β' εξαμηνιαία αναφορά. Πρόγραμμα παρακολούθησης των επιπτώσεων στα μεγάλα θηλαστικά και τα ενδιαιτήματα τους από τη κατασκευή και λειτουργία της Εγνατίας οδού στο τμήμα Παναγία- Γρεβενά 4.1- Φάση Β', κατασκευαστική. Καλλιστώ ΜΚΟ, Εγνατία οδός Α.Ε.
- Ηλιόπουλος, Γ., Καλλιμάνης, Α., Γιαννακόπουλος, Α. & Τράγος, Α. 2006. Καθορισμός ζωνών διέλευσης ατόμων λύκου και αγριόχοιρου, στη νέα σιδηροδρομική γραμμή υψηλών ταχυτήτων (ΝΣΓΥΤ) Λαμίας– Δομοκού. Προτάσεις για τον περιορισμό της γεωγραφικής απομόνωσης. Τελική αναφορά ΜΚΟ "Καλλιστώ". Ερευνητικό πρόγραμμα μελέτης της συμπεριφοράς του λύκου στη νέα σιδηροδρομική γραμμή υψηλών ταχυτήτων (ΝΣΓΥΤ) Λαμίας-Δομοκού. Αργυρόπουλος, Δ. & Συνεργάτες- ΕΡΓΟΣΕ.
- Θεοδωρόπουλος Κ., Ελευθεριάδου Ε. 2003. Η βλάστηση θαμνώνων οξύκεδρης αρκεύθου (Juniperus oxycedrus L. ssp. oxycedrus) στο όρος Όρβηλος (Α. Μακεδονία, Νομός Δράμας, Ελλάδα) στο *Λιβαδοπονία και Ανάπτυξη Ορεινών Περιοχών*. 3ο Πανελλήνιο Λιβαδοπονικό Συνέδριο. Επιμέλεια: Πλατής Παναγιώτης, Παπαχρήστου Θωμάς. Καρπενήσι-Ελλάδα. Αθήνα. Ελληνική Λιβαδοπονική Εταιρεία. σ.223-232.
- Kazantzidis, S. & E. Koutrakis (2007) Great Cormorants and fisheries in Greece: conflict & management. NAGREF. Unp. Report. 4 pp.
- Καζαντζίδης Σ., (2005) Ερωδιοί, Ελληνική Ορνιθολογική Εταιρεία.
- Καζαντζίδης, Σ. & Μ. Νοϊδου (συντον. έκδοσης) (2008) Προσδιορισμός της Φαινολογίας Μετανάστευσης των Θηρευσίμων Υδρόβιων Πουλιών. ΥΠ. Α.Α. & Τ/Γεν. Δνση Δασών-ΕΘΙΑΓΕ/Ι.Δ.Ε. Θεσσαλονίκη. 255 σ.+ Παράρτημα.
- Καλτσής Α., Μανωλόπουλος Α. 2023. Προσδιορισμός κρίσιμων ενδιαιτημάτων (χαρτογράφηση ευαισθησίας) του Όρνιου στην Ελλάδα – Καθορισμός διαχειριστικών κατευθύνσεων. Έργο LIFE-IP 4 NATURA: Ολοκληρωμένες δράσεις για τη διατήρηση και διαχείριση των περιοχών του δικτύου Natura 2000, των ειδών, των οικοτόπων, και των

οικοσυστημάτων στην Ελλάδα (LIFE16 IPE/GR/000002). Παραδοτέο Δράσης C.1. Ελληνική Ορνιθολογική Εταιρεία, Αθήνα, 50 σελ. και Παράρτημα

- Κολιόπουλος Γ., (1999) Επιπτώσεις των παρασιτοκτόνων στην Ορνιθοπανίδα στο Χατζηλάκου Δ.. (Επιμέλεια).Συνοπτικός Οδηγός. Επιπτώσεις έργων και δραστηριοτήτων στα πουλιά και τους βιοτόπους τους. Διαχείριση βιοτόπων της ορνιθοπανίδας. Αθήνα. Ελληνική Ορνιθολογική Εταιρεία.
- Κοντσιώτης, Β. 2005. Οι τροφικές συνήθειες του Ευρωπαϊκού Λαγού (Lepus europaeus) στο Νομό Δράμας. Μεταπτυχιακή Διατριβή. Σχολή Δασολογίας και Φυσικού Περιβάλλοντος Α.Π.Θ., Θεσσαλονίκη, 157 σελ.
- Κριτσέπη, Μ. & Μερτζάνης, Γ. 1998. Απειλούμενα είδη, καφέ αρκούδα: στοιχεία εξέλιξης, τροφικές συνήθειες, βιολογία, παθολογία. ΑΝΙΜΑ 6(2): 46-53.
- Λεγάκις, Α. και Μαραγκού, Π. 2009. Το Κόκκινο Βιβλίο των Απειλούμενων Ζώων της Ελλάδας. Ελληνική Ζωολογική Εταιρεία, Αθήνα, 528 σελ.
- Μαυρομμάτης, Γ. 1980. Το βιοκλίμα της Ελλάδος. Σχέσεις κλίματος και φυσικής βλαστήσεως. Βιοκλιματικοί χάρτες. *Δασική έρευνα*, 1: 1-63.
- Μερτζάνης Γ., Αραβίδης Ηλ., Πετρίδου Μ., Ψαραλέξη Μ., Vieira J. (2018): Ταυτοποίηση και χωροθέτηση τομέων υψηλού κινδύνου σύγκρουσης –αλληλεπίδρασης ανθρώπου – αρκούδας (περιοχή Δ. Αμυνταίου) με την μέθοδο της τηλεμετρίας, ερωτηματολογίων & της γεωπληροφορικής. Τεχνική αναφορά, έργο LIFE15NAT/GR/001108 (ΚΑΛΛΙΣΤΩ), (δράση Α3), 100 σελ.
- Μερτζάνης Γ., Κομηνός Θ., Γαλανάκη Α., Αραβίδης Η. 2021. Εξάπλωση και επαναποίκηση της καφέ αρκούδας (Ursus arctos) σε παλιές και νέες περιοχές στην Ελλάδα τα τελευταία 28 χρόνια. ΜΚΟ, Καλλιστώ / Εργαστήριο Θαλάσσιας και Χερσαίας Ποικιλότητας, Τομέας Ζωολογίας, Τμήμα Βιολογίας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης / Αναπτυξιακή Εταιρία Θεσσαλονίκης tkominos@bio.auth.gr
- Μερτζάνης, Γ. & Μπούσμπουρας, Δ. 1996. Η καφέ αρκούδα: βιογεωγραφία, πληθυσμοί, οικολογία. Στο: Γενικό Σχέδιο Δράσης για την προστασία και διαχείριση των πληθυσμών και βιοτόπων της καφέ αρκούδας στην Ελλάδα. Πρόγραμμα LIFE93NAT/GR/001080, Αρκτούρος, 276 σελ. + 25 χάρτες.
- Μερτζάνης, Γ. 2001. Βιολογία, Οικολογία της καφέ αρκούδας και λοιπά αποτελέσματα παρακολούθησης. Στο: Εφαρμογή Διαχειριστικών Σχεδίων στις περιοχές Γράμμου και Ροδόπης -1η ενδιάμεση αναφορά. Πρόγραμμα LIFE99NAT/GR/6498, Αρκτούρος.
- Μπακαλούδης Δ. 2008. Βιολογία Άγριας Πανίδας. Εκδόσεις Γιαχούδη, Θεσσαλονίκη
- Μπαλαφούτης Χ. 1977. *Συμβολή εις την μελέτην του κλίματος της Μακεδονίας και Δυτικής Θράκης*. Διδακτορική διατριβή. Θεσσαλονίκη, σελ. 121.
- Μπίρτσας 2002. Οικολογία και Προστασία του Νυχτοκόρακα (*Nycticorax nycticorax*) στην Τεχνητή Λίμνη Κερκίνη του Ν. Σερρών. Διδακτορική Διατριβή. Θεσσαλονίκη 2002
- Μπούσμπουρας Δ. (2009). Σχέδιο δράσης για τη Ζώνη Ειδικής Προστασίας «GR1340008 Λίμνες Χειμαδίτιδα και Ζάζαρη». Στο: Δημαλέξης, Α. Μπούσμπουρας, Δ., Καστρίτης, Θ., Μανωλόπουλος Α. και Saravia V. (Συντονιστές Έκδοσης). Τελική αναφορά προγράμματος

επαναξιολόγησης 69 σημαντικών περιοχών για τα πουλιά για τον χαρακτηρισμό τους ως Ζωνών Ειδικής Προστασίας της Ορνιθοπανίδας. ΥΠΕΧΩΔΕ, Αθήνα.

- Ντάφης Σ. 1973. Ταξινόμηση της δασικής βλαστήσεως της Ελλάδας. *Επιστ. Επετ. Τμήματος Γεωπ και Δασολ. Σχολ*. Παν. Θεσσαλονίκης. 15(2):75-91
- Ξηρουχάκης, Σ. (επιμ.) 2021. Εθνικό Σχέδιο Δράσης για τρία πτωματοφάγα είδη ορνιθοπανίδας (γύπες): Γυπαετό (*Gypaetus barbatus*), Όρνιο (*Gyps fulvus*), Μαυρόγυπα (*Aegypius monachus*). Έργο LIFE-IP 4 NATURA: Ολοκληρωμένες δράσεις για τη διατήρηση και διαχείριση των περιοχών του δικτύου Natura 2000, των ειδών, των οικοτόπων, και των οικοσυστημάτων στην Ελλάδα (LIFE16 IPE/GR/000002). Παραδοτέο Δράσης Α.1. Ελληνική Ορνιθολογική Εταιρεία, Αθήνα, 84 σελ. & V Παραρτήματα. Τελική έκδοση
- Ξηρουχάκης, Σ., (επιμ., 2019). Σχέδιο Δράσης για τρία πτωματοφάγα είδη ορνιθοπανίδας (γύπες): Γυπαετό (*Gypaetus barbatus*), Όρνιο (*Gyps fulvus*), Μαυρόγυπα (*Aegypius monachus*). Έργο LIFE-IP 4 NATURA: Ολοκληρωμένες δράσεις για τη διατήρηση και διαχείριση των περιοχών του δικτύου Natura 2000, των ειδών, των οικοτόπων, και των οικοσυστημάτων στην Ελλάδα (LIFE16 IPE/GR/000002). Παραδοτέο Δράσης Α.1. Ελληνική Ορνιθολογική Εταιρεία, Αθήνα, 180 σελ. & 6 Παραρτήματα.
- *ΟΔΗΓΙΑ 92/43/ΕΟΚ ΤΟΥ ΣΥΜΒΟΥΛΙΟΥ* της 21ης Μαΐου 1992 για τη διατήρηση των φυσικών οικοτόπων καθώς και της άγριας πανίδας και χλωρίδας (ΕΕ L 206 της 22.7.1992, σ. 7)
- Παπαϊωάννου Δημήτριος - Χαράλαμπος (Χαρητάκης). (2016). Το Βαλκανικό Αγριόγιδο (*Rupicapra rupicapra balcanica*, Bolkay 1925) στην Ελλάδα. Διδακτορική διατριβή. Τμήμα Διαχείρισης Περιβάλλοντος και Φυσικών Πόρων. Πανεπιστήμιο Πατρών. Σελίδες 264.
- Παπαϊωάννου Δ-Χ. 2021. Εθνικό Σχέδιο Δράσης για το Αγριόγιδο των Βαλκανίων (*Rupicapra rupicapra balcanica*). Έργο LIFE-IP 4 NATURA: Ολοκληρωμένες δράσεις για την διατήρηση και διαχείριση των περιοχών του δικτύου Natura 2000, των ειδών, των οικοτόπων και των οικοσυστημάτων στην Ελλάδα (LIFE16 IPE/GR/000002). Παραδοτέο Δράσης Α.1. Υπουργείο Περιβάλλοντος και Ενέργειας. Αθήνα, 95 σελ. & VI Παραρτήματα. Τελική έκδοση.
- Παπαϊωάννου, Χ. (2007). Το Βαλκανικό αγριόγιδο (R.r.balcanica) στα όρη Τζουμέρκα & Περιστέρι. Στο: «Δημόπουλος, Π. & Κατή, Β. [Eds]. Βιοποικιλότητα στην προστατευόμενη περιοχή Τζουμέρκων & Περιστερίου». Σελ. 317-340. Πρόγραμμα Πυθαγόρας ΙΙ. Πανεπιστήμιο Ιωαννίνων.
- Παπαϊωάννου, Χ. (2015a). Τεχνική αναφορά για το έργο της παρακολούθησης του αγριόγιδου (*R.r.balcanica*) στην περιοχή ευθύνης του Φορέα Διαχείρισης Εθνικών Δρυμών Βίκου- Αώου και Πίνδου (Εθνικό Πάρκο Βόρειας Πίνδου). ΦΔ ΕΔ Βίκου Αώου και Πίνδου.
- Παπαϊωάννου, Χ. (2015b). Τεχνική αναφορά για το έργο της παρακολούθησης του αγριόγιδου (*R.r.balcanica*) στην περιοχή ευθύνης του Φορέα Διαχείρισης Εθνικού Πάρκου Τζουμέρκων, Περιστερίου & χαράδρας Αράχθου. ΦΔ ΕΠ Τζουμέρκων, Περιστερίου & χαράδρας Αράχθου.
- Παπαϊωάννου, Χ. (2015c). Τεχνική αναφορά για το έργο της παρακολούθησης του αγριόγιδου (*R.r.balcanica*) στις περιοχές ΕΖΔ του δικτύου Natura 200 που δεν υποκεινται σε καθεστώς διαχείρισης από Φορέα Διαχείρισης ΠΠ. ΑΤΕΠΕ- Διαχείριση Οικοσυστημάτων.

- Παπαϊωάννου, Χ. (2015d). Τεχνική αναφορά για το έργο της παρακολούθησης του αγριόγιδου (*R.r.balcanica*) στην περιοχή ευθύνης του Φορέα Διαχείρισης Εθνικού Δρυμού Οίτης. ΦΔ ΕΔ Οίτης.
- Παπαϊωάννου, Χ. (2015e). Τεχνική αναφορά για το έργο της παρακολούθησης του αγριόγιδου (*R.r.balcanica*) στην περιοχή ευθύνης του Φορέα Διαχείρισης Εθνικού Πάρκου οροσειράς Ροδόπης. ΦΔ ΕΠ οροσειράς Ροδόπης.
- Παπαναστάσης Β.Π. 2006. Νέες απόψεις για την εξέλιξη της βλάστησης και η εφαρμογή τους στα Ελληνικά λιβάδια στο *Λιβάδια των πεδινών και ημιορεινών περιοχών: Μοχλός ανάπτυξης της υπαίθρου.* 4ο Πανελλήνιο Λιβαδοπονικό Συνέδριο. Επιμέλεια: Πλατής Παναγιώτης, Αθανάσιος Σφουγγάρης , Παπαχρήστου Θωμάς και Αλέξανδρος Τσιόντσης. Βόλος - Ελλάδα. Αθήνα. Ελληνική Λιβαδοπονική Εταιρεία.
- Παπαχρηστοδήμα, Κ. 2018. *Πρότυπα κατανομής και αξιολόγησης φυτικών ειδών του Π.Δ. 67/81 και διαχρονική εφαρμογή της Σύμβασης CITES στην Ελλάδα*. Πανεπιστήμιο Πατρών. 241 σελ.
- Πορτόλου, Δ., Μπουρδάκης, Σ., Βλάχος, Χ., Καστρίτης, Θ., και Τ. Δημαλέξης. (επιμ.). 2009. Οι Σημαντικές Περιοχές για τα Πουλιά της Ελλάδας: Περιοχές προτεραιότητας για τη διατήρηση της βιοποικιλότητας. Ελληνική Ορνιθολογική Εταιρεία, Αθήνα.
- Πυρινή. Χρ. 2011. *Το οικοσύστημα των λιμνών Βεγορίτιδας και Πετρών: χλωρίδα, βλάστηση και φυτογεωγραφία*. Διδακτορική διατριβή. Τμήμα Βιολογίας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης.
- Πυρινή. Χρ. 2011. Το οικοσύστημα των λιμνών Βεγορίτιδας και Πετρών: χλωρίδα, βλάστηση και φυτογεωγραφία. Διδακτορική διατριβή. Τμήμα Βιολογίας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης.
- Σιδηρόπουλος Λ. (2009). Σχέδιο δράσης για τη Ζώνη Ειδικής Προστασίας «GR1240008 Όρος Βόρας». Στο: Δημαλέξης, Α. Μπούσμπουρας, Δ., Καστρίτης, Θ., Μανωλόπουλος Α. και Saravia V. (Συντονιστές Έκδοσης). Τελική αναφορά προγράμματος επαναξιολόγησης 69 σημαντικών περιοχών για τα πουλιά για τον χαρακτηρισμό τους ως Ζωνών Ειδικής Προστασίας της Ορνιθοπανίδας. ΥΠΕΧΩΔΕ, Αθήνα.
- Σκαρτσή, Θ. και Ποϊραζίδης, Κ. 2002. Διαχειριστικό σχέδιο για το μαυρόγυπα στην προστατευόμενη περιοχή του δάσους Δαδιάς-Λευκίμης-Σουφλίου. WWF Ελλάς, Αθήνα.
- Σφουγγάρης, Α. & Γιαννακόπουλος, Α. 2005. Σχέσεις πληθυσμιακής πυκνότητας και παραμέτρων του ενδιαιτήματος για τρία οπληφόρα (ζαρκάδι, αγριόχοιρο, αγριόγιδο) στην Ήπειρο. Πρακτικά 2ου Πανελλήνιου Συνεδρίου Ένωσης Ελλήνων Οικολόγων – Ελληνικής Ζωολογικής Εταιρείας «Βιοποικιλότητα και Πλανητική Αλλαγή», Μυτιλήνη 2004, ΕΕΟ-Πανεπιστήμιο Αιγαίου, σελ. 226-232.
- Σφουγγάρης, Α. (Συντονιστής) 2002. Πιλοτική έρευνα απογραφής και διαχείρισης των πληθυσμών και βιοτόπων 4 μεγάλων θηλαστικών στην Ήπειρο: Ζαρκάδι (*Capreolus capreolus*), Αγριογούρουνο (*Sus scrofa*), Αγριόγιδο (*Rupicapra rupicapra balcanica*) και Ελάφι (*Cervus elaphus*). Τελική έκθεση ερευνητικού προγράμματος, Πανεπιστήμιο Θεσσαλίας, Υπουργείο Γεωργίας.

- Σφουγγάρης, Α., Γκαραβέλη, Α. & Γιαννακόπουλος, Α. 2006. Προσδιορισμός και χαρτογράφηση της εξάπλωσης του ζαρκαδιού και του αγριόχοιρου στο τμήμα της Εγνατίας οδού Παναγιά-Γρεβενά. Πρακτικά 3ου Συνεδρίου της Ελληνικής Οικολογικής Εταιρείας και της Ελληνικής Ζωολογικής Εταιρείας «Οικολογία και Διατήρηση της Βιοποικιλότητας», Ιωάννινα, σελ. 351-356.
- Τσιριπίδης Ι. και Μπαζός Ι. 2023. *Χλωρίδα και Βλάστηση των Δασών της Ελλάδας* στο ΕΑΔΟ, 2023. Η Ανθεκτικότητα των Ελληνικών Δασικών Οικοσυστημάτων στην Κλιματική Αλλαγή. Επιτροπή για την Ανθεκτικότητα των Ελληνικών Δασικών Οικοσυστημάτων στην Κλιματική Αλλαγή (ΕΑΔΟ) [Μ. Αριανούτσου, Χ. Ζερεφός, Κ. Καλαμποκίδης, Α. Πούπκου, Φ. Αραβανόπουλος (επιμ.)]. Ακαδημία Αθηνών, Αθήνα, Ελλάδα, 547 σελ.
- Τσιφτσής Σ. και Ζ. Αντωνόπουλος. 2017. *Άτλας των Ελληνικών Ορχεοειδών*. Τόμος Ι. Mediterraneo Editions, Ρέθυμνο.
- Υπουργείο Περιβάλλοντος και Ενέργειας, 2016. Μελέτη 9: «Εποπτεία και αξιολόγηση του καθεστώτος διατήρησης ειδών ορνιθοπανίδας, κοινοτικού και εθνικού ενδιαφέροντος, στην Ελλάδα»
- Υφαντής, Γ. & Καζαντζίδης, Σ. 2003. Καταγραφή των αποικιών των ερωδιών στην Ελλάδα. ΕΟΕ, Αθήνα, Τελική Αναφορά.
- Υφαντής, Γ. & Καζαντζίδης, Σ. 2003. Καταγραφή των αποικιών των ερωδιών στην Ελλάδα. ΕΟΕ, Αθήνα, Τελική Αναφορά.
- Φ.Ε.Κ. 23/Α/30-01-1981. Προεδρικό Διάταγμα 67/81 «*Περί προστασίας της αυτοφυούς χλωρίδας και της άγριας πανίδας και καθορισμού διαδικασίας συντονισμού και ελέγχου της έρευνας αυτών*».
- Φοίτος Δ., Κωνσταντινίδης Θ. & Καμάρη Γ. (Εκδ.) 2009: *Βιβλίο Ερυθρών Δεδομένων των Σπάνιων και Απειλούμενων Φυτών της Ελλάδας*, Τόμος 1 (A-D), Ελληνική Βοτανική Εταιρεία, Πάτρα, xxvi+405 pp.
- Φοίτος Δ., Κωνσταντινίδης Θ. & Καμάρη Γ. (Εκδ.) 2009: *Βιβλίο Ερυθρών Δεδομένων των Σπάνιων και Απειλούμενων Φυτών της Ελλάδας*, Τόμος 2 (E-Z), Ελληνική Βοτανική Εταιρεία, Πάτρα, xxvi+413 pp.
- Χανδρινός, Γ. 1992. Πουλιά. Στο: Καρανδεινός, Μ. και Λεγάκις, Α. (επιμ. εκδ.) Το Κόκκινο Βιβλίο των Απειλουμένων Σπονδυλόζωων της Ελλάδος. ΕΖΕ - ΕΟΕ, Αθήνα, σελ. 123-243.
- Χανδρινός, Γ. 1999. Το σπανιότερο τουρλί. Οιωνός 11:16.
- Χασάπης, Μ., Θεοδωρόπουλος, Κ. & Ελευθεριάδου, Ε. 2013. Χαρτογράφηση της βλάστησης στο όρος Τζένα (Β. Ελλάδα) στα *Πρακτικά 16ου Πανελλήνιου Δασολογικού Συνεδρίου*, Θεσσαλονίκη, 2013, σελ. 21-29.

Internet sites

https://geo.rae.gr/, available on 09/12/2024

= https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?siteGR1260005, available on 26/11/2024

= https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?siteGR1260010, available 26/11/2024
= https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?siteBG0002098, available on 26/11/2024
= https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?siteBG0002078, available on 26/11/2024
= https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?siteBG0002072, available on 26/11/2024
= https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?siteBG0001028, available on 26/11/2024
www.iucnredlist.org, available on 26/11/2024
www.herpetofauna.gr, available on 26/11/2024
www.votaniki.gr, available on 26/11/2024
https://ypen.gov.gr/perivallon/viopoikilotita/diktyo-natura-2000/ available on 26/11/2024